Energy Vision 2020

VOLUME THREE, RESPONSES TO PUBLIC COMMENTS

Integrated Resource Plan
Environmental Impact Statement

TVA

Energy Vision
2020

VOLUME THREE, RESPONSES TO PUBLIC COMMENTS

Integrated Resource Plan
Environmental Impact Statement

Tennessee Valley Authority
December 1995

Table of Contents

Volume 3, Responses to Public Comments

INTRODUCTION

This volume of TVA's Energy Vision 2020 contains responses made to public comments on the draft integrated resource plan. Some 275 individuals and organizations made approximately 2,000 comments during the 81-day comment period, which followed the release of the draft on July 26, 1995. The public made many of its comments at nine public meetings held at different locations throughout the TVA region. Both oral and written comments were received.

Due to the volume of these comments and their frequent similarity, TVA has summarized all of them. The summarized comments—approximately 875 of them—and responses have been categorized for easier public review.

In some cases, Volumes 1 and 2 of Energy Vision 2020 have been changed in response to comments, and this has been noted in this volume.

TVA has identified, when possible, those individuals and organizations that made similar comments after each summarized response. Because the comments were summarized, the precise wording of the comments was not always used. Also, in some cases, the identified commenters did not individually raise every point or element within a summarized comment.

For example, a number of commenters urged TVA to support or invest more in renewable energy resources, such as wind or solar power. Some of those making this comment thought that such resources were environmentally cleaner; others supported such investment as a means of mitigating the risk to fossil energy resources of more stringent environment controls. Still others supported the investments because of concerns about global climate change. Because "Jane Doe" supported one of the reasons, she was identified as a supporter of renewable resources in the context of a summarized comment that lists all three reasons.

In summarizing and categorizing comments, TVA tried to retain all important nuances or differences among similar comments. Consequently, a number of summarized comments may appear repetitious. Further refinements, although more reader friendly, would risk losing a possibly important nuance. A few comments were voluminous and identified a number of sub-issues or elements in connection with the major points made in the comment. Not all of these sub-issues or elements were separately answered when the primary response adequately encompassed them.

The public comments spanned a variety of issues. However, a number of commenters addressed three issues: (1) the merits of starting up Watts Bar Nuclear Plant Unit 1 and its treatment in Energy Vision 2020, (2) the merits of using more demand-side management options in the final plan, and (3) the merits of using more renewable energy options in the final plan. To avoid repetition and to ease the burden on readers, TVA has prepared a comprehensive response for each of these three comment categories.

To help the reader in finding comments and responses about a particular subject, this volume is organized in the sections listed below. In addition, an index follows the comments and responses. This index shows the name of each commenter followed by the numbers of the summarized comments that were made by that commenter.

TVA Overview and Actions

This section includes comments and responses about:

- the changing electric industry and the potential effect of competition on TVA
- TVA's vision and statutory mission as a regional resource development agency
- historical TVA activities including the areas of safety and resource protection
- the qualifications and compensation of TVA managers
- TVA's responsibilities as a Federal agency and its public accountability
- the potential consequences if TVA were privatized.

The Plan

This section includes comments and responses about:

- how well information has been presented in Energy Vision 2020 and the format of the document
- the goals and objectives of Energy Vision 2020
- the appropriateness of the evaluation criteria used in Energy Vision 2020 and the desirability of additional or different criteria
- the monetization of externalities

The Process

This section includes comments and responses about:

- the overall Energy Vision 2020 process
- the public participation process used in Energy Vision 2020

Existing System

This section includes comments and responses about:

- TVA's debt
- TVA's existing electric rate structure and its effect on energy use
- the operation of TVA's existing generating units, including its coal-fired, hydroelectric, and nuclear units
- the merits and economics of Watts Bar Nuclear Plant Unit 1, and other issues (assumptions, safety and health) related to start-up and operation of Watts Bar Nuclear Plant Unit 1 and restart of Browns Ferry Nuclear Plant Unit 3

This section includes a comprehensive response for a number of comments about the economics of operating Watts Bar Nuclear Plant Unit 1.

Long-Term Plan

This section includes comments and responses about:

- the energy resource strategies considered in Energy Vision 2020
- the process TVA used to develop strategies
- the merits of various supply-side resource options contained in Energy Vision 2020 strategies, including the conversion of Bellefonte to a gasification plant with a chemical coproduct, nuclear units, renewable energy resources such as wind, and emerging or new technologies
- TVA's decision to cease constructing Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2
- the role of demand-side management resources in Energy Vision 2020
- TVA's strategy for complying with the 1990 Clean Air Act Amendments, including the role of scrubbers and the use of sulfur dioxide allowances
- the use of biomass and refuse-derived fuel in the plan
- the merits of the use of coal-fired units in the plan
- the treatment of debt and TVA's electric rates in Energy Vision 2020
- the treatment of various uncertainties, including competition in the electric utility market, load growth, natural gas prices, environmental regulations, and nuclear performance and costs
- the evaluation methods used in Energy Vision 2020

Short-Term Action Plan

This section includes comments and responses about:

- the merits of proposed actions
- the details of Energy Vision 2020's short-term action plan
- the merits of using more demand-side management options in the plan
- the merits of using more renewable energy options in the plan, including the recommendations of the National Renewable Energy Laboratory
- the purchase of options to purchase energy resources
- the investigation of and research into various options

This section includes two comprehensive responses to a number of comments about the merits of using more demand-side management and renewable options in the plan.

Load Forecast and Need for Power

This section includes comments and responses about:

- the accuracy and range of TVA's load forecasts, including the assumptions and methodology used in forecasting future demands for Energy Vision 2020
- the need for power in the future in the TVA region

Customer Service Options

This section includes comments and responses about:

- the development and characterization of customer service options in Energy Vision 2020
- the merits of beneficial electrification
- the role of education in demand-side management
- the effect of electric rates on energy conservation
- the merits and effect of interruptible rates
- the merits of various end-use renewable energy options
- the importance of promoting energy efficiency, low income energy conservation and energy efficiency programs

Supply-Side Options

This section includes comments and responses about:

- the identification and characterization of supply-side options in Energy Vision 2020, including coal-fired, gas-fired, and hydroelectric resource options
- the merits of nuclear generation options
- the Kenetech wind farm project
- the merits of large photovoltaic and wind stations
- the effect of various options on global climate change or the greenhouse effect
- the merits of purchased power options, including the purchase of call options
- smaller-scale distributed generation options

Affected Environment and Environmental Consequences

This section includes comments and responses about:

- various aspects of the environmental quality of the TVA region
- the effect of coal combustion on air quality related problems, including acid rain, visibility, adverse effects in the Great Smoky Mountains National Park, forest health impacts, and global climate change
- water quality in TVA reservoirs and the TVA region
- socioeconomic conditions
- the treatment of environmental consequences in Energy Vision 2020, including the impact of radioactive wastes

Transcripts of the public meetings and all original comments are available for review at TVA's offices.

TVA OVERVIEW AND ACTIONS

This section includes comments and responses about:

- the changing electric industry and the potential effect of competition on TVA
- TVA's vision and statutory mission as a regional resource development agency
- historical TVA activities including the areas of safety and resource protection
- the qualifications and compensation of TVA managers
- TVA's responsibilities as a federal agency and its public accountability
- the potential consequences if TVA were privatized

The Changing Electric Industry (Competition)

1

Comment: *With utilities competing for customers and Congress demanding change from agencies, TVA faces tough challenges. In the last few years it has trimmed its work force, refinanced its debt, and eliminated unnecessary programs to become more competitive. We applaud these efforts.*

Comment by: Tennessee Valley Industrial Committee

Response: Energy Vision 2020 is expected to help TVA's efforts to remain competitive in the future.

2

Comment: *As deregulation occurs, utilities that have prepared early will be better prepared to respond to deregulation. TVA has made significant efforts in this regard and the Tennessee Valley Industrial Committee wants to work with TVA to continue these efforts.*

Comment by: Tennessee Valley Industrial Committee

Response: TVA will continue its efforts to improve its competitive position as deregulation continues and is eager to work with its customers in developing new products and services.

3

Comment: *TVA should work with distributors to better understand end-use customers in order to be ready for competition. TVA needs to allow greater choice. TVA thinks its customers are just distributors and direct-served industries, but they are really the residential customer.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA works with distributors of TVA power to better understand end-use customers. TVA and distributors survey end-use customers to identify electricity and appliance consumption patterns. TVA's customer service managers also work with distributors on a daily basis. A major part of this relationship involves identifying new end-use customers and customer needs.

4

Comment: *TVA's history does not justify removing the fence.*

Comment by: Ann Harris

Response: Restructuring of the electric utility industry is increasing competition among electric utilities. Recognizing the trends in the utility industry, the TVA Board of Directors asked a utility consulting firm, Palmer Bellevue, to examine TVA's competitiveness. This study, "The Ties That Bind: TVA in a Competitive Electric Market," has concluded that the fence provisions should be changed in two phases. Phase 1 would allow TVA to conduct all conventional types of wholesale business with utilities bordering TVA and beyond. During Phase 1, TVA would not be allowed unbalanced access to traditional non-profit wholesale customers of neighboring utilities with which TVA's relationship has been severely restricted since 1959 and which cannot be served in the TVA territory under the TVA Act. Phase 2 would remove the fence entirely, giving TVA's current wholesale customers in the Valley free market access to other suppliers of power and, at the same time, permitting TVA to seek markets outside the Valley on the same basis that competitors could enter the Valley to provide service.

5

Comment: *We do not have true open market competition in this region because TVA's distributors are locked into long-term contracts.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: True open market competition does not yet exist anywhere in this country. TVA has contracts with most of the distributors of its power that require the distributors to give TVA at least ten years' notice before meeting their power needs from other sources. It is one of TVA's goals to maintain itself as a low-cost and preferred supplier of electric energy and services for its distributors and others in the future.

6

Comment: *The people of the Valley should be preparing for the day when the TVA power program becomes investor-owned and the region will have to compete economically without the assistance of TVA.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: Currently, TVA's electric rates are very competitive with those of other utilities. In looking toward the future, the TVA Board of Directors has established a new vision for TVA that calls for the corporation to be the recognized world leader in providing energy and related services, independently and in alliance with others, for society's global needs. The recommendations in Energy Vision 2020 will help position TVA to continue to be competitive in the future.

7

Comment: *TVA lacks the data on end-users to adequately respond to a competitive environment where knowledge of one's customers could mean the difference between maintaining or losing an individual customer or market segment. Given the size and resources of*

TVA and the impending changes in the competitive environment, it is surprising that they have very little data on distributors' retail customers.

Comment by: Tennessee Valley Public Power Association

Response: TVA works with distributors of TVA power to better understand end-use customers. TVA and distributors survey end-use customers to identify electricity and appliance consumption patterns. TVA's customer service managers also work with distributors on a daily basis. A major part of this relationship involves identifying new end-use customers and customer needs.

8

Comment: *TVA should consider "lobbying" for legislation that would prevent environmentally unfriendly competitors from being allowed to sell power to its customers.*

Comment by: Elizabeth Garber

Response: The commenter is free to seek such legislation in Congress. TVA has prepared itself and continues its efforts to prepare itself to meet competition. Although it would be helpful if TVA's competitors were held to the same environmental standards and requirements that TVA is, TVA expects to be successful without such environmental parity.

TVA's Mission/Vision

9

Comment: *TVA can serve a valuable purpose for both the region and the nation.*

Comment by: Mary English (University of Tennessee)

Response: TVA serves a number of valuable purposes for the region and the nation. Maintaining and enhancing its ability to compete as a low-cost energy supplier, serving as a steward of the environment, and working toward the best quality of life for the region will be some of the ways that TVA will continue to serve a valuable purpose both in the Tennessee Valley region and the nation.

10

Comment: *TVA has a tremendous potential for leadership in the utility industry and for doing what is good for the Valley in the long run without much interference.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: TVA has historically been a leader in the utility industry in a number of different ways. It pioneered large central generating stations and large-capacity transmission lines. It also conducted some of the basic research into air pollution control equipment for coal-fired power plants. In the late 1970s and early 1980s, TVA initiated energy conservation programs that have become models for the utility industry. The Energy Vision 2020 process has employed cutting-edge analytical methods and integrated resource planning techniques. The process to purchase options on energy resources that TVA has initiated

in tandem with Energy Vision 2020 has attracted widespread industry attention because of its innovative nature.

Although TVA is not subject to the authority of state public utility commissions, it is subject to the authority of the United States Congress, and its activities are scrutinized by Congress. Both as a matter of policy and law, TVA also provides numerous opportunities for public input into its decision-making processes such as those used for Energy Vision 2020.

11

Comment: *TVA should return to its original mission of regional economic development, rural electrification, and protecting natural resources. Electric power is only one component of that mission. There is more to TVA than just selling cheap power. It should be a leader in sustainable energy.*

Comment by: Michelle Carratu, Martha McGill, Richard Simmers, Fred Wright, Alan Ball, Sheilla Cheyenne, Mary Ellen Bowen, Bruce Wood, Howard Switzer (Sun/Earth Tempered Organic Architecture), Michelle Neal (Tennessee Valley Energy Reform Coalition), Ann Harris, Alan Jones (Tennessee Environmental Council), Nancy Bell, Edward Smeloff (Sacramento Municipal Utility District), Debra Jackson, David Bowman (Huntsville News), Stephen Smith (Tennessee Valley Energy Reform Coalition), Retha Ferrell, Eileen McIlvane (Coalition for Jobs and the Environment), Robert Schreiber (Common Sense), Sharon Fidler (League of Women Voters), Alexander Dewey, Steven Walsh

Response: Under the TVA Act, TVA is charged with conducting a broad program directed toward development of the natural resources of the Tennessee River drainage basin and of such adjoining territory as may be related to or materially affected by the development consequent to this Act all for the general purpose of fostering an orderly and proper physical, economic, and social development of said areas. TVA has never deviated from this mission. TVA agrees that its electric power program is simply one component of its regional resource development program; albeit, a very important component in the success that TVA has achieved in fostering improvements in the region's social and economic well-being.

TVA's first effort toward meeting the energy needs of the region occurred in the context of the development of most of its hydroelectric units, which exemplify sustainable energy. TVA's hydroelectric system continues to be a very important part of the TVA power system and, as part of Energy Vision 2020, TVA has proposed enhancing the use of its hydroelectric units. In its long-term portfolio of energy resource options, it has also included biomass, end-use solar photovoltaics, demand-side management, and wind turbines. The flexibility of the Energy Vision 2020 plan will allow TVA to appropriately consider and implement other sustainable energy resource options as they become available in the future. (See Volume 1, Chapter 9, Figure 9-23.)

12

Comment: *As a public entity TVA has the responsibility to offer energy services that benefit the public and the environment.*

Comment by: Alan Ball, John Noel, Linda Cataldo Modica, Robert Schreiber (Common Sense)

Response: TVA agrees. Accomplishing this, however, is difficult, as reflected by the kind of trade-offs identified in Energy Vision 2020. (See, for example, Volume 1, Chapter 9, Figures 9-4 to 9-9.) The Energy Vision 2020 long- and short-term action plans recommend several customer service options and supply-side resource options that perform

well across all evaluation criteria including environmental quality, economic development, and rates. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

13

Comment: *TVA as a federal agency has the luxury to invest in things that monetarily responsible utilities could not do.*

Comment by: Maggie Kalen (Tennessee Valley Energy Reform Coalition)

Response: TVA, especially in this era of increasing competition, must make responsible monetary decisions. Its status as a federal agency does not change this.

14

Comment: *TVA is commended for generating electricity.*

Comment by: Julian McManus (Cherokee Lions Club)

Response: Your comment has been reviewed and noted.

15

Comment: *Because TVA is just in the business of pushing electricity, a quote that needs to be added to the record is "if electricity is just another commodity, then oxygen is just another gas."*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

Response: TVA is not just in the business of pushing electricity. The recommendations in the long-term plan and short-term action plan in Energy Vision 2020 are based on consideration of a number of criteria. These criteria include long-term costs, customer value, short- and long-term electric rates, environmental quality, economic development, debt, and risk management. Many of these criteria were suggested to TVA by the public.

16

Comment: *TVA should be asking the question "How do we meet the energy needs of the Valley?" and not "How should we generate more power?" The answer to the first question is conservation and renewables, and the answer to the second question is fossil and nuclear electric power.*

Comment by: Fred Wright

Response: Energy Vision 2020 asks how the energy needs of the Valley can be met and does not ask how should we generate more power. Energy Vision 2020 first determines the energy needs of the Valley and then determines the best way of meeting those needs. In Energy Vision 2020, the long-term plan and short-term action plan (see Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1) identify both demand- and supply-side resource options for meeting customer needs. This includes renewables and energy conservation.

TVA Actions and History

17

Comment: *I am impressed with the work done to improve the efficiency of TVA.*

Comment by: Ann Lamb

Response: Your comment has been reviewed and noted.

18

Comment: *TVA has been a major force in economic development since its inception.*

Comment by: William Bowker (Kentucky Coal Marketing and Export Council)

Response: TVA's broad mission is to foster the social and economic welfare of the TVA region. Accordingly, one of the criteria used to evaluate Energy Vision 2020 strategies is economic development.

19

Comment: *TVA's early television ads showing the state of the Valley before TVA were good ads because they show people the way things were.*

Comment by: Alexander Dewey

Response: Your comment has been reviewed and noted.

20

Comment: *TVA should continue to discourage chip mills.*

Comment by: Dennis Haldeman, Richard Simmers, Elizabeth Garber

Response: It is not TVA's intention to encourage or discourage chip mills. As appropriate, it looks at the ramifications of allowing chip mills to use property under TVA control or of approving water use facilities associated with chip mills.

21

Comment: *I admire TVA for its efforts to control soil erosion and bring electricity to the Valley. TVA has done some incredibly good things in the past such as stopping chip mills.*

Comment by: Marjorie Raines, John Noel, Alexander Dewey, John van der Harst

Response: Your comment has been reviewed and noted.

22

Comment: *Historically TVA's policies have shifted back and forth from resource conservation to resource exploitation.*

Comment by: Bruce Wood

Response: TVA's mandate is to manage the natural resources of the Tennessee Valley in a manner that fosters the social and economic welfare of the TVA region. The emphasis that TVA has given to the conservation of natural resources has varied over the years and

has included elements of both preservation and wise use. This has in part reflected the desires and needs of the public served by TVA, as well as the evolving role of other public and private entities in the conservation and protection of natural resources.

23

Comment: *TVA has reversed its former position of stewardship and enhancement of degraded lands by setting up an infrastructure that permits degradation of natural resources by private companies.*

Comment by: Dennis Haldeman

Response: As a regional resource development agency, TVA is broadly responsible for managing the natural resources of the Tennessee Valley in a manner that fosters the social and economic well-being of the TVA region. It has not deviated from or shirked this responsibility, although it recognizes that others may have a different view, depending on their own perceptions and goals. One of TVA's primary mandates in the TVA Act is to improve the navigability of the Tennessee River and to provide for flood control on the Tennessee River and its tributaries. TVA does not consider the fulfillment of this mandate to be inconsistent with TVA's stewardship of the region's natural resources. TVA has developed the infrastructure to achieve this mandate and continues its efforts to appropriately maintain that infrastructure. Inherent in the concept of navigation is the ability of people and business entities to use the Tennessee River for economic purposes, whether those purposes are recreation-related or related to the movement of natural resources into and out of the region.

24

Comment: *TVA has not been responding to hundreds of Freedom of Information Act requests on Watts Bar Nuclear Plant Unit 1 which makes people think TVA is hiding something.*

Comment by: Beth Zilbert (Greenpeace)

Response: As of October 1, 1995, no pending Freedom of Information Act requests on Watts Bar Nuclear Plant Unit 1 are outstanding. All requests for the last 10 years have been handled in accordance with standard Freedom of Information Act practices.

25

Comment: *My comments on the Nuclear Regulatory Commission Environmental Impact Statement for Watts Bar were illegible when photocopied and included in that document. Simple citizens just cannot figure out how TVA can blow such things.*

Comment by: John van der Harst

Response: TVA was not responsible for photocopying and including comments on the supplemental environmental impact statement which the Nuclear Regulatory Commission prepared for TVA's Watts Bar Nuclear Plant. The Nuclear Regulatory Commission was responsible for this. One of the drawbacks of including actual copies of the comments received in environmental impact statements is the occasional difficulty encountered in reproducing fully legible copies in the environmental impact statement, either due to the poor quality of the incoming document received or the reproduction process itself.

26

Comment: *TVA represses and punishes those seeking to speak to the Board in opposition to decisions they make.*

Comment by: Beth Zilbert (Greenpeace)

Response: TVA welcomes comments from the public and makes time to hear them at its Board meetings. In order to ensure that everyone who wishes to address the Board has an opportunity to do so, it is important that an orderly process be adhered to.

27

Comment: *TVA spends hundreds of thousands of dollars harassing and terrorizing employees and people who oppose it.*

Comment by: Beth Zilbert (Greenpeace)

Response: TVA does not harass or terrorize its employees. It provides many opportunities for employees to express concerns.

28

Comment: *The appalling history of TVA has been that not only were nuclear whistle blowers not promoted but they were harassed and fired. I have personally known many TVA workers at all levels who were forced by their supervisors to sign off on shoddy work and undone testing. The judge at the Sixth Circuit of Appeals in Cincinnati agreed with the allegations in nuclear engineer Jim Jones' harassment suit but did not find them "outrageous." Any reasonable unbiased person would find them outrageous. I have talked to the Nuclear Regulatory Commission inspectors about the fact that discovery of faults and shoddy workmanship by workers was punished rather than rewarded, and they acknowledged that they knew it.*

Comment by: Fred Wright

Response: TVA employees are our most important asset and provide valuable information concerning all aspects of our nuclear program. Therefore, it is TVA policy that intimidation, harassment, discrimination, or retaliation will not be tolerated. TVA is committed to ensuring an environment where employees feel free to express their concerns and ensuring that their concerns are properly addressed.

TVA has established two programs to assure that employee concerns have been, and will continue to be, properly addressed and resolved. The ongoing Concerns Resolution Program, put in place on February 1, 1986, was established to encourage the prompt and effective resolution of employee concerns through the normal line management process, as well as provide an alternate avenue for concerns that cannot be effectively resolved that are similar to and under the oversight of the Concerns Resolution Staff. Employees and line management are the key building blocks of this program; however, the Concerns Resolution Staff and contractor programs are available on-site as alternate avenues for employees to raise and resolve concerns. Concern programs are made known to employees in General Employee Training, site bulletins, and postings on bulletin boards. In addition, employees leaving the site participate in an exit interview with the Concerns Resolution Staff or their contractor concern program to specifically identify

any unresolved safety issues they are aware of. These programs have been successful. The number of issues expressed to concern programs TVA-wide has consistently trended downward from 1,298 in 1986 to 77 in 1995 (through October). Nuclear Regulatory Commission reviews in 1993 and 1995 of the programs revealed the site-wide employee concerns programs are being effectively implemented. Employee interviews conducted by the Nuclear Regulatory Commission during their 1993 and 1995 inspections of the programs, and by the TVA Office of the Inspector General in 1994 and 1995 were very positive and indicated that the vast majority of employees will report nuclear safety or quality problems by some available avenue, have confidence in line management to resolve issues, and will, if needed, use the concern programs as an alternative avenue to raise issues.

The second program, known as the Employee Concerns Special Program was established to resolve concerns expressed prior to February 1, 1986. The Employee Concerns Special Program made use of an independent contractor in 1985 and early 1986 to interview all employees associated with Watts Bar Nuclear Plant to make sure all employee concerns were identified. Over 5,800 employees associated with Watts Bar Nuclear Plant (not necessarily on-site) were interviewed which resulted in over 5,000 employee concerns being identified by approximately 1,850 employees. Hot lines for all employees and the public were also established. Due to the large number of concerns expressed, TVA established Employee Concern Task Groups to categorize and investigate the concerns. The Employee Concern Task Groups issued 1,591 Corrective Action Tracking Documents for issues that were validated and required further corrective actions. All 704 Corrective Action Tracking Documents that are applicable to Watts Bar Nuclear Plant Unit 1 have been closed.

29

Comment: *TVA is marketing electricity to feed its dying nuclear monsters.*

Comment by: Retha Ferrell, Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: In Energy Vision 2020, TVA has considered many different customer service options, including marketing options. Some decrease electricity consumption; others increase consumption. But all increase customer value. The choice of these customer service options is not dictated by TVA's nuclear program.

TVA's Organization/Work Force

30

Comment: *What are the qualifications of TVA's energy program senior leadership?*

Comment by: Robert Nash

Response: TVA's Board of Directors exercises ultimate management authority over all of TVA's programs, both its energy or power programs and its natural resource management programs. In addition, there are two other managers who collectively are responsible for all aspects of TVA's energy programs and who report to the Board. These individuals and their principal occupations in recent years are:

Craven Crowell, TVA Board Chairman since July 1993 —
Chief of Staff to Senator Sasser (1989-1993)
Vice President of TVA's Office of Governmental & Public Affairs and TVA Director of Information (1980-1988)

Johnny H. Hayes, TVA Board Director since July 1993 —
Tennessee State Commissioner of Economic and Community Development (1992-1993)
Tennessee State Commissioner of Employment Security (1991-1992)

William H. Kennoy, TVA Board Director since April 1991 —
President, Kennoy Engineers (1966-1991)

Joseph W. Dickey, Chief Operating Officer since February 1994 —
Senior Vice President of TVA's Office of Fossil & Hydro Power (1991-1994)
Vice President of Florida Power & Light Company's Power Resources Division (1988-1991)

Oliver D. Kingsley, Jr., President of TVA Nuclear and Chief Nuclear Officer since February 1994 —
President of TVA's Generating Group (1991-1994)
Senior Vice President of TVA's Office of Nuclear Power (1988-1991)
Vice President of Mississippi Power and Light Company's Nuclear Power Division (1985-1988)

31

Comment: *TVA needs more enlightened, accountable management that will restore its leadership in energy conservation and demonstrate commitment to a clean energy future.*

Comment by: John Johnson (Earth First), Linda Cataldo Modica, Robert Schreiber (Common Sense)

Response: In Energy Vision 2020, hundreds of supply- and demand-side management options were carefully developed and evaluated using a multi-attribute criteria process. A number of demand-side management options have been recommended either for implementation or further investigation in the short-term action plan. These options were selected by balancing the multiple evaluation criteria. Additional demand-side management options could be implemented in the future as identified in the short-term and long-term plans. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) TVA thinks that the Energy Vision 2020 process and its recommendations demonstrate a commitment to energy conservation and to a clean energy future.

32

Comment: *TVA needs to reduce its expenses in such areas as high managers getting unwarranted and illegal bonuses that exceed the federal pay cap.*

Comment by: Jeannine Honicker, Frank Holm

Response: TVA's compensation policies, including supplementary compensation, are well within the law. Supplementary compensation contributes to TVA's ability to recruit and retain top management talent in a competitive environment. The benefit for TVA customers is a nine-year track record of stable electricity rates, made possible because TVA's management team has been able to reduce costs and interest expense.

33

Comment: *TVA should have an annual report that identifies what TVA employees, contractors, and consultants get paid.*

Comment by: Frank Holm

Response: As appropriate, TVA makes available such information, but this is not included in TVA's annual reports to Congress.

TVA's Accountability/Possible Privatization

34

Comment: *I do not want to see TVA split up, but if it is going to stay whole, it needs to be more responsive to the public.*

Comment by: Debra Jackson, John Noel

Response: TVA makes a concerted effort to be responsible to the public. The public participation effort made as part of the Energy Vision 2020 process is an example of this. (See Volume 1, Chapter 1.)

35

Comment: *There needs to be a larger TVA Board with a citizens' representative or the creation of a public oversight panel. This may prevent TVA from repeating its dramatic mistakes from the past.*

Comment by: Myles Jakubowski (Sunbeam Household Products)

Response: The idea of increasing the size of the TVA Board of Directors has been raised over the years, but has not been widely supported. The law calls for the TVA Board to be appointed by the President with the advice and consent of the Senate. Congress, made up of the elected representatives of the people, has the responsibility to oversee TVA. It is unclear how a larger board would be more responsive to the public or provide significantly more effective leadership.

36

Comment: *Although Duke Power and Southern Company can do a better job of pushing electrons through a meter, the benefits of TVA's broad mission, such as serving rural or low income customers, could be lost if TVA is privatized. It is more cost-effective to serve urban areas. TVA must be kept strong and viable and as a yardstick against which other utilities can be measured.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA is able to fully compete with Duke Power and Southern Company in the electric market. However, TVA agrees that both the cost and reliability of electric energy services provided to many of the ultimate users of TVA-provided energy would likely be adversely impacted if TVA is privatized. As a federal power provider, TVA's mission and requirements are generally broader than those of private utilities. TVA's mission also includes economic development, management of the Tennessee River system, and environmental stewardship. TVA's development of new technologies has been and is expected to be an important means of accomplishing its broad mission.

37

Comment: *We want to see TVA survive. There are thousands of employees who are counting on this. There are also millions of customers counting on TVA to be responsible with how they generate energy and manage their resources. We want TVA to remain a public power firm because of the vital role it used to play.*

Comment by: Beth Zilbert (Greenpeace)

Response: We agree that TVA's role as a non-profit power supplier is very important to the social and economic well-being of the region.

38

Comment: *The Tennessee Valley Energy Reform Coalition is advocating a more environmentally and economically responsible agency.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA certainly shares these goals. In Energy Vision 2020, a number of criteria were used to evaluate strategies. These include environmental quality, economic development, and rates.

39

Comment: *The impacts on the costs of power to the TVA distributors and their customers from privatization would likely be substantial.*

Comment by: Tennessee Valley Public Power Association

Response: We agree. Privatizing TVA would result in major changes in TVA's capital structure, resulting in increased electric rates for TVA customers. There are no sound business reasons for privatization.

40

Comment: *If the final Energy Vision 2020 report includes a resource strategy with projected debt that exceeds the limitations, there could be significant direct increases on TVA's cost of providing service. Obviously, TVA would have to get legal authority to raise its total debt above $30 billion. This would be very difficult to accomplish and an attempt by TVA to convince Congress to adjust the debt ceiling may expedite the privatization of the TVA system.*

Comment by: Tennessee Valley Public Power Association

Response: Energy Vision 2020 supports the internal ceiling on debt. As shown in Energy Vision 2020, Volume 1, Chapter 9, Figure 9-4, Strategy Trade-Off for Debt in Year 2001 vs. Total Resource Costs, all seven of the key strategies remain well below the internal debt ceiling. In addition, the short-term action plan (see Volume 1, Chapter 10, Figure 10-1) results in debt in the year 2001 less than the internal debt ceiling (see Volume 1, Chapter 10, Figure 10-7). Past the year 2001, the long-term resource plan includes recommendations for unique energy supply arrangements such as partnerships with investors supplying capital as well as options to purchase power which have no effect on debt while providing the needed generating capacity.

41

Comment: *TVA needs to consider having private industry generate power and TVA becoming the broker of energy transmission lines and dam operators. This will be the cheapest way in the future to hold down electricity costs.*

Comment by: C. L. McKinney (Creret, Inc.)

Response: In Energy Vision 2020, several supply-side options (generation) proposed by private industry have been considered. In the short-term action plan, TVA has identified up to 3,000 megawatts of option purchase agreements for purchase from private industry.

TVA's Energy Vision 2020 recognizes that the electric industry is becoming increasingly competitive. As electric utility industry restructuring continues, many different utility structures may occur. TVA's generation resources may have to compete in an open market against other generators while TVA's transmission system takes on more of the status of a common carrier. However, TVA's current or existing generating units are expected to be able to compete in this competitive market.

42

Comment: *If TVA is going to behave like an investor-owned utility, why should TVA not be privatized? The draft Energy Vision 2020 ignores TVA's unique mission as a federal corporation.*

Comment by: Alexander Dewey, Eric Hirst (Oak Ridge National Laboratory), Stephen Smith (Tennessee Valley Energy Reform Coalition), Linda LaForest (Tennessee Citizens for Wilderness Planning), Robert Schreiber (Common Sense), Michelle Neal (Tennessee Valley Energy Reform Coalition)

Response: TVA is making a strong effort to operate more efficiently and to reduce costs in order to keep rates low and be better able to compete in the sale of electric energy. This is fully in keeping with TVA's historical mission as a federal agency and corporation. Efficient, cost-effective operations should not be attributes of only investor-owned utilities. Efficiently producing and selling competitively priced electricity has long been one

of the cornerstones of TVA's regional resource development mission. In fact, its ability to compete with investor-owned utilities in the sale of electric energy has been one of the things that has characterized TVA as a unique federal agency.

The Energy Vision 2020 plan is one of the ways TVA is preparing for an increasingly competitive utility industry while serving as a steward of the many natural resources of the region.

43

Comment: *TVA's lack of accountability must be addressed. Its actions must be subject to closer public review to protect consumers against abuses. TVA has a politically appointed Board, and stakeholders do not have a say in who governs TVA. There is no public oversight of TVA. The plan should provide for this.*

Comment by: Stan Gloeckner (Sierra Club), Robert Schreiber (Common Sense), Beth Zilbert (Greenpeace), John Johnson (Earth First), Nancy Bell, Powell & Sharon Foster

Response: TVA is subject to public accountability and scrutiny in a number of different ways. The three members of its Board of Directors are appointed by the President, with the advice and consent of the United States Senate. As a federal agency, TVA's activities are scrutinized by Congress, and TVA officials appear before congressional committees to testify about TVA activities.

As a regional resource agency whose headquarters and personnel are located in the area served by the agency, the public has access to TVA's senior officers and management to a much greater degree than almost any other federal agency. TVA's management and employees live and work in the communities served by the agency. Notice of TVA Board meetings is provided in advance. Board meetings are open to the public, and members of the public are given an opportunity to address the Board. Board meetings are held at different locations in the TVA region throughout the year in order to facilitate attendance of interested members of the public in those locales.

TVA activities are also subject to a number of external review processes, including the National Environmental Policy Act. The Energy Vision 2020 process has been conducted in conformity with the National Environmental Policy Act's environmental impact statement procedures. Substantial opportunities for public input and scrutiny have been provided throughout the entire Energy Vision 2020 process.

In light of the existing opportunities for public scrutiny and involvement, there is no need to create additional opportunities in the context of TVA's energy resource planning efforts.

44

Comment: *By 2020 TVA should be administered by an elected body and overseen by financial and environmental experts who are dedicated to the original purpose of TVA to benefit the region.*

Comment by: Retha Ferrell

Response: Such a change would require congressional legislation and is not being proposed as part of Energy Vision 2020.

45

Comment: *TVA is keeping rates artificially low to stall the movement toward privatization.*

Comment by: Steven Walsh

Response: TVA's electric rates are not artificially low. TVA's electric prices that it charges all of its customers cover all the costs of operation plus the cost of servicing TVA's debt. It is a benefit to the region to provide low-cost power to customers.

46

Comment: *TVA's plan should address the consequences of privatization.*

Comment by: Nancy Bell

Response: Energy Vision 2020 assumes that TVA will continue as a federal government agency and TVA will not be privatized (see Volume 1, Chapter 1). A privatized TVA would likely have goals and objectives radically different than TVA's current goals which account for TVA's mission as a federal regional resource agency.

THE PLAN

This section includes comments and responses about:

- how well information has been presented in Energy Vision 2020 and the format of the document
- the goals and objectives of Energy Vision 2020
- the appropriateness of the evaluation criteria used in Energy Vision 2020 and the desirability of additional or different criteria
- the monetization of externalities

Presentation of Information

47

Comment: *TVA's development, analysis, display, and discussion of various resource portfolios, alternative futures, and uncertainties demonstrated a high degree of technical competence and communication skills.*

Comment by: TVA Retirees Association, Eric Hirst (Oak Ridge National Laboratory)

Response: In addition to internal resources, TVA had the assistance of other experts and stakeholders throughout the process.

48

Comment: *We commend TVA for making a long-range plan. The plan is well laid out and shows a lot of work.*

Comment by: Ken Wheeler (Midland Enterprises)

Response: TVA made a concerted effort to produce a good, readable integrated resource plan.

49

Comment: *TVA's draft is well organized, well written, logically structured, comprehensive, and the easiest to read integrated resource planning report ever.*

Comment by: TVA Retirees Association, Mary English (University of Tennessee), Eric Hirst (Oak Ridge National Laboratory)

Response: TVA made a concerted effort to produce a good, readable integrated resource plan.

50

Comment: *In my opinion, the beauty of these documents is the degree to which they are readable and yet technically convincing. The use of graphs, maps, charts, and tables is superb.*

Comment by: Tom Forsythe

Response: TVA made a concerted effort to produce a good, readable integrated resource plan.

51

Comment: *The report is not written so that it is user-friendly to the average person. It should clearly explain what the situation is, what the goal is, and how to achieve it.*

Comment by: Dolores Howard, John van der Harst

Response: TVA has endeavored to write the Energy Vision 2020 in a user-friendly manner, but we realize that much of this material is technical in nature.

52

Comment: *The format of the document indicates insensitivity to environmental issues because of the glossy conventional public relations style of the document.*

Comment by: Howard Switzer (Sun/Earth Tempered Organic Architecture)

Response: The document was purposely formatted to promote clarity, understanding, and ease of reading. The document is printed on recycled paper.

53

Comment: *A section with the traditional environmental impact statement title of "Alternatives" does not appear in the Table of Contents of Energy Vision 2020. This may be confusing to some reviewers. We note, however, that alternatives are covered in Chapter 9, which is listed as "Resource Integration" in the Table of Contents. We recommend that the full title of Chapter 9 (i.e., "Resource Integration/Alternative Strategy Comparisons") be included in the Table of Contents in order to signify an alternatives analysis.*

Similarly, the section on "Environmental Consequences" is difficult to find (Chapter 9) in the Table of Contents of Volume 1. This may also be confusing to some reviewers. However, Environmental Consequences is covered in detail and clearly listed in Volume 2, technical Document 2.

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: As recommended, the full title of Chapter 9, Resource Integration/Alternative Strategy Comparisons has been included in the Table of Contents for Volume 1 of the final Energy Vision 2020.

54

Comment: *The discussion of the "preferred bundle of resource options" is somewhat confusing. TVA may wish to consider minor language changes to clarify that the goal of the preferred bundle of resource options is to develop a preferred set of resource options (portfolio). (See Executive Summary, page 14, Figure 2.) This is better explained in Volume 1, Chapter 9, page 9.34 and in Volume 2, Technical Document 2, page T2.51.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: This has been changed in the final Energy Vision 2020.

55

Comment: *TVA's Energy Vision 2020 document is extensive, descriptive, and well referenced. However, detailed descriptions of each strategy evaluated in the Energy Vision 2020 process are not included. Memphis Light, Gas and Water requests a detailed description of each strategy.*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: Detailed descriptions of each strategy have been provided to Memphis Light, Gas and Water.

Goals and Objectives/Evaluation Criteria

GENERAL

56

Comment: *The long-term strategy appropriately emphasizes flexibility and seeks to balance the goals of economic growth and environmental quality.*

Comment by: TVA Retirees Association, Eric Hirst (Oak Ridge National Laboratory)

Response: Through Energy Vision 2020, TVA developed a comprehensive evaluation system that reflects TVA's goals and objectives, as well as the concerns and values of the public. Some of TVA's evaluation criteria include risk management, flexibility, economic development, and environment. These criteria and other measures became the quantitative basis for ranking supply-side and customer service options. They were used to develop the long-term plan and the short-term action plan. In addition to these quantitative criteria, TVA took into account other qualitative factors such as some environmental concerns.

57

Comment: *The plan balances energy, policy, and environmental issues with practical business considerations that are necessary if TVA is to continue serving the needs of both the region's power consumers and its growing economy. If implemented, it should provide a sound framework for TVA to achieve its goals for economic development of the Valley, combined with high-level environmental stewardship.*

Comment by: TVA Retirees Association

Response: Your comment has been reviewed and noted.

58

Comment: *There should be a renewables portfolio standard by which there is a set amount of renewable investment that is uniform throughout the industry.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA cannot require a renewables portfolio standard throughout the utility industry. TVA has, however, included more than 2,500 megawatts of renewable energy in the

Energy Vision 2020 portfolio. This includes a wind turbine and biorefinery projects as well as research and development programs for supply and customer service renewables in the short-term action plan.

59

Comment: *Alternative and renewable energy sources have the potential for assisting the rural families in Appalachia by providing employment and benefiting the environment.*

Comment by: Calvin Moore

Response: TVA believes in the importance of the Valley's economic development. TVA has set up an Economic Development Office and through its appropriated-funded programs helps disadvantaged rural communities. In addition, economic development is one of the criteria being used in the Energy Vision 2020 process. As part of the Energy Vision 2020 study, each strategy was analyzed as to its environmental and economic development impacts. Strategies in Energy Vision 2020 included alternative energy sources such as wind power and conservation. The key strategies from which the long-term plan is derived (all of which performed well in terms of economic development and the environment) contain such energy sources. Energy Vision 2020 is not a site-specific analysis. Siting issues, impacts, and benefits will be examined when TVA proposes to implement specific resource options.

60

Comment: *Although its fundamentals are excellent, the report is not strong enough as it relates to protecting the environment and TVA's economic survival.*

Comment by: John Noel

Response: Environmental quality and competitive electric rates were among the criteria used to evaluate and develop the strategies considered in Energy Vision 2020. The evaluation of the strategies using these and other criteria are reported in Volume 1, Chapter 9, Figures 9-4 to 9-10.

Early in the evaluation process, it was recognized that strategies that improved the quality of the environment also increased electric rates and, conversely, strategies that provided competitive electric rates also provided less improvement to the environment. This trade-off between environmental quality and competitive electric rates was improved by including in strategies low-cost renewable energy options with few environmental emissions. These renewable energy options include wind power, biomass, landfill methane recovery, and small modular distributed generation such as fuel cells. These options are identified in TVA's long-term plan. (See Volume 1, Chapter 9, Figure 9-23.)

61

Comment: *TVA's draft plan is not capable of achieving its stated goal. Its goal is to provide electricity at the lowest cost by integrating and balancing new technology, consumer needs, existing resources, and environmental concerns. This means providing clean, safe, and affordable energy. However, the plan continues to lean heavily on conventional technologies with negative environmental and health impacts.*

Comment by: Bruce Wood, Sharon Force

Response: The goal of the long-term plan and the short-term action plan in Energy Vision 2020 was to develop strategies and resource options that balanced several criteria besides the lowest cost. These included minimizing short- and long-term electric rates and TVA debt, reducing environmental impacts, increasing economic development and customer value, and providing robustness and flexibility to meet an uncertain future. The long-term plan and short-term action plan provide a balance of existing resources, supply-side resources, demand-side management, and new technologies in order to meet future customer needs. (See Volume 1, Chapter 9 and Chapter 10.)

62

Comment: *I recommend that TVA adopt the six principles that the National Association of Regulatory Utility Commissioners adopted at its 1995 summer meeting and to advocate these principles with its distributors. The National Association of Regulatory Utility Commissioners adopted these warnings about the risk to the low income customers by the restructuring of the electric utility industry.*

The principles are: One, prevent unfair cost shifting between customer classes; two, make available the benefits of the competitive market to each customer class without undue discrimination; three, maintain fair and reasonable billing and collection practices; four, sustain Commission approved low income energy efficiency and rate programs; five, limit disproportionate environmental impact in low income neighborhoods; and six, ensure the effective participation of all citizens in the restructuring debate.

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Michael Karp (Northwest Conservation Act Coalition)

Response: Although the exact nature of the changes due to the restructuring of the electric utility industry is not yet fully known, TVA developed evaluation criteria which reflected many of the values underlying the National Association of Regulatory Utility Commissioners' six principles related to the restructuring of the electric utility industry. These criteria were used to evaluate all strategies considered when developing TVA's plan for the future. These include equity among rate classes, customer value, and environmental impacts. The process for developing the plan included extensive public participation efforts. TVA and distributors of TVA power have a long history of providing outreach and assistance to low income customers, and a number of initiatives are included in the proposed short-term action plan that would benefit low income customers. (See Volume 1, Chapter 10, Figure 10-1.)

63

Comment: *The growth paradigm is destroying the biosphere, and to just assume that as a culture we are going to continue with unlimited growth, unlimited economic growth, and so-called progress, is really short-sighted. Unlimited growth on a planet with limited resources is a really ridiculous and short-sighted view—it is a very destructive way to run a society.*

Comment by: John Johnson (Earth First)

Response: There are limits to uncontrolled growth. Economic development was only one of the criteria that TVA considered in evaluating various strategies for the future. Each strategy was also carefully evaluated considering a number of other criteria, including the environmental impacts on air, water, and other aspects of the environment.

64

Comment: *We do not need a mean and lean TVA. We need a TVA that thinks not only of low-cost energy but of socioeconomics, the environment, and jobs for the people.*

Comment by: Anne Redwine

Response: Like other utilities, TVA is expecting important changes in the relationships between customers and utilities. Consumer, legislative, and utility actions across the nation are changing the electric utility industry from a regulated monopoly to a competitive marketplace. Energy Vision 2020 will guide TVA in entering this competitive marketplace and beyond by identifying the best energy resource choices for the current and future generation of consumers.

However, Energy Vision 2020 goes beyond simply providing competitively priced power. The plan also considers economic development and the environment as part of TVA's mandate to be a leader in total resource development. Innovative approaches to meeting the demand for energy through new technologies and business arrangements are the means by which TVA can achieve all of these goals: competitively priced power, opportunities for economic growth, and a quality environment rich in natural resources.

65

Comment: *For a competitive strategy, TVA should focus on customer service, value, and bills, not just rates, unless TVA plans to compete solely on price.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Robert Schreiber (Common Sense), Arthur Smith, Eric Hirst (Oak Ridge National Laboratory)

Response: TVA has considered both electric rates and customer bills by using several measures. These include total resource costs, customer value, and electric rates, including short- to long-term. These evaluation criteria are explained in Volume 1, Chapter 5. TVA's strategies are evaluated using these criteria, and the results are presented in Volume 1, Chapter 9.

Although additional conservation can lower electric bills, it can also increase electric rates. This trade-off is considered in Volume 1, Chapter 9, pages 9.15 to 9.21.

TVA primarily sells wholesale power. Wholesale power is delivered to 160 power distributors that in turn distribute electricity to homes and businesses within their service areas. In the future marketplace, rates and reliability will be critically important.

66

Comment: *Energy Vision 2020 lacks proper quantification of many important externalities. Many states force utilities to charge more for electricity generated from non-renewable technologies and charge less for electricity from renewable energy sources. Fossil and nuclear hidden costs (externalities) should be considered. This promotes the use of alternative resources because the real costs from electricity generated by dirty methods become part of our bills. TVA should factor in externalities (extended costs). A low rate is not necessarily an efficient rate. Rates should cover total costs, including externalities.*

Comment by: Danielle Droitsch, Luther Gulick, A. B. Evans, Mary Anne Terry, Chris Gulick, Faith Young, Myles Jakubowski (Sunbeam Household Products), Ann & Mike Sanders, William Emmott, Powell & Sharon Foster, Brian Bury, Mary Carton, Benjamin Stewart (Faith Lutheran Church), Ruth Peeples, Katherine Osborn, Sharron Eckert, Isahl Hemm, Mary Schwarz, John Schwarz, Jr., Robert Peeples, Jo Anne Clark, Marion Zachiel, Arthur Smith, R. & G. Ludwig, Walter & Dorothy Stark, Ben & Winn Welch, F. W. Munson, N. E. Whitfield, Stephanie Calvert, M. Nathan Perry, Deborah Cuva,

Tohert, Leith Patton, Salo, Ray Williams, Karl Grotke, Susana Harwood, Shirley Schaaf, Dolores Howard, Hermann, Kim Grube, K. Varnum, Garry Shores, Kathy Priore, Karah Bates, M. Case, Dottie Hodges, Sharon Force, C. T. Brewster, Robert Schreiber (Common Sense), Wilson Prichett (Tennessee Valley Energy Management Association), Alan Jones (Tennessee Environmental Council), Maggie Kalen (Tennessee Valley Energy Reform Coalition), John Harwood, John van der Harst, Nancy Bell, Jim Snell, Olivia Lim (Southeast Center for Ecological Awareness), John Johnson (Earth First), Dennis Haldeman, Michelle Neal (Tennessee Valley Energy Reform Coalition), Alan Ball, Linda Ewald, David Bordenkircher, L. M. Johnson, Sr., Stephen Smith (Tennessee Valley Energy Reform Coalition), Sahara, C. Strain, Karen Lovell, Lynn Leach (Alabama Environmental Council)

Response: An "externality" is a cost or benefit that results from the production or consumption of goods and services that is not reflected in the prices of those goods or services. For example, driving a car or generating electricity may produce various forms of pollution that can damage vegetation. If such pollution is not controlled at the source such that the cost of control is included in production costs, it is an environmental externality, or a cost borne by society. TVA and other federal agencies have long assessed potential environmental externalities in the context of the National Environmental Policy Act reviews they perform.

Several commenters asked TVA to monetize the environmental externalities that may result from the strategies or options in Energy Vision 2020. Monetization of externalities involves directly adding the cost of externalities to other costs, such as construction and fuel costs. Given the many difficulties in monetizing externalities, and the lack of a consistent position in the utility industry on the values to be used, TVA chose not to monetize externalities in Energy Vision 2020. (See TVA's Approach to Evaluating Externalities Resulting from the Production and Consumption of Electricity in Volume 2, Technical Document 4.)

Instead, each strategy considered in Energy Vision 2020 was evaluated by multiple evaluation criteria, including environmental evaluation criteria, using a multi-attribute trade-off analysis methodology. The methodology is discussed in Volume 1, Chapters 2 and 9. The consideration of environmental impacts using environmental evaluation criteria was an important factor in the selection of the strategies and energy resources to be included in TVA's Energy Vision 2020 portfolio and plan. The environmental evaluation criteria and the evaluation of each strategy's environmental performance are discussed in Volume 1, Chapters 3, 5, and 9. In addition, environmental issues have been addressed qualitatively in Energy Vision 2020. A more detailed discussion of these issues is located in Volume 2, Technical Document 1, Comprehensive Affected Environment, and Volume 2, Technical Document 2, Environmental Consequences.

67

Comment: *Energy issues and policies can quickly become technically complex and emotionally charged when one begins to consider all the technological, environmental, economic, and socio-political aspects. In such policy debates, the most difficult task is to establish the fundamental principles to guide future decision-making. The National Hydro Association suggests there are three fundamental tenets that should be considered:*

- *The health of modern economics depends on a solid and stable energy foundation.*
- *Energy sources should be sustained over the long term.*
- *All energy sources have drawbacks.*

Comment by: Linda Church Ciocci (National Hydropower Association)

Response: Through Energy Vision 2020, TVA developed a comprehensive evaluation system that reflects TVA's goals and objectives, as well as the concerns and values of the

public. TVA's evaluation criteria include: long-run cost/value, TVA short- to long-term rates, reliability, environment, economic development, financial requirements, risk management, and equity among rate classes. (See Volume 1, Chapter 5 for further information on TVA's evaluation criteria.)

COST/VALUE

68

Comment: *The primary measure of cost that TVA used was total resource cost. This measure incorporates all measurable costs associated with a resource including construction costs, operating and maintenance costs, fuel costs, marketing/administrative costs, rebates, equipment costs, etc. It is the standard used throughout the industry and is similar to a "required revenues" approach commonly used in supply planning and rate making.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

69

Comment: *An extension of the total resource cost is "customer value." This criterion adds to the total resource cost the value of increased comfort or security as well as the value to society of decreased market barriers. Customer value is particularly useful when evaluating beneficial electrification, because the total resource costs ignore the value of increased security, for example, when outdoor lighting is added. The title, "customer value" is an unfortunate one, however, because it implies that this is what customers prefer. This is not necessarily the case. Customer value is simply an extension of the total resource cost that includes an estimate of the value of increased electrification.*

Comment by: Tennessee Valley Public Power Association

Response: The customer value criterion is an extension of the total resource cost test. The value test is rigorously derived from the economic theory of supply and demand and represents a complete test of economic efficiency. It is also unique in that it is the only cost-benefit test that provides a consistent measure of both energy efficiency, as well as beneficial electrification options. Customer value reflects customer preferences to the extent these preferences are revealed in customer demands for energy services.

70

Comment: *Explain how TVA estimates some of the factors in the value test, such as amenity level and market barrier costs.*

Comment by: Eric Hirst (Oak Ridge National Laboratory)

Response: TVA used several methods to estimate the factors considered in the value test. Market barrier costs are estimated by the net benefits identified in the participant test before a utility program is implemented. The participant test compares the benefits in terms of energy bill savings resulting from adoption of high-efficiency technology to the incremental cost of the technology. If the energy savings benefits exceed the cost and the customer does not adopt the technology, one can assume the customer must face market barrier costs. The market barrier costs must be at least as great as the net benefits provided by the technology. The market barriers faced by the customer may be lack of infor-

mation, risk associated with a new technology, or lack of available capital. Programs designed to address these market barriers reduce the costs borne by participants and increase the value of a customer service option. TVA evaluated the effectiveness of each proposed program in reducing or eliminating market barrier costs. Generally, more aggressive programs were more effective at reducing market barrier costs but had higher program costs.

The change in amenity level can also be measured using the results of the participant test. For the beneficial electrification options, for example, customers will incur the cost of a new electrotechnology and increased energy use. For a customer to participate in the program, the customer must receive benefits greater than the increased costs. Those benefits can be improved quality, increased productivity, or reduced environmental compliance cost. In most cases for electrotechnologies, TVA estimated these benefits directly. If the benefits cannot be estimated directly, the participant test provides a conservative estimate of the change in amenity level for a participating customer.

71

Comment: *TVA is proposing to use consumer value as a criteria. This is a highly arbitrary and subjective criterion. TVA should go back and rethink the use of this.*

Comment by: Geoffrey Crandall (MSB Energy Associates)

Response: Customer value as a criterion is based on sound economic principles. In particular, the value test is a rigorously derived test of economic efficiency and is a much more complete criterion than any of the other standard practice tests. Some of the issues associated with evaluation criteria are discussed in Volume 2, Technical Document 4. TVA used the value test, along with many of the other tests commonly used in integrated resource planning as evaluation criteria in the planning process.

72

Comment: *I challenge TVA's viewpoint regarding stable rates. It is not the rate, it is the bill. Others have found that their customers are happy to pay higher rates as long as demand-side features lower their usage, resulting in a net stable monthly bill. For example, TVA should offer programs in which they help customers reduce their demand through efficient lighting, refrigerators, etc., in exchange for higher rates, with the result of a net stable bill.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Will Kidd (Sunsource Unlimited, Inc.), Michelle Neal (Tennessee Valley Energy Reform Coalition), Steven Walsh

Response: All Energy Vision 2020 strategies were evaluated using multiple evaluation criteria. Both the total resource cost criteria and the value test criteria take the customers' electricity bills into account. The advantages of demand-side efforts are apparent when using these evaluation criteria, and were considered when determining which strategies/resource options were included in TVA's Energy Vision 2020 long- and short-term plans. (See Volume 2, Technical Documents 2 and 4.)

ECONOMIC DEVELOPMENT

73

Comment: *Development of the region and employment of its residents are in TVA's best interest long term. TVA should encourage industry that provides a favorable balance between energy use and jobs provided.*

Comment by: Ann Lamb

Response: Because of the importance of the Tennessee Valley's economic development, not only has TVA set up an Economic Development Office, but economic development is one of the evaluation criteria being used in Energy Vision 2020. All the strategies were evaluated as to their economic development effects in terms of Valley employment and income as well as other criteria. All of the final strategies performed well on the basis of economic development.

74

Comment: *Investments in renewable energy would provide 2 to 10 times more jobs than Watts Bar Nuclear Plant at a fraction of the cost.*

Comment by: Peggy Snow, Jenny Willoghby

Response: Economic development is one of the criteria being used in Energy Vision 2020. All the strategies were evaluated as to their economic development effects in terms of Valley employment and income. This included other energy sources such as wind power and conservation. The key strategies from which the long-term plan is derived (all of which performed well in terms of economic development) all contain such energy sources. Watts Bar Nuclear Plant Unit 1 was considered part of the existing system in Energy Vision 2020.

To respond to this comment, however, estimates were made for average direct annual employment for Watts Bar Nuclear Plant Unit 1, a wind power option, and an average compilation of demand-side management options on a per 100-megawatt basis for purposes of comparison. These estimates are: 67 employees per 100 megawatts for Watts Bar Nuclear Plant Unit 1, 54 employees per 100 megawatts for a wind option, and 57 employees per 100 megawatts for demand-side management.

75

Comment: *Other than in one chart, employment of TVA residents is not discussed. Employment from renewables and energy conservation is not addressed.*

Comment by: Nancy Bell

Response: As part of the Energy Vision study, each strategy was analyzed as to its economic development effects as measured by both employment and income. Strategy options such as renewables and energy conservation were found to create jobs directly through the construction and operation of these energy sources or through program setup and operation. Additionally, employment was found to be indirectly generated as related payrolls and expenditures were spent in the Valley. The economic development effects due to electricity costs resulting from the strategies were also estimated. The key strategies from which the long-term plan is derived all performed well in terms of economic development and all contain renewables and energy conservation resources. Further descrip-

tion of the methodology and results of the economic development effect analysis is in Volume 2, Technical Document 2, Environmental Consequences, pages T2.14 to T2.16.

ENVIRONMENT

76

Comment: *The text states that the first objective is to "balance costs, rates, environment, debt, and economic development." We suggest that the term "environment" may be too general in this list of options to be balanced. Clearly, the primary objective is to balance costs, rates, debt, and the cost of economic development; the expression "environment," however, may include either or both financial expense and savings. In addition, it is desirable that the options preserve and protect the environment. To indicate these distinctions, TVA may wish to include the following: the expense of environmental compliance (this may include cost and possible savings which may be incurred through waste reduction and prevention technical assistance programs); prohibitive environmental regulations which may eliminate options; a quantification of ambient conditions and estimated environmental impact; and identification and risk evaluation of the population impacted.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Energy Vision 2020 takes into account all of the cited environmental elements. However, for simplicity, the term "environment" has been used. This has been clarified in the text.

77

Comment: *One of the goals of the plan should be clean air and clean water.*

Comment by: Patricia Chapman, Peggy Snow, Anne Redwine, Sheilla Cheyenne, Dara Chernicky, William Arney

Response: During the Energy Vision 2020 process, extensive effort has been devoted to analyzing numerous environmental impacts and other consequences of each strategy for meeting electricity needs for the future. Clean air, clean water, and other aspects of the environment were important considerations in determining TVA's proposed plan for the future. (See Volume 1, Chapter 9, Figure 9-23.)

78

Comment: *TVA's Energy Vision 2020 is a testament to the status quo. Rather, what is needed is a vision for healthy land, pure water, clean air, rich diversity, renewable energy, and energy conservation. This dream can be realized only by TVA making bold changes.*

Comment by: Myles Jakubowski (Sunbeam Household Products)

Response: During the Energy Vision 2020 process, extensive effort has been devoted to analyzing numerous environmental impacts and other consequences of each strategy for meeting electricity needs for the future. (See Volume 1, Chapter 9, pages 9.22 to 9.27.) TVA's proposed short- and long-term plans include both renewable resources and demand-side management. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

79

Comment: *What criteria and principles should we adopt about the nature and scope of problems we are willing to leave to our children? The National Hydro Association believes that we should leave only those problems to our future generations that are largely solvable and predictable, that do not threaten human health and safety, and that are not largely incompatible with a healthy and diverse environment over the long term.*

Comment by: Linda Church Ciocci (National Hydropower Association)

Response: TVA is committed to planning for the best ways to meet the future electricity needs of the Tennessee Valley. This means that the quality of life for future generations is an important consideration. Therefore, extensive effort has been devoted to analyzing numerous environmental impacts, economic impacts, and other consequences of possible strategies for meeting electricity needs for the future. Health and environment were important considerations in formulating the Energy Vision 2020 plan.

80

Comment: *I feel that TVA has pursued an unsustainable energy policy. The needs of our children should be taken account of in the plan. The planning horizon should be 500 to 1,000 years.*

Comment by: M. Nathan Perry, Jo Anne Clark, John Noel, John Schwarz, Jr., Rodney Webb, L. M. Johnson, Sr., Ruth Peeples, Barbara Soliday, Walter & Dorothy Stark, Howard Switzer (Sun/Earth Tempered Organic Architecture), Robert Peeples, Deborah Cuva, Peter Brinson, William Emmott, Mary Schwarz, Isahl Hemm, Stephen Stedman, C. T. Brewster, Sahara, C. Strain, Karen Lovell, Marion Zachiel, Katherine Osborn, N. E. Whitfield, Lynn Leach (Alabama Environmental Council), Alan Jones (Tennessee Environmental Council), Luther Gulick, A. B. Evans, Mary Anne Terry, Chris Gulick, Faith Young, Ann & Mike Sanders, Ben & Winn Welch, Jamie Pizzirusso, F. W. Munson, R. & G. Ludwig, Salo, M. Case, Karah Bates, Kathy Priore, Garry Shores, K. Varnum, Kim Grube, Hermann, Tohert, Dottie Hodges, Amy Perry, Ray Williams, Shirley Schaaf, John Harwood, Susana Harwood, Jean Cheney, Jennifer Lapidus & Hannah Bennett, Kirk Johnson, Myles Jakubowski (Sunbeam Household Products), Sheilla Cheyenne, Sanford McGee (Cumberland Center for Justice and Peace), Dennis Haldeman, John Johnson (Earth First), Jennifer Hurgeton, Karl Grotke

Response: Energy Vision 2020 identified a viable mix of conservation programs and options for power plant operations that will be used to responsibly and economically provide energy for sustainable economic growth. For all resource options, the environmental consequences and economic impacts were considered as part of TVA's effort to encourage sustainable economic growth in the region.

Energy Vision 2020 explicitly considered a number of criteria or measures related to sustainability. These included long- and short-term economic costs, environmental quality, economic development, and risk management (including fuel diversity). The changes or trends in these criteria over the planning period were all either favorable or were mitigated through the analytical method used for Energy Vision 2020 (multi-attribute trade-off analyses) in the formulation of strategies. The long-term plan (see Volume 1, Chapter 9, Figure 9-23) identifies several resource options that would help provide a more sustainable energy future. These resource options include an increased emphasis on energy efficiency on both the demand and supply side, increased use of natural gas, and more use of renewables such as wind, landfill methane, and biomass.

The uncertainty of a 500- to 1,000-year planning horizon is too large to address in Energy Vision 2020. However, Energy Vision 2020 provides the flexibility to adapt to an uncertain future in the next 25 years.

EQUITY

81

Comment: *Fairness in rates should be a major goal. TVA should establish a rate structure based on cost-of-service for each customer class.*

Comment by: John Sharp, Jr.

Response: TVA uses a cost-of-service-based method for developing its rate structure.

82

Comment: *The rate impacts of the various resource strategies were evaluated in relation to the total TVA system revenue requirements. The nature of the Energy Vision 2020 process and results did not facilitate consideration of impacts on TVA's wholesale rates or the distributors' retail rates on an individual customer classification basis.*

Comment by: Tennessee Valley Public Power Association

Response: Rate changes by class of service due to demand-side management options were considered in Energy Vision 2020. (See Volume 1, Chapter 9, page 9.18.)

FINANCIAL/DEBT

83

Comment: *TVA's problems such as those identified by the United States General Accounting Office—including the level of TVA's debt, the amount of debt that supports non-revenue producing assets, and the possible effects of increasing competition on TVA—should be addressed and not assumed away. The tone of Energy Vision 2020 is too positive.*

Comment by: Eric Hirst (Oak Ridge National Laboratory), Mary English (University of Tennessee), Bryan Deel, Sheilla Cheyenne, Alan Ball

Response: While we agree that continuing attention to TVA's debt will be required, we strongly disagree with the "crisis" tone of the United States General Accounting Office report as a whole and Chapter 5 in particular. TVA is a large corporation with more than $5.4 billion in annual revenues. Debt is a recognized necessity for large corporations, and TVA has consistently met very stringent bond tests and the debt service is recovered in revenues. However, recognizing that managing debt is important, TVA has, as a result of Energy Vision 2020 analyses, placed a limit on its debt that is expected to be $2 billion to $3 billion less than its statutory limit of $30 billion.

TVA's debt and resultant financing costs do not jeopardize its ability to meet competitive challenges from neighboring utilities. When TVA's debt is compared to the overall capitalization of neighboring investor-owned utilities, it is not out of line with its competitors in the utility industry. (See "The Ties that Bind: TVA in a Competitive Electric Market," Palmer Bellevue, April 1995.)

84

Comment: *With the level of debt being one of the major criteria for evaluating the various resource option strategies considered in Energy Vision 2020, both the legal debt ceiling of $30 billion and the internal debt limitation of $27 to $28 billion have significant implica-*

tions for the outcome of Energy Vision 2020. All the resource strategies project that the total debt will exceed both the legal limit and the internal limit placed on TVA during the study period.

Comment by: Tennessee Valley Public Power Association

Response: The seven key strategies which make up the long-term resource plan (see Volume 1, Chapter 9, Figure 9-23) have debt in 2001 well below the voluntary internal debt ceiling of $27 billion to $28 billion as shown in Volume 1, Chapter 9, Figure 9-4. Past the year 2001, the long-term resource plan includes recommendations for unique energy supply arrangements such as partnerships with investors supplying capital, as well as options to purchase power that have no effect on debt while providing the needed generating capacity.

85

Comment: *The United States General Accounting Office report notes that "because of TVA's high fixed costs and impending competition, we believe the federal government may be at risk for some portion of TVA's $26 billion debt." This is in addition to the $4.2 billion that TVA owes directly to the federal government. Clearly, TVA is an agency that needs to seriously consider its finances.*

Comment by: Beth Zilbert (Greenpeace)

Response: Given the significant differences in capital structure between investor-owned and publicly-owned utilities, it is surprising that the United States General Accounting Office neglects to make any financial comparisons between TVA and publicly-owned utilities. Such comparisons would show that TVA has more financial flexibility than most generation and transmission cooperatives and is reasonably on par with other publicly-owned utilities around the country.

While we agree that continuing attention to TVA's debt burden will be required, we strongly disagree with the "crisis" tone of the United States General Accounting Office report as a whole. TVA's debt is large in absolute terms. But it is also true that TVA is a large corporation, with more than $5.4 billion in annual revenues. Debt is a recognized necessity for large corporations, and TVA has consistently met its very stringent bond tests. However, recognizing that managing debt is important, TVA has, as a result of Energy Vision 2020 analyses, placed a limit on its debt that is expected to be $2 billion to $3 billion less than its statutory limit of $30 billion.

TVA's debt and resultant financing costs do not jeopardize its ability to meet competitive challenges from neighboring investor-owned utilities; it is not out of line with its competitors in the utility industry. TVA can finance capital projects only by issuing debt. Investor-owned utilities, in addition to issuing debt, raise approximately one-half of their capital through issuing stock.

RATES

86

Comment: *Industries within the TVA region must have competitive electric rates and reliable service to compete regionally and globally. The competitiveness of electric rates is a major factor when deciding to build new facilities, increase production at existing facilities, or*

close facilities. For large industries directly served by TVA, electric prices are the most important element of the plan.

Comment by: Ron Kapavik, Tennessee Valley Industrial Committee

Response: TVA agrees that electric rates are important and has evaluated all options/strategies for short-term to long-term effects on electric rates and for economic development effects.

87

Comment: *As one of TVA's largest consumers, we are very much interested in anything that will help hold down current and future power costs. I believe this is a key to future development in your service area.*

Comment by: R. D. Newman (Bowater Newsprint)

Response: TVA is also interested in holding down current and future power costs and offering rates for electricity that will enhance the development and quality of life in the Tennessee Valley. Therefore, each strategy for the future was evaluated for its impacts in several areas. Evaluation criteria included total costs, and short-term to long-term rates.

88

Comment: *With deregulation approaching, competitive electric prices may be the Valley's most important resource in preserving and attracting job-producing businesses.*

Comment by: Tennessee Valley Industrial Committee

Response: TVA agrees that electric rates are important for encouraging economic development; it has evaluated the effects of rates on economic development.

89

Comment: *Status quo on boundaries, barriers, and protective territory may be challenged soon. Customers may soon be able to make choices on power-buying decisions. TVA should keep in mind that low-cost provider and cost may take on new meanings. Take this into account in the plan.*

Comment by: Ron Kapavik

Response: TVA recognizes the important changes in the relationships between utilities and their customers. Consumer, legislative, and utility actions across the nation are changing the electric utility industry from a regulated monopoly to a competitive marketplace. TVA is in the forefront of this change and welcomes the opportunity for growth and improved service and responsiveness to the needs of its current and new customers. TVA has taken steps to position itself for success in this new competitive environment. TVA's electric power production and operating costs are competitive with utilities in the regional market. The same is true for electric prices paid by consumers in the TVA service area.

Energy Vision 2020 will guide TVA in entering the emerging competitive marketplace and beyond by identifying the best energy resource choices for the current and future generation of consumers.

However, Energy Vision 2020 goes beyond simply providing competitively priced power. The plan also considers economic development and the environment as part of TVA's mandate to be a leader in total resource development. Innovative approaches in meeting the demand for energy through new technologies and business arrangements

are the means by which TVA can achieve all of these goals: competitively priced power, opportunities for economic growth, and a quality environment rich in natural resources.

Recommendations concerning barriers or boundaries inhibiting TVA in a competitive market are found in the Palmer Bellevue report. This study, "The Ties That Bind: TVA in a Competitive Electric Market," has concluded that the fence provisions should be changed in two phases. Phase 1 would allow TVA to conduct all conventional types of wholesale business with utilities bordering TVA and beyond. During Phase 1, TVA would not be allowed unbalanced access to traditional non-profit wholesale customers of neighboring utilities with which TVA's relationship has been severely restricted since 1959 and which cannot serve in the TVA territory under the TVA Act. Phase 2 would remove the fence entirely, giving TVA's current wholesale customers in the Valley free market access and, at the same time, permitting TVA to seek markets outside the Valley on the same basis that competitors could enter the Valley to provide service.

90

Comment: *Although retaining and expanding TVA's customer base through quality service at reasonable rates should remain a corporate goal, encouraging greater consumption per capita of electricity should not.*

Comment by: Sharon Fidler (League of Women Voters)

Response: TVA agrees that retaining and expanding TVA's customer base through quality service at reasonable rates should remain a corporate goal. One of TVA's goals is to be customer driven—to be recognized by our customers as the best and easiest corporation with which to do business, to anticipate the needs of our customers, and to continue to offer competitive prices.

In Energy Vision 2020, TVA has developed over 50 different customer service options (see Volume 1, Chapter 8). TVA has evaluated all customer service options for several criteria including: cost, electric rates, customer value, economic development, environmental quality, and financial factors such as debt (see Volume 1, Chapter 9). All customer service options, whether they increase or decrease consumption, that are recommended for implementation will either reduce cost or improve customer value (see Volume 1, Chapter 10, Figures 10-4 to 10-7).

91

Comment: *Keeping rates stable should not be the vision or goal of Energy Vision 2020.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: As stated in the Summary in Volume 1, the "purpose of Energy Vision 2020 is to identify, with extensive public involvement, long- and short-term actions TVA can take to provide flexible, competitive energy choices." As explained in this same section, TVA hopes to use its energy resource plan "to achieve its goals" of "competitively priced power, opportunities for economic growth, and a quality environment rich in natural resources." Stability of rates is an important indicator that TVA is maintaining itself as the energy supplier of choice, and this certainly advances opportunities for economic growth by contributing to a more stable economic environment.

The recommendations in the long-tern plan and short-term action plan in Energy Vision 2020 are based on consideration of a number of evaluation criteria. These criteria include long-term costs, customer value, short- to long-term electric rates, environmental

quality, economic development, reliability, debt, and risk management. Many of these criteria were suggested to TVA by the public.

92

Comment: *After reviewing the TVA 25-year energy plan, it seems the cost of electricity for the 8 million people in a 7-state region will be enormous.*

Comment by: Olivia Lim (Southeast Center for Ecological Awareness)

Response: In developing Energy Vision 2020, all proposed strategies and resource options were evaluated using several criteria. This includes long-term cost, short- to long-term electric rates, debt, environmental quality, customer value, economic development, reliability, and resource flexibility. The long- and short-term plans in Energy Vision 2020 balance the various criteria listed above.

The projection of electric rates shown in Volume 1, Chapter 10, Figure 10-8 indicates that from 1996 to 2005, electric rates/cost will increase less than the rate of inflation (approximately 3.3 percent per year). In addition, rates over the long term from 2005 to 2020 show only moderate increases. Thus, the plan does not project an enormous increase in the cost of electricity.

RELIABILITY

93

Comment: *TVA generally plans generation reliability to a one-day-outage-in-ten-years criteria. This is common in the utility industry.*

Comment by: Tennessee Valley Public Power Association

Response: Yes, this is a standard criterion in generation planning. TVA establishes its reliability criteria based on balancing the cost of adding capacity that would reduce customer outages and the cost to customers of outages. The resulting reliability criteria is approximately the same as the one-day-outage-in-ten-years criteria.

94

Comment: *The most important criterion for the Tennessee Valley Public Power Association was reliability. Unserved energy was used as a measure of reliability for the strategies.*

Comment by: Tennessee Valley Public Power Association

Response: TVA agrees that reliability is a critical factor when planning to meet future energy needs. For this reason, capacity reserve margins of 13 percent were included in all strategies. The strategies were then evaluated to determine their economic, environmental, and other impacts. All strategies met this reliability criteria.

RISK

95

Comment: *Another TVA objective for Energy Vision 2020 is maintaining flexibility—an appropriate objective in today's utility environment. In resource planning, maintaining flexibility typically means deferring capital commitment as long as possible. In the prelim-*

inary results, TVA has shown that making the strategies more flexible improves their attractiveness under the evaluation criteria. As we enter the twenty-first century, this will be the key to success for both private and public entities.

Comment by: Tennessee Valley Public Power Association, R. D. Newman (Bowater Newsprint)

Response: An important aspect of selecting any strategy for the future is dealing with the uncertainty of a rapidly changing world. Therefore, TVA carefully evaluated each strategy for Energy Vision 2020 for its flexibility (the ability to modify actions quickly in response to future changes).

96

Comment: *Memphis Light, Gas and Water, through its experience in the gas industry, has learned that flexibility is achieved by making short-term commitments to supply alternatives. Robustness is achieved by identifying the lowest cost alternatives that satisfy a range of uncertainties. Success is determined by one's ability to correctly perceive the market and respond with the proper financial and operational tools at hand. TVA's challenge in the electric industry will be no different.*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: TVA agrees with this comment concerning the need for flexibility and robustness. The long-term plan in Energy Vision 2020 emphasizes both robustness and flexibility, using a portfolio approach. TVA's short-term action plan emphasizes the implementation of flexible internal and external options that will allow TVA to adapt to changing industry circumstances. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

THE PROCESS

This section includes comments and responses about:
- the overall Energy Vision 2020 process
- the public participation process used in Energy Vision 2020

General

97

Comment: *TVA should be commended for seeking to develop and implement a process that would be beneficial to TVA, to its stakeholders, and to the nation.*

Comment by: Tennessee Valley Industrial Committee, Michael Browder (Bristol Tennessee Electric System), Mary English (University of Tennessee)

Response: This is one of TVA's goals for the integrated resource planning process.

98

Comment: *TVA is commended for doing an integrated resource plan. It is long overdue.*

Comment by: Patrick Byington (Alabama Environmental Council), Arthur Smith

Response: Although TVA has for many years done resource energy planning, this is the first time that TVA has sought widespread public involvement at the planning stage itself.

99

Comment: *TVA is congratulated for a planning process, including extensive public participation, that shows TVA's genuine regard for any effects that its actions may have on the environment, the economy, and the TVA region.*

Comment by: William Bowker (Kentucky Coal Marketing and Export Council), Marjorie Raines

Response: Your comment has been reviewed and noted.

100

Comment: *The Tennessee Valley Energy Reform Coalition believes that least-cost—including the environmental cost—strategic planning, coupled with vision will provide the formula and methodology for the long-term economic and environmental health of our region and TVA. Energy Vision 2020 has great potential to rekindle a sense of pride and mission in the employees of and citizens served by TVA as it charts a 25-year course.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Energy Vision 2020 considers competitively priced power, economic development, and the environment as part of TVA's mandate to be a leader in total resource development. Innovative approaches to meeting the demand for energy through new technologies and business arrangements are the means by which TVA can achieve all of

these goals: competitively priced power, opportunities for economic growth, and a quality environment rich in natural resources.

101

Comment: *Energy Vision 2020 is being developed with many state-of-the-art processes.*

Comment by: Tennessee Valley Public Power Association

Response: Many constructive comments and references to the best practices in doing integrated resource planning were very helpful in the early stages of TVA's process. These suggestions came from a variety of sources identified in the discussion on Public Participation in Volume 1, Chapter 1.

102

Comment: *The TVA Retirees Association is a voluntary group representing the interests of TVA retirees. Our active membership includes over 7,000 TVA retirees, organized in 21 chapters throughout the Tennessee Valley and Florida. Members represent a wide range of talents and perspectives gained from their years of work at TVA. Although no longer in the active work force, we continue our close interest in the success of TVA's programs and planning.*

Based on their views, the Association has concluded that the 18-month study which resulted in the draft Energy Vision 2020 represents a thorough and comprehensive approach to integrated resource planning and environmental analysis. It is clearly based upon a solid foundation of top-quality professional work. It reflects a sincere effort to fairly consider difficult issues, such as the nuclear construction program and TVA debt, in the context of providing a reliable and low-cost power supply.

Comment by: TVA Retirees Association

Response: Your comment has been reviewed and noted.

103

Comment: *If there are large numbers of the draft documents on hand, they should not go to waste. TVA could look for opportunities to place them in the hands of college students studying industry and technology, ecology, environmental policy, technical writing, and the like.*

Comment by: Tom Forsythe

Response: Thank you for the suggestion. We will take it into consideration.

104

Comment: *The public should be informed about the significance of the plan and how it will affect them and their children.*

Comment by: TVA Retirees Association, John Johnson (Earth First)

Response: The purpose of TVA's integrated resource plan is to develop a portfolio of resource options to meet customer needs. Increasing competition, changing technologies, and environmental concerns were among the many issues considered when TVA developed its plan. The long-term and short-term plans have set forth a range of actions TVA can use to meet the future needs of its customers.

Energy Vision 2020 has provided significant opportunities for public participation. TVA sought to incorporate a broad base of public input into the scope of the planning process. During the scoping stage, before the draft was published, and again after the draft was published, a series of public meetings was held in cities around the Valley to collect public input. At these meetings, interactive computer-video displays were available that addressed key issues related to the development of Energy Vision 2020. TVA technical experts also attended every meeting to discuss issues, respond to questions, and help record people's comments. The draft resource plan was offered for public review and comment through October 15, 1995. (See the Public Participation section of Volume 1, Chapter 1.) Over 2,500 copies of the document were sent out to the public.

Public Participation

105

Comment: *TVA is commended for its public involvement efforts.*

Comment by: Tom Fitzgerald (Kentucky Resources Council, Inc.), Jason Gurley, Barbara Altizer (Virginia Coal Council), Jamie Pizzirusso, Catherine Murray (Sierra Club, State of Franklin Group), Alan Jones (Tennessee Environmental Council), David Bordenkircher, Carolyn Novkov, Barbara Soliday, Retha Ferrell, Philip & Winfred Thomforde, Bruce Wood, Martha McGill, Mary Byrd Davis (Ygdrasil Institute), Michelle Neal (Tennessee Valley Energy Reform Coalition)

Response: Your comment has been reviewed and noted.

106

Comment: *TVA has conducted a thorough and effective planning process, seeking information from a diverse pool of interests. This includes the Energy Vision 2020 Review Group.*

Comment by: Don Dills (Tennessee Department of Environment and Conservation), Tennessee Valley Industrial Committee, Tennessee Valley Public Power Association, William Pippin (Huntsville Utilities), TVA Retirees Association

Response: This is one of TVA's goals for the integrated resource planning process.

107

Comment: *The hard work and cooperative spirit during the year-long Energy Vision 2020 Review Group was appreciated.*

Comment by: Eric Hirst (Oak Ridge National Laboratory), Sharon Fidler (League of Women Voters)

Response: Your comment has been reviewed and noted.

108

Comment: *TVA is commended for allowing individuals with diverse viewpoints to participate in a detailed way on the Energy Vision 2020 Review Group.*

Comment by: Michael Browder (Bristol Tennessee Electric System), Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: The plan is strengthened by diverse input.

109

Comment: *TVA provided an open forum and placed all information, assumptions, and data before the Energy Vision 2020 Review Group. It allowed the Energy Vision 2020 Review Group to hire independent consultants to provide opinions on load forecasting, the nuclear program, and resource integration. As a result of this, TVA changed its medium peak load forecast from 2.5 to 2.2 percent. The long-range forecast went from 2.0 to 1.9 percent.*

Comment by: William Pippin (Huntsville Utilities)

Response: The Energy Vision 2020 Review Group provided valuable input for the Energy Vision 2020 process.

110

Comment: *The TVA staff involved in Energy Vision 2020 are commended for their hard work and spirit of cooperation. TVA shared its data and rationale for the actions under consideration.*

Comment by: Sheila Holbrook-White (Sierra Club, Alabama Chapter), Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

111

Comment: *TVA listened to the Energy Vision 2020 Review Group's diverse plans of interests and suggestions and incorporated viewpoints into the overall plan.*

Comment by: William Pippin (Huntsville Utilities)

Response: In an effort to produce the best possible plan, TVA purposefully sought diverse viewpoints.

112

Comment: *Many on the Energy Vision 2020 Review Group have concerns about TVA's nuclear program and based on cost data, it became clearly evident that continuation of Bellefonte Nuclear Plant, Watts Bar Nuclear Plant Unit 2 and Browns Ferry Nuclear Plant Unit 1 would be very costly. The review panel could only conclude that it would not be wise to finish these units. It is very important to witness TVA in action. When the Board saw these figures themselves they announced that these units would not be completed.*

Comment by: William Pippin (Huntsville Utilities)

Response: TVA and its Board of Directors are concerned about and focused on TVA's financial viability, the size of its debt, and the ability of its generating resources to compete in the future. The TVA Board decided that TVA should not by itself complete Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2 or return Browns Ferry Nuclear Plant Unit 1 to service in light of the economic analyses that were produced during the Energy Vision 2020 process. (See Volume 2, Technical Document 8.)

113

Comment: *TVA should have challenged the Energy Vision 2020 Review Group to build consensus. TVA was more interested in hearing diverse opinions so that the Energy Vision 2020 Review Group would not give recommendations.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: It is true that the regularly held meetings between TVA staff and Energy Vision 2020 Review Group were used to learn from each other, as well as from outside experts, in all areas of the Energy Vision 2020 process. In an effort to produce the best possible plan, TVA purposefully sought diverse viewpoints. The input of Energy Vision 2020 Review Group members was seriously considered in every phase of the process in order to develop a long-range energy plan for a diverse constituency.

114

Comment: *You should listen to your elders, rather than arrest grandmothers.*

Comment by: Jennifer Hurgeton

Response: TVA encourages those interested in TVA's activities to make their views known. This has been especially true for Energy Vision 2020 where TVA's public participation effort has been wide-ranging and comprehensive.

115

Comment: *TVA should listen to its customers.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition), Hollis Fenn

Response: TVA makes a concerted effort to obtain the input of stakeholders and customers. The process used for Energy Vision 2020 exemplifies this. (See the Public Participation section of Volume 1, Chapter 1.)

116

Comment: *Citizens' comments should be taken seriously and interjected in the final plan.*

Comment by: Sheilla Cheyenne, Stephen Smith (Tennessee Valley Energy Reform Coalition), Jamie Pizzirusso, Michelle Neal (Tennessee Valley Energy Reform Coalition), Catherine Murray (Sierra Club, State of Franklin Group), Jonathan Scherch, Scott Banbury

Response: TVA has taken seriously all substantive public comments. Summaries of all oral and written comments TVA received on the draft Energy Vision 2020 have been included in the final document. When appropriate, changes to TVA's energy resource plan have been made in response to comments. We have not necessarily changed TVA's preferred strategy or its components in ways that every commenter has requested, but this does not mean that a particular commenter's position was not seriously considered.

117

Comment: *TVA should not treat the public as an antagonist, but as possible sources of resolution for its difficulties.*

Comment by: John Johnson (Earth First), Elizabeth Garber

Response: TVA greatly values public input. In developing Energy Vision 2020, TVA gathered comments from a series of public meetings, opinion leader interviews, and the Energy Vision 2020 Review Group. These comments provided the basis for the issues and criteria considered in the plan. After releasing the draft plan, TVA obtained additional comments from the public and the Energy Vision 2020 Review Group. These comments have been used as appropriate to further modify the plan. All comments are addressed in this volume.

118

Comment: *The only reason TVA is having a public process is because it is required to do so by law and it does not really care what its ratepayers think.*

Comment by: Leith Patton

Response: It is true that the National Environmental Policy Act requires that there be opportunities for public review and comment of proposed major federal actions for which environmental impact statements are required. However, TVA went well beyond the minimum requirements of the National Environmental Policy Act. For example, TVA decided to hold 12 scoping meetings and 9 hearings at various locations throughout the TVA region to ensure that the public had ample opportunities to learn about Energy Vision 2020 and to provide input. TVA also met with various stakeholder representatives for monthly meetings throughout the process (the Energy Vision 2020 Review Group). Finally, TVA provided 81 days for public comment on the draft document; applicable National Environmental Policy Act procedures require only a 45-day comment period.

119

Comment: *We understand that this public review process is just for show to make us feel as if we are being listened to.*

Comment by: Sheilla Cheyenne, Ann Harris, Beth Zilbert (Greenpeace)

Response: In general, the comments that TVA has received about the public participation process used in Energy Vision 2020 have commended TVA for the efforts it made to obtain public input. Public input was very critical to the formulation of evaluation criteria that were used to assess energy resource options and strategies. Public input also played an important role in the development of actual resource strategies.

120

Comment: *My earlier comments from the last round have not been addressed in the draft. I am nervous that they are not going to be addressed this time.*

Comment by: John van der Harst

Response: All comments received during the scoping phase of Energy Vision 2020 were carefully considered in determining the scope and formulating the process to develop TVA's plan for the future. This process resulted in a draft plan. You will find responses in this volume to each of the concerns you expressed in your comments on the draft Energy Vision 2020.

121

Comment: *Describe how the comments from the public meetings will be reviewed and handled in the agency; how will we know what the public supports?*

Comment by: Ann Harris, Monique Mollet, Rowland Huddleston

Response: The comment evaluation process is explained in the introduction to this volume.

122

Comment: *The TVA Least-Cost Planning Program, as outlined in the Energy Policy Act of 1992, calls for participation by TVA distributors. Memphis Light, Gas and Water believes that TVA did not adequately include distributors in the analysis of contract reform, rate structure incentives, distributor cost of capital, and demand-side management programs.*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: TVA provided distributors of TVA power a number of opportunities to participate in Energy Vision 2020, in full compliance with the requirements of the 1992 Energy Policy Act. TVA Energy Vision 2020 staff met with representatives of all distributors of TVA power, including Memphis Light, Gas and Water, to encourage and facilitate their input into the Energy Vision 2020 process. TVA provided the Tennessee Valley Public Power Association, which is an association representing TVA distributors, substantial financial assistance in order that they could retain independent expertise to review and comment on TVA's energy resource planning activities. Four distributors were designated by the Tennessee Valley Public Power Association to represent distributors on the Energy Vision 2020 Review Group. In addition, TVA Energy Vision 2020 staff met on a number of occasions with the Tennessee Valley Public Power Association Power Supply Committee whose responsibility it was to review the Energy Vision 2020 process. The Tennessee Valley Public Power Association and other distributors, who commented on Energy Vision 2020, generally expressed satisfaction with the opportunities TVA provided them for participation and the efforts TVA made to obtain their input.

123

Comment: *The opportunity for the Tennessee Valley Public Power Association to be directly involved in TVA's long-range planning process has been an enlightening experience. Four Tennessee Valley Public Power Association representatives had the opportunity to participate and comment for the Tennessee Valley Public Power Association through membership on the Energy Vision 2020 Review Group. Additionally, the 28 Tennessee Valley Public Power Association system managers who comprise the Tennessee Valley Public Power Association Power Supply Planning Committee, with consulting assistance, reviewed in-depth all the topics covered in the Energy Vision 2020 study.*

The opportunity to directly participate in this planning review process has been extremely helpful to the Tennessee Valley Public Power Association in assessing the long-term power supply options and range of potential effects on rates, reliability, debt, and various other measures of interest to power distribution systems and their customers.

Comment by: Tennessee Valley Public Power Association

Response: The input of customers in the Energy Vision 2020 process was an important part of the process.

124

Comment: *Staff willingness to work with the Tennessee Valley Public Power Association consultants in testing additional scenarios helped us reach separate but similar conclusions on the preferred plans for TVA to retain in its portfolio. Incidentally, several scenarios that Tennessee Valley Public Power Association members thought would score well did not turn out that way.*

Comment by: Tennessee Valley Public Power Association

Response: Thank you for your comments on the cooperation between TVA and the Tennessee Valley Public Power Association's consultants. It is an important form of validation when two groups can come to similar results when using different scenarios.

125

Comment: *I would like to see two public opinion surveys: one on the start-up of Watts Bar Nuclear Plant and one on photovoltaic pioneering programs.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

Response: TVA has no plans to conduct public opinion surveys at this time.

126

Comment: *The State of Tennessee will monitor implementation of the plan. We would like to be involved in future phases of decision-making as you determine which options would be most beneficial for the Tennessee economy, and its cultural and environmental prosperity.*

Comment by: Don Dills (Tennessee Department of Environment and Conservation)

Response: We look forward to cooperating with the State of Tennessee in TVA's future activities.

127

Comment: *TVA should establish a mechanism for regular public participation in its energy resource decision-making. For example, TVA needs to meet regularly with a knowledgeable group of people.*

Comment by: John Johnson (Earth First), Olivia Lim (Southeast Center for Ecological Awareness), Susan Bailey, Debra Jackson, Clark Buchner (Sierra Club, Tennessee Chapter), Hester Cope (Alabama Environmental Council)

Response: There are a number of existing processes for involvement in TVA decision-making, including its energy resource decision-making. For example, the meetings of TVA's Board of Directors are open to the public, and members of the public can address the Board on matters that interest them. Prior to making decisions to select new major energy resource options, TVA provides the public opportunities to be involved in the context of its environmental reviews under the National Environmental Policy Act. As appropriate, TVA seeks out the views of knowledgeable people as it did for Energy Vision 2020.

128

Comment: *My library has no copy of your Energy Vision 2020 report and I do not know if it pertains to organizational structure and advice on how to run your business, or precludes everything.*

Specifically, I wish to know if ordinary citizens like myself may send inventive ideas and solutions for your consideration and development. If so, to whom would they be addressed?

Comment by: William Shadden

Response: You can provide your comments by calling any one of the TVA Customer Service Centers listed below:

Chattanooga, TN	423-697-4220	Mayfield, KY Office	502-247-2442
Cleveland, TN	423-472-3355	Bowling Green, KY	502-781-7653
Columbia, TN	615-380-8000	Memphis, TN	901-756-3500
Huntsville, AL	205-534-8434	Murfreesboro, TN	615-893-8161
Jackson, TN	901-423-5100	Muscle Shoals, AL	205-386-2025
Johnson City, TN	423-434-8700	Nashville, TN	615-231-7245
Kentucky	502-782-6559	Tupelo, MS	601-891-4450
Knoxville, TN	423-673-2200	Starkville, MS	601-338-3160

We will make every effort to ensure that the final version of Energy Vision 2020 will be at your local library, and we will send you a copy.

129

Comment: *Please include my resume and miscellaneous information attached to my resume as appendices in the final Energy Vision 2020.*

Comment by: Daniel Axelrod

Response: The submittal is not appropriate as appendices to the final document.

130

Comment: *TVA's 25-year energy plan affects us all.*

Comment by: Patricia Chapman, Linda Church Ciocci (National Hydropower Association), Olivia Lim (Southeast Center for Ecological Awareness)

Response: It is because of the importance of Energy Vision 2020 that TVA sought widespread public input and provided many more opportunities for this than the minimum specified by law.

131

Comment: *I appreciate TVA allowing people to either speak in a lecture hall or a small room on tape since I do not have much time.*

Comment by: Susan Jata

Response: You are welcome.

132

Comment: *The decision-makers of TVA should be at the public meetings.*

Comment by: Tom Phillips, Beth Zilbert (Greenpeace), Retha Ferrell

Response: Senior TVA management attended every public meeting to serve as hearing officers and listen to commenters. Management representatives included:

- Dwight Nunn, Vice President Nuclear
- Bill Museler, Senior Vice President Transmission/Power Supply
- Glenn Parrish, Vice President Customer Group
- Jimmy Cross, Vice President System Planning
- Henry Martinez, Vice President Hydro Operations
- Terry Kemp, Customer Service Center Manager
- Don Dickerson, Customer Service Center Manager
- Myron Callahan, Customer Service Center Manager
- Ron Williams, Acting Vice President, Environmental Research Center.

The TVA Board of Directors will be provided the final Energy Vision 2020 document, which will include this public comment and response volume. The Board will consider the final document, its recommendations, and the public comments for at least a 30-day period before making a final decision.

133

Comment: *TVA employees should be at the public meetings to hear the public's views rather than what they are being fed at TVA.*

Comment by: Retha Ferrell

Response: A number of TVA employees with technical expertise relevant to the Energy Vision 2020 process were present at every public meeting to respond to public questions and hear their concerns. All TVA employees received notice of scheduled public meetings and could have attended those meetings if they desired. A number of employees in fact did so and also provided their own comments on Energy Vision 2020.

134

Comment: *TVA did not adequately advertise the public meetings.*

Comment by: Carolyn Novkov, Retha Ferrell, Dianna Young

Response: The Energy Vision 2020 public meetings on the draft document were widely advertised. Press notices containing the meeting schedules were released in August prior to the first meeting, notices of the meetings were placed in 50 local newspapers, and approximately 150 public service announcements about the meetings were made. A substantial number of newspapers carried stories about the meetings, and various TVA employees were interviewed by the press about the meetings and Energy Vision 2020 prior to each meeting. In addition, over 2,000 copies of the meeting schedules were directly mailed to interested members of the public along with copies of the draft document. Notice of the meetings was also provided in "TVA Today," and TVA employees received notice of the meetings.

135

Comment: *There were too many people at the Nashville hearing for the time allotted for comment.*

Comment by: John van der Harst

Response: The Nashville hearing was extended by an hour and a half to allow time for all commenters. Also, there was a separate room for tape-recorded comments for individuals whose time was constrained. In addition, almost a month was available after the hearing in which to submit written comments.

136

Comment: *I attended the Chattanooga public hearing and there were no accommodations for the handicapped.*

Comment by: Ann Harris

Response: There was a ramp next to the front stairs at the Chattanooga public meeting. Needs of the handicapped were a consideration at all the meetings. The advertisements gave a TDD number for the hearing impaired to request an interpreter, and all meeting rooms were wheelchair accessible.

EXISTING SYSTEM

This section includes comments and responses about:

- TVA's debt
- TVA's existing electric rate structure and its effect on energy use
- the operation of TVA's existing generating units, including its coal-fired, hydroelectric, and nuclear units
- the merits and economics of Watts Bar Nuclear Plant Unit 1, and other issues (assumptions, safety and health) related to start-up and operation of Watts Bar Nuclear Plant Unit 1 and restart of Browns Ferry Nuclear Plant Unit 3

This section includes a comprehensive response for a number of comments about the economics of operating Watts Bar Nuclear Plant Unit 1.

General

137

Comment: *TVA has several improvements planned for the transmission system. The projects are needed primarily due to load flow issues. No voltage stability problems were identified on the bulk system.*

Comment by: Tennessee Valley Public Power Association

Response: Generator unit stability is a concern in TVA, but voltage stability is not known to be a problem in this area.

138

Comment: *TVA has financial and environmental problems.*

Comment by: Debra Jackson

Response: TVA recognizes the importance of financial health and environmental stewardship. For this reason, both the financial situation and environmental impacts are used as criteria to evaluate all strategies considered in Energy Vision 2020.

Financial/Debt

139

Comment: *As businesses looking at TVA's worth and value to the Valley and to the nation, we do not view TVA's debt as unmanageable.*

Comment by: Tennessee Valley Industrial Committee

Response: We agree. TVA has an aggressive debt management program. Since 1989, it has refinanced high-interest debt to accomplish annual interest savings of $317 million. By

1998, TVA expects to generate all of its capital funds internally, thus, eliminating the need to borrow new debt.

140

Comment: *TVA has taken a big step by voluntarily capping its debt at $28 billion. It would be more believable if this was a legal requirement.*

Comment by: Powell & Sharon Foster, Jamie Pizzirusso, Hamp Dobbins, Jr., Alan Jones (Tennessee Environmental Council), Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA is committed to not exceeding its voluntary cap of $2 to $3 billion below its statutorily mandated $30 billion cap.

141

Comment: *In light of its bad financial straits, TVA's selling bonds seems like fraud.*

Comment by: James Riccio (Public Citizens Critical Mass Energy Project)

Response: Since 1988, TVA has taken significant actions to improve its financial position—notably by reducing the work force by half and cutting expenses throughout the corporation by $800 million. TVA generates more than sufficient cash to fund its ongoing operations and to service its debt.

TVA, like many industrial companies, borrows to finance growth. Once it completes its major capital program to expand capacity in the first quarter of 1996, TVA's need for capital will decrease significantly, which will continue to improve its competitive position within the region.

TVA has consistently met its very stringent bond tests and continues to carry the highest possible debt rating from rating agencies.

142

Comment: *Who would invest in TVA in light of its deplorable debt?*

Comment by: Bruce Wood

Response: The amount of debt a company has is not as important as its ability to repay its debt. TVA has over $33 billion in assets along with sufficient revenue to meet all of its debt obligations. TVA expects to be able to continue to manage its debt.

143

Comment: *In noting the financial strength of TVA, the following statement is made: "TVA's power program is self-supporting with revenues from power sales." Does TVA also have "non-power programs" which are factored into projections? (See Executive Summary, page 3.)*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Energy Vision 2020 considers TVA's power program since integrated resource plans generally address the types of resources necessary to meet electricity or energy needs. Therefore, TVA's non-power program, which receives funds through congressional appropriations, is not factored into projections.

144

Comment: *TVA has misled the ratepayers in the past by not including $14 billion in the rate base. How many other costs has TVA left off?*

Comment by: Ann Harris

Response: All of TVA's financial information is properly disclosed in its financial statements as certified by Coopers and Lybrand L.L.P. This is an independent accounting firm.

145

Comment: *According to the United States General Accounting Office, 69 percent of TVA's $27 billion debt is due to its nuclear program, which produces only 14 percent of TVA's power.*

Comment by: Bryan Deel, Andy Fazio, Susan Switzer, Jenny Willoghby, Richard Simmers, Beth Zilbert (Greenpeace)

Response: The nuclear program has contributed to TVA's debt. However, the completion of the remaining large nuclear capital construction projects and the addition of other non-nuclear resources to the TVA system should reduce the nuclear program's contribution to any future debt. By 1997, nuclear generation is expected to be 20 percent of TVA's total generation. TVA is committed to keeping its debt below the statutorily-mandated $30 billion cap.

146

Comment: *According to my calculations, TVA has accrued $3,000 of debt for every person in the TVA region.*

Comment by: Kirk Johnson

Response: TVA can only issue debt to provide capital for its power program and to refund existing indebtedness. TVA provides electric power for the residents in the 7-state TVA region. TVA's customers have among the lowest residential rates in the United States.

147

Comment: *Approximately 30 percent of my bill goes to pay interest on TVA's $26 billion debt.*

Comment by: Jean Cheney

Response: While it is true that approximately 30 percent of TVA's expenses is for debt service, TVA has undergone an aggressive debt refinancing program since 1989 which has resulted in annual interest savings over $317 million. TVA's customers have among the lowest residential rates in the United States, and TVA has not had a rate increase in nine years.

148

Comment: *Since TVA's focus has become profits, the debt has increased.*

Comment by: Paul Elliott

Response: TVA's debt has increased as its business has grown. TVA's focus is on providing electric power to the residents and businesses in the seven state Tennessee Valley region. TVA's rates are among the lowest in the nation and have remained stable for nine years. This low-cost electric power has contributed to attracting new businesses to the region.

149

Comment: *Allowance for funds used during construction (AFUDC), or interest expense capitalized as part of the cost of construction, has been recognized by TVA in its financial statements. AFUDC transfers a portion of the interest costs from current period expenses on the income statement to the assets on the balance sheet. This decreases the amount of interest cost recovered in current revenues and spreads that recovery through depreciation over the life of the assets.*

The exception to this is that TVA has not recognized AFUDC on new nuclear construction for several years. AFUDC is still recorded on all plant additions and improvements, including those related to nuclear facilities. Since no current interest cost has been capitalized on the investment in the new nuclear facilities which were included in construction work-in-progress or on the investment in those nuclear units which were deferred, the carrying cost (interest on investment) of these plant investments has been recovered from the current ratepayers. If AFUDC had continued to be recorded on the nuclear facilities, it would have caused the costs of the nuclear facilities to be much higher but the current revenue requirement would have been substantially lower. This approach has provided TVA with more timely recovery of these financing costs than it would have received if the AFUDC was recognized. Since this has had the effect of raising the current revenue requirement and lowering the amount of rate increase required when the nuclear units are placed in service, the non-recognition of AFUDC on these facilities has had somewhat of a rate stabilization effect.

Comment by: Tennessee Valley Public Power Association

Response: The discontinuance of AFUDC on substantially complete and deferred nuclear units has the effect of lowering revenue needed to produce desired operating margins.

150

Comment: *To be credible TVA should be honest as in accounting for expenditures.*

Comment by: Elizabeth Garber, John Sharp, Jr.

Response: We agree. TVA uses standard accounting practices.

Rates

151

Comment: *In 1994, TVA's average revenue rate per kilowatt-hour was 4.22 cents. Compared to other major utilities in the southeastern quadrant of the country, TVA's average rates are at the lower end of the spectrum, which ranges from approximately 4.0 cents per kilowatt-hour to about 8.5 cents per kilowatt-hour.*

Comment by: Tennessee Valley Public Power Association

Response: We agree that TVA rates are very competitive.

152

Comment: *We commend TVA for holding rates constant.*

Comment by: Bill O'Brien (B. F. Goodrich)

Response: Your comment has been reviewed and noted.

153

Comment: *One of the more significant issues that could cause TVA's rates to rise in the future is its level of debt service requirements. TVA has stated that it plans to limit further growth in the amount of its outstanding debt. TVA's ability to hold level or reduce its outstanding debt is contingent on the extent of its capital expenditures programs. If the level of these expenditures drops substantially after the nuclear program is completed, TVA would then be able to use internally generated funds to reduce the debt and, potentially, have the flexibility to decrease its rates. However, if extensive future investments in new or replacement facilities are planned or come up unexpectedly, this may prevent TVA from having that flexibility to adjust its rates downward.*

Comment by: Tennessee Valley Public Power Association

Response: TVA, like many industrial companies, borrows to finance growth. Once it completes its major capital program to expand capacity in the first quarter of 1996, TVA's need for capital will decrease significantly. The level of capital spending is scheduled to be reduced by $1 billion through fiscal year 1997. This enables TVA to, in the near term, cap its debt at the self-imposed limit of $2 to $3 billion below the $30 billion allowed by Congress and, ultimately, to reduce its debt, thereby continuing to improve its competitive position within the region.

154

Comment: *TVA's existing rate structure includes a demand charge that is high for peak usage that encourages demand-side management.*

Comment by: Michael Browder (Bristol Tennessee Electric System)

Response: It is true that as demand charges increase, consumers are encouraged to reduce demand.

155

Comment: *Residential ratepayers are subsidizing big business and industries. I do not understand that.*

Comment by: Michelle Carratu, Bruce Wood

Response: Residential ratepayers do not subsidize big business or industry. TVA employs a cost-of-service concept and its rates are based on the cost of providing service to each customer class.

156

Comment: *TVA's rates are artificially low because the federal government pays some of their bills.*

Comment by: Lynn Leach (Alabama Environmental Council)

Response: The TVA power program is totally self-financing and receives no appropriated (taxpayer) monies. The power program operates on funds collected from electricity users. The appropriations TVA receives fund other programs such as the management of TVA's reservoir system and the watershed water quality protection activities.

157

Comment: *TVA's Economy Surplus Power rate is interruptible and this reduces the capacity TVA would need during peak periods such as in July. People buying this power were interrupted.*

Comment by: Michael Browder (Bristol Tennessee Electric System)

Response: Your comment has been reviewed and noted.

158

Comment: *TVA should eliminate the rate breaks for industries that have agreed to allow service to be interrupted. TVA has not exercised its right to interrupt for years. These special rates mean increased rates for others who must make up the revenue difference.*

Comment by: John Sharp, Jr.

Response: TVA has several different types of interruptible power available to industrial customers. Many of these industrial customers agreed to use interruptible power for a portion of their requirements in lieu of installing their own generation facilities or moving the production to another location outside the TVA service area. By allowing these customers to use interruptible power, TVA has retained a portion of the firm load that would have been lost and has also gained an important demand-side management tool. Over the years TVA has in fact exercised its right to interrupt power to these customers. The interruptions have been on both a voluntary and mandatory basis. This type of demand-side management tool benefits all TVA power consumers.

Generating Resources

FOSSIL AND HYDROELECTRIC

159

Comment: *Energy Vision 2020 properly places great emphasis on TVA's existing coal-fired generating plants in both the short-term and long-term plans. Along with the nuclear units (including Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3), they will continue to be the backbone of TVA's power system. By the year 2020, the coal-fired units, which make up over 50 percent of today's capacity, will be approaching 70 years old. This is about twice the service life expected when the units were planned and built.*

Formal life extension or modernization programs have been in place for many of the units for a number of years. Routine rehabilitation of major unit components has been a part of the operation and maintenance program for the last 30 years. The technology to secure the expected improvement in plant efficiency and reliability that the plan projects is readily available and achievable for the short-term 10-year period. Additionally, there

is no reason to believe that given good maintenance practices, the great majority of the coal-fired plants cannot continue to operate through the Energy Vision 2020 period.

Comment by: TVA Retirees Association

Response: Your comment has been reviewed and noted.

160

Comment: *Modern high-tech coal-fired plants are meeting clean air standards, operating with zero discharge levels for water, and recycling combustion byproducts—all of this by producing electricity for low cost to the consumer.*

Comment by: Barbara Altizer (Virginia Coal Council)

Response: TVA agrees that modern coal-fired plants, with their associated pollution control equipment and designs, produce much less pollution than older plants. The coal-fired plants included as supply-side options for the Energy Vision 2020 analyses assume the use of Best Available Control Technology (BACT) for emissions from the facilities.

161

Comment: *TVA should be congratulated for its clean coal technology improvements.*

Comment by: James Gillum (Tennessee River Valley Association)

Response: Your comment has been reviewed and noted.

162

Comment: *I do not expect the fossil units now in service to provide another 25 years of efficient service.*

Comment by: Whiting Delk

Response: TVA has a program to replace or refurbish major unit components at its fossil units as well as the auxiliary equipment where assessments show a need and benefit. With this dedication to the maintenance of the units, the units are expected to continue to be a viable source of electricity for at least another 25 years. Energy Vision 2020 takes this into account. (For information on TVA's existing power system, see Volume 1, Chapter 4.)

163

Comment: *The out-of-state corporations from whom TVA buys coal are failing to declare this for purposes of state franchise revenue purposes. TVA should guarantee proper state tax enforcement.*

Comment by: Charles Sanford (Sanford & Associates)

Response: State tax enforcement is not a TVA responsibility. TVA requires and expects its contractors to comply with all applicable laws.

164

Comment: *Hydroelectric power is reliable, efficient, and low cost. TVA's 29 existing conventional hydro projects and the Raccoon Mountain pumped-storage project have helped provide a solid economic foundation throughout the Tennessee Valley for decades.*

TVA's hydro projects contribute to the quality of life in the Tennessee Valley beyond the traditional electricity benefits. Hydro project reservoirs and associated lands provide many opportunities for families and recreationists with a wide variety of interests, including fishing, boating, camping, hiking, picnic areas, and sports playing fields. Reservoirs also may supply community drinking water and irrigation needs. Hydro development creates opportunities to enhance fish and wildlife habitat, promote scientific understanding of aquatic life, and reduce water pollution. By controlling water levels, many hydropower facilities also control seasonal flooding or facilitate the navigation of ships and barges that transport products and agricultural goods.

Comment by: Linda Church Ciocci (National Hydropower Association)

Response: TVA considers the resources provided by the Tennessee River system to be one of the cornerstones for the prosperity of the Tennessee Valley.

165

Comment: *Reconsider deep drawdowns to TVA lakes, since this results in sedimentation, decreased recreation values, and damage to the flora and fauna. Any losses in revenue involved in this procedural change could be offset by modernizing the hydro plants to increase their efficiency.*

Comment by: Powell & Sharon Foster

Response: In the late 1980s, TVA evaluated the potential financial and environmental impacts of altering TVA's reservoir management policies. This evaluation culminated in a Final Environmental Impact Statement, "Tennessee River and Reservoir System Operation and Planning Review," that was released to the public in December 1990. Based on this evaluation, TVA decided to maintain higher lake levels on its tributary (headwater) reservoirs for a longer period in the summer months, but to continue with normal winter drawdowns. Maintaining higher lake levels for even longer periods of time was determined to be financially or environmentally unacceptable. TVA has not proposed to re-evaluate reservoir levels as part of its Energy Vision 2020 integrated resource planning process. It has, however, evaluated the merits of continuing the modernization of hydroelectric plants, and this is one of the energy resource options identified in the short-term action plan.

166

Comment: *The hydro plants are undermaintained and are disasters waiting to happen.*

Comment by: Stan Gloeckner (Sierra Club)

Response: TVA's Dam Safety Program, which includes regularly scheduled rigorous inspections, was audited by the United States Office of Management and Budget in 1987. The program was recognized as one of the best among federal programs and one which should be a model for other agencies. All of TVA's dams have been assessed against today's seismic, hydrologic, and structural standards. Several require upgrades to handle

the probable maximum flood. These upgrades will be completed in the next four years. The hydro power plants have continuously been the most reliable units in the TVA system. The current hydro modernization program is designed to increase capacity and efficiency, and to ensure continual exceptional reliability for the next 50 years.

167

Comment: *A study revealed that TVA has the highest operating costs compared to other utilities for hydro operations. TVA believes that by remotely controlling all of its plants, the operating and maintenance costs should be reduced to be more in line with other utility hydro operations.*

Comment by: Tennessee Valley Public Power Association

Response: The comment is correct in its observations about TVA's previous operating costs for its hydro facilities. These costs are being reduced.

NUCLEAR

168

Comment: *TVA is assuming that steam generator replacements at Sequoyah Nuclear Plant Units 1 and 2 and at Watts Bar Nuclear Plant Units 1 and 2 will cost $150 million per unit. It does not give a basis for this number, which is generally consistent with recent industry experience.*

Comment by: Tennessee Valley Public Power Association

Response: The basis for the cost of $150 million per unit is recent industry replacement costs at domestic plants. North Anna Nuclear Plant Unit 1 completed steam generator replacement in 1993 for a cost of $125 million. This replacement was for three steam generators; Sequoyah and Watts Bar Nuclear Plants have four steam generators each.

169

Comment: *It is not clear that TVA has done all that might be done to minimize the potential for future impacts of generic equipment problems at its nuclear plants. The failure to install hydrogen water chemistry (to reduce the potential for stress corrosion cracking of reactor vessel internals) at Browns Ferry Nuclear Plant is one example. Also, it appears that TVA has not done all that could be done to prevent problems with low-pressure turbine rotors or generator rotors and stators. This is of particular concern given how much money has been spent on additions and improvements at Browns Ferry Nuclear Plant and Sequoyah Nuclear Plant.*

Comment by: Tennessee Valley Public Power Association

Response: TVA is currently evaluating the feasibility of installing hydrogen water chemistry at Browns Ferry Nuclear Plant.

TVA performs all required inspections and necessary repairs on low-pressure turbine rotors or generator rotors and stators, and does not have a history of major problems with this equipment. Three spare turbine rotors are maintained at each site to support the Browns Ferry and Sequoyah nuclear operating units. With regard to the generators,

TVA has been proactive in upgrading its Sequoyah Nuclear Plant generators, including replacement of the Sequoyah Nuclear Plant Unit 1 stator winding, replacement of all generator rotor retaining rings, and installation of upgraded winding modules for Sequoyah Nuclear Plant Unit 2. In addition, the Browns Ferry Nuclear Plant Unit 2 generator was tested and defective stator bars were replaced.

170

Comment: *There is a crack in the reactor pressure vessel head at Weld W-09-10 at Sequoyah Nuclear Plant Unit 1.*

Comment by: Jeannine Honicker

Response: The preservice ultrasonic examination of the Sequoyah Nuclear Plant Unit 1 reactor closure head revealed a flaw in weld W-09-10. The flaw exceeded the acceptance tables and required acceptance by analytical evaluation as allowed by the American Society of Mechanical Engineers Boiler and Pressure Vessel code. The flaw was classified as a subsurface (mid-wall) planar flaw. The code classifies flaws of this nature as a crack for conservatism even though this flaw was actually entrapped slag from the fabrication welding process. TVA demonstrated that if the crack growth rate was one thousand times greater than that used in the analysis, the resultant flaw would still meet the acceptance criteria of the American Society of Mechanical Engineers code.

Based upon an independent calculation and a review of TVA's analysis, the Nuclear Regulatory Commission agreed that the closure head was acceptable for service. In order to verify the predictions of the analysis, the Nuclear Regulatory Commission required TVA to monitor the flaw for growth rates.

The flaw in weld W-09-10 was identified in 1979. Sequoyah Nuclear Plant Unit 1 began producing commercial power in 1981. The flaw was ultrasonically examined in 1984, 1990, and 1993 with no flaw growth found. The weld will continue to be monitored throughout the service life of the plant in accordance with the American Society of Mechanical Engineers Inservice Inspection Code.

171

Comment: *Without license extensions by the United States Nuclear Regulatory Commission for Browns Ferry Nuclear Plant Units 1, 2, and 3 and Sequoyah Nuclear Plant Units 1 and 2, Watts Bar Nuclear Plant Unit 1 will be the only TVA nuclear unit producing power in 2020.*

Comment by: Whiting Delk

Response: TVA nuclear units have a 40-year operating license. Both Sequoyah Nuclear Plant units and Watts Bar Nuclear Plant Unit 1 will be licensed to produce power in 2020. TVA anticipates that Browns Ferry Nuclear Plant Units 2 and 3 are excellent candidates for license extension and are expected to be available over the Energy Vision 2020 study period. This is discussed in the section on TVA's Nuclear Plants in Volume 2, Technical Document 3.

In 1995, the Nuclear Regulatory Commission revised and issued 10-CFR-54, a rule on license extension. TVA's assessment of the revised rule is that it is a workable approach to license renewal and TVA expects that any process questions will be resolved in time to support preparation of license extension applications for TVA nuclear units.

172

Comment: *If you add together capital, decommissioning, and maintenance costs, Watts Bar Nuclear Plant Units 1 and 2 cost $15 billion and have not generated anything yet.*

Comment by: Ann Harris

Response: TVA has invested a total of $8.5 billion into Watts Bar Nuclear Plant. This includes an investment of $6.8 billion in the construction of Watts Bar Nuclear Plant Unit 1 and $1.7 billion in Watts Bar Nuclear Plant Unit 2. These costs have been incurred and will have to be repaid whether or not Watts Bar Nuclear Plant Unit 1 operates. Operating the unit will allow TVA the opportunity of earning a return on the agency's investment. In December 1994, the TVA Board decided it would not, by itself, complete Watts Bar Nuclear Plant Unit 2 as a nuclear unit.

No expenses have been incurred for maintenance or decommissioning. Expenses for maintenance will be spent over the life of the unit to ensure safe and efficient operation. Payments to the decommissioning fund will also be made over the 40-year life of the unit.

173

Comment: *TVA is violating the TVA Act requirement to produce electricity at the lowest possible cost because of the cost of its nuclear program.*

Comment by: Jeannine Honicker

Response: The current cost of power is dependent on many factors, and TVA produces electricity at the lowest possible cost in light of these factors. TVA has not violated the TVA Act.

174

Comment: *TVA is locked into huge nuclear plants that are extremely expensive, high risk, and have permanent pollution.*

Comment by: Bruce Wood

Response: Nuclear power is a vital part of TVA's power mix. Nuclear plants supply energy reliably, safely, and with little environmental impact. The Nuclear Regulatory Commission monitors plant operations every day and conducts comprehensive reviews that cover all aspects of the plants. TVA's Nuclear Plants are economical to operate. The nuclear industry and TVA are dedicated to safe and efficient nuclear plant operation.

In December 1994, as one of the actions to limit debt, TVA decided it would not, by itself, complete Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2, as nuclear units. Browns Ferry Nuclear Plant Unit 1 will continue in its inoperative status.

The short- and long-term plans proposed in Energy Vision 2020 provide TVA enhanced flexibility so that it is not locked into any specific kind of resource in the future. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

175

Comment: *For the amount of money TVA spent on its nuclear program, it could have put photovoltaics on every residence and business in Tennessee. I know this cannot be done now because TVA's debt has eliminated choices. That is money that could have been used for cleaning up emissions, insulating homes, and advanced power systems.*

Comment by: Dolores Howard, Myles Jakubowski (Sunbeam Household Products)

Response: Energy Vision 2020 evaluated the completion of Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2, as well as central station and end-use solar photovoltaics. (See Volume 2, Technical Document 8, Figures T8-9 and T8-18, and pages T8.65 to T8.83.) The short-term action plan recommends research and development of distributed generation alternatives, which includes end-use solar photovoltaics. (See Volume 1, Chapter 10, Figure 10-1.)

WATTS BAR NUCLEAR PLANT UNIT 1/BROWNS FERRY NUCLEAR PLANT UNIT 3

Economics/Alternatives of Watts Bar Nuclear Plant Unit 1

The following comments are addressed in a comprehensive response that appears after comment number 205.

176 **Comment:** *To have an adequate Energy Vision 2020, TVA needs to fully assess and include in Energy Vision 2020 the completion of Watts Bar Nuclear Plant Unit 1 including uncertainties of start-up date, completion costs, operating costs and performance, decommissioning costs, capital cost, total cost, cost effectiveness, alternative resources, and corrections of safety violations. According to the United States General Accounting Office, TVA spent in 1994 an average of $1.1 million daily on Watts Bar Nuclear Plant Unit 1.*

Comment by: Eric Hirst (Oak Ridge National Laboratory), Mary English (University of Tennessee), Mary Byrd Davis (Ygdrasil Institute), Powell & Sharon Foster, Danielle Droitsch, Mandy Tiesler, Jamie Pizzirusso, Michelle Neal (Tennessee Valley Energy Reform Coalition), Stephen Smith (Tennessee Valley Energy Reform Coalition), Nancy Bell, Leith Patton, Sheila Holbrook-White (Sierra Club, Alabama Chapter), Bryan Deel, Stephanie Calvert, Beth Zilbert (Greenpeace), Andy Fazio, Maggie Kalen (Tennessee Valley Energy Reform Coalition), James Riccio (Public Citizens Critical Mass Energy Project), Jim Snell, David Bordenkircher, Henry Nickell (Memphis Light, Gas and Water Division), John Johnson (Earth First), Tom Fitzgerald (Kentucky Resources Council, Inc.)

177 **Comment:** *You can slow the Watts Bar Nuclear Plant fuel loading and get the information from independent sources which will prove beyond a doubt that the power generated by Watts Bar Nuclear Plant will not be competitive and that fuel loading should be deferred.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

178 **Comment:** *I am opposed to the start-up of Watts Bar Nuclear Plant Unit 1. Watts Bar Nuclear Plant Unit 1 costs over $8 billion to construct, costs over $1 million per day until it can be licensed, decommissioning costs will be at least $500,000 million, and it has thousands of outstanding safety violations.*

Comment by: Walter & Dorothy Stark, Jamie Pizzirusso, Mandy Tiesler, Mark Johnson, Jason Gurley, Jenny Willoghby, Beth Zilbert (Greenpeace), Stephen Smith (Tennessee Valley Energy Reform Coalition), Beth Wallace, Leith Patton, Dennis Henke, James Riccio (Public Citizens Critical Mass Energy Project), Peggy Snow, James Barr, Jim Snell, Howard Switzer (Sun/Earth Tempered Organic Architecture), Sharon Force, Tom Phillips, Olivia Lim (Southeast Center for Ecological Awareness), John Johnson (Earth First), Jean Cheney, Jan Jones (Tennessee River Valley Association), Dennis Haldeman

179 **Comment:** *Given TVA's history of underestimating construction costs and the nuclear power industry's limited experience, nuclear plant decommissioning costs should have been a key uncertainty. TVA admits (see Volume 2, Technical Document 3, page T3.8) the difficulty in estimating actual nuclear plant decommissioning costs and equitably recovering*

these costs from ratepayers throughout the life of the plant. While the majority of Watts Bar Nuclear Plant Unit 1 construction costs are sunk, until fuel is loaded, no decommissioning costs are incurred. If TVA amortized its medium case decommissioning costs over the 30-year life of the plant, at its costs of capital of 7.75 percent, assuming all other costs and capacity factor at the medium case, TVA's production costs would be $22.55 per megawatt-hour (plant production costs at the recent 4-year average capacity factor and operating and maintenance cost is $26.91 per megawatt-hour). Given the uncertainty in capacity factor and operation and maintenance costs, this price is comparable to current bulk power available through interchange. TVA's estimated annual cost of deferring a nuclear plant is $10 to $20 million per year (see Volume 2, Technical Document 8, page T8.72). It would seem prudent to defer the start-up of Watts Bar Nuclear Plant Unit 1 until a clear economic advantage appeared.

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

---

180 **Comment:** *Because nuclear costs are as high as 8 cents per kilowatt-hour including operating and maintenance and additions and improvements costs of 3 to 4 cents per kilowatt-hour, TVA probably would be better off trying to divest itself of Watts Bar Nuclear Plant Unit 1 and associated risk.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District)

---

181 **Comment:** *If Watts Bar Nuclear Plant Unit 1 costs $6.7 billion to build and it is depreciated over its planned life cycle of 25 years, that amounts to $268 million per year in depreciation alone. If it operates at full capacity 100 percent of the time, 1,100 megawatts at 1.7 cents per kilowatt-hour amounts to income of only $163 million per year. That does not include any costs for operation, fuel, maintenance, decommissioning, and no outages. The true costs of electricity from that plant, I believe, will be 5 or 6 cents per kilowatt-hour. That is not good economics.*

Comment by: Arthur Smith, Bryan Deel, Stephanie Calvert, Debra Jackson, Faith Young, Stephen Smith (Tennessee Valley Energy Reform Coalition)

---

182 **Comment:** *In their economic projections, TVA apparently chose to ignore the $6.8 billion they have spent to date trying to build Watts Bar Nuclear Plant.*

Comment by: Beth Zilbert (Greenpeace)

---

183 **Comment:** *TVA should recognize that the $7 to $8 billion sunk into Watts Bar Nuclear Plant are already lost and the best thing to do now is to quit throwing money at it. Watts Bar Nuclear Plant is ultimately the camel that breaks the back.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Richard Simmers, Dolores Howard, Dennis Haldeman

---

184 **Comment:** *If Watts Bar Nuclear Plant Unit 1 starts producing electricity, it would cap an embarrassing 22-year construction period marred by cost overruns and endless delays. TVA states that Watts Bar Nuclear Plant Unit 1 will be operated at "…a very economical and competitive cost." While it is true that nuclear power is typified by low operation and maintenance costs, its capital costs (the expense to finance and construct a nuclear power plant) are higher than any other energy resource.*

Nuclear construction has become so expensive that no other federal, public, or private utility will build another nuclear power plant. In fact, several utilities have abandoned

their plans to build new nuclear facilities or have shut down operating nuclear units because they are too expensive and in response to public pressure. In TVA's case, the construction delays and Nuclear Regulatory Commission licensing problems will result in a finished construction cost of approximately $7 billion or $6,000 per kilowatt of installed capacity—more expensive than any other commercial energy source. Quite simply, there is no way for TVA to bring Watts Bar Nuclear Plant Unit 1 into operation without a significant increase in electric rates, adversely affecting its customers, or without a massive federal bailout.

Watts Bar Nuclear Plant Unit 1 is an expensive plant and cannot pay for itself. Including construction debt, costs attributable to Watts Bar Nuclear Plant Unit 1 will be 20 to 44 cents per kilowatt-hour. Without construction debt, Watts Bar Nuclear Plant Unit 1 costs to TVA will be 4.1 to 9.2 cents per kilowatt-hour. Consider that with Watts Bar Nuclear Plant on-line, TVA's average system-wide production cost will be only 3.9 cents per kilowatt-hour. The result is, at best, TVA will lose 0.2 cents per kilowatt-hour for every kilowatt-hour of Watts Bar Nuclear Plant energy it sells. With all costs included, TVA will lose 16 to 40 cents on each kilowatt-hour of energy produced at Watts Bar Nuclear Plant Unit 1.

On average, on an annual basis, operating Watts Bar Nuclear Plant Unit 1 and paying on its debt will cost TVA between $1 billion and $1.5 billion per year. However, Watts Bar Nuclear Plant Unit 1 will only generate $240 million to $213 million in revenue from the sale of its electricity. The result is that Watts Bar Nuclear Plant Unit 1 will lose between $804 million and $1.3 billion per year for TVA and its bondholders.

Despite TVA's pledge to not raise rates for another year, it is reasonable to expect that some or all of these costs will be passed on to citizens in Tennessee.

Comment by: Beth Zilbert (Greenpeace)

---

185 **Comment:** *Why is the TVA Board completing Watts Bar Nuclear Plant Unit 1, which is not technologically or economically feasible or environmentally sensitive? Perhaps they are getting golden parachutes in the retirement funds of $20 to 30 million.*

Comment by: Tom Phillips

---

186 **Comment:** *TVA continues to maintain that bringing Watts Bar Nuclear Plant Unit 1 on line is the only economical option open to them at this late stage of construction. The MSB report shows this assertion to be simply not true. TVA's case for bringing Watts Bar Nuclear Plant Unit 1 on line is based on a series of flawed assumptions.*

The study "Deadly Dollars - The Economic Fallout of TVA's Watts Bar Nuclear Plant Unit 1" by MSB Energy Associates indicates that TVA's decision to load fuel into Watts Bar Nuclear Plant Unit 1 will only deepen TVA's financial woes.

TVA has spent $6.8 billion to date building Watts Bar Nuclear Plant, and they expect to spend at least another $200 million to finish the plant. TVA asserts that since $6.8 billion has already been spent, it would be foolish to not finish the plant and operate it to recoup their investment. But if TVA brings Watts Bar Nuclear Plant into service, two events occur. One is that they immediately buy into paying for decommissioning of the plant, which may cost as much as $5.9 billion if they run the plant for 30 years or at least $475 million if Watts Bar Nuclear Plant Unit 1 is shut down in 1996. These annual decommissioning payments are not factored into TVA's presentation of Watts Bar Nuclear Plant economics, and will make the operation of Watts Bar Nuclear Plant more expensive than natural gas-fired power plants and wind energy. The second consequence of Watts Bar Nuclear Plant's operation is that TVA will immediately have to begin making payments on

the total construction cost, which has been deferred in special accounts the whole time Watts Bar Nuclear Plant Unit 1 has been under construction.

Watts Bar Nuclear Plant Unit 1 construction costs will have to be paid by somebody at sometime and there are no easy answers as to whom and when. TVA's analysis of Watts Bar Nuclear Plant economics only considers future operating costs, not their accumulated construction debts. But since these costs do have to be repaid, it is disingenuous at best to hide them from the public.

The MSB report asks two questions of TVA's decision to operate Watts Bar Nuclear Plant:

- *First, what economic effect will Watts Bar Nuclear Plant Unit 1 have on TVA's finances when all construction costs are included along with expected operating costs?*
- *Second, even if construction costs are ignored, do the economics of finishing and operating the power plant make sense? TVA apparently believes they should throw more good public money after bad just to prove that they can get the plant operating in a misguided attempt to rectify a $6.8 billion mistake.*

The study shows that even when excluding construction debts, the decision to finish Watts Bar Nuclear Plant makes poor economic sense. If all costs are included, then the decision to complete Watts Bar Nuclear Plant is nothing short of incompetent.

Our study (the table below summarizes the cost analysis) conclusively shows that the decision to operate Watts Bar Nuclear Plant is fiscally irresponsible to both ratepayers in Tennessee and the United States taxpayer. If TVA insists on loading fuel into Watts Bar Nuclear Plant Unit 1, it will not only endanger the lives of people in the Tennessee Valley, it will be guilty of creating one of the largest wastes of public money ever.

TVA Watts Bar Nuclear Plant Unit 1 (WBN1) – Economic Analysis Summary (including WBN1 construction costs)

Carrying Charge 20%	Existing System	TVA with Watts Bar Unit 1, under assumption: TVA	Case 1	Case 2	Case 3	Case 4	WBN1 Average
ENERGY PROD. COSTS							
System Cost (cents/kWh)	2.64	3.84	3.88	3.84	3.85	3.85	3.85
Increase		45%	47%	45%	46%	46%	46%
WBN1 Cost (cents/kWh)		20.16	20.73	23.41	30.21	43.94	27.69
Increase Over System Average		1,532%	1,585%	1,857%	2,536%	3,909%	2,284%
WBN1 Annual Cost (millions)		1,570	1,614	1,559	1,579	1,576	1,580
WBN1 Annual Revenue (millions)		299	302	255	201	138	239
WBN1 Net Cost (millions)		1,271	1,312	1,304	1,378	1,438	1,341
STRANDED COSTS							
Nuclear Only (millions)	$ (467)	(1,780)	(1,815)	(1,814)	(1,885)	(1,946)	(1,848)
All TVA Generation (millions)	$ 1,732	112	116	68	14	(49)	52
				most likely			
Carrying Charge 12.01%							
ENERGY PROD. COSTS							
System Cost (cents/kWh)	2.64	3.41	3.45	3.41	3.42	3.42	3.42
Increase		29%	30%	29%	29%	29%	29%
WBN1 Cost (cents/kWh)		12.94	13.47	14.97	19.46	28.27	17.82
Increase Over System Average		853%	902%	1,056%	1,504%	2,385%	1,340%
WBN1 Annual Cost (millions)		1,008	1,049	997	1,017	1,014	1,017
WBN1 Annual Revenue (millions)		266	269	227	179	123	213
WBN1 Net Cost (millions)		742	784	770	838	891	805
STRANDED COSTS							
Nuclear Only (millions)	$ (168)	(1,034)	(1,067)	(1,064)	(1,129)	(1,182)	(1,095)
All TVA Generation (millions)	$ 2,392	725	729	686	638	582	672

For TVA's nuclear generation as a whole, their average production costs (capital costs plus operating and maintenance) increase from a current level of 6.6 cents per kilowatt-hour to 11.5 cents per kilowatt-hour, a 75 percent increase. Under these conditions there is no way TVA can claim Watts Bar Nuclear Plant is an economical source of energy.

Scenario (including construction debts)	Watts Bar Unit 1 Cost of Energy 20% capital cost	12% capital cost	Nuclear Stranded Costs 20% capital cost	12% capital cost
TVA w/o Watts Bar Unit 1	Average generation cost w/o WBN1 = 2.60		467	168
TVA Assumption	20.16	12.95	1,780	1,034
Case 1	20.73	13.51	1,815	1,067
Case 2	23.40	14.97	1,814	1,064
Case 3	30.21	19.46	1,885	1,129
Case 4	43.93	28.27	1,946	1,182

Comment by: Beth Zilbert (Greenpeace)

187 **Comment:** *TVA's justification for bringing Watts Bar Nuclear Plant Unit 1 on-line is wholly unrealistic and fatally flawed. Given this problem, the MSB study constructs four additional scenarios, all of which are based on average costs and performance in the nuclear*

industry as a whole and in TVA. In each one of these scenarios, Watts Bar Nuclear Plant is not a cost-effective option.

Comment by: Beth Zilbert (Greenpeace)

---

188 **Comment:** *By excluding consideration of alternatives for the start-up of Watts Bar Nuclear Plant Unit 1, management has committed TVA to a course of action that could substantially increase the utility's cost, and limit its opportunities to take advantage of the competitive wholesale power market.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District)

---

189 **Comment:** *Watts Bar Nuclear Plant Unit 1 should not be started up because the spot market purchase of power costs is less than the incremental cost of power from Watts Bar Nuclear Plant Unit 1.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

---

190 **Comment:** *TVA is projecting a cost of 2.1 cents per kilowatt-hour to produce power from Watts Bar Nuclear Plant. This is significantly lower than the historic estimates at other plants, including Watts Bar Nuclear Plant's sister plant, Sequoyah Nuclear Plant. Sequoyah Nuclear Plant's operating and maintenance costs are more than that. Even taking this at face value, TVA can now buy power for less than that. The market price for energy exchanged between the states of Washington and Oregon at times falls below 2 cents per kilowatt-hour.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District), Stephen Smith (Tennessee Valley Energy Reform Coalition)

---

191 **Comment:** *With a TVA system average production cost (assumed to set the market selling price) of 3.9 cents per kilowatt-hour, Watts Bar Nuclear Plant Unit 1 is still not economical in all but one scenario in TVA's own projection, even when construction costs are excluded.*

Scenario	*WBN 1 Cost of Energy (cents per kilowatt-hour) at 20 Percent*	*WBN 1 Cost of Energy (cents per kilowatt-hour) at 12 Percent*
TVA WBN 1 Projection	*4.15*	*3.71*
Case 1	*4.72*	*4.27*
Case 2	*4.69*	*4.17*
Case 3	*6.36*	*5.69*
Case 4	*9.17*	*8.21*

Comment by: Beth Zilbert (Greenpeace)

---

192 **Comment:** *A TVA Board decision to fuel and operate the Watts Bar Nuclear Plant Unit 1 would cause severe economic damage to TVA. The cost of bringing Watts Bar Nuclear Plant Unit 1 on-line would effectively prevent TVA from participating in a competitive market with other utilities. As a result, TVA would most likely require federal protection or assistance to keep its existing customers locked into getting their energy from TVA. This would more than likely result in excessive electric rates, hindering the economic development of the TVA region as business and industry relocate to secure more favorable energy rates.*

Comment by: Beth Zilbert (Greenpeace)

193 **Comment:** *If Watts Bar Nuclear Plant goes into operation, TVA costs will increase to where they will not be competitive with other electric utilities. Outside electric companies could come in and cherry-pick TVA's largest customers. With the resulting loss in revenue, the possibility of TVA defaulting on its debts becomes real. If TVA defaults, its bondholders (including the federal government) will be stuck with the debt, or TVA may call on the federal government to bail them out for the entire debt amount.*

On the other hand, if TVA abandons Watts Bar Nuclear Plant, then TVA, Congress, and all interested parties will have the luxury of time to decide on the best approach to reconcile TVA's massive debt. This may mean forming strategic alliances with other businesses and utilities, more aggressive refinancing strategies, or innovative market-based solutions. Delaying Watts Bar Nuclear Plant offers TVA and its stakeholders the maximum flexibility to resolve these critical issues.

Comment by: Beth Zilbert (Greenpeace)

194 **Comment:** *By starting up Watts Bar Nuclear Plant Unit 1, you will raise rates and drive away customers. If TVA continues with Watts Bar Nuclear Plant Unit 1, TVA will either be privatized or it will lead to a bailout by the federal government.*

Comment by: James Riccio (Public Citizens Critical Mass Energy Project)

195 **Comment:** *TVA's stranded investment (stranded investment indicates the amount of existing generation resources owned by a utility that will be unlikely to be able to produce energy at a competitive cost in the open market), as determined for its current existing nuclear system, is estimated to be approximately $467 million. If Watts Bar Nuclear Plant Unit 1 is completed, the stranded investment potential increases over 300 percent to $1,848 million. At this level, instead of making a reasonable profit each year, TVA revenues will barely cover their production and capital costs, leaving almost no money left over for other expenses such as plant improvements and pollution control.*

Note that this calculation does not include decommissioning costs for Watts Bar Nuclear Plant Unit 1, which have been estimated at $500 million to $1 billion if the plant shuts down in 1996, and up to $5.8 billion if Watts Bar Nuclear Plant operates for 30 years. Therefore, the total stranded investment for TVA including Watts Bar Nuclear Plant Unit 1 is estimated to be $2.4 billion to $7.6 billion.

Utility	*Stranded Nuclear Investment (excluding decommissioning) (millions)*
TVA (Without Watts Bar Nuclear Plant Unit 1)	*$467*
TVA (With Watts Bar Nuclear Plant Unit 1)	*$1,858*
Boston Edison Company	*$475*
Western Massachusetts Electric Company	*$150*
New England Electric System	*$600*

As can be seen from the table above, TVA's current stranded costs are similar to the nuclear-owning utilities of New England, but the addition of Watts Bar Nuclear Plant Unit 1 to the TVA system adds almost $1.5 billion in unrecoverable costs (excluding decommissioning costs).

Comment by: Beth Zilbert (Greenpeace)

196 **Comment:** *A concern for TVA (and every other vertically integrated regulated power producer) is the specter of competition in the electric industry. For over 60 years, electric companies have been tightly regulated and controlled by regulatory agencies. Regulators have set rates, authorized construction, and ensured compliance with federal and state laws. In return, the regulated utility is given exclusive rights to service areas and is allowed to earn a predetermined rate of return for its stockholders. Today, many utilities and large industrial customers are pushing for the deregulation of the electric industry. The goal is to give large electric companies the same freedoms as have already been given to the telecommunications and airline industries. Under deregulation, an electric company would be separated into independent units, each responsible for the generation, transmission, and distribution of electricity. With over 25,000 megawatts of generation, TVA would likely stay a generating company. In a competitive marketplace, generation costs will be the driver of success. Advocates of competition cite excessive electric rates as the need for deregulation and assert that rates will go down if the "market" is allowed to set rates. Therefore, as the TVA Board considers its future in the "brave new world" of competition, cost minimization should be a high priority. Loading fuel into the Watts Bar Nuclear Plant reactor and starting commercial operation does not support a philosophy of cost minimization or maximization of TVA's future competitiveness.*

Comment by: Beth Zilbert (Greenpeace)

197 **Comment:** *Financial analysis of decisions involving large capital investments over a long time period must include the cost of capital or carrying charge. The carrying charge, unique to every organization, reflects a business's cost of financing its operations, capital investments, taxes, and depreciation of capital assets.*

For this analysis, Watts Bar Nuclear Plant Unit 1 energy production, annual costs and production costs were evaluated at TVA's 12 percent carrying charge and at an anticipated competitive market carrying charge of 20 percent. The 12 percent value was calculated for TVA based on data contained in their 1994 Annual Report and in TVA's federally filed annual report (Form EIA-412). The 20 percent carrying charge is a reasonable approximation of the capital costs TVA would incur if it were truly competing on a level playing field in the power generation market. Today, most investor-owned utilities' carrying costs are approximately 20 percent.

As a federal agency, TVA pays no taxes. If TVA were privatized, a competitive market would mandate that TVA operate under the same laws as other electricity sellers which in turn would require that TVA lose its tax-exempt status. TVA has openly embraced the ideals of a competitive market. In doing so, they must be willing to enter the market fairly. This means paying taxes like every other for-profit business. If TVA balks at the idea of losing their tax-exempt status, then they are implying that they want competition, but want to maintain an unfair market advantage over their competitors.

Comment by: Beth Zilbert (Greenpeace)

198 **Comment:** *The start-up of Watts Bar Nuclear Plant Unit 1 limits flexibility because it commits TVA to raising $300 to $700 million over the length of time to pay for its decommissioning. Once the plant has started up, decommissioning becomes an unfunded plant cost.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District)

199 **Comment:** *The start-up of Watts Bar Nuclear Plant Unit 1 limits flexibility because it adds a substantial amount of new power; and the regional marketplace already has surplus capacity. The United States General Accounting Office directly questions the assumption made by TVA that it will be able to market all the power when these plants are in operation.*

Most likely the power generated by Watts Bar Nuclear Plant Unit 1 will displace current capacities, or be sold on the spot market at a substantial discount.

Comment by: Edward Smeloff (Sacramento Municipal Utility District), Sheilla Cheyenne

200 **Comment:** *The large array of smaller, more dependable power options available to TVA through the request for proposals for future power needs should provide TVA more flexibility at less cost than starting the remaining troubled nuclear units. A more thorough analysis of smaller generation replacing the non-operational nuclear units would be preferable.*

Comment by: Sharon Fidler (League of Women Voters)

201 **Comment:** *TVA predicts it will need 2,396 megawatts of new capacity by 2005 of which 2,235 megawatts are expected to come from nuclear sources. As part of this study, alternative energy resources were considered and compared to costs of Watts Bar Nuclear Plant. The technologies evaluated included 500-megawatt integrated gasification combined cycle coal-fired plants, 50-megawatt gas-fired combustion turbines, 225-megawatt combustion turbine-combined cycle gas units, 40-megawatt municipal solid waste plant, 50-megawatt biomass combustion stokers, 100-megawatt whole-tree energy plants, and energy conservation programs. Using conservative utility data, cost and performance characteristics for each of these technologies were evaluated to meet the capacity and energy needs that Watts Bar Nuclear Plant would provide.*

When construction costs are included, each of the above energy resource options, with the exception of municipal solid waste, would meet TVA's needs at a lower cost than Watts Bar Nuclear Plant Unit 1. Without construction costs, combustion turbines, combined cycle combustion turbines, and wind plants are cost-effective options to Watts Bar Nuclear Plant. Demand-side management capital costs were not fully developed since they vary widely with the type of conservation program employed. Utility experience with demand-side management shows that the majority of programs have achieved energy savings in the 0.5 cents per kilowatt-hour to 6.0 cents per kilowatt-hour ($5 per megawatt-hour to $60 per megawatt-hour) range. For this analysis, a conservative estimate of 3 to 6 cents per kilowatt-hour was used. At 3 cents per kilowatt-hour, TVA should be able to achieve additional energy savings based on their current average production cost of 2.64 cents per kilowatt-hour. At 6 cents per kilowatt-hour, an upper boundary is set for the most expensive demand-side management programs where the "last" or marginal level of energy savings occurs.

Combustion turbines and combined cycle power plants use natural gas as a fuel source. The combustion of natural gas produces almost no sulfur dioxide or oxides of nitrogen. Both of these pollutants are regulated by the Clean Air Act Amendments of 1990. TVA argues that nuclear power avoids the problem of the expensive pollution control equipment required by the Clean Air Act Amendments for their coal-fired power plants. Using natural gas as a fuel, these concerns are completely avoided. Also, wind power is a renewable energy resource which produces no air emissions at all. And because wind is a free "fuel," TVA is insulated form potential price jumps in fossil and nuclear fuel prices.

In addition to being cheaper, each alternative energy option is available in smaller capacity increments and can therefore be installed as (and if) TVA's forecast energy needs develop. In this way, system resource additions can be added when and only when they are needed, spreading out the costs over time, and providing flexibility for TVA to respond to technological, economic, demographic, and industry changes.

The MSB report examines TVA's alternatives prior to loading fuel and contaminating Watts Bar Nuclear Plant. Wind energy and natural gas power turn out to be more cost-effective than Watts Bar Nuclear Plant even when you disregard the $6.8 billion that TVA has already spent and look only at current and future costs. Opting for either of these more environmentally friendly technologies will leave TVA with the greatest range of flexibility possible for dealing with its huge debt in the future.

Comment by: Beth Zilbert (Greenpeace)

---

202 **Comment:** *Watts Bar Nuclear Plant should be converted to another form of energy, such as gas.*

Comment by: Michelle Carratu

---

203 **Comment:** *The most prudent decision TVA can make, one that protects its long-term interests and respects its customers' desire for reliable and economic service, would be to abandon all plans to fuel and operate the Watts Bar Nuclear Plant Unit 1. By scrapping the Watts Bar Nuclear Plant now, TVA can prevent massive rate hikes, avoid the problems of funding an ever-increasing decommissioning cost schedule, and also lessen their exposure to radioactive waste storage and disposal problems.*

Comment by: Beth Zilbert (Greenpeace)

---

204 **Comment:** *TVA has not demonstrated the ability to safely and reliably operate their existing nuclear plants, and there is no compelling reason to believe that Watts Bar Nuclear Plant Unit 1 would be an exception. As a result, TVA's cost and performance projections for Watts Bar Nuclear Plant should be regarded as highly optimistic. If Watts Bar Nuclear Plant Unit 1 experiences unexpected or delayed outages, or if maintenance requirements are higher than expected, TVA will find itself in a deeper and deeper financial hole.*

Comment by: Beth Zilbert (Greenpeace)

---

205 **Comment:** *In light of TVA's poor nuclear management record, I am distressed that TVA is still proceeding with some nuclear power plants. TVA has ignored that both TVA's and private nuclear programs are economic disasters. As an example, TVA has continued with Watts Bar Nuclear Plant which, is a shining example of an overpriced, poorly built plant.*

Comment by: Steven Walsh, Sharon Force, Paul Elliott

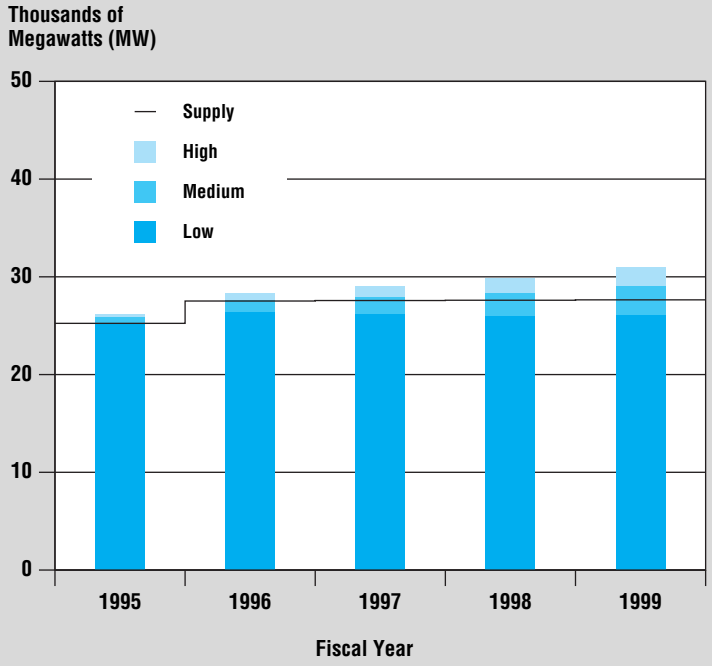
COMPREHENSIVE RESPONSE ON WATTS BAR NUCLEAR PLANT UNIT 1

Because Watts Bar Nuclear Plant Unit 1 was essentially complete when Energy Vision 2020 was initiated, TVA appropriately decided to include it in the Energy Vision 2020 evaluations as an existing resource. Generation from Watts Bar Nuclear Plant Unit 1 is needed to meet customer needs in 1996 and it is a cost-effective alternative for meeting this need.

Customer Power Needs

Figure 1 shows the capacity situation through 1999, with Watts Bar Nuclear Plant Unit 1 commencing operation in fiscal year 1996 and Browns Ferry Nuclear Plant Unit 3 also returning to service the same year. As shown, with the addition of these two units, the supply is about equal to the medium load requirements in 1996. The need for additional capacity increases to 1,500 megawatts by 1999. Based on the high load forecast, additional capacity of 800 megawatts would be needed in 1996, increasing to 3,400 megawatts by 1999. For the low load forecast, TVA would not need additional capacity during the forecast period (2020) with Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 operating. The most likely load growth scenario is the medium forecast, which shows that a supply deficit would be expected without Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 available to generate in fiscal year 1996. Figure 2 shows the surplus (or deficit) capacity values based on the low, medium, and high load forecasts with both Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 operating.

FIGURE 1. **Long-Term Capacity Requirements and Supply – High Medium & Low Load Forecast**



Note: Requirements equal peak load plus desired reserves.

FIGURE 2. **TVA Capacity Situation Based on Low, Medium, and High Load Forecasts – Projected Surplus Capacity (Megawatts)**

	Low Load Growth	Medium Load Growth	High Load Growth
1996	1,075	-125	-825
1997	1,375	-400	-1,525
1998	1,625	-775	-2,275
1999	1,575	-1,475	-3,375

Watts Bar Nuclear Plant Unit 1 Current Status

Commercial operation of Watts Bar Nuclear Plant Unit 1 is expected to be achieved in spring of 1996. The unit was granted a license to load fuel and perform low power operations in November of 1995. Fuel loading was completed in November. As explained above, generation from Watts Bar Nuclear Plant Unit 1 continues to be needed.

TVA has invested approximately $6.8 billion in constructing Unit 1 and common facilities at the plant. Since these costs have already been incurred, changing TVA's course of action and deciding not to operate the plant would not avoid these costs. TVA would still have to recover the incurred costs in its power rates. Operating the plant would allow TVA to begin earning a return on agency investment in the form of generation from Unit 1.

Alternatives to Watts Bar Nuclear Plant Unit 1

TVA considered a number of alternatives to constructing and operating Watts Bar Nuclear Plant in its 1972 final environmental impact statement. Among those alternatives were construction of coal-fired units, hydroelectric units, gas-fired units, and oil-fired units. These alternatives were either deemed not feasible, more costly, and/or more environmentally detrimental than operation of Watts Bar Nuclear Plant. TVA also considered purchasing firm power from neighboring utilities. However, TVA projected that neighboring utilities would not be able to supply sufficient firm power to meet its needs and concluded that the environmental impacts of a neighboring utility generating that power would likely be similar to or greater than those impacts associated with operation of Watts Bar Nuclear Plant.

Construction at Watts Bar Nuclear Plant Unit 1 is now complete, and the alternatives available to TVA in light of the status of Watts Bar Nuclear Plant Unit 1 and the need for the power in 1996 are limited. Those alternatives are described below. TVA has determined that operating Watts Bar Nuclear Plant Unit 1 is both the most cost-effective and environmentally preferable alternative available.

Description of Watts Bar Nuclear Plant Unit 1 Alternatives

TVA identified and evaluated three alternatives in connection with TVA's supplemental environmental review of the plant issued in June 1995. These included: operate Watts Bar Nuclear Plant Unit 1, delay operation of Watts Bar Nuclear Plant Unit 1 and purchase power, and cancel Watts Bar Nuclear Plant Unit 1 and purchase power. TVA identified a number of other alternatives, but these were dismissed from further consideration as not feasible.

Operate Watts Bar Nuclear Plant

Commercial operation of the unit is now expected in spring 1996. Watts Bar Nuclear Plant Unit 1 would add 1,170 megawatts of base-load capacity to the TVA system. Because this alternative does not change TVA's current course of action, it would be tantamount to the "No Action Alternative" in an environmental impact statement.

Delay Operation of Watts Bar Nuclear Plant Unit 1 and Purchase Power

TVA also considered the consequences of not operating Watts Bar Nuclear Plant Unit 1 and purchasing power from neighboring utilities, independent power producers, or other sources to meet any shortfall in available generation. To ensure that the power is available when needed, TVA would have to purchase it on a firm-power basis. This would involve paying a demand (reservation) charge and a price for the energy itself. Assuming firm power is available from neighboring utilities, TVA could purchase it for a number of years and delay operation of Watts Bar Nuclear Plant Unit 1 for this period. For purposes of this analysis, TVA assumed that Watts Bar Nuclear Plant Unit 1 would be delayed only one year; longer delays would have consequences similar to cancellation. While Watts Bar Nuclear Plant Unit 1 could be delayed, there would be the added cost of power purchases along with the completion costs of the unit. At the same time, some risk is inherent in depending on other utilities for peak load supply.

Cancel Watts Bar Nuclear Plant Unit 1 and Purchase Power

Canceling Watts Bar Nuclear Plant Unit 1 would require that power be purchased for an extended period of time. As with the delay and purchase alternative discussed above, the purchase of firm power would require the payment of both a demand charge and an energy price. Assuming power is available, it would have to be purchased until another means of meeting system needs could be deployed.

Non-Viable Alternatives

Constructing another generating source instead of Watts Bar Nuclear Plant Unit 1 would take a number of years to complete and would result in additional environmental impacts. Figure 3 identifies a representative set of alternative generating methods and the time required to implement these alternatives (including development of a technology if necessary). Those methods considered demonstrated and available now include: supercritical pulverized coal, recirculating atmospheric fluidized bed combustion, simple cycle combustion turbines, gas-fired combined cycle turbines, small combined cycle turbines, and compressed air storage. There are other generating methods, but those have not been demonstrated commercially and are not considered available without further development.

FIGURE 3. **Alternative Generating Methods**

Generating Method	Lead Time	Earliest Operation Date
Supercritical Pulverized Coal	8 years	2004
Circulating AFBC*	8 years	2004
Simple Cycle Turbine	5 years	2001
Gas-Fired Combined Cycle	5 years	2001
Small Combined Cycle	4.5 years	2000
Compressed Air Storage	10 years	2006
Fuel Cell	4 years	2005
Advanced Battery	3 years	2015
Light Water Reactor	10 years	2008
Cogen/Combined Cycle	4 years	2000
Wind	6 years	2002

* Atmospheric Fluidized Bed Combustion

These generation alternatives could be constructed and operated either by TVA or by an independent power producer. However, the lead time required to bring on another generating source would not be appreciably faster if an independent power producer undertook the project. Because of the need for power in 1996, none of these alternative methods of generating power are considered viable.

There are also a large number of energy conservation (demand-side management) options which could reduce the need for power on the TVA system. These include such things as replacing less efficient electric heating with electric heat pumps, envelope tightening measures (for example, home insulation programs, energy-efficient appliances, and the use of more energy-efficient materials in manufactured homes), the use of more energy-efficient lighting, the use of more energy-efficient appliances, and the use of more energy-efficient motors by industries. Most of the demand-side management measures have some associated environmental impacts (for example, the disposal of old appliances and lighting waste) but, compared to the construction and operation of new generating sources, their associated impacts would be less. TVA's analyses indicate that it would take a large number of these demand-side management programs to achieve sufficient energy savings to offset the demand that is intended to be met by operating Watts Bar Nuclear Plant Unit 1. It also takes from three to five years to put in place demand-side management programs and to begin to achieve noticeable energy savings. The combination of sufficient demand-side management programs to offset Watts Bar Nuclear Plant Unit 1 is estimated to cost approximately 7.0 cents per kilowatt-hour which substantially exceeds the cost of operating Watts Bar Nuclear Plant Unit 1 (about 1.7 cents per kilowatt-hour). In addition, Watts Bar Nuclear Plant Unit 1 generates cash compared to the demand-side management alternatives.

Comparison of Viable Alternatives

TVA compared the potential environmental and economic consequences associated with the viable alternatives identified. Because of the uncertainties associated with purchasing replacement power for Watts Bar Nuclear Plant Unit 1, a range of costs for purchased power is used. The cost of power purchases is compared to the incremental cost of operating Watts Bar Nuclear Plant Unit 1.

Cost of Watts Bar Nuclear Plant Unit 1

Key Assumptions

Capital Additions and Improvements ($/kilowatt/year)	$26.5/kW
Fuel Cost (cost per kilowatt-hour)	0.425/kWh
Operation and Maintenance Cost ($/kilowatt/year)	$69/kW
Decommissioning (millions of 1994$)	$300

Incremental Cost of Power from Watts Bar Nuclear Plant Unit 1	*Cents/Kilowatt-Hour*
Capital Additions and Improvements	0.10
Fuel	0.43
Operation and Maintenance	1.01
Decommissioning	0.11
Total Cost to Operate	1.65

With fuel and operating costs added to decommissioning costs, the first-year cash cost of generating power at Watts Bar Nuclear Plant Unit 1 is estimated to be 1.7 cents per kilowatt-hour (Figure 4). This compares very favorably to the estimated cost of purchasing firm base-load power— 2.5 to 3.6 cents per kilowatt-hour. TVA has already spent approximately $6.8 billion on the construction of the unit and common facilities. These costs have to be recovered whether or not the unit operates. Watts Bar Nuclear Plant Unit 1 should be among TVA's lowest-cost generating sources.

FIGURE 4. **Power Cost Comparison**

Watts Bar Nuclear Plant Unit 1 (Fuel, Operation and Maintenance, Decommissioning)	1.7 cents per kilowatt-hour
Purchase with Reservation Charge (Firm)	2.5 -3.6 cents per kilowatt-hour

The Preferred Alternative

Based on the need for power, the lack of sufficiently viable alternatives, and the economics and other limitations of purchasing versus operating Watts Bar Nuclear Plant Unit 1, operating Watts Bar Nuclear Plant Unit 1 is clearly in TVA's and its customers' best interest. In the short term, the variable cost of Watts Bar Nuclear Plant Unit 1 is the fuel cost of 0.4 cents per kilowatt-hour. Because of the low fuel cost, this unit will be dispatched before other non-nuclear units. This provides TVA the flexibility to lower the generation from higher cost units on the power system, therefore, minimizing overall variable costs. Because completion and operation of Watts Bar Nuclear Plant Unit 1 would have environmental impacts similar to or less than purchasing power, it was also considered the environmentally preferred course of action.

Sunk Cost and Economic Analysis

It appears that many of the comments (particularly comment numbers 184 and 201) estimated the cost of Watts Bar Nuclear Plant Unit 1 to include the construction costs which have already been spent (sunk costs). TVA's analysis of the cost of Watts Bar Nuclear Plant Unit 1 is based on the incremental operating and other costs necessary to operate the unit compared to delaying this unit one year. The construction costs—or sunk

costs—have been paid whether or not Watts Bar Nuclear Plant Unit 1 is operated and regardless of future competitive conditions. Therefore, sunk costs should be excluded from the analysis.

There is also some confusion related to the accounting cost changes that would result when Watts Bar Nuclear Plant Unit 1 begins operation. When Watts Bar Nuclear Plant Unit 1 begins commercial operation, accounting costs will increase for depreciation, operation and maintenance, and fuel. The costs associated with Watts Bar Nuclear Plant Unit 1 will be offset by additional revenue from the generation from Watts Bar Nuclear Plant Unit 1 or reductions in operating costs due to lower generation from TVA fossil units or combustion turbines. Still, many commenters believe that electricity rates will increase substantially. This notion is probably based on the idea that when Watts Bar Nuclear Plant Unit 1 begins operation, all interest costs associated with capital invested to construct Watts Bar Nuclear Plant Unit 1 will be included in rates at that time. But, in fact, TVA pays such interest from current revenues. Thus, when Watts Bar Nuclear Plant Unit 1 begins operation, electric rates will not increase due to interest costs.

When Watts Bar Nuclear Plant Unit 1 begins operation, the costs have been appropriately accounted for in the electric rate projections shown for the short-term action plan in Volume 1, Chapter 10, Figure 10-8. These electric rate projections indicate that TVA will hold rates constant through 1997, and from 1998 to 2005, electric rates will increase less than the projected rate of inflation (3.3 percent per year). Furthermore, readers should be aware that the TVA budget for 1996, in which Watts Bar Nuclear Plant Unit 1 was operating for six months, was presented to the TVA Board in September of 1995, and no rate increase was announced.

TVA's Economic Analysis Versus Other Analyses of the Cost of Watts Bar Nuclear Plant Unit 1

TVA's estimated cash cost to operate Watts Bar Nuclear Plant Unit 1 is 1.7 cents per kilowatt-hour. Other commenter estimates for Watts Bar Nuclear Plant Unit 1 range from 4.2 to 9.2 cents per kilowatt-hour. These cost estimates are based on the cost to complete Watts Bar Nuclear Plant Unit 1 plus a variety of other assumptions concerning operation and maintenance costs, fuel costs, and decommissioning costs.

In our opinion, TVA's assumptions of these costs components are better than the assumptions made by a number of the commenters who came up with higher cost estimates. TVA's assumptions have been reviewed by National Economic Research Associates, Inc., and R. J. Rudden Associates, Inc., in the report "An Evaluation of the Nuclear Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan." Their conclusions were that TVA's estimates were reasonable. These companies were retained for and provided advice to the Energy Vision 2020 Review Group, the stakeholder group involved in Energy Vision 2020.

Rate impacts, comparative operating cost, performance/capacity factor, decommissioning costs, safety, and uncertainty of costs portions of the comments listed above are further addressed in the responses to comments found below.

Assumptions for Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3

206

Comment: *TVA is bringing on Watts Bar Nuclear Plant Unit 1 only to allow it to begin to charge ratepayers more in order to pay off TVA's debt.*

Comment by: Leith Patton, Ann Harris, Bryan Deel

Response: Watts Bar Nuclear Plant Unit 1 will be brought on-line to help meet customer demand. The completion of this unit will end TVA's requirement to borrow capital funds for major power system construction. All of TVA's capital requirements will be generated internally by 1998 and rates are expected to remain stable until at least 1998.

207

Comment: *If it starts up Watts Bar Nuclear Plant, TVA will have to raise rates. According to my calculations, it would have to pay $960 million per year which is 20 percent of TVA's current revenue.*

Comment by: Jeannine Honicker

Response: TVA does not expect to raise rates when Watts Bar Nuclear Plant Unit 1 is started.

208

Comment: *We feel very strongly that Watts Bar Nuclear Plant Unit 1 will probably never achieve the capacity factors that TVA has projected.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Bryan Deel

Response: National Economic Research Associates, Inc. and R. J. Rudden Associates, Inc. were retained for the Energy Vision 2020 Review Group to evaluate the key assumptions related to the cost and performance of TVA's nuclear units. Their conclusions regarding capacity factor were that the TVA estimates for Watts Bar Nuclear Plant are reasonable and somewhat lower than their estimates. The details of the analysis and conclusions regarding TVA's estimates of capacity factor are found on pages 9 and 10 of the report titled "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan."

209

Comment: *TVA has now received an exemption to lower the temperature of the core at Watts Bar Nuclear Plant, which will lower capacity.*

Comment by: Ann Harris

Response: TVA intends to operate Watts Bar Nuclear Plant at the licensed core power level and at the highest capacity factors possible.

210

Comment: *Right now, Watts Bar Nuclear Plant is a clean, uncontaminated site and should stay that way. The moment fuel is loaded, TVA will incur at least a $500 million and possibly up to a $1 billion commitment to decommission and decontaminate the site.*

Comment by: Sheilla Cheyenne, Stephen Smith (Tennessee Valley Energy Reform Coalition), Susan Switzer, Michelle Carratu, Scott Banbury, Leith Patton

Response: Decommissioning costs were fully considered in the Energy Vision 2020 analysis. National Economic Research Associates, Inc. and R. J. Rudden Associates, Inc. were retained for the Energy Vision 2020 Review Group to evaluate the key assumptions related to the cost and performance of TVA's nuclear units. The overall conclusions regarding TVA's estimates of decommissioning costs (for pressurized water reactors $200 to $600 million per unit) are that the range of costs estimated by TVA are reasonable, and decommissioning costs represent a relatively small part of nuclear generating costs; therefore, large increases in the estimated costs would have a very small impact on the overall operating costs of a nuclear plant.

The details of the analysis and conclusions regarding TVA's estimates of decommissioning costs and waste disposal are found on pages 13 to 15 of the report titled "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan."

211

Comment: *TVA has excluded decommissioning costs from their calculations—a potential $5.9 billion omission.*

A review of current literature and cases leads to the following estimate of Watts Bar Nuclear Plant Unit 1 decommissioning costs (expressed in 1994 dollars for a 1996 shutdown):

Minimum Cost: $475 million
Maximum Cost: $655 million

These estimates do not include contingency factors for unknown and unquantifiable events. Contingency factors are designed to include such events as labor problems, weather stoppages, equipment/tool problems, regulatory changes and procedural changes. In New York, the Shoreham decommissioning study added a 40.7 percent contingency factor and in 1987, the California Energy Commission ordered a 50 percent contingency factor for the Diablo Canyon decommissioning. If a 50 percent contingency factor is added to the Watts Bar Nuclear Plant decommissioning cost estimate, the costs increase to :

Minimum Cost: $713 million
Maximum Cost: $996 million

The cost to decommission a nuclear plant increases with the amount of time the plant has been fueled and operating. If Watts Bar Nuclear Plant Unit 1 is fueled when planned, it will incur some decommissioning costs even if TVA decides to shut it down before commercial operation. But the longer it remains fueled and is subject to low- and high-power testing, the more expensive it will be to decommission the unit. This is a result of several factors: 1) hot plant operation consumes fuel which in turn generates high and low level radioactive wastes, 2) neutron bombardment (a byproduct of fission) of the containment structure causes the structure's metals and concrete to become radioactive, and 3) low levels of tritium are produced from neutron bombardment of hydrogen in the primary cooling system resulting in a contamination of the primary cooling loop components.

Studies have indicated that the escalation rate of decommissioning cost estimates has run as high as 3 to 9 percent over the rate of general inflation. This means that each year TVA waits to decommission Watts Bar Nuclear Plant Unit 1, the expected costs to decommission the plant will rise exponentially. To demonstrate the effect of an escalation rate in this range, consider that the value of an investment made today will double in only 10 years if it is earning seven percent annually.

Two factors should be clear:

1. *It will be less expensive to shut down Watts Bar Nuclear Plant Unit 1 if it has not been fueled*
2. *Even if it is fueled and tested, it will still be significantly less expensive to shut it down sooner rather than later.*

A preliminary review of TVA's financial statements indicate it is highly unlikely that TVA is accurately funding decommissioning accounts. The TVA 1994 Annual Report lists a fund balance of $264 million. Additionally, TVA's Annual Report of Public Electric Utilities states that the decommissioning provision for Browns Ferry Nuclear Plant is $190 million per unit and $150 million for each Sequoyah Nuclear Plant unit (1990 dollars). If TVA's Watts Bar Nuclear Plant Unit 1 decommissioning estimates are similar, they will clearly encounter severe financial problems at the plant's end-of-life.

Accurately accounting for nuclear decommissioning costs is important for several reasons. First and foremost is so that TVA can establish and properly fund decommissioning accounts now to ensure the required funds are available when they are needed. Failure to do so may result in huge rate increases for TVA customers or federal bailouts at the time of decommissioning. The second reason is so that electricity costs and rates accurately reflect the full cost of generating electricity from nuclear power.

Comment by: Beth Zilbert (Greenpeace)

Response: Decommissioning costs were fully considered in the Energy Vision 2020 analysis for nuclear options as illustrated in Volume 2, Technical Document 6, Figure T6-1. All costs of operating Watts Bar Nuclear Plant Unit 1 for a 40-year operating life, including decommissioning costs, are included in the Energy Vision 2020 analysis as part of existing assets.

National Economic Research Associates, Inc. and R. J. Rudden Associates, Inc. were retained for the Energy Vision 2020 Review Group to evaluate the key assumptions related to the cost and performance of TVA's nuclear units. Their overall conclusions regarding TVA estimates for performance and costs were that the ranges estimated by TVA are reasonable, including decommissioning costs of $200 to $600 million per unit for pressurized water reactors, and that decommissioning costs represent a relatively small part of nuclear generating costs; therefore, large increases in the estimated costs would have a very small impact on the overall operating costs of a nuclear plant. The details of the analysis and conclusions regarding TVA's estimates of costs and performance are found in the report titled "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan."

TVA's policy on the collection of funds for decommissioning is explained and activities associated with the decommissioning fund since it was established are described in the section on TVA's Nuclear Plants in Volume 2, Technical Document 3.

Investments of power funds have been made since 1982 to provide for the accumulation of funds for decommissioning nuclear plants. TVA's policy is to collect funds for decommissioning through rates based on a constant dollar amount adjusted for inflation

over the life of the operating license of a nuclear plant. Decommissioning expense has been recovered from ratepayers annually based on the present value of amounts not provided through earnings on the fund.

212

Comment: *TVA has not factored in the risks of spent fuel storage and the increasing possibility that a high level nuclear waste repository may never be available.*

Comment by: Beth Zilbert (Greenpeace)

Response: All costs of operating nuclear units, including the costs for life-of-plant on-site storage, are included in the Energy Vision 2020 analysis. (See Volume 2, Technical Document 1, pages T1.122 to T1.125.)

213

Comment: *TVA has not considered the total cost of Watts Bar Nuclear Plant Units 1 and 2 combined ($11 billion).*

Comment by: Bryan Deel

Response: TVA has invested $6.8 billion in the construction of Watts Bar Nuclear Plant Unit 1 and $1.7 billion in Watts Bar Nuclear Plant Unit 2. These costs have been incurred and will have to be repaid whether Watts Bar Nuclear Plant Unit 1 operates or not. Operating the unit will allow TVA the opportunity of earning a return on the agency's investment. In December 1994, TVA decided it would not, by itself, complete Watts Bar Nuclear Plant Unit 2 as a nuclear unit.

214

Comment: *TVA has assumed that Watts Bar Nuclear Plant Unit 1 will operate at a lower cost than any other TVA reactor has ever operated.*

Comment by: Bryan Deel

Response: If Watts Bar Nuclear Plant is a one-unit plant, TVA cost projections for Watts Bar Nuclear Plant Unit 1 operation are about one-third higher than operation of either Browns Ferry Nuclear Plant or Sequoyah Nuclear Plant on a single unit basis.

National Economic Research Associates, Inc. and R. J. Rudden Associates, Inc. were retained for the Energy Vision 2020 Review Group to evaluate the key assumptions related to the cost and performance of TVA's nuclear units. Their conclusion regarding the TVA estimates for operating and maintenance, additions and improvements, and capacity factor was that the TVA estimates are reasonable. The details of the analysis and conclusions regarding TVA's estimates are found in the report titled "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan."

215

Comment: *TVA claims that they can operate and maintain Watts Bar Nuclear Plant Unit 1 at a lower cost than the current national averages for all nuclear plants and for less money than it now costs TVA to run either their Sequoyah or Browns Ferry nuclear units. This is unrealistic, particularly considering the fact that Watts Bar Nuclear Plant Unit 1*

has set a national record of over 6,000 whistleblower allegations of safety violations during its 23-year construction period.

TVA claims that Watts Bar Nuclear Plant Unit 1 will operate 76 percent of the time, while they have only been able to operate Browns Ferry and Sequoyah Nuclear Plants (Watts Bar's sister plant) at a combined capacity factor of 51 percent.

Comment by: Beth Zilbert (Greenpeace)

Response: Because Watts Bar Nuclear Plant is a one-unit plant, TVA cost projections for Watts Bar Nuclear Plant Unit 1 operation are about one-third higher than operation of either Browns Ferry Nuclear Plant or Sequoyah Nuclear Plant on a single plant basis.

There have been numerous modifications made over the past several years to improve plant safety and performance. Modifications have included alterations in design, processes, and hardware to improve safety, performance, and costs of nuclear unit operation. Each of the plant modifications has been thoroughly reviewed for safety implications and the plant design documents have been updated to reflect design changes. The Nuclear Regulatory Commission has conducted comprehensive inspections on the construction activities, including the review of design changes. Extensive operational readiness inspections by the Nuclear Regulatory Commission and TVA continued to be conducted prior to TVA certifying to the Nuclear Regulatory Commission that TVA was ready to load fuel and begin safe operation. All safety issues were resolved to the satisfaction of TVA and the Nuclear Regulatory Commission prior to fuel load. TVA is dedicated to safe and efficient nuclear plant operation.

National Economic Research Associates, Inc. and R. J. Rudden Associates, Inc. were retained for the Energy Vision 2020 Review Group to evaluate the key assumptions related to the cost and performance of TVA's nuclear units. Their conclusion regarding the TVA estimates for operating and maintenance, additions and improvements, and capacity factor was that the TVA estimates are reasonable. The range for capacity factor used in Energy Vision 2020 was 55 to 86 percent with a medium estimate of 67 percent. The details of the analysis and conclusions regarding TVA's estimates are found in the report titled "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan."

Overall capacity factor through fiscal year 1995 for Browns Ferry Nuclear Plant and Sequoyah Nuclear Plant units since restart after the 1985 outages is 69 percent. Combined capacity factor for fiscal year 1995 is 80 percent.

Safety/Health

216

Comment: *The Nuclear Regulatory Commission does not agree with TVA's fuel load date for Watts Bar Nuclear Plant Unit 1. They are going slow because the plant was built wrong and there continue to be employee and other safety concerns and violations.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Jeannine Honicker, Bryan Deel, Dennis Henke

Response: The Nuclear Regulatory Commission approved fuel load at Watts Bar Nuclear Plant in early November 1995. Prior to fuel load all safety issues were resolved and TVA demonstrated that the plant could be operated safely.

217

Comment: *I am concerned about how employees who report safety violations at Watts Bar Nuclear Plant Unit 1 have been treated.*

Comment by: Dennis Henke

Response: TVA employees are our most important asset and provide valuable information concerning all aspects of our nuclear program. Therefore, it is TVA policy that intimidation, harassment, discrimination, or retaliation will not be tolerated. TVA is committed to ensuring an environment where employees feel free to express their concerns and ensuring their concerns are properly addressed.

TVA has established two programs to assure that employee concerns have been, and will continue to be, properly addressed and resolved. The ongoing Concerns Resolution Program, put in place on February 1, 1986, was established to encourage the prompt and effective resolution of employee concerns through the normal line management process, as well as provide an alternate avenue for concerns that cannot be effectively resolved that are similar to and under the oversight of the Concerns Resolution Staff. Employees and line management are the key building blocks of this program; however, the Concerns Resolution Staff and contractor programs are available on-site as alternate avenues for employee to raise and resolve concerns. Concern programs are made known to employees in General Employee Training, site bulletins, and postings on bulletin boards. In addition, employees leaving the site participate in an exit interview with the Concerns Resolution Staff or their contractor concern program to specifically identify any unresolved safety issues they are aware of. These programs have been successful. The number of issues expressed to concern programs TVA-wide has consistently trended downward from 1,298 in 1986 to 77 in 1995 (through October). Nuclear Regulatory Commission reviews in 1993 and 1995 of the programs revealed the site-wide employee concerns programs are being effectively implemented. Employee interviews conducted by the Nuclear Regulatory Commission during their 1993 and 1995 inspections of the programs, and by the TVA Office of the Inspector General in 1994 and 1995 were very positive and indicated that the vast majority of employees will report nuclear safety or quality problems by some available avenue, have confidence in line management to resolve issues, and will, if needed, use the concern programs as an alternative avenue to raise issues.

The second program, known as the Employee Concerns Special Program was established to resolve concerns expressed prior to February 1, 1986. The Employee Concerns Special Program made use of an independent contractor in 1985 and early 1986 to interview all employees associated with Watts Bar Nuclear Plant to make sure all employee concerns were identified. Over 5,800 employees associated with Watts Bar Nuclear Plant (not necessarily on-site) were interviewed which resulted in over 5,000 employee concerns being identified by approximately 1,850 employees. Hot lines for all employees and the public were also established. Due to the large number of concerns expressed, TVA established Employee Concern Task Groups to categorize and investigate the concerns. The Employee Concern Task Groups issued 1,591 Corrective Action Tracking Documents for issues that were validated and required further corrective actions. All 704 Corrective Action Tracking Documents that are applicable to Watts Bar Nuclear Plant Unit 1 have been closed.

218

Comment: *Because of the risk of accidents and its proximity to people, I recommend that TVA cease work on Watts Bar Nuclear Plant Unit 1.*

Comment by: Clark Buchner (Sierra Club, Tennessee Chapter), Scott Banbury, Debra Jackson, Calvin Moore, Jean Cheney, Stephanie Calvert, Bryan Deel, Sanford McGee (Cumberland Center for Justice and Peace), Ann Harris, Hamp Dobbins, Jr., Arthur Webb

Response: TVA's Watts Bar Nuclear Plant has been one of the most closely monitored and evaluated nuclear plants in the United States. TVA is committed to ensuring that it can be operated safely. Through careful, conservative planning for safety, the potential risk of nuclear reactors has been reduced to a very low level. Nuclear plants supply energy reliably, safely, and with little environmental impact. The Nuclear Regulatory Commission monitors operations every day and conducts comprehensive reviews that cover all aspects of Watts Bar Nuclear Plant.

Two serious accidents have occurred in 30 years of commercial energy production, the Three Mile Island and Chernobyl accidents. At Three Mile Island, no one was injured or killed because nuclear energy plants in the United States use a series of physical barriers to prevent the release of radioactivity. About half of the uranium fuel melted at Three Mile Island, but only minute amounts of radioactive material escaped into the environment. The radiation exposure from Three Mile Island was actually much less than most of us receive each year from naturally occurring radioactive materials in soil, rocks, air, food, and water.

The Chernobyl plant in the Soviet Union had design flaws and no containment structure. As a result of the Chernobyl accident, radioactive material escaped and significant environmental damage occurred. More than 200 people were hospitalized for radiation exposure and burns, and approximately 30 people died. Reports suggest that more people may have died later. A plant like Chernobyl could not be licensed in the United States, and its design is completely different than Watts Bar Nuclear Plant.

219

Comment: *I am concerned about Watts Bar Nuclear Plant Unit 1 because it is located on a fault line.*

Comment by: Dennis Henke

Response: Watts Bar Nuclear Plant is not located on a seismic fault line. TVA and the Nuclear Regulatory Commission are aware of the data and studies of the seismic activity in east Tennessee. In fact, the data was gathered from TVA's Seismic Monitoring Network. Watts Bar Nuclear Plant has been designed for earthquakes significantly larger than any in the historical record for the eastern Tennessee seismic zone. The plant also has design margins well in excess of the earthquake design basis. The Nuclear Regulatory Commission addressed this specific issue in section 9.4.6 of Supplement 1 to NUREG-0498, "Final Environmental Impact Statement Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2", April, 1995.

220

Comment: *I am concerned about Watts Bar Nuclear Plant Unit 1 because the escape routes rely on an unconstructed bridge and a ferry boat.*

Comment by: Dennis Henke

Response: The evacuation routes and plan for evacuation for Watts Bar Nuclear Plant are developed by the Tennessee Emergency Management Agency. TVA works closely with the Tennessee Emergency Management Agency in this effort. No evacuation route in the plan crosses the Tennessee River; therefore, an unconstructed bridge or ferry boats on the river are not factors in the evacuation plan.

Each year TVA provides information, including maps and evacuation routes, to residents within a 10-mile radius of each nuclear plant. For Watts Bar Nuclear Plant, the information is mailed each November.

221

Comment: *If there is a catastrophic accident at the Watts Bar Nuclear Plant, people will know that Craven Crowell, Johnny Hayes, and Bill Kennoy are responsible. Your grandchildren will revile your names.*

Comment by: Tom Phillips

Response: The TVA Board is fully aware of its responsibilities in this area. Through careful, conservative planning for safety, the potential risk of nuclear reactors has been reduced to a very low level. Nuclear plants supply energy reliably, safely, and with little environmental impact. It is physically impossible for a nuclear plant to explode because the low-enriched fuel is not concentrated enough. The Nuclear Regulatory Commission monitors plant operations daily and conducts comprehensive reviews that cover all aspects of the plant. TVA is dedicated to safe and efficient nuclear plant operation.

222

Comment: *I am concerned about the prediction in the Nuclear Regulatory Commission's report that there is a 45 percent chance of a meltdown of Watts Bar Nuclear Plant Unit 1 within the next 25 years.*

Comment by: Bryan Deel

Response: TVA is not aware of a Nuclear Regulatory Commission report in which the Nuclear Regulatory Commission predicts a 45 percent chance of meltdown at Watts Bar Nuclear Plant within the next 25 years. TVA has performed a Probabilistic Risk Assessment which analyzes failure probabilities. One estimate in these analyses is core damage frequency (this is not equivalent to meltdown). The Probabilistic Risk Assessment was updated in 1994 to incorporate plant changes, procedural changes, and to more realistically model Watts Bar Nuclear Plant Unit 1. The latest submitted analysis has a core damage frequency of 0.00008 event per reactor year. The plant configuration and procedures that were in place at the time of fuel load lead to an estimated reduction in this value to 0.000044 event per reactor year. Over the 40-year life of the plant, this corresponds to less then a 0.2 percent chance of core damage. Core damage does not necessarily result in a release from the reactor coolant system, from the containment, or a

radiation release to the environment. When the core was damaged in the Three Mile Island accident, about half of the uranium fuel melted, but only minute amounts of radioactive material escaped into the environment because the multiple barriers contained the release of radioactivity. The radiation exposure from Three Mile Island was much less than most of us receive each year from naturally occurring radioactive materials in soil, rocks, air, food, and water.

223

Comment: *Watts Bar Nuclear Plant is a complicated issue. The parts that have been there for 22 years probably have metal fatigue, and there are probably going to be misfits between old and new parts. Because of this, it will be very difficult to operate the plant safely.*

Comment by: Michelle Carratu

Response: There have been numerous modifications made over the past several years to improve plant safety and performance. Modifications have included alterations in design, processes, and hardware to improve safety, performance, and costs of nuclear unit operations. Each of the plant modifications has been thoroughly reviewed for safety implications, and the plant design documents have been updated to reflect design changes. The Nuclear Regulatory Commission has conducted comprehensive inspections on the construction activities, including the review of design changes. Extensive operational readiness inspections by the Nuclear Regulatory Commission and TVA were conducted prior to TVA certifying to the Nuclear Regulatory Commission that TVA was ready to load fuel and begin safe operation. TVA is dedicated to safe and efficient nuclear plant operation.

224

Comment: *The reason it is taking so long to get Watts Bar Nuclear Plant started is nuclear power is dangerous. The nuclear accident at Chernobyl killed 125,000 people, so society is being cautious at Watts Bar Nuclear Plant. That is why it has cost billions of dollars to get it together.*

Comment by: Susan Switzer

Response: The Chernobyl plant in the Soviet Union had design flaws and no containment structure. As a result of the Chernobyl accident, radioactive material did escape. More than 200 people were hospitalized for radiation exposure and burns, and approximately 30 people died. There have been reports that additional people have died. A plant like Chernobyl could not be licensed in the United States.

Two serious accidents, at Chernobyl and Three Mile Island, have occurred in 30 years of commercial energy production. No one was injured or died as a result of the accident at Three Mile Island. In the United States, nuclear energy plants use a series of physical barriers to prevent the release of radioactivity. At Three Mile Island, about half of the uranium fuel melted, but only minute amounts of radioactive material escaped into the environment because the multiple barriers contained the release of radioactivity. The radiation exposure from Three Mile Island was much less than most of us receive each year from naturally occurring radioactive materials in soil, rocks, air, food, and water.

Through careful, conservative planning for safety, the potential risk of nuclear reactors has been reduced to a very low level. Nuclear plants supply energy reliably, safely, and with little environmental impact. It is physically impossible for a nuclear plant to explode

because the low-enriched fuel is not concentrated enough. The Nuclear Regulatory Commission monitors operations daily and conducts comprehensive reviews that cover all aspects of the plant. TVA is dedicated to safe and efficient nuclear plant operation.

225

Comment: *There are 71 counties within 100 miles of the Oak Ridge National Laboratory, Tennessee's current radioactive site. Cancer rates went up 29 percent in that region, while the rest of the country went up only 1 percent and that is just breast cancer death rates, not all cancers. We are going to see cancer rates go up when Watts Bar Nuclear Plant goes on-line. It is crazy.*

Comment by: Jean Cheney, Howard Switzer (Sun/Earth Tempered Organic Architecture), Anne Redwine

Response: The report alleging that fatalities from breast cancer are increasing in areas affected by nuclear facilities was released by Greenpeace at press conferences in several locations. It was not published in any technical journal and was released without peer review. Other reports issued by Greenpeace have been criticized by respected health physicists for selectively using statistics to support a desired outcome.

The Greenpeace report, "Nuclear Power, Human Health and the Environment: The Breast Cancer Warning in the Great Lakes Basin" (1995) is an example where proof of the assertions was not supported by the analysis according to a peer review by two experts in environmental and cancer epidemiology at the University of Massachusetts. A report issued in March 1995 by the Minnesota Department of Health, Chronic Disease and Environmental Epidemiology, found that breast cancer mortality trends over the period 1950 to 1992 in the 10 counties near nuclear power plants in the state of Minnesota showed no discernible difference from the statewide trend.

The largest study of cancer rates, by the National Cancer Institute, found no increased levels of cancer around nuclear plants. Rather, this study found that breast cancer mortality increased more in states without nuclear power plants than in states with such facilities.

Repeated surveys around TVA's operating nuclear plants have shown no detectable increase in radiation levels over normal background levels. The nearest plant neighbor gets about 10 times more radiation from watching a color television than from the nuclear facility. TVA does not expect to see cancer rates go up with operation of Watts Bar Nuclear Plant Unit 1.

226

Comment: *Nuclear can be compared to asbestos, which was once thought to be a wonder material, but is now known to be potentially life-threatening and very costly to remove. Therefore, I think we should be moving away from nuclear power. The money being spent on Watts Bar Nuclear Plant is money going down a black hole.*

Comment by: Susan Jata

Response: Nuclear energy is a mature technology with over three decades of operating history. More than 400 nuclear plants are operating in 27 countries around the world. Nuclear energy is the most researched of all power production technologies. Technical issues and health effects are well understood. The nuclear industry and TVA are dedicated to safe and efficient nuclear plant operation.

227

Comment: *Greenpeace's contractor, MSB Energy Associates, has been credited and praised by TVA as being fair and unbiased in utility regulatory and economic analysis. This firm has over 100 years of combined experience.*

Comment by: Beth Zilbert (Greenpeace)

Response: TVA has never had a contract with MSB Energy Associates.

228

Comment: *I do not trust Watts Bar Nuclear Plant. TVA should set up a trust fund to cover catastrophic accidents, like 1 cent per kilowatt.*

Comment by: Beth Speltz

Response: Through careful, conservative planning for safety, the potential risk of nuclear reactors has been reduced to a very low level. TVA is confident that Watts Bar Nuclear Plant Unit 1 can and will be operated safely. Collecting money for a fund to cover the cost of a catastrophic accident at the plant would unnecessarily burden customers because the chance of this occurring is very small. TVA carries insurance that covers catastrophic accidents.

Other Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 Issues

229

Comment: *We fully agree with the TVA decision to treat Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 as existing in-place TVA power supply assets. The units are expected to be placed in or returned to service in 1996. With the relatively low remaining incremental cost required, they clearly provide an attractive low-cost generating source for the consumer. Since these two units will be among the lowest dispatch cost units on the system, they will be base-loaded as soon as available. This will not only lower system generating costs, but also will displace higher cost coal-fired generation and thereby reduce the environmental impacts associated with coal-fired generation in the short run.*

These two units will also reduce the need to purchase power from other utilities, which is expected to become much more expensive after the turn of the century. Clearly, these two nuclear units are properly included in any TVA plan for power supply.

Comment by: Matt Smith, TVA Retirees Association

Response: TVA agrees that the completion of Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 is important to TVA's economic and competitive health. TVA analyses indicate that these units will generate electricity at a competitive cost.

230

Comment: *To have an adequate Energy Vision 2020, TVA needs to fully assess and include in Energy Vision 2020 the completion of Browns Ferry Nuclear Plant Unit 3 including uncertainties of start-up date, completion costs, operating costs and performance, decommissioning costs, capital cost, total cost, cost effectiveness, alternative resources, and corrections of safety violations. According to the United States General Accounting Office, TVA spent in 1994 an average of $833,000 daily on Browns Ferry Nuclear Plant Unit 3.*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division), Nancy Bell, Jamie Pizzirusso, Danielle Droitsch, Mary Byrd Davis (Ygdrasil Institute), Eric Hirst (Oak Ridge National Laboratory), Sheila Holbrook-White (Sierra Club, Alabama Chapter), John Johnson (Earth First), Mary English (University of Tennessee)

Response: Your comment has been reviewed and noted. However, Browns Ferry Nuclear Plant Unit 3 has been restarted. TVA has a need for this capacity in 1996. The operating costs of this unit are approximately 1.7 cents per kilowatt-hour and it is cost-effective compared to other viable alternatives.

231

Comment: *I am opposed to the start-up of Browns Ferry Nuclear Plant Unit 3.*

Comment by: Dennis Haldeman, Walter & Dorothy Stark, Jamie Pizzirusso, Beth Wallace, Sharon Force

Response: Your comment has been reviewed and noted. However, Browns Ferry Nuclear Plant Unit 3 has been restarted. TVA will need this capacity beginning in 1996.

232

Comment: *I believe the completion of the nuclear units as described is appropriate.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: Your comment has been reviewed and noted.

233

Comment: *It is more difficult to criticize the restart of Browns Ferry Nuclear Plant Unit 3 because they already have an operating license.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA recognizes that one of the benefits of Browns Ferry Nuclear Plant Unit 3 is that it does have an operating license.

234

Comment: *"If we were a private utility we would not still be constructing nuclear power plants. But we are a government agency and we have access to capital that allows us to continue construction."—TVA Chairman Craven Crowell*
In the fall of 1995, TVA intends to load nuclear fuel into its Watts Bar Nuclear Plant Unit 1 reactor. In February of 1996, TVA plans to bring Watts Bar Nuclear Plant Unit 1 into commercial operation.

Comment by: Beth Zilbert (Greenpeace)

Response: The first statement was taken out of context. The Chairman was referring to the fact that as the nuclear program evolved, TVA had access to capital easily and moved aggressively forward building nuclear power plants.

Chairman Crowell stated that the nuclear construction program needed to end to ensure the corporation was looking at all of the available power resources and that TVA was making the right decisions for continued power generation. In December, 1994, the Chairman announced that TVA would not itself complete Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2 as nuclear units. He also said that TVA would cap its debt $2 to $3 billion below the congressionally mandated cap of $30 billion.

Fuel was loaded into Watts Bar Nuclear Plant Unit 1 reactor in early November 1995. TVA expects to bring Watts Bar Nuclear Plant Unit 1 into commercial operation in the spring of 1996.

235

Comment: *While TVA claims they welcome competition in an open energy market, their assessment of Watts Bar Nuclear Plant Unit 1 was conducted under current market economic conditions in which TVA receives huge subsidies and tax breaks.*

Comment by: Beth Zilbert (Greenpeace)

Response: TVA's power sales fully support all power activities. Although TVA is not required to pay taxes, it makes payments in lieu of taxes which amount to about 5 percent of revenues.

236

Comment: *The public is very aware of the gross mismanagement in construction of Watts Bar Nuclear Plant.*

Comment by: Scott Banbury

Response: TVA did not attempt to avoid acknowledgment of problems in the management and work control processes in the construction of Watts Bar Nuclear Plant. Corrective actions have been taken, and TVA was granted a license from the Nuclear Regulatory Commission to load fuel and perform low power operations at Watts Bar Nuclear Plant Unit 1 in early November 1995.

237

Comment: *Congressional hearings should be held before TVA starts up Watts Bar Nuclear Plant Unit 1.*

Comment by: Yvonne Seperich

Response: TVA oversight hearings were held by Congress on March 9, 1994. Watts Bar Nuclear Plant Unit 1 was addressed in those hearings.

238

Comment: *Why was sensitivity analysis not performed on Watts Bar Nuclear Plant Unit 1 to determine if the expected costs, including fuel, operations and maintenance, capital additions, and decommissioning costs were lower than available bulk power purchases?*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: In Energy Vision 2020, Watts Bar Nuclear Plant Unit 1 is considered an existing resource and not as an option for future power supply because the unit was essentially complete and is expected to operate in 1996. Watts Bar Nuclear Plant Unit 1 was granted a license to load fuel and perform low power testing in November 1995. Full loading was completed in November, and Watts Bar Nuclear Plant Unit 1 is expected to begin commercial operation in spring of 1996. There is an immediate need for power that could be provided by Watts Bar Nuclear Plant Unit 1, and the alternative of purchasing firm power on

the bulk power market would be more costly than operating Watts Bar Nuclear Plant Unit 1. A detailed sensitivity analysis of all the cost components of the nuclear units was not deemed necessary since nuclear assumptions used in Energy Vision 2020 were reviewed by R. J. Rudden Associates, Inc. for the Energy Vision 2020 Review Group. They concluded that these assumptions were reasonable. This review is titled "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan."

In addition, the uncertainty in the need for power for Watts Bar Nuclear Plant Unit 1 was analyzed. This result is reported in the "Final Supplemental Environmental Review of Operation of Watts Bar Nuclear Plant Units 1 and 2" (Tennessee Valley Authority, June 1995).

239

Comment: *According to the Nuclear Regulatory Commission, Watts Bar Nuclear Plant is the worst design. They should tear it down and put up solar cells.*

Comment by: Howard Switzer (Sun/Earth Tempered Organic Architecture)

Response: There have been numerous modifications made over the past several years to improve plant safety and performance. Modifications have included alterations in design, processes, and hardware to improve safety, performance, and costs of nuclear unit operation. Each of the plant modifications has been thoroughly reviewed for safety implications and the plant design documents have been updated to reflect design changes. The Nuclear Regulatory Commission has conducted comprehensive inspections on the construction activities, including the review of design changes. TVA was granted a license from the Nuclear Regulatory Commision to load fuel and perform low power operations at Watts Bar Nuclear Plant Unit 1 in early November 1995. TVA is dedicated to safe and efficient nuclear plant operation.

240

Comment: *TVA should sue Westinghouse for its faulty steam generators. TVA is afraid to do it because it will not be able to license Watts Bar Nuclear Plant. Westinghouse designs are plaguing utilities throughout the country and resulting in very costly capital additions and modifications. This means TVA is underestimating the costs.*

Comment by: James Riccio (Public Citizens Critical Mass Energy Project), Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA has already addressed this issue with Westinghouse and entered into a settlement agreement in 1986, which provided financial considerations for TVA. Potential steam generator replacement costs were factored into the Energy Vision 2020 process.

241

Comment: *Watts Bar Nuclear Plant should not be started in the interest of long-term healthy ecosystems.*

Comment by: Dennis Haldeman

Response: The environmental reviews for the Watts Bar Nuclear Plant have not found any potentially significant environmental impacts. These reviews include:

- "Supplemental Environmental Review (Final), Operation of Watts Bar Nuclear Plant Units 1 and 2," Tennessee Valley Authority, June 1995.

- "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2," Dockets Nos. 50-390 and 50-391, Tennessee Valley Authority, (NUREG-0498 Supplement No. 1) U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, April 1995.
- "Final Environmental Impact Statement, Watts Bar Nuclear Plant Units 1 and 2," Tennessee Valley Authority, 1992.

242

Comment: *The Watts Bar Nuclear Plant facility should be turned into a nuclear waste storage facility rather than operated.*

Comment by: Bryan Deel

Response: The Watts Bar Nuclear Plant facility was not designed for operation only as a nuclear waste storage facility. It has been designed for nuclear plant operation with limited areas for spent fuel and low level waste storage. A 10 CFR part 30 license would be required by the Nuclear Regulatory Commission for low level waste storage facility operation. A 10 CFR part 72 license would be required for spent fuel storage.

LONG-TERM PLAN

This section includes comments and responses about:

- the energy resource strategies considered in Energy Vision 2020
- the process TVA used to develop strategies
- the merits of various supply-side resource options contained in Energy Vision 2020 strategies, including the conversion of Bellefonte to a gasification plant with a chemical coproduct, nuclear units, renewable energy resources such as wind, and emerging or new technologies
- TVA's decision to cease constructing Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2
- the role of demand-side management resources in Energy Vision 2020
- TVA's strategy for complying with the 1990 Clean Air Act Amendments, including the role of scrubbers and the use of sulfur dioxide allowances
- the use of biomass and refuse-derived fuel in the plan
- the merits of the use of coal-fired units in the plan
- the treatment of debt and TVA's electric rates in Energy Vision 2020
- the treatment of various uncertainties, including competition in the electric utility market, load growth, natural gas prices, environmental regulations, and nuclear performance and costs
- the evaluation methods used in Energy Vision 2020

Strategies Considered

FINAL STRATEGIES

243

Comment: *TVA has done an excellent job in the preparation of Energy Vision 2020 and has considered every conceivable energy option.*

Comment by: J. E. Butt

Response: Your comment has been reviewed and noted.

244

Comment: *To TVA's credit, the resource expansion strategies identified to date do not place heavy reliance on any one generation technology. TVA is considering diversified portfolios of expansion strategies which should help to mitigate the risks associated with the various options.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

245

Comment: *The Environmental Protection Agency commends TVA on its efforts to increase dissolved oxygen in its reservoir release waters. Low-dissolved oxygen releases are recognized as an important water quality issue. Will improvements in dissolved oxygen levels in reservoir releases be included in all scenarios or only in scenarios involving capacity*

increases to existing plants? Also, what level of improvement (increase in milligram per liter of dissolved oxygen) is expected as a result of TVA's Lake Improvement Plan?

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA's Lake Improvement Plan was approved in 1991 and is proceeding in concert with the hydro modernization process. TVA has committed to improve tailwater conditions by maintaining minimum flows and aerating releases below 16 dams. The aeration target is to increase dissolved oxygen to a 5 or 6 milligrams per liter minimum, depending on the fishery, through a combination of aeration at TVA dams and state action to control sources polluting the reservoirs. These improvements are planned regardless of future energy strategy decisions.

246

Comment: *The strategies diverge past the year 2000 with different mixes of resources. However, no strategy is dominated by a single technology or single generator size greater than approximately 300 megawatts.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

247

Comment: *Of the strategies (A-U) presented in the long-term action plan (see Volume 1, Chapter 9), Strategy T appears to be rated the best for all TVA criteria including environmental aspects. This strategy includes the repowering of coal-fired power plants to natural gas plants, which are environmentally superior. Specifically, Strategy T involves low-cost renewables, low-price demand-side management, repowering, and Bellefonte coproduct partnership, which all have some associated environmental benefits.*

Comment by: Heinz Mueller (United States Environmental Protection Agency), Catherine Murray (Sierra Club, State of Franklin Group)

Response: Strategy T is best for some of the evaluation criteria. For example, of all of the strategies, it performs best on reducing potential contributions to air quality impacts. It performs less well on other criteria such as enhancement of customer value and average annual income (a measure of economic development). The overall good performance of Strategy T was the reason that it is included as one of the seven final strategies. Other strategies such as Strategies Q and R provided flexibility to adapt to changing conditions in an uncertain future. These strategies were developed through an iterative process that refined the elements of each strategy so that it could perform as well as possible over multiple criteria. The resource options from all of these final strategies, including Strategy T, were used to develop the long-term plan or "portfolio" discussed in Volume 1, Chapter 9, Figure 9-23.

248

Comment: *The following comment is based on projected project impacts described in Volume 2, Technical Document 2, Environmental Consequences. It is based on our concerns regarding impacts to fish and wildlife resources from reservoir operations and land use on TVA projects in North Carolina.*

Our primary air quality concern is the effect of atmospheric deposition on high elevation forests. Project alternatives that appear to reduce atmospheric impacts include Strategy O and Strategy T.

Comment by: Chrys Baggett (North Carolina State Clearinghouse)

Response: The options contained in Strategies O and T are contained in TVA's preferred alternative, which is a portfolio of energy resource options. As a result, the environmental advantages of these options are inherent in the portfolio.

249

Comment: *The Environmental Protection Agency would encourage TVA to avoid components of Strategy D ("No Action" alternative dominated by coal-fired plants) and to prefer components of Strategy T (although we note that a new coal-fired unit is proposed at Shawnee Fossil Plant under Strategy T) in your portfolio approach to the implementation of energy resource options through the year 2020.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Strategy D was not selected for the Energy Vision 2020 portfolio. Strategy T is best for some of the evaluation criteria. For example, of all of the strategies, it performs best on reducing potential contributions to air quality impacts. It performs less well on other criteria such as enhancement of customer value and average annual income (a measure of economic development). The overall good performance of Strategy T was the reason that it is included as one of the seven final strategies. Other strategies such as Strategies Q and R provided flexibility to adapt to changing conditions in an uncertain future. These strategies were developed through an iterative process that refined the elements of each strategy so that it could perform as well as possible over multiple criteria. The resource options from all of these final strategies, including Strategy T, were used to develop the long-term plan or "portfolio" discussed in Volume 1, Chapter 9, Figure 9-23.

250

Comment: *In general, the strategies with the use of gas-based capacity, Bellefonte coproduct, and low-cost demand-side management are the better-performing strategies using TVA assumptions.*

Comment by: Tennessee Valley Public Power Association

Response: We agree with this assessment.

251

Comment: *Given the information available, it is the opinion of Burns & McDonnell/XENERGY that a reasonable strategy for TVA should include the following:*

1. *Elimination of new investment in nuclear beyond the current plans for completing Browns Ferry Nuclear Plant Unit 3 and Watts Bar Nuclear Plant Unit 1*
2. *Installation of gas-fired combustion turbine and combined cycle units or use of lower cost purchases if available, over the next several years to approximately 2003*
3. *Implementation of the first two blocks of demand-side management that include cost-effective load management and generally accepted low-cost conservation*
4. *Options that maximize flexibility in the design and construction process—both internally and externally to TVA*

5. *Consideration of renewables such as wind and biomass in the long-term years (after 2005)—doing nothing other than reviewing research by others in the short term*
6. *Addition of base-load facilities after 2003 using conventional, proven technologies such as pulverized or fluidized bed coal units*
7. *Reduction of the percentage of debt to depreciated assets*

Comment by: Tennessee Valley Public Power Association

Response: The short-term and long-term plans identified in Energy Vision 2020 contain the suggested options and provide TVA the flexibility to take the suggested actions. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

252

Comment: *TVA has planned all of the strategies developed for Energy Vision 2020 to be equivalent from a loss-of-load probability standpoint and to maintain the appropriate reserve margin to achieve this level. Since the strategies utilize similarly-sized generating units, there is little difference in the reliability of the strategies.*

Comment by: Tennessee Valley Public Power Association

Response: All strategies considered in Energy Vision 2020 had adequate and comparable levels of reliability.

253

Comment: *A measure of reliability to consider in the strategies is the amount of unserved energy. Unserved energy is a measure of the probability, due to forced and scheduled outages, that a given set of generating units would be unable to serve all of the load on a system. Unserved energy was determined for all of the selected strategies. Strategies with maximum capacity diversity resulted in the lowest amount of unserved energy.*

Comment by: Tennessee Valley Public Power Association

Response: The loss-of-load probability method is the most widely accepted approach in the electric utility industry for calculating generation requirements. This method estimates a certain amount of unserved energy per year. A simple comparison of unserved energy may be appropriate for evaluating reliability.

254

Comment: *TVA developed strategies designed to compare favorably under the environmental decision criteria.*

Comment by: Tennessee Valley Public Power Association

Response: TVA developed strategies to address both specific environmental criteria and key environmental uncertainties.

DEVELOPMENT OF STRATEGIES

255

Comment: *Generally, TVA's approach to developing strategies was well above the industry norm. A wide range of strategies was developed and evaluated, each containing significant detail regarding the timing and mix of resource options to be added. The idea of developing strategies that focus on each evaluation criterion or uncertainty is a good approach.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

256

Comment: *TVA has studied the construction process in sufficient detail to identify what it calls flexible base-load resources and flexible peak load resources. Strategy 40 incorporates these efficiencies into Strategy 20 (Bellefonte coproduct). The concept of flexibility could actually be incorporated into all of the strategies.*

Comment by: Tennessee Valley Public Power Association

Response: These flexible options have been incorporated into the long-term and short-term resource plans. (See Volume 1, Chapters 9 and 10.)

257

Comment: *TVA's sensitivity analyses show that should low load growth occur, strategies containing high levels of demand-side management perform worse, while those that have high levels of sales (e.g., Strategy 12) do better. Nuclear strategies such as Strategy 23 perform poorly under a low growth future. Strategies 34, 34A, and 41 look strong on most criteria.*

For high growth futures, strategies such as Strategy 34 with higher demand-side management do better with respect to total resource cost. In general, Strategies 20, 34, 34A, and 34B continue to perform well regardless of the growth projection.

It is interesting to note that rates tend to increase for most strategies in both the high growth and low growth futures. This would seem to indicate that the strategies have been developed to perform well on the middle growth scenario. One might assume that with low growth, fixed costs would be spread to a smaller population of customers, thus raising rates. And, under the high growth future, that expensive off-system capacity must be purchased, thus increasing rates, as well.

Comment by: Tennessee Valley Public Power Association

Response: Generally this comment is correct, but the flexible strategies, Q and R, perform well under all load growth assumptions. (See Volume 1, Chapter 9, pages 9.27 and 9.28.)

258

Comment: *As part of the early screening of strategies, TVA should have spent more time developing strategies that focus on a single resource such as demand-side management or clean coal. By developing mixed strategies so early in the process, it is very difficult to separate out the impact, for example, of demand-side management from renewables because a mixed strategy tends to include them both. TVA's view is that by conducting a thorough*

ranking of options prior to developing strategies, it is redundant to develop single resource strategies.

Comment by: Tennessee Valley Public Power Association

Response: Early in the integrated resource planning process, TVA developed and evaluated over 2,000 single resource strategies. The single resource strategies formed the basis for the development of the mixed resource strategies. (See Volume 2, Technical Document 8, Figure T8-1 for a partial listing of these strategies.)

259

Comment: *While the strategies were developed systematically, there was a large degree of judgment included. It is not clear if good strategies were missed. Although TVA has the EGEAS optimization model in house, it was never used to develop or evaluate strategies. Burns & McDonnell/XENERGY recommend that EGEAS be run to produce its preferred (i.e., optimal) strategies for several criteria, including total resource cost, environmental emissions, and rates. These strategies can then be compared to those produced using judgment by TVA staff. While optimization models may favor a single dominant resource, they are able to identify the best strategy for a single criterion given the input assumptions. Because of the shortfalls of optimization models, Burns & McDonnell/XENERGY do not recommend automatic selection of the optimal strategy. But, the optimal strategy certainly deserves comparison to the others selected and could be used as a starting point for developing more flexible mixed strategies.*

Comment by: Tennessee Valley Public Power Association

Response: As discussed in the Burns & McDonnell/XENERGY report on page VII-2, "Summary of TVA Methodology," the TVA approach to integration avoids the optimization trap and attempts to evaluate a wide variety of strategies using decision analysis techniques. TVA's philosophy is that plans should contain a portfolio of options that provide a hedge against unforeseen events. Optimization models such as EGEAS tend to produce a rush to an extreme such that the winning supply-side option is relied upon almost exclusively. This approach could be considered as a starting point in future resource planning.

260

Comment: *Innovative ways to combine some distributors' systems should be considered to save money. therefore ensuring a stronger competitive position when protective fences are removed.*

Comment by: Tennessee Valley Industrial Committee

Response: Distributors of TVA power are independent entities. These entities are cooperatives and municipalities and are controlled by local boards and local governments, not TVA.

Content

GENERAL

261

Comment: *We support and approve your Energy Vision 2020 plan.*

Comment by: Bill Kling, Jr. (Top of Alabama Regional Council of Governments), Terry McKinney & Miles Mennele (Association of Tennessee Valley Governments), Linda Church Ciocci (National Hydropower Association)

Response: Your comment has been reviewed and noted.

262

Comment: *I appreciate the magnitude of this project. My reaction is one of total awe. Energy Vision 2020 exhibits a level of excellence second to none. I hope it receives national acclaim and recognition.*

Comment by: Tom Forsythe

Response: Many people contributed to Energy Vision 2020, including the public and the Energy Vision 2020 Review Group.

263

Comment: *The long-term plan and the short-term action plan in general are headed in the right direction.*

Comment by: Mary English (University of Tennessee)

Response: Your comment has been reviewed and noted.

264

Comment: *In summary, TVA has demonstrated that they will be a strong and viable energy provider for the next 25 years.*

Comment by: William Pippin (Huntsville Utilities)

Response: Your comment has been reviewed and noted.

265

Comment: *The draft Energy Vision 2020 reflects a rigorous, in-depth study of all aspects of the power supply options available to TVA for the time period covered. Overall, the long-term and short-term action plans provide a well thought-out and comprehensive approach. If adopted, it will permit TVA to be at the forefront of providing the Tennessee Valley region with the opportunity for economic growth by providing reliable, affordable, improved services of electricity to meet the needs of its present and future customers.*

Comment by: TVA Retirees Association

Response: Your comment has been reviewed and noted.

266

Comment: *I was very impressed by the comprehensive study, as well as the multitude of alternatives that TVA has considered.*

Comment by: R. D. Newman (Bowater Newsprint)

Response: TVA has used the best industry practices in integrated resource planning, which include looking at a broad range of supply-side and customer service options, using multiple evaluation criteria, considering future uncertainties, and seeking public input.

267

Comment: *The following were identified as major policy concerns and issues by the Tennessee Department of Economic and Community Development and the Department of Environment and Conservation:*

- *Compliance with the Clean Air Act*
- *Demand-side management*
- *Supply-side options*
- *Investment in the nuclear program*
- *Realistic load growth forecasting and planning system capacity analysis*
- *Potential cost savings through improved energy efficiency*
- *Siting and financing of future construction sites*
- *Control of electricity rates*

We are generally pleased with TVA's initial assessments and reaction to these and other issues.

Comment by: Don Dills (Tennessee Department of Environment and Conservation)

Response: Your comment has been reviewed and noted.

268

Comment: *Energy Vision 2020 has been found consistent with Georgia State social, economic, and physical goals, policies, plans, and programs.*

Comment by: Tripp Reid and Barbara Melvin (Georgia State Clearinghouse)

Response: Your comment has been reviewed and noted.

269

Comment: *The Alabama Department of Environmental Management has reviewed the information submitted and has no objections to the draft Energy Vision 2020. We do point out, however, and refer you to the map in Volume 1, Chapter 3, page 3.11. There are no nonattainment areas in Alabama for total suspended particulate matter as indicated.*

Comment by: Marilyn Elliott (Alabama Department of Environmental Management)

Response: The map has been revised.

270

Comment: *Bowaters thinks that Energy Vision 2020 will continue to ensure that it enjoys a long and prosperous relationship with TVA.*

Comment by: R. D. Newman (Bowater Newsprint)

Response: Your comment has been reviewed and noted.

271

Comment: *TVA's Energy Vision 2020 plan fairly represents the consideration requested by the Energy Vision 2020 Review Group members.*

Comment by: Mary English (University of Tennessee), Tennessee Valley Industrial Committee

Response: Your comment has been reviewed and noted.

272

Comment: *TVA needs to ask, "How much electricity is enough?" This question never seems to be asked in corporate decision-making. The answer is to raise rates, reduce demand, and work on clean, renewable technology. Pay the true cost as we go, not leaving the debt of money or environmental degradation to future generations.*

Comment by: Dolores Howard

Response: Electricity is often credited with contributing to the high standard of living in the United States. Hospitals, schools, manufacturing plants, and other commercial and industrial customers all rely on inexpensive, reliable power to provide consumers with products and services. Increases in rates by TVA would not only cause higher prices for those goods and services, but would also make industrial customers consider relocating to areas of lower priced power since electricity is a major contributor to their operating cost. One of TVA's responsibilities is to provide a reliable source of power to the region.

Energy Vision 2020 balances costs, rates, environmental impacts, reliability, economic development, financial requirements, and other criteria. The short-term and long-term resource plans recommend both demand-side management programs and renewable energy. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

273

Comment: *TVA must become long-range goal oriented. For an example of its shortsightedness, one only has to look at its compliance with the Clean Air Act by using scrubbers and buying credits. Banked credits do not help our carbon dioxide situation and the greenhouse effect, and scrubbers reduce efficiency of power production. Selling energy to areas outside its "fence" is another example of a short-range attempt to fix a long-range problem of indebtedness. With the additional capacity external sales would require, the region would be subjected to even more drastic pollution from current-technology coal-fired units.*

Comment by: Powell & Sharon Foster

Response: Energy Vision 2020 identifies resources to meet the electricity and energy service needs of TVA's customers through the year 2020. This long-range plan addresses increasing competition, changing technologies, environmental concerns, economic devel-

opment of the region, reliability, electric rates, TVA's financial requirements, and risk management, all with public participation.

Sulfur dioxide emissions are to be reduced in two phases, according to the 1990 Clean Air Act Amendments. The larger and more polluting utility units were required to reduce sulfur dioxide emissions in Phase I; Phase I sources generally were to be in compliance by January 1, 1995. In Phase II, the remainder of utility sources become subject to sulfur dioxide reductions, and the allowances issued by the Environmental Protection Agency to the Phase I affected sources will be reduced. All sulfur dioxide sources must be in compliance with Phase II requirements by January 1, 2000. TVA met all Phase I requirements and milestones, and budgetary commitments are in place for TVA to meet Phase II requirements. (See Volume 1, Chapter 4.) TVA evaluated many options for reducing sulfur dioxide emissions, including scrubbers, and found scrubbers to be a very cost-effective solution for certain units. Other units must rely on switching to a low sulfur coal or other control measures. TVA's approach to date has been not to rely on its ability to buy allowances from other sources to achieve its reduction obligations.

Currently there are no carbon dioxide requirements, but Energy Vision 2020 has recognized and evaluated the possibility of a cap on carbon dioxide emissions and the creation of an allowance market for carbon dioxide similar to the sulfur dioxide allowance market. The uncertainty of carbon dioxide regulations was evaluated against all strategies. The long-term resource plan (see Volume 1, Chapter 9, Figure 9-23) adequately responds to this uncertainty.

The removal of "the fence" and other related legislation would allow TVA to serve new customers throughout the nation. According to the National Energy Policy Act of 1992, competition is intended to allow utilities to make better use of existing generating facilities, bring more cost-effective options to the market, and provide utilities and their customers with lower cost electricity. (See The Changing Electric Utility Industry section of Volume 1, Chapter 1.)

TVA expects to meet future load growth using the resources defined in the short-term and long-term resource plans. These plans performed well against the criteria listed above, including the environmental criteria. The plans performed well when they were evaluated for their robustness against environmental regulations and environmental uncertainties. TVA is mindful of the environmental impacts of all resource options evaluated. TVA will identify this further in environmental reviews that will be conducted before it decides to put specific options in place. (See Volume 1, Chapter 10.)

274

Comment: *TVA must become a living laboratory for new technologies if it expects to re-emerge as a competitive force.*

Comment by: Powell & Sharon Foster, Sheila Holbrook-White (Sierra Club, Alabama Chapter)

Response: Supply-side options with both new and existing technology have been evaluated and quantitatively ranked according to multiple criteria, including rates and reliability. New technology options such as cascaded humidified advanced turbines, fuel cells, wind-driven turbines, a biorefinery, landfill and coalbed methane, distributed technologies, and end-use photovoltaics are all potentially cost-effective resources and are in the short-term action plan. (See Volume 1, Chapter 10, Figure 10-1.)

275

Comment: *The plan lacks a sound, strong policy and goals with regard to demand-side management and renewable technologies. As an example, TVA rejected a Kenetech Windpower proposal as unproven technology needing testing while giving serious consideration to a project that has only been done once in the United States—the conversion of Bellefonte Nuclear Plant to an integrated gasification combined cycle plant.*

Comment by: Danielle Droitsch, Stephen Smith (Tennessee Valley Energy Reform Coalition), Michelle Neal (Tennessee Valley Energy Reform Coalition), Eileen McIlvane (Coalition for Jobs and the Environment), Geoffrey Crandall (MSB Energy Associates), Sheila Holbrook-White (Sierra Club, Alabama Chapter), Michelle Carratu, Mary Carton

Response: The Kenetech proposal, a wind farm, had a projected cost of 4.5 cents per kilowatt-hour, which was higher than other resource options. It was therefore concluded that the proposal was not currently competitive. However, wind turbines may be a more cost-effective source of power in the future. Accordingly, wind turbines have been included in TVA's proposed long-term plan. (See Volume 1, Chapter 9, Figure 9-23.) The conversion of Bellefonte Nuclear Plant to an integrated gasification combined cycle plant with the production of a chemical coproduct has been identified in Energy Vision 2020 as one of the best options available to TVA. Recognizing the risk associated with this type of project, TVA is proposing to further study Bellefonte Nuclear Plant conversion options over the next 18 to 24 months before deciding to pursue this option. Prior to making a decision on Bellefonte Nuclear Plant, TVA intends to complete a site-specific environmental review.

The short-term action plan includes demand-side management options, which would add up to 650 megawatts by 2002 and potentially 2,200 megawatts by 2010. This includes several flexible demand-side management programs. These programs will include a low income program, heat pump water heater program, and several programs in the commercial sector. The short-term action plan includes investigations and research into the possibility of a wind project, landfill methane, coalbed methane, end-use photovoltaics, and biomass energy projects to produce power. Short-term actions by TVA will include a flexible wind project at a selected site in the TVA service area. The first phase will determine the potential for this technology and the second phase will include building a wind turbine depending upon the outcome of the first phase. Biomass energy facilities include a biorefinery that uses refuse-derived fuel, wood waste, and energy crops, and a combined garbage and biomass energy plant. (See Volume 1, Chapter 10 for the short-term action plan.)

276

Comment: *When given a choice of 6 funding priorities, the public supported solar and energy efficiency programs by 62 percent; nuclear, coal, and oil by 19 percent; and natural gas by 14 percent. (Source: Safe Energy Communication Council)*

Comment by: Al Fritsch (Appalachia–Science in the Public Interest)

Response: Your comment has been reviewed and noted.

277

Comment: *TVA is forcing people to choose between jobs and their children's health and future.*

Comment by: Beth Zilbert (Greenpeace)

Response: TVA disagrees that it is posing such a dilemma. The long-term plan and short-term action plan recommended in Energy Vision 2020 seek to balance both short- and long-term needs. Among other criteria, the plans were evaluated for both the short-term and long-term effects on economic development (jobs and income), long- and short-term environmental impacts, and short-term electric rates and long-term costs. These evaluations are shown in Volume 1, Chapters 9 and 10.

278

Comment: *TVA should focus more on environment than on rates.*

Comment by: Debra Jackson, Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: In Energy Vision 2020, TVA has sought to balance several evaluation criteria in deciding on both the long-term plan and short-term action plan. The criteria (see Volume 1, Chapter 5) included both environmental emissions and electric rates. The evaluation of strategies (long-term plan) using both electric rates and environmental measures is included in Volume 1, Chapter 9, Figures 9-4 to 9-10. In Volume 1, Chapter 9, Figure 9-11, all strategies lessened TVA's contribution to various air quality problems compared to the reference strategy.

The final strategies used to formulate TVA's proposed long- and short-term action plans were determined to provide the best balance among criteria, including environmental criteria. (See Volume 1, Chapter 10, Figures 10-4 to 10-7.)

279

Comment: *It certainly makes sense for TVA to make practical purchases of peaking and base-load power resources to improve its hydro plants and to invest in cost-effective demand-side management measures.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District)

Response: Your comment has been reviewed and noted.

280

Comment: *There needs to be an immediate moratorium on TVA's unsafe, uneconomical, and unwanted nuclear program.*

Comment by: Jim Sells, Fred Wright, Myles Jakubowski (Sunbeam Household Products)

Response: Nuclear power is a vital part of TVA's power mix and should not be abandoned. Nuclear plants are economical to operate and supply energy reliably, safely, and with little environmental impact. It is physically impossible for a nuclear plant to explode because the low-enriched fuel is not concentrated enough. United States nuclear energy plants use a series of physical barriers to prevent the release of radioactivity. The Nuclear Regulatory Commission monitors operations every day and conducts comprehensive reviews that cover all aspects of the plant. TVA is dedicated to safe and efficient nuclear plant operation.

In Energy Vision 2020, the possibility of a nuclear moratorium was evaluated. Such an event would increase TVA's costs significantly but was deemed to have a low probability of occurrence. (See Volume 2, Technical Document 8, page T8.27 and Figure T8-32.)

281

Comment: *Energy Vision 2020 presents a portfolio (bundle) of options drawn from seven key strategy alternatives. These options were chosen because they are projected to best meet TVA's objective of economic development, environmental control, debt management, etc., and to be the most robust and flexible options. However, uncertainties of the future can dramatically alter the plans for providing the best balance of options. Thus, building flexibility into the integrated resource plan bundle is a key.*

TVA not only should undertake resource options which can be altered as to size and schedule of commercial operation, but should also take steps in the short run to ensure that future options are not limited. Proven resources should not be ruled out because initial steps such as site selection, environment monitoring, and site purchases were not undertaken on a timely basis.

For these reasons, Energy Vision 2020 should make it very clear that other resource options not specifically included in the final portfolio may still provide the best balance and be most cost-effective, given the many uncertainties which could arise and the possibility of significant improvements in technology.

Thus, while Energy Vision 2020 is an impressive review of TVA's energy options, it should be viewed only as a guide, not a concrete strategy, and as only one management tool available to the TVA Board to plan the future of the TVA power system. TVA should remain flexible enough to adopt other options both in the short-term and long-term plans if they should prove to best meet the objectives of the integrated resource plan.

Comment by: TVA Retirees Association

Response: TVA recognized that the Energy Vision 2020 must be a flexible plan, one that is conducive to change as events unfold and near-term futures become more clearly known. Flexible supply-side options are ones that have smaller unit size, shorter lead times to construct or start, lower capital costs, and low walk-away costs.

With flexibility in mind, TVA's proposed short-term action plan incorporates flexible purchase agreements for peaking and base-load power to meet customer needs through the year 2002. TVA's short-term plan includes preliminary work for siting and engineering for combustion turbines (peaking power) at existing TVA sites to provide TVA with the flexibility to meet an uncertain future. The short-term plan also includes flexible demand-side management options. (See Volume 1, Chapter 10, Figure 10-1.)

282

Comment: *TVA should treat its plan as a flexible instrument, permitting alternative courses and new options to keep pace with evolving needs and future uncertainties.*

Comment by: TVA Retirees Association, Tennessee Valley Industrial Committee

Response: TVA recognized that Energy Vision 2020 must be a flexible plan, one that is conducive to change as events unfold and near-term futures become more clearly known. Flexible supply-side options are ones that have smaller unit size, shorter lead times to construct or start, lower capital costs, and low walk-away costs.

With flexibility in mind, TVA's proposed short-term action plan incorporates flexible purchase agreements for peaking and base-load power to meet customer needs through the year 2002. TVA's short-term plan includes preliminary work for siting and engineering for combustion turbines (peaking power) at existing TVA sites to provide TVA with the flexibility to meet an uncertain future. The short-term plan also includes flexible demand-side management options. (See Volume 1, Chapter 10, Figure 10-1.)

283

Comment: *Six of the seven final strategies include the Bellefonte Nuclear Plant conversion, but the viability of this option remains uncertain. This option may be helping to tilt the scales in favor of the six strategies. Consequently, the final strategy overrelies on the Bellefonte Nuclear Plant conversion and may not be robust enough.*

Comment by: Mary English (University of Tennessee), Danielle Droitsch

Response: Based on the analyses done for Energy Vision 2020, the Bellefonte Nuclear Plant conversion options appear to be both viable and very beneficial. The Ranking of Options section of Volume 2, Technical Document 8 shows that the best options are the conversion options. The best conversion is the integrated gasification combined cycle plant, with the production of a chemical coproduct.

As shown in Volume 1, Chapter 9, Figure 9-5, Strategy Trade-off for Short-Term Rates vs. Total Resource Cost, all of the strategies that are low cost, with the exceptions of Strategies M and F, contain the Bellefonte Nuclear Plant conversion to a coal gasification plant with the production of both electricity and a chemical coproduct. The Bellefonte Nuclear Plant conversion option reduces both costs and electric rates. The costs and rates are reduced because the sale of the chemical coproduct provides benefits that reduce the cost of electricity. In addition, this option minimizes electric rates because much of the existing plant at Bellefonte can be used in the conversion that reduces the potential write-off of unused plant and equipment. The chemical coproduct sales associated with some of these conversions provide a natural hedge against a rising gas market.

Without the Bellefonte conversion options, there would be more of a trade-off between costs and short-term electric rates. For example, again in Figure 9-5, Strategies B, L, and F could be lower cost if they included the Bellefonte Nuclear Plant conversion option, but would have higher electric rates. Even if the Bellefonte conversion option is removed from TVA's final strategies, they would still be preferred over competing strategies, and the long-term portfolio would still represent TVA's best course of action.

284

Comment: *TVA's efforts to be a world leader in total resource development through innovative approaches to new technology and business arrangements are to be applauded. At the same time, however, it is important that TVA plan to expand capacity only by using proven, mature technology for a significant amount of the new resources, if it is to maintain a dependable power system. Proven technology not only should be more reliable, but also more predictable as to construction schedules, cost, and environmental consequences. In our view, only a small portion of the required new capacity should be committed to innovative technology.*

This is not to say that TVA should not be commended for exploring the new options included in the portfolio. However, we do believe it would be prudent to try only small prototype units for new designs in order to gain practical experience on costs and reliability. In its planning, TVA should allow adequate time to research, test, and prove a new resource type before having to count on it as a significant source of dependable power supply.

The proposed strategies in Energy Vision 2020 appear to include significant reliance on innovative technologies such as cascaded humidified advanced turbines, compressed air energy storage, biomass, fuel cells, wind turbines, and landfill and coal mine methane sources. These power sources are in varying degrees of development, but it is not yet clear

that they can at any time soon be called mature, proven technology. TVA should guard against being overly optimistic in relying on these sources.

Comment by: TVA Retirees Association

Response: TVA agrees with this cautionary advice and has structured Energy Vision 2020 to provide the kind of flexibility that will allow TVA to respond appropriately to changing technologies and future uncertainties. The Energy Vision 2020 short-term action plan identifies both resource options for implementation and research and development activities. Among the options proposed for implementation are the purchase of call options for both base capacity and peaking capacity, investments in hydro modernization projects, and cost-effective biomass cofiring. TVA also proposes to expand its demand-side management efforts.

As part of the short-term action plan, TVA proposes research and development activities for fuel cells, wind turbines, and landfill and coalbed methane. TVA also proposes to further study the feasibility of converting Bellefonte to integrated gasification using natural gas or coal. In addition, TVA proposes to invest in siting and engineering studies for combined cycle, combustion turbines, cascaded humidified advanced turbines, and compressed air energy storage. If during the engineering development, there are significant problems with any of these technologies (many of which are proven technologies) TVA would not pursue these technologies further.

285

Comment: *Many of the power supply options identified by TVA as attractive options involve technologies that are not currently commercially proven. As electric utilities head toward competition, maintaining costs as low as possible will become a top priority. TVA has stated its commitment to maintaining the lowest possible power costs. However, pursuing the addition of generation technologies which are not commercially mature exposes TVA to risks which could ultimately upwardly influence wholesale power costs. (In the past, TVA has pushed new technology and size limits. If continued, this may put TVA at a competitive disadvantage vs. others who use proven technology with low risk.)*

Comment by: Tennessee Valley Public Power Association

Response: TVA agrees with this cautionary advice and has structured Energy Vision 2020 to provide the kind of flexibility that will allow TVA to respond appropriately to changing technologies and future uncertainties. The Energy Vision 2020 short-term action plan identifies both resource options for implementation and research and development activities. Among the options proposed for implementation are the purchase of call options for both base capacity and peaking capacity, investments in hydro modernization projects, and cost-effective biomass cofiring. TVA also proposes to expand its demand-side management efforts.

As part of the short-term action plan, TVA proposes research and development activities for fuel cells, wind turbines, and landfill and coalbed methane. In addition, TVA proposes to further study the feasibility of converting Bellefonte to integrated gasification using natural gas or coal. TVA also proposes to invest in siting and engineering studies for combined cycle, combustion turbines, cascaded humidified advanced turbines, and compressed air energy storage. If during the engineering development, there are significant problems with any of these technologies (many of which are proven technologies) TVA would not pursue these technologies further.

286

Comment: *The long-term action plan includes 2,000 megawatts of wind turbines to serve as base-load power. This installation would require an estimated 50,000 acres of land located on a prominent bluff or ridge line for proper operation. This would make the wind turbines visible over great distances. Although variable speed wind turbines have been developed, locations that offer wind speeds sufficient to generate significant amounts of base-load power may be quite limited in the Tennessee Valley. A prototype wind turbine was constructed in the North Carolina mountains a few years ago, and test results should now be available and taken into account by TVA. Even if the public would accept 50,000 acres of wind turbines, TVA should be assured that this would be a dependable source of power before embarking on such a venture.*

Comment by: TVA Retirees Association

Response: The recommended short-term action plan (see Volume 1, Chapter 10, Figure 10-1) includes a wind turbine project. The first phase of this project includes an investigation of wind resources to evaluate whether the available winds in candidate locations are in fact adequate for power generation. The evaluation will also consider the performance characteristics of the best available wind turbine technology. The second phase includes building a wind turbine, depending on the outcome of the first phase. The results of this project will help decide the potential for a larger commitment to wind resources in the long-term plan.

287

Comment: *There is minimal or no vision in the plan. TVA did a good job of keeping a lot of options and a good job of hedging against the competitive future, but it really has not charted a path for the future.*

Comment by: Howard Switzer (Sun/Earth Tempered Organic Architecture), Stephen Smith (Tennessee Valley Energy Reform Coalition), Dennis Haldeman, Tom Fitzgerald (Kentucky Resources Council, Inc.)

Response: TVA's vision is "to be the recognized world leader in providing energy and related services, independently and in alliances with others, for society's global needs." Energy Vision 2020 enhances TVA's capabilities of achieving this vision.

TVA is expecting important changes in the relationships between utilities and their customers. Consumer, legislative, and utility actions across the nation are changing the electric utility industry from a regulated monopoly to a competitive marketplace. TVA is in the forefront of this change and welcomes the opportunity for growth and improved service and responsiveness to the needs of its current and new customers. TVA has taken steps to position itself for success in this new competitive environment. TVA's rates have remained stable since 1987. Its work force has been streamlined from 34,000 employees in 1988 to 16,500 in 1995. Improved productivity and efficiency, lowered operating and maintenance costs, and reductions in interest expense have resulted in savings of more than $800 million per year.

The result of these efforts is that TVA is financially strong. TVA's power program is self-supporting with revenues from power sales. TVA's electric power production and operating costs are competitive with utilities in the regional market. The same is true for the electric prices paid by consumers in the TVA service area. Energy Vision 2020 will guide TVA in entering this competitive marketplace and beyond by identifying the best energy resource choices for the current and future generations of consumers. However, Energy Vision 2020 goes beyond simply providing competitively priced power. The plan

also considers economic development and the environment as part of TVA's mandate to be a leader in total resource development. Innovative approaches in meeting the demand for energy through new technologies and business arrangements are the means by which TVA can achieve all of these goals: competitively priced power, opportunities for economic growth, and a quality environment rich in natural resources.

288

Comment: *As a member of the Energy Vision 2020 Review Group, I do not endorse the plan as written.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Your comment has been reviewed and noted.

289

Comment: *The utility industry has begun to view resource addition impacts over a much shorter horizon. Although TVA's Energy Vision 2020 considers various strategies over a 25-year horizon, there are too many changes occurring in the industry to think that any single strategy will work over that time frame. Therefore, decision-makers are looking at long-term options but focusing their attention on the economic, environmental, and reliability issues over a shorter horizon such as 5 to 10 years. Within the five-year time frame, it is often difficult to change direction once a resource plan has been selected. However, with current market conditions, flexibility in this short of a time frame is important.*

Comment by: Tennessee Valley Public Power Association

Response: TVA chose to develop a long-term plan consisting of a portfolio of resource options from the final key strategies. This portfolio enables TVA to meet customer needs at an acceptable level of risk and meet the objective of balancing costs, rates, environmental impact, reliability, debt, economic development, and other criteria. To manage risk, the portfolio provides a set of both robust and flexible resource options. These include such flexible options as option purchase agreements, investments in siting and pre-engineering to reduce lead times, and purchases of power from independent power producers and cogenerators. (See Volume 1, Chapter 9, Figure 9-23.)

NUCLEAR DECISION

290

Comment: *I support TVA's decision not to build any more nuclear plants. This includes Watts Bar Nuclear Plant Unit 2, Bellefonte Nuclear Plant Units 1 and 2, and Browns Ferry Nuclear Plant Unit 1.*

Comment by: Jamie Pizzirusso, Jan Jones (Tennessee River Valley Association), David Bowman (Huntsville News), J. Richard Hommrich (Volunteer Barge & Transport, Inc.), Tennessee Valley Public Power Association, Stephen Smith (Tennessee Valley Energy Reform Coalition), Mary Byrd Davis (Ygdrasil Institute), Powell & Sharon Foster, Jim Von Bramer, Philip & Winfred Thomforde, Alan Jones (Tennessee Environmental Council)

Response: Although TVA has decided by itself not to complete or restore these units as nuclear, it is exploring ways to obtain value from these assets.

291

Comment: *The large expenditures and questions about continued reliability make nuclear options questionable in today's market. No other utilities in the country are bringing on nuclear power plants because they do not make good economic sense in a deregulated free market.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Michelle Neal (Tennessee Valley Energy Reform Coalition), Ron Kapavik, Carol Kimmons, Jean Cheney, Sharon Fidler (League of Women Voters), Alexander Dewey

Response: In December 1994, the TVA Board decided TVA would not, by itself, complete Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2, as nuclear units. Browns Ferry Nuclear Plant Unit 1 will continue in its inoperative status.

TVA decided to complete and operate Watts Bar Nuclear Plant Unit 1 and return Browns Ferry Nuclear Plant Unit 3 to service. Operating both of these units will provide cost-effective, needed capacity for the TVA system and these units are expected to be in operation by 1996. (See response to comments in the section on Economics/ Alternatives of Watts Bar Nuclear Plant Unit 1.)

Performance in the nuclear industry and at TVA continues to improve. A discussion of the improvement of TVA's nuclear performance can be found in the section on Nuclear Generation in Volume 1, Chapter 4 and the section on TVA's Nuclear Plants in Volume 2, Technical Document 3.

292

Comment: *In 1992, 65 percent of people in a Harris poll were opposed to building nuclear power plants.*

Comment by: Al Fritsch (Appalachia–Science in the Public Interest)

Response: There have been many surveys or polls done that have assessed public opinion on nuclear power. A Cambridge Reports survey of 500 opinion leaders, conducted in the spring of 1995, found 62 percent who said that nuclear energy should play an important role in meeting the nation's future energy needs. A Bruskin/Goldring Research survey of a representative sample of the United States population conducted in March 1995 found that 70 percent thought nuclear energy should play an important role in meeting the nation's future energy needs.

Levels of support that are found consistently in national polls follow:
75-85 percent favor keeping existing nuclear plants.
75-80 percent favor keeping the option to build more nuclear energy plants.
67-70 percent support an important future role for nuclear energy to meet the country's electricity needs.
52 percent favor the use of nuclear energy.
35 percent do not favor use of nuclear energy.

293

Comment: *I do not think nuclear power is the answer to all of our energy needs and we need to try and find some other avenues for producing energy because of the danger and radioactive waste of nuclear.*

Comment by: Susan Jata, Dolores Howard, Kathleen O'Donohue, Mike Eastman

Response: One of the major conclusions of Energy Vision 2020 is that TVA by itself will not complete three nuclear units: Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2. Browns Ferry Nuclear Plant Unit 1 will continue in its inoperative status. As described in Energy Vision 2020, TVA proposes to rely on several different supply- and demand-side resources to meet future customer needs.

Energy Vision 2020 indicates that TVA will continue to operate five nuclear units. Nuclear plants supply energy reliably, safely, and with little environmental impact.

294

Comment: *TVA should not continue to pursue investors for their nuclear power plants because of the high cost in nuclear waste storage, as well as the incredible social costs.*

Comment by: Elizabeth Garber

Response: TVA will keep open alternatives for the uncompleted nuclear units that would balance the evaluation criteria used in Energy Vision 2020 including minimizing short-term rates, increasing long-term flexibility, minimizing long-term costs, and limiting debt. Alternatives include converting the units to another technology, replacing the capacity, or completing these units as nuclear units with partners.

295

Comment: *No new nuclear facilities should be opened until their impacts on our health are better understood and they can be as safe as the options of solar, wind, and other renewables. Why use toxics when we have clean sources available?*

Comment by: Dara Chernicky, Monique Mollet

Response: Nuclear energy is a mature technology with over three decades of operating history. More than 400 nuclear plants are operating in 27 countries around the world. Nuclear energy is the most researched of all power production technologies. Technical issues and health effects are well understood. The nuclear industry and TVA are dedicated to safe and efficient nuclear plant operation.

Nuclear plants supply energy reliably, safely, and with little environmental impact. Nuclear energy plants produce electricity by the fissioning of uranium, not the burning of fuel. As a result, nuclear plants do not pollute the air with sulfur dioxide, nitrogen oxides, dust, or greenhouse gases like carbon dioxide.

BELLEFONTE CONVERSION

296

Comment: *TVA should convert the Bellefonte Nuclear Plant and other unfinished nuclear units to coal. Coal is low-cost, dependable, and plentiful.*

Comment by: Barbara Altizer (Virginia Coal Council), Jan Jones (Tennessee River Valley Association), J. Richard Hommrich (Volunteer Barge & Transport, Inc.), Ed Brooks (Tennessee Southern Railroad)

Response: Energy Vision 2020 includes several options for the coal-fired conversion of Bellefonte Nuclear Plant. One of these options is an integrated coal gasification combined cycle demonstration project that could be the first phase of converting Bellefonte Nuclear Plant to utilize fossil fuels. An 18 to 24-month study is just starting to further assess and

refine the strategy for converting Bellefonte Nuclear Plant. This study will concentrate on both natural gas and coal-fired options, and the value of possible coproducts.

TVA is keeping its options open with respect to its unfinished nuclear units, and among other things will be considering the use of other technologies, such as the use of other fuels like coal.

297

Comment: *Bellefonte Nuclear Plant should be converted to a coal plant because of the economical resources of coal throughout eastern Kentucky, eastern Tennessee, West Virginia, and Virginia. Other conversion options should also include coal.*

Comment by: Ed Brooks (Tennessee Southern Railroad), William Bowker (Kentucky Coal Marketing and Export Council), James Gillum (Tennessee River Valley Association)

Response: Energy Vision 2020 includes several options for the coal-fired conversion of Bellefonte Nuclear Plant. One of these options is an integrated coal gasification combined cycle demonstration project that could be the first phase of converting Bellefonte Nuclear Plant to utilize fossil fuels. An 18 to 24 month study is just starting to further assess and refine the strategy for converting Bellefonte Nuclear Plant. This study will concentrate on both natural gas and coal-fired options and the value of possible coproducts.

Natural gas combined cycle and integrated coal gasification combined cycle repowering of some of TVA's older pulverized coal-fired plants are also considered in Energy Vision 2020.

298

Comment: *The Kentucky Coal Marketing and Export Council wants to assist TVA in analyzing the conversion of the Bellefonte Nuclear Plant to coal gasification.*

Comment by: William Bowker (Kentucky Coal Marketing and Export Council)

Response: TVA is continuing to evaluate the conversion of Bellefonte Nuclear Plant to a coal-fired technology, as well as other technologies. In the process of the ongoing investigations, we expect to be in contact with entities involved with all phases of the project. This will include potential future fuel suppliers. We will be in contact with the Kentucky Coal Marketing and Export Council as appropriate in these studies.

299

Comment: *Cincinnati Gas and Electric converted a nuclear plant that was about 85 percent complete to coal in about two and a half years. The plant has been operating about two and a half years and has been an outstanding success. This is the same situation TVA is facing today.*

Comment by: Ken Wheeler (Midland Enterprises)

Response: We are familiar with the pulverized coal conversion of the Zimmer plant by Cincinnati Gas and Electric with American Electric Power. The Zimmer and the Midlands plants natural gas combined cycle conversions are good examples of successful conversions of nuclear units to alternative fuels.

300

Comment: *The smaller conventional coal-fired units with their predictable costs, construction schedules, performance, reliability, and greater operating flexibility present a very attractive option. Conversion of the Bellefonte Nuclear Plant to a conventional coal-fired facility would also incorporate proven technology.*

Comment by: TVA Retirees Association

Response: The smaller coal-fired units were included in the options for Energy Vision 2020 because they have known characteristics and their size matched well with system expansion rates. A coal-fired conversion of Bellefonte Nuclear Plant was considered. (See Volume 2, Technical Document 6, Figure T6-1, option 7.1.1.2.)

301

Comment: *The coproducts derived from integrated gasification are similar to the methane-based products made at natural gas processing plants. Not only is TVA forecasting higher natural gas prices, TVA is speculating that natural gas prices will be as forecast. TVA is betting that the cost to produce coproducts through coal gasification will be less than the cost to produce through natural gas-based processing. However, given current forward market prices of natural gas and the current stage of commercial development of integrated gasification technology, natural gas processing of coproduct continues to hold an economic advantage. TVA should consider a staged approach to combustion turbine and combined cycle construction—initially firing these plants with natural gas and adding gasifiers when proven technology and economics dictate.*

If TVA used the low case scenario for gas prices, how would TVA's revenues from coproducts affect total project costs?

Comment by: Tennessee Valley Public Power Association, Henry Nickell (Memphis Light, Gas and Water Division)

Response: TVA recognizes that there are several uncertainties with the integrated gasification combined cycle plant with the production of a chemical coproduct. Two of the key uncertainties are the price of natural gas and the uncertainty in future coproduct prices. The uncertainty in chemical coproduct prices is evaluated with the uncertainty in natural gas prices in Volume 1, Chapter 9, pages 9.28 and 9.29. Lower prices for the chemical coproduct based on the lower natural gas prices reduce the value of the integrated gasification combined cycle with the production of the chemical coproduct as indicated in Volume 1, Chapter 9, Figure 9-18.

Recognizing there are potential risks with an integrated gasification combined cycle with chemical coproducts, the Energy Vision 2020 short-term action plan recommends further investigation of this and other viable options at Bellefonte. These investigations will also examine a staged approach to converting Bellefonte. The investigation should be completed within 18 to 24 months.

302

Comment: *Memphis Light, Gas and Water would prefer to see TVA, a government agency, refrain from such high risk, pioneering type activities as coal gasification and selling of coproduct. Private industry financing is better suited for these types of business risks. What success has TVA had in the methane-based coproducts industry?*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: TVA recognizes that there is a degree of risk associated with coal gasification and coproduction of chemicals. The risks associated with coal gasification and coproduction will be addressed in the proposed evaluation and development of an integrated gasification combined cycle demonstration project under the Clean Coal Technology program of the Department of Energy. In addition, the risks will be assessed in an 18 to 24 month study on various aspects of commercial development of gasification and coproduction. (See Volume 1, Chapter 10, Figure 10-1.) Also, the integrated gasification combined cycle options used in Energy Vision 2020 designated "with partners" (e.g., options 7.1.1.6 and 7.1.1.7, Volume 2, Technical Document 6, Figure T6-1) assumed that the gasification plant was wholly owned and operated by the partner, not TVA, and that TVA purchases syngas from the partner. One of the goals of the 18 to 24 month study will be to recommend any future integrated gasification combined cycle commercial development.

With respect to the risks of chemical coproduction, the 18 to 24 month study in the Energy Vision 2020 short-term action plan will study the various risks of coproduction in more detail. TVA gained some experience in the coproduction of chemicals from synthesis gas from a coal-gasification facility operated at our Muscle Shoals facilities. Another of the goals of the 18 to 24 month study is to determine a recommended course of action with respect to TVA ownership and operation of coproduction facilities in conjunction with future integrated gasification combined cycle commercial development.

303

Comment: *Will the market for methyl tertiary butyl ether be greatly diminished if electric or natural gas-burning vehicles replace gasoline-burning vehicles in non-attainment areas? Will ethanol dominate the market for fuel additives, reducing expected methyl tertiary butyl ether demand? Methyl tertiary butyl ether competes with ethanol additives produced from agricultural products. Significant expansion can occur quickly in agriculture to offset upwardly moving natural gas prices and, hence, increasing costs of methyl tertiary butyl ether.*

Comment by: Tennessee Valley Public Power Association

Response: The short-term action plan recommends an 18 to 24 month study to review the economics and assumptions that have been used for the conversion of Bellefonte, including an integrated gasification combined cycle/coproduction facility. The data presented in Energy Vision 2020 is based on studies performed by reputable consultants in the chemical market and price forecasting field. However, a more detailed evaluation of the potential chemical markets and range of prices will be performed as part of this study. This study will revisit the range of chemicals that can be produced from synthesis gas, prepare a market forecast for the more attractive of these chemicals, and prepare a range of price forecasts for these chemicals based upon market variability. It is likely that a range of coproducts would be selected for production with the intent of providing a hedge on the loss of a particular chemical market by diversity of chemicals being produced.

304

Comment: *The impact statement (see Volume 1, Chapter 9, Figure 9-34, Long-Term Plan) specifies that siting and engineering for a combined cycle plant will supply base-load power. Do you not mean building and operating a combined cycle plant will supply base-load power?*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: Building a combined cycle plant with siting and pre-engineering to supply base-load power is recommended in TVA's short- and long-term action plans. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) Investing in siting and pre-engineering can shorten the lead time for the plant, thus making the option more flexible.

305

Comment: *The natural gas combined cycle option did not prove economically competitive based on the assumptions employed by TVA in the analysis. The natural gas combined cycle option was assumed to have a capacity factor of 40 percent, while the integrated gasification combined cycle and pulverized coal options were assumed to be base-loaded at a capacity factor of 85 percent. Burns & McDonnell was told this was a "dispatching decision," implying that a production cost model such as MIDAS was not allowed to dispatch the option based on relative economics. Based on the TVA estimates for both capital and operating and maintenance costs for these three options, if the capacity factors were equivalent, the natural gas combined cycle would likely prove the most economical.*

Another factor impacting the natural gas combined cycle's economics was the inclusion of selective catalytic reduction for nitrogen oxides control. TVA's selective catalytic reduction trigger level is 25 parts per million nitrogen oxides or less. This can now be routinely achieved through commercially available dry low nitrogen oxides burner technology. Elimination of the selective catalytic reduction requirement would further improve natural gas combined cycle economics.

Comment by: Tennessee Valley Public Power Association

Response: The selection of 85 percent capacity factor for base-load options such as integrated gasification combined cycle and pulverized coal units versus 40 percent capacity factor for natural gas-fired combined cycle units is based on how these various unit types would be economically dispatched on the TVA system. As a result, those units that have low fuel costs and good heat rates will run at a higher capacity factor than units with higher fuel costs and comparable heat rates.

With respect to the installation of selective catalytic reduction controls on a combined cycle unit, TVA recognizes that dry low-nitrogen oxides burners are available that can achieve less than 25 parts per million using natural gas. However, if the unit operates for a significant period of time on fuel oil during a natural gas curtailment, low nitrogen oxides burner controls may not meet emission limitations. Inclusion of selective catalytic reduction controls better ensures compliance. Natural gas combined cycle is a cost-effective option if constructed using a staged construction process. (See Volume 1, Chapter 9, Figure 9-14.)

306

Comment: *Converting Bellefonte Nuclear Plant to natural gas is feasible; future gas prices will be stable enough to allow this. Converting to coal gasification in conjunction with a partner also remains a viable option.*

Comment by: William Pippin (Huntsville Utilities)

Response: Your comment has been reviewed and noted.

307

Comment: *The conversion of Bellefonte Nuclear Plant to a combined cycle plant using natural gas appears to be a desirable option. The possibility of using coal gasification technology, however, is risky, especially in today's highly competitive marketplace.*

TVA's plan for an independent engineering study of the Bellefonte Nuclear Plant conversion option is definitely needed. We hope the use of either coal gasification and/or a coproduct line with this conversion will carefully consider the risks of commercially untried technology and the questionable growth potential of the methyl tertiary butyl ether market.

Comment by: Tennessee Valley Public Power Association

Response: TVA recognizes that the risk of an integrated gasification combined cycle plant is greater than for more conventional technology. Recognizing this risk, the short-term action plan recommends an 18 to 24 month independent study to review the viable Bellefonte Nuclear Plant conversion options.

This study will assess the chemical coproduction market and sales potential. TVA would pursue commercialization of integrated gasification combined cycle technology and coproduction of chemicals only if the project meets TVA's objectives.

308

Comment: *To reduce pollution caused by TVA coal-burning plants, we urge the use of only natural gas, as in converting the Bellefonte Nuclear Plant to a combined cycle plant. Landfill methane and coalbed methane (natural gas) should be considered as clean fuel possibilities for TVA plants.*

Comment by: Powell & Sharon Foster, Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA is considering both natural gas and coal-fired alternatives for conversion of Bellefonte Nuclear Plant. The coal-fired alternatives utilize emissions control technologies that meet or exceed the currently recognized Best Available Control Technology (BACT). As a result, the emissions from any of the coal-fired options would be equivalent to or below the emission rates from any existing TVA coal-fired plant.

Landfill and coalbed methane are not likely fuels for a conversion of other TVA plants due to their locations. However, these options have been identified in the short-term action plan for further investigation. (See Volume 1, Chapter 10, Figure 10-1.)

309

Comment: *When converting Bellefonte Nuclear Plant, TVA should consider the use of biomass as fuel, provided this is not whole logs. Using short rotation woody crops, residual wood waste, and sawdust helps with a solid waste disposal problem and will burn cleaner than coal. Other advantages are that it recycles carbon and helps with the greenhouse warming problem, will decrease forest fragmentation, and will increase use of reserve lands.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: The conversion of Bellefonte Nuclear Plant to an integrated gasification combined cycle plant using biomass was considered early in the Energy Vision 2020 process. However, this option was eliminated from further analysis due to its high cost. TVA is actively investigating other biomass options, and this has been included in the short-term action plan. (See Volume 1, Chapter 10, Figure 10-1.)

CUSTOMER SERVICE

310

Comment: *I am satisfied with the quality of TVA's service and the price. I do not believe TVA should become a national leader in demand-side management/energy conservation. I do not want electricity usage restricted in even a minor way.*

Comment by: L. George Hannye

Response: TVA's objective in Energy Vision 2020 was to enhance the quality of its services and to maintain the competitive price of its electricity. Using a multi-attribute trade-off method, TVA evaluated a large number of supply-side and demand-side options to accomplish this. This resulted in recommended short- and long-term plans that include cost-effective supply- and demand-side management options which perform well across all evaluation criteria, including rates and reliability.

311

Comment: *It is not clear in the plan how much energy savings would or could result from demand-side management options in TVA's long- and short-term plans? What effect would or could these options have on the need for new power plants? If demand-side management negates the need for a new plant or the need to finish a nuclear plant, is the plan flexible enough to allow this?*

Comment by: Naomi Furman Kipp (Legal Services Corporation of Alabama)

Response: The demand-side management programs recommended for implementation in the Energy Vision 2020 short-term action plan represent 650 megawatts of capacity savings by the year 2002. (See Volume 1, Chapter 10, Figure 10-1.) This capacity savings would be in lieu of building 650 megawatts of supply-side options. These demand-side management programs continue to provide additional capacity savings, up to approximately 2,200 megawatts by the year 2010. The capacity savings represented by any demand-side management program are fully integrated into each strategy identified in Energy Vision 2020.

312

Comment: *Options that improve customers' comfort, and energy efficiency and help them save money will improve customer loyalty and satisfaction.*

Comment by: Ann Lamb

Response: The customer service options included in the Energy Vision 2020 short-term action plan and the long-term plan are designed to increase customer value, comfort, and energy efficiency and lower energy bills.

313

Comment: *TVA should build brand recognition in its product and in its corporate name. This can be done by giving the citizens more customer service options.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: As part of Energy Vision 2020, TVA considered many customer service options with a wide range of technologies, promotion strategies, and costs. The options that

were included in the Energy Vision 2020 short-term and long-term action plans were selected based on the evaluation criteria for Energy Vision 2020 including their resource cost, the ability to minimize any rate impact, and their potential to enhance customer value. By selecting options that maximize customer value, TVA will build brand recognition in its product and in its corporate name for itself and for the distributors partnering with TVA to offer the customer service options.

314

Comment: *Most of the power TVA sells to its distributors goes to residential customers. TVA should be more concerned about the residential customers because they are TVA's primary customers. You need to focus more on energy efficiency and be an energy service company.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Debra Jackson

Response: TVA realizes the importance of the residential customers. TVA also realizes that the distributors of TVA power may soon find themselves in a market similar to the long distance telephone industry, with competition based both on price and value-added services.

The long-term plan in Volume 1, Chapter 9, sets forth a range of actions TVA can take to meet future needs of its customers. This portfolio of resource options enables TVA to meet the objective of balancing cost, rates, environmental impact, debt, and economic development. This long-term plan relies on a balance of supply-side options as well as demand-side management and beneficial electrification to meet customers' needs. Some examples of the recommended demand-side management programs include energy efficiency improvements, residential new construction, and commercial and industrial energy services to improve demand-side management. Some examples of beneficial electrification include residential heating, air-conditioning, and water heater programs.

315

Comment: *While there are persistent problems with how demand-side management can be provided equitably and cost-effectively, the long-term plan should explore mechanisms for addressing these problems.*

Comment by: Mary English (University of Tennessee)

Response: TVA has begun to address the issue of providing demand-side management programs equitably and cost-effectively in its short-term action plan. In developing customer service options, TVA studied both the past and current demand-side management activities of other utilities. While aware of the past program successes of other utilities, TVA also notes the current evolution of demand-side programs. This evolution includes moving away from programs with large rebates and cross-subsidies. Many utilities are developing new programs that are more market-driven with greater emphasis on customer value.

TVA plans to test several new demand-side program strategies through programs identified in the short-term action plan. For example, TVA's plan includes an Energy Efficiency Catalog and Retail program to build the infrastructure for energy-efficient technologies and to provide value-added services to residential customers. The short-term action plan also includes an aggressive and innovative program for commercial and industrial customers. The Comprehensive Measure Financing option from Block 1 was expanded to over twice its original level to form the Commercial and Industrial Energy

Services option. This program addresses the expanding market for energy services and includes funding for incentives targeted to lost opportunities in new construction and market transformation activities. Through these and other programs, TVA hopes to test new delivery strategies designed to address the problems of providing demand-side management equitably and cost-effectively over the long term.

316

Comment: *TVA should explain how it will decide to convert a pilot program into a permanent program, particularly with respect to low income programs.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition), Naomi Furman Kipp (Legal Services Corporation of Alabama), Martha McGill

Response: Demand-side management programs can be started at the pilot (reduced scale) level for various reasons. Some programs are started at the pilot level because of equipment concerns or limitations of availability, others to provide flexibility, and others to evaluate uncertain energy and demand impacts. Some programs are started at the pilot level to evaluate a new delivery mechanism or to develop the necessary cooperative relationships for cost-effective implementation as in the case of the low income program. Depending on how these various issues are resolved, a pilot program may be scaled up to a full program.

In Energy Vision 2020, flexible demand-side management programs have replaced pilot programs. The flexible demand-side management options will be implemented at a reduced scale at first, but can ramp up quickly in response to resource needs. Flexible demand-side management programs have been identified. The programs are similar to the flexible supply-side options. These flexible demand-side programs have two phases of development. In the first phase, the programs are tested in the marketplace as experiments or pilot programs. The flexible demand-side management programs would add 50 megawatts by 2002 and potentially 750 megawatts by 2010.

317

Comment: *In the long-term plan, there is no description of implementation of a low income program; in fact, the low income sector is not even mentioned.*

Comment by: Naomi Furman Kipp (Legal Services Corporation of Alabama), Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA is working with community action agencies to implement the Residential Low Income program, which is included in both the long-term and short-term plans of Energy Vision 2020. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) The program will quickly survey a low income residence, install cost-effective weatherization measures, and provide education about saving energy to the homeowner. Included in the program are compact fluorescent lights, low flow showerheads, as well as pipe insulation, water heater tank wraps, heating, ventilation, and air conditioning maintenance, and attic insulation where cost-effective.

318

Comment: *While solar photovoltaics is listed as an option in Volume 1, Chapter 7, page 7.4, it is not included in any of the options considered in Volume 1, Chapter 7, Figures 7-6A*

through D. Contrast this with what other utilities are doing, such as Pacific Gas and Electric and Niagara Mohawk Power Company.

Comment by: Andrew Danzig

Response: Photovoltaics is not among the supply-side options identified in Volume 1, Chapter 7, Figures 7-6 A through D. These figures do not show all of the options considered. The full list of options considered is included in Volume 2, Technical Document 6, Figure T6-1. Figure T6-1 provides summary evaluation information for the large array of supply-side options considered in Energy Vision 2020. Option 1.3.3.1, included in Figure T6-1, is a large solar photovoltaic fixed flat plate power plant.

Photovoltaics was also included in the customer service options as a miscellaneous program. (See Volume 2, Technical Document 8, Figure T8-18, and the description of the program in Volume 2, Technical Document 7, pages T7.66 to T7.69.) Current and expected future (technology advancement) photovoltaic system costs were included.
The recommended short-term plan includes research and development of distributed generation, including end-use solar photovoltaics. (See Volume 1, Chapter 10, Figure 10-1.)

319

Comment: *Beneficial electrification and off-system sales should be reconsidered given their effects on increased carbon dioxide emissions and other emissions.*

Comment by: Arthur Smith, Eric Hirst (Oak Ridge National Laboratory)

Response: Beneficial electrification options include technologies that take advantage of the unique characteristics of electricity and improve productivity and quality for TVA customers. The use of electrotechnologies in manufacturing could reduce adverse environmental impacts. Generally, electrotechnologies limit emissions to those produced by an electric generating plant in contrast to the combustion of fuel oil or natural gas by the end user. Emissions are more easily and efficiently controlled at the generating plant. Energy Vision 2020 reviewed beneficial electrification options, transportation, and electric manufacturing technologies, as well as commercial and residential options for cooking, heating, security lighting, and water heating.

TVA off-system sales provide revenue and help to keep rates low for Valley ratepayers. In addition, off-system power sales allow other interconnected utilities to buy reliable power when experiencing critical peak load conditions. If TVA did not sell power to these utilities, they would purchase it from some other system which may operate more polluting-generating sources than TVA. As mandated by the Clean Air Act, TVA has reduced its emissions of sulfur dioxide by 50 percent between 1976 and 1990 and expects to achieve an 80 percent reduction from 1976 levels when it completes actions to comply with the 1990 Clean Air Act Amendments. It also expects to reduce nitrogen oxides emissions by up to 50 percent.

320

Comment: *TVA may be focusing too much on encouraging load growth, without clearly explaining how this would benefit customers and the region.*

Comment by: Mary English (University of Tennessee), Jason Gurley, Stephen Smith (Tennessee Valley Energy Reform Coalition), Eric Hirst (Oak Ridge National Laboratory), Robert Schreiber (Common Sense), Sam Denham, Sharon Fidler (League of Women Voters)

Response: TVA is encouraging economic development and the efficient use of energy. One method of encouraging economic development is by keeping electric rates low, which attracts industry to the region, thus providing jobs to people in the region. The low electric rates also contribute to the low cost of living, which benefits customers and everyone in the region. These activities result in load growth.

TVA is a non-profit entity, and the revenue produced by the power system is used to cover the costs of producing electricity.

321

Comment: *The restructuring of the electric utility industry will have a tremendous impact on TVA's Energy Vision 2020. Large industrial customers are forcing electric utilities to become more competitive in rates. Utilities all across the country are starting to jettison things that are not competitive. This has caused TVA to rethink recommitments in the areas of energy efficiency and conservation. Rather than committing to 5,500 megawatts of demand-side management, TVA is only looking at 600. TVA feels they have got to do this to be competitive.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: The restructuring of the utility industry is expected to have a significant effect on TVA. Increasing competition will force utilities to be as cost-effective and customer-driven as their individual situations allow. Energy Vision 2020 is helping TVA prepare for this. Energy Vision 2020 took into account the potential effects of increased competition, and TVA has been able to produce a plan that proposes 650 megawatts of demand-side management in year 2002 and up to 2,200 megawatts by 2010.

ENVIRONMENTAL CONTROLS

322

Comment: *TVA should explain how it intends to meet the requirements of the 1990 Clean Air Act Amendments.*

Comment by: David Bordenkircher

Response: TVA's strategy to comply with the 1990 Clean Air Act Amendments is discussed in Volume 1, Chapter 7, pages 7.9 and 7.10. The emission control options are listed as including scrubbers, fuel switches, alternative fuels (e.g., natural gas), repowering with new lower emitting power plant technology, allowances, and increased use of demand-side management options (e.g., conservation) and renewable energy sources. The "reference case" strategy was developed as a basis for comparison of all potential options. This reference case includes a mixture of low sulfur coal switches at most of TVA's fossil plants plus a limited number of sulfur dioxide scrubbers on a few TVA plants, along with the addition of nitrogen oxides reducing burners and burner systems on almost all of TVA's fossil plants. This is one of many strategies developed for TVA compliance with the 1990 Clean Air Act Amendments.

323

Comment: *TVA should not rely just on additional scrubbers for its Phase II Clean Air Act strategy, because they control only sulfur dioxide and make carbon dioxide emissions worse.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Nancy Bell

Response: TVA has not decided to deploy additional scrubbers for Phase II Clean Air compliance. We know scrubber cost, schedule, and performance characteristics very well. Although they contribute to other environmental problems, scrubbers work well. We are assessing other technologies and control strategies in an attempt to identify better performing, lower cost environmental options.

324

Comment: *TVA's Clean Air Strategy simply uses banked credits from installing scrubbers to delay implementation of Phase II controls. This is not an environmental leadership position. Rather, TVA should increase efficiency by bringing on zero emission technologies. It can then sell its credits to pay down the debt. The Environmental Protection Agency has money for utilities that seek to use conservation and renewables to comply.*

Comment by: John van der Harst, Hamp Dobbins, Jr., Stephen Smith (Tennessee Valley Energy Reform Coalition), Catherine Murray (Sierra Club, State of Franklin Group)

Response: TVA's Clean Air Act Phase II strategy has not yet been developed. The addition of scrubbers at Cumberland Fossil Plant in Phase I of TVA's Clean Air Act strategy resulted in overcompliance by TVA earlier than required by the 1990 Clean Air Act Amendments. TVA determined that early installation of scrubbers at Cumberland Fossil Plant benefited the TVA ratepayers. TVA did reserve "bonus" allowances or credits for installing these scrubbers. This provides TVA flexibility in scheduling subsequent sulfur dioxide reduction measures. However, early compliance at Cumberland Fossil Plant means that emissions at the plant were reduced early.

The Environmental Protection Agency does not have money for utilities seeking conservation or renewables, but they do have a conservation and renewable energy reserve of 300,000 special bonus allowances set aside to reward new initiatives in demand-side efficiency and renewable energy. TVA assessed the possibilities associated with the program in the 1992-1994 time period and found that the initiatives were not sufficient to change the strategy toward more conservation or renewable options. TVA's deadline for joining the program and earning these bonus allowances ended January 1, 1995.

325

Comment: *TVA could meet its Phase II Clean Air Act requirements entirely through conservation. Renewables could also play a role. How much would a 1 percent investment in conservation contribute to emission reductions and meeting TVA's Phase II requirements?*

Comment by: Eileen McIlvane (Coalition for Jobs and the Environment)

Response: Assuming an expenditure of 1 percent per year of TVA's 1994 annual gross revenue ($5.4 billion) on conservation program activities spread from 1996 through 1999 (Phase II compliance begins in 2000) and assuming all of the conservation programs are successful, TVA projects an annual savings of 1.8 billion kilowatt-hours of avoided power generation beginning in 2000. Further assuming that all of this avoided power is fossil generation and projecting a TVA fossil system generation load of 101 billion kilowatt-

hours in 2000, this amounts to a 1.8 percent reduction in projected fossil generation and sulfur dioxide, and related emissions. Sulfur dioxide reduction limits under Phase II of the 1990 Clean Air Act Amendments require TVA to reduce sulfur dioxide emissions by almost another 50 percent below present 1995 emission levels. Therefore, a 1 percent investment in conservation would eliminate only 1.8 percent of the required 50 percent additional reduction, or only about 4 percent of the total sulfur dioxide reduction requirement.

326

Comment: *Install more pollution control devices to reduce emissions which contribute to acid rain.*

Comment by: Hamp Dobbins, Jr.

Response: TVA estimates spending for the pollution control measures associated with the 1990 Clean Air Act Amendments will be approximately $2.3 billion for related capital expenditures with annual operating costs (including fuel switches) exceeding $300 million per year. (See Volume 1, Chapter 4, page 4.8.) As a result of these expenditures, TVA's contribution to acid rain will be significantly reduced.

327

Comment: *The buying of allowances rather than scrubbing coal plants affects the image of the South and needs to be considered as an externality.*

Comment by: John van der Harst

Response: The ability to transfer an allowance (the authorization to emit one ton of sulfur dioxide) from one source to another while limiting sulfur dioxide emissions on a national basis is a fundamental innovation of the 1990 Clean Air Act Amendments. The intent of this innovation was to achieve the national objective of reducing atmospheric loadings of sulfur dioxide while allowing the marketplace to determine where the reductions could be achieved most cost-effectively. The approach has worked. Control costs have been reduced by approximately 50 percent over what would have been spent to achieve the same level of reductions under a source-by-source, command-and-control program. The buying and selling of allowances on the open market offers the opportunity for even more savings.

TVA is acutely aware, however, that many of its customers do not support the allowance-trading concept—particularly if the trade involves TVA purchasing allowances from outside its service territory. We participated in the first inter-utility allowance transaction, purchasing 10,000 allowances. Although this purchase represents a small fraction of TVA's annual reduction requirement, it generated a great deal of controversy and adverse reaction from the public. There is opportunity for reducing the cost of compliance by participating in the allowance market. However, public opinion and the potential to harm TVA's image as environmentally responsible will certainly be considered in future decisions to purchase allowances.

328

Comment: *Based on its past experience with allowance purchases, TVA does not appear to be willing to consider sulfur dioxide allowance purchases as a compliance option at this time. TVA plans to comply with sulfur dioxide limitations by making modifications within*

its own utility system. This is a sound approach as long as the cost of reducing sulfur dioxide emissions from TVA's plants is lower cost than the price of sulfur dioxide allowances. If the cost of sulfur dioxide allowances ever drops below TVA's cost of reducing sulfur dioxide emissions from its plants, TVA will be incurring additional costs by fuel switching, for example, rather than purchasing allowances.

Comment by: Tennessee Valley Public Power Association

Response: TVA has assessed the purchase of sulfur dioxide allowances for compliance with the 1990 Clean Air Act Amendments. TVA does not at this time anticipate buying allowances for compliance purposes, but we are continually reviewing our compliance strategies and would consider allowance purchases if this becomes appropriate.

SUPPLY SIDE

329

Comment: *Recognizing every form of electricity generation including nuclear power has positive and negative values, TVA should continue to look for ways to provide its customers reliable and efficient electric power at competitive prices.*

Comment by: Paul Amon (Amon Consulting), Tennessee Valley Industrial Committee

Response: The Energy Vision 2020 long- and short-term plans contain a portfolio of conservation and supply-side generation options which provides the best mix of options to TVA and its customers. These options will provide customers a reliable source of power at competitive prices, perform better environmentally, increase economic development, and mitigate risks.

330

Comment: *Our future is linked to coal in a cost-effective electric society. TVA should continue to look for ways to take advantage of the coal resources in the region.*

Comment by: James Gillum (Tennessee River Valley Association), Barbara Altizer (Virginia Coal Council)

Response: Both traditional technologies (e.g., coal plants, combustion turbines), as well as potential renewable and advanced technology facilities, have their place in TVA's proposed portfolio of resources. This is identified in both the long-term plan and short-term action plan where gas-fired, coal-fired, wind turbine, and hydro-driven resources provide a robust set of resource options allowing TVA diversification among fuel types to help mitigate risk of future fuel prices. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

331

Comment: *The Kentucky Marketing and Export Council strongly supports the options in the plan that utilize coal. We believe that a coal-centered strategy ensures abundant, reliable, low-cost, environmentally sound energy for the region. This also supports TVA's core mission—economic development. Coal provides low-cost power, jobs, coal mining, and transportation, which are vital to the region. Seventy-eight percent of TVA's coal comes from Kentucky, Tennessee, Alabama, and Virginia.*

Comment by: William Bowker (Kentucky Coal Marketing and Export Council)

Response: Both traditional technologies (e.g., coal plants, combustion turbines), as well as potential renewable and advanced technology facilities, have their place in TVA's proposed portfolio of resources. This is identified in both the long-term plan and short-term action plan where gas-fired, coal-fired, wind turbine, and hydro-driven resources provide a robust set of resource options allowing TVA diversification among fuel types to help mitigate risk of future fuel prices. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) Both direct and indirect economic development impacts including jobs were considered for each final strategy.

332

Comment: *The Tennessee River is exceptional for its ability to move coal in an environmentally friendly way. This should be considered as an asset.*

Comment by: Ken Wheeler (Midland Enterprises)

Response: Your comment has been reviewed and noted.

333

Comment: *TVA should support more use of fluidized bed combustion.*

Comment by: Jim Golden

Response: TVA has been a proponent and supporter of fluidized bed combustion technology over the years. TVA built a 20-megawatt atmospheric bubbling fluidized bed combustor pilot plant followed by a 160-megawatt atmospheric fluidized bed combustion plant. The demonstration plant continues to operate successfully as part of TVA's Shawnee Fossil Plant. In addition, atmospheric circulating technology, as well as pressurized fluidized bed technology, are included in the options considered in the Energy Vision 2020 process.

334

Comment: *Energy Vision 2020 includes repowering in the extensive list of options. Repowering or replacement of at least some of the coal-fired units would appear to be likely enough that those options should be specifically included in both the short-term and long-term plans. It would certainly seem prudent to keep Energy Vision 2020 flexible enough to include repowering or replacing at least some of these aging units as the need should arise.*

Comment by: TVA Retirees Association

Response: The long-term plan in Energy Vision 2020 (see Volume 1, Chapter 9, Figure 9-23) includes combined cycle repowering of coal-fired units. The long-term plan provides the guidance and flexibility to revise the short-term action plan as future conditions change.

335

Comment: *Conceptually, the Environmental Protection Agency is supportive of justified power generation alternatives that upgrade existing facilities through repowering, cogeneration, coproduction, and/or conversion. Power purchasing (for base-load or peak power) outside the TVA network or power transmission within the TVA network are also*

noteworthy in lieu of new construction if the power generation infrastructure is already in place and licensed. Therefore, for conventional energy sources such as fossil-fuel and hydroelectric plants, utilization of existing sources is preferred over construction of new generation sources if they are environmentally sound or can be upgraded to be more efficient and therefore environmentally improved.

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Your comment has been reviewed and noted.

336

Comment: *Clean coal technologies such as integrated gasification combined cycle technologies for new power generation or conversion of existing conventional facilities also provide environmental benefits. Integrated gasification combined cycle plants produce less air emissions (pollution prevention), increase efficiency (e.g., heat reuse) and often produce a usable byproduct (recycling) when compared to conventional systems such as a pulverized coal power plant, and still allow the use of domestic coal at a level environmentally competitive with natural gas. As such, if a new coal-fired unit is proposed at Shawnee, consideration should be given to alternatively making it an integrated gasification combined cycle plant for cleaner coal use or making it a natural gas unit which is environmentally superior to coal or fuel oil.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: The use of clean coal technologies for repowering have many desirable features. Typically, they exhibit improved cost of production along with reduction in emissions. However, their viability in repowering an existing facility is specific to the facility involved. In the case of Shawnee, the proposed Unit 11 consists of building a new steam cycle in order to utilize one of the existing boilers that has been taken out of service. When the 160-megawatt atmospheric fluidized bed combustion unit was built, it was connected to the existing Unit 10 steam turbogenerator and to the Unit 10 flue gas handling system. The existing Unit 10 boiler was taken out of service and layed-up in such a way that future recommissioning would be possible. The Unit 11 project would provide the atmospheric fluidized bed combustion unit with its own steam turbogenerator, flue gas handling system, and associated equipment while allowing the old Unit 10 to be returned to its original configuration and resume operation.

337

Comment: *If TVA continues its trend of being heavily committed (57 percent) to burning coal to generate electricity, we recommend that continued refinement of control technologies be employed for new and repowered power plants and that existing plants be retrofitted to minimize emissions such as sulfur oxides, nitrogen oxides, volatile organic compounds, and mercury.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Consistent with applicable environmental requirements, including new source review and new source performance standards that are promulgated by the U.S. Environmental Protection Agency, TVA would employ appropriate, refined emission control technologies at any new or repowered coal-fired plants. TVA is in the process of employing additional emission control strategies at its existing coal-fired units.

Energy Vision 2020 considered several different environmental control options and several options for the repowering of existing coal-fired units. (See Volume 1, Chapter 7.)

338

Comment: *In Volume 1, Chapter 9, Figure 9-3, what does 1.3 percent cofiring mean? Is 1.3 percent of the coal displaced by biomass? Does it apply to all coal units? Why is so little coal displaced by cofiring; the biomass numbers seem very low.*

Comment by: Eric Hirst (Oak Ridge National Laboratory)

Response: In Volume 1, Chapter 9, Figure 9-3, the term 1.3 percent wood waste cofiring refers to the fraction of fuel energy to the TVA coal-fired generating system that would be provided by wood waste. Specifically, 1.3 percent of the coal system's total energy input would be provided by wood waste. This applies to the entire TVA coal-fired system. Based on wood waste resource assessments of the TVA region, this is the amount of currently unutilized wood waste that would be available to TVA. This would displace about 500,000 tons of coal. As TVA further investigates the use of biomass, additional sources of wood waste may be identified.

339

Comment: *TVA should expand the wood residue cofiring project.*

Comment by: Sharon Fidler (League of Women Voters)

Response: Biomass cofiring has been assessed in Energy Vision 2020 and proposed for implementation in the short-term action plan. The precise scope and magnitude of the program will depend on further evaluation of its economic and environmental effects. As TVA learns more about the wood waste market, considerably more wood waste may be available at favorable costs than currently expected. If this situation develops, the program could be expanded.

340

Comment: *TVA is not on the cutting edge of cofiring technology (coal/wood). TVA is late coming to this, but it is still the right thing to do at 4 to 10 percent heat input rates.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: TVA has been closely following and participating in the development of wood cofiring (biomass) at coal-fired power plants. TVA has several mechanisms in place to keep up to date on this technology. These include technical discussions with other utilities including Southern Company, Northern States Power, and Santee-Cooper regarding their experiences with wood cofiring. TVA is also a member of the Southeast Bioenergy Roundtable in which all forms of bioenergy are topics of discussion. TVA has also participated with Electric Power Research Institute in wood cofiring projects.

TVA has completed cofiring test burns at three of its coal-fired units to determine the technical limitations of cofiring biomass at these different types of units (cyclone, wall-fired pulverized coal, and tangentially-fired pulverized coal). TVA has now initiated pre-commercial demonstration cofiring to determine the long-term impacts of cofiring on plant operating and maintenance costs and to verify biomass cost and availability. With the successful conclusion of these demonstrations, TVA expects to initiate permanent

commercial cofiring at one or more plants. The short-term action plan identifies cost-effective biomass use as a recommended option. (See Volume 1, Chapter 10, Figure 10-1.)

341

Comment: *Although use of short growth-cycle products or chipping of products grown on abused or unused land is merited, nothing would prevent chipping our limited forests to meet a large biomass demand.*

Comment by: Clark Buchner (Sierra Club, Tennessee Chapter), Powell & Sharon Foster

Response: These products are referred to as short rotation woody crops in Energy Vision 2020. Monitoring of short rotation woody crops suppliers is one way of safeguarding against the chipping of existing forests. This and other safeguards will be considered by TVA.

342

Comment: *I am opposed to biomass, burning trees. Use of biomass has led to whole-tree removal in the past.*

Comment by: Dolores Howard, Dennis Haldeman, Bruce Wood

Response: Energy Vision 2020 recommends implementation and/or research into several biomass uses. None of these uses recommend whole-tree removal from natural forests. (See Volume 1, Chapter 10, Figure 10-1.) Monitoring of biomass suppliers is one way of safeguarding against the chipping of existing forests. This and other safeguards will be considered by TVA.

343

Comment: *Biomass cofiring and studies should be abandoned. There is no way to keep hazardous chemicals from tires and solid waste out of the stream.*

Comment by: Powell & Sharon Foster

Response: TVA proposes to implement cost-effective biomass cofiring at several of its coal-fired generating plants. The biomass that would be used is currently unutilized wood waste from primary and secondary forest products industries. This wood waste would primarily be in the form of sawdust. Only wood waste from processes using untreated, unpainted wood will be acceptable. This material would be processed and screened so that the material is of the proper size to ensure complete combustion and to eliminate any foreign material. These wood waste specifications and the processing would ensure that no hazardous materials are introduced to the boilers with the fuel.

At the plants in which wood waste cofiring is implemented, wood fuel would displace coal so that less coal would be burned. Since wood has negligible sulfur content and lower ash content than coal, sulfur dioxide emissions and fly ash production from the plant would be reduced relative to the plant being fueled with coal only. The carbon dioxide emitted from burning wood is part of the naturally occurring carbon cycle, so there are no net carbon emissions to the atmosphere. This is not the case when fossil fuels are burned. If the wood waste were not cofired in TVA plants, it would most likely be disposed of by landfilling, where it would decompose into carbon dioxide and methane. These effects show the environmental benefits that would be realized from cofiring wood waste at TVA coal-fired plants.

344

Comment: *By working with community and county governments, TVA should be able to pick up some biogas-fired capacity at landfills and wastewater treatment plants. Many communities are expanding or need to expand their wastewater treatment facilities. By adding anaerobic digestion to their treatment plant, they can improve their effluent quality and generate several megawatts of power, but they are cash strapped. TVA should be investing with them and selling power at an industrial rate and should reduce dependence somewhat on coal-fired power. TVA should also take advantage of methane mitigation credit, which would occur by supporting landfill and water treatment biogas production. The wastewater treatment facilities are solid units which will be here for a long time to come and will produce a consistent supply of gas which could be used in either peaking or base-load mode. Decatur, Alabama has a facility which is an excellent example of anaerobic digester technology with biogas utilization. TVA should be talking to every community about this. TVA would add very little net power to the grid from these type plants, but the partnerships with the communities would be very valuable. There is a potential for many small, but highly reliable methane-fueled generation facilities throughout the Valley at landfills and wastewater treatment plants.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: TVA has done a preliminary investigation of the potential for methane fuel from landfills and wastewater treatment plants. The Energy Vision 2020 short-term action plan (see Volume 1, Chapter 10, Figure 10-1) includes further research and development on use of landfill methane. This would also be applicable to methane from wastewater treatment plants. This research and development program may lead to the consideration of this option for implementation in the long-term plan.

345

Comment: *TVA's mission is one of regional resource development with the goal of economic development coupled with stewardship of the region's natural resources. The production of low-cost power is quite an attractive selling point for recruitment of industry, but the package of reasonable, low-cost power, low-cost water resources (both potable and treated water), and a reasonable solid waste policy is a better recruitment tool. Waste-to-energy plants and biogas plants are not the lowest cost power, but the synergistic effect of their power production and control of environmental problems at the community level places the region in a much more competitive position for the long term.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: TVA evaluated a broad range of supply-side options. The renewable options include several biomass technologies, wind turbines, photovoltaics, landfill and coalbed methane recovery, and technologies that burn garbage as a fuel.

While the cost of power is an important consideration, TVA also considered other criteria including the environmental impacts, rates, reliability, economic development, financial requirements, and risk management. The proposed long-term plan or portfolio (see Volume 1, Chapter 9, Figure 9-23) balanced TVA's goals and objectives, as well as the concerns and values of the public.

346

Comment: *In the report, there is a notable lack of interest in building large base-loaded power stations; recognizing the large capital expenditures and TVA debt, this is understandable. However, an increase in peak load of approximately 16,000 megawatts is no small amount of generating capability, and landfill methane just is not going to cut it.*

Comment by: J. E. Butt

Response: In the long- and short-term action plans, TVA has identified a wide range of resource options to meet future needs through the year 2020. This includes many options that are not capital-intensive and would not increase TVA's debt. These options include power purchased from other producers, power purchased by joint ventures, and demand-side management. TVA's request for proposals for purchase of power resulted in 138 proposals representing 9,800 megawatts of peaking capacity and 12,200 megawatts of base-load capacity. The short-term action plan outlines specific activities to provide reliable power to the Valley through the next 7 years.

347

Comment: *What effect would a 1 percent investment in wind and solar have on rates and the ability to produce power in the long term (10-20 years)?*

Comment by: Eileen McIlvane (Coalition for Jobs and the Environment)

Response: Assuming 1 percent of annual revenues is invested in the construction of solar and wind-powered generating units, mid-term rates would increase 1.7 percent compared to the electric rates in the short-term action plan. In addition, total resource costs would increase $350 million, debt in 2001 would increase by $800 million, and carbon dioxide emissions would decrease by 0.5 percent.

348

Comment: *Coal and nuclear power are dead as future sources of energy and should not be TVA's preferred energy choices.*

Comment by: Larry Smith (Mid-South Peace and Justice Center), Mary Byrd Davis (Ygdrasil Institute), Jim Von Bramer, Catherine Murray (Sierra Club, State of Franklin Group), Beth Wallace, Retha Ferrell

Response: In its preferred strategy, TVA would continue to operate its existing coal and nuclear plants in the future. However, TVA does not plan to complete by itself the Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Unit 2. Browns Ferry Nuclear Plant Unit 1 will continue in its inoperative status. TVA will utilize clean coal technologies in the future. In addition, TVA's preferred strategy includes other resources for meeting energy demand, such as demand-side management and renewable energy such as wind power.

349

Comment: *TVA should phase out its nuclear program. Nuclear power is dangerous.*

Comment by: Hollis Fenn, Bruce Wood, Mary Byrd Davis (Ygdrasil Institute), Barbara Soliday, Jason Gurley, Linda Cataldo Modica, Rela Edwards, Alexander Dewey, Michelle Neal (Tennessee Valley Energy Reform Coalition), Doris Gunn, Beth Speltz, Michelle Carratu, Susan Switzer, Susan Bailey, John Johnson (Earth First), Sanford McGee (Cumberland Center for Justice and Peace), Sheilla Cheyenne, Suzanne Sims, Fred Wright, Edwin Curtis, Dolores Howard, Faith Young

Response: Nuclear power is a vital part of TVA's power mix. In 1994, nuclear generation represented 13 percent of TVA's operating generation and will play an even more important role when Watts Bar Nuclear Plant Unit 1 commences operation and Browns Ferry Nuclear Plant Unit 3 is returned to service. In 2005, nuclear generation is expected to represent almost 20 percent of TVA's generating capacity.

Nuclear plants supply energy reliably, safely, and with little environmental impact. Through careful, conservative planning for safety, the potential risk of nuclear reactors has been reduced to a very low level. The Nuclear Regulatory Commission carefully oversees the operation of nuclear plants in this country.

Two serious accidents have occurred in 30 years of world wide commercial energy production, the Three Mile Island and Chernobyl accidents. At Three Mile Island no one was injured or killed because nuclear energy plants in the United States use a series of physical barriers to prevent the release of radioactivity. About half of the uranium fuel melted at Three Mile Island, but only minute amounts of radioactive material escaped into the environment. The radiation exposure from Three Mile Island was actually much less than most of us receive each year from naturally occurring radioactive materials in soil, rocks, air, food, and water.

The Chernobyl plant in the Soviet Union had design flaws and no containment structure. As a result of the Chernobyl accident, radioactive material escaped and significant environmental damage occurred. More than 200 people were hospitalized for radiation exposure and burns, and approximately 30 people died. Reports suggest that more people may have died later. A plant like Chernobyl could not be licensed in the United States.

350

Comment: *We need to follow the example of post-nuclear Austria, which built reactors and then the citizens had the wisdom to walk away from their investment.*

Comment by: Fred Wright

Response: Nuclear power is a vital part of TVA's power mix. Nuclear plants supply energy reliably, safely, and with little environmental impact. The Nuclear Regulatory Commission monitors operations every day and conducts comprehensive reviews that cover all aspects of the plant. The nuclear industry and TVA are dedicated to safe and efficient nuclear plant operations.

351

Comment: *It is stupid for TVA to burn natural gas at a thermal efficiency of 35 percent in order to generate electricity to heat homes. Even a heat pump only recovers a fraction of that.*

Comment by: Arthur Smith

Response: TVA has a mix of generating plants including nuclear, coal, hydro, and combustion turbines. Natural gas and diesel fuel are used by the combustion turbines, which made up only 8 percent of TVA's generating capacity in 1994. Combustion turbine generation is used mostly during peak load periods, normally having quite low annual capacity factors (1 to 5 percent). Generation capacity must be planned to meet the varying system load demands. While combustion turbines have high operating costs, they have relatively low capital costs to build. New natural gas generation technologies with much higher efficiencies are being studied by TVA.

352

Comment: *Neither the long-term nor short-term plans include hydro pumped-storage for peaking power, although several possible pumped-storage projects were among the supply-side options considered in the initial review. With its rapid start-up and pump-to-generating times, a pumped-storage plant can be a very valuable supplier of operating reserves on the TVA power system. Newly developed variable speed pumped units will add to the attractiveness of this resource to rapidly serve changing load demands.*

Increased local housing development may soon make some of the better of the region's pumped-storage sites unavailable to TVA. Adding near-term acquisition of one or more hydro pumped-storage sites to the short-term action plan would maintain the flexibility to adopt this option for the uncertain future TVA faces, at relatively low capital cost. This would keep this mature, proven option available as an alternative to the less proven compressed air energy storage option.

Comment by: TVA Retirees Association

Response: TVA has evaluated hydro pumped-storage facilities in Energy Vision 2020, but has come to the conclusion that the costs involved are too high and the project lead time too long. (See Volume 2, Technical Document 8.) TVA will continue to consider alternative business arrangements involving hydro pumped-storage facilities.

353

Comment: *TVA's history lies in its development of hydroelectric power. The decision to preserve the hydroelectric resource within the TVA system recognizes the important role hydro plays in meeting the needs to provide ample electricity to the people and industries of the Tennessee Valley, ensuring continued stability, growth, and economic opportunity, while responding to the need to preserve the quality of life in the area through improved technologies and the continued mitigation of the impacts of development. This responsible use of the river system is a wise and efficient use of the resources within the Valley.*

Comment by: Linda Church Ciocci (National Hydropower Association)

Response: Your comment has been reviewed and noted.

354

Comment: *Oil is too valuable to burn.*

Comment by: Jeff Peterson

Response: The TVA system utilizes primarily coal and nuclear fuel, with hydro also making a significant contribution. TVA currently uses natural gas and fuel oil only for start-up and peaking power.

FINANCIAL

355

Comment: *Nuclear power plants were accepted at a time when nuclear was associated with the image of a secure nation. I think that was fallacious. However, TVA's debt is due to its nuclear program, therefore the country should share our problem like the bailout of the savings and loans. I think TVA's nuclear program is tied up with the whole national security issue and Congress should consider this and give us some help.*

Comment by: Susan Switzer

Response: Your comment has been reviewed and noted.

356

Comment: *For Energy Vision 2020, a 30-year write-off of deferred nuclear costs was assigned, depending on the resource strategy and when decisions were made about use of these assets.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

357

Comment: *TVA needs to address more fully how the cost of deferred assets (non-producing nuclear plants) are going to be recovered.*

Comment by: Mary English (University of Tennessee)

Response: TVA will operate both Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3. The generation from these units will produce revenue to cover the costs from these units.

The use of the deferred assets (Bellefonte Nuclear Plant Units 1 and 2) will be reviewed as part of the Bellefonte conversion study which will be completed in 18 to 24 months. The use of Watts Bar Nuclear Plant Unit 2 will be reviewed after the Bellefonte conversion study. TVA is aware of the impact that a write-off of these assets could have on the level of rates, and is considering all possibilities that may lessen the impact of any write-off that may be required.

358

Comment: *The accumulated costs of deferred nuclear generating facilities represent a significant percentage of TVA's assets. If these units are permanently canceled, TVA will have to determine treatment of those costs for rate purposes.*

Comment by: Tennessee Valley Public Power Association

Response: TVA is aware of the impact that a large write-off could have on the level of rates, and is considering all possibilities that may lessen the impact of any write-off that may be required.

359

Comment: *It is likely that at least some portion of the deferred nuclear plant costs will be written off by TVA. Whether they are taken against retained earnings, reinvested, or written off against current operating income, and over what length of time, will have a significant impact on the level of TVA's revenue requirement and its rates.*

Comment by: Tennessee Valley Public Power Association

Response: TVA is aware of the impact that a large write-off could have on the level of rates, and is considering all possibilities that may lessen the impact of any write-off that may be required.

360

Comment: *The costs accumulated to date for Watts Bar Nuclear Plant Unit 2 and Bellefonte Nuclear Plant Units 1 and 2 have been deferred until their final disposition is decided. These deferred costs totaled approximately $6.2 billion as of the end of fiscal year 1994. TVA's policy for the period over which to write off its deferred nuclear costs was ten years. That is the period in which it wrote off the deferred costs associated with the first eight canceled units during the 1980s. TVA had discussed changing this policy and writing off the $6.2 billion in deferred nuclear costs over a period of thirty years rather than only ten years. This decision, when finalized, also could have substantial impact on the level of TVA's and the distributors' rates.*

Comment by: Tennessee Valley Public Power Association

Response: TVA is aware of the impact that a large write-off could have on the level of rates, and is considering all possibilities that may lessen the impact of any write-off that may be required.

361

Comment: *Unless the unfinished, unneeded, and uneconomical nuclear plants are charged off in rates, then the current process of sweeping them under the carpet will lead to financial difficulties requiring taxpayer bailout and calls for privatization.*

Comment by: Powell & Sharon Foster, Bryan Deel, Ann Harris

Response: TVA's Nuclear Plants provided 13 percent of TVA's generating capacity mix in 1994. TVA has taken an important step to substantially limit the size of its nuclear program and TVA's financial exposure. TVA's decision not to complete, by itself, three of its unfinished nuclear plants reduces the financial risks associated with its nuclear program and enables TVA to cap its debt below the $30 billion level. This action will improve TVA's cash flow and financial strength.

Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 are expected to begin generating power in 1996. These units will provide an additional 2,235 megawatts of generating capacity. Operating them will help meet projected future loads on the TVA power system at a very competitive cost. Both will be revenue-producing assets when they go into operation. The construction expenditures on these units will be depreciated, and the depreciation costs, along with other costs, such as fuel and operating and maintenance costs, will be recovered in revenues.

Compared to purchasing power or meeting demand with coal-fired generation or combustion turbine units, operation of these two nuclear units will be among TVA's low-

est cost generating sources. Operating costs for Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 are projected to be approximately 1.7 cents per kilowatt-hour (fuel and operation and maintenance cost). In contrast, the operating costs of alternative generating sources would range from 2 to 6 cents per kilowatt-hour. (See Volume 1, Chapter 4, page 4.4.)

For further information, see "Operation of Watts Bar Nuclear Plant Supplemental Environmental Review," TVA, June 1995.

362

Comment: *I am concerned about TVA's debt. TVA should reduce the debt.*

Comment by: Garry Shores, Joan Prewitt, Robert Peeples, Sahara, C. Strain, Tohert, Hermann, Sheilla Cheyenne, K. Varnum, Richard Simmers, Kathy Priore, Karah Bates, Kathy Dowbiggin, M. Case, Alan Ball, Paul Elliott, Mary Schwarz, Lynn Leach (Alabama Environmental Council), Kim Grube, N. E. Whitfield, Dolores Howard, Susana Harwood, John Harwood, Salo, Ray Williams, Isahl Hemm, Philip & Winfred Thomforde, Karl Grotke, Patricia Chapman, John Schwarz, Jr., Susan Bailey, Stephen Stedman, C. T. Brewster, Yvonne Seperich, John Sharp, Jr., Dottie Hodges, Shirley Schaaf, Sharron Eckert, Ben & Winn Welch, Karen Lovell, Mary Carton, Walter & Dorothy Stark, Ruth Peeples, Ann & Mike Sanders, Myles Jakubowski (Sunbeam Household Products), Katherine Osborn, Robert Schreiber (Common Sense), Michelle Neal (Tennessee Valley Energy Reform Coalition), Faith Young, F. W. Munson, Chris Gulick, Mary Anne Terry, A. B. Evans, Luther Gulick, William Emmott, Jo Anne Clark, M. Nathan Perry, R. & G. Ludwig, Bruce Wood, Clark Buchner (Sierra Club, Tennessee Chapter), Scott Banbury, L. M. Johnson, Sr., Amy Perry, Hamp Dobbins, Jr., Marion Zachiel, Deborah Cuva

Response: TVA is also concerned about the level of debt, but it expects to effectively manage its debt. Debt is one of several evaluation criteria used in Energy Vision 2020. (See Controlling the TVA Debt section of Volume 1, Chapter 4, and the Financial Requirements section of Volume 1, Chapter 5.) The debt was a major consideration in TVA's decision not to complete several nuclear units. (See the Decision on Nuclear Power section of Volume 1, Chapter 9.) Debt was also a criteria for selecting the best long- and short-term strategies. (See the Final Strategy Evaluation and the Final Evaluation sections of Volume 1, Chapter 9, and Chapter 10.)

When TVA's debt is compared to the overall capitalization of neighboring investor-owned utilities, it is not out of line with its competitors in the utility industry. TVA can finance capital projects largely by issuing debt. Investor-owned utilities, in addition to issuing debt, raise approximately one-half of their capital through issuing stock. Debt is a recognized necessity of large corporations, and TVA has consistently met its very stringent bond tests. (See "The Ties that Bind: TVA in a Competitive Electric Market.")

TVA's debt limit, as set by Congress in the TVA Act, is $30 billion. TVA's current debt is some $3 billion below this debt ceiling. The TVA Board has announced plans to establish a self-imposed debt limit $2 to $3 billion below the $30 billion allowed by Congress. To achieve this, the level of capital spending is scheduled to be reduced by $1 billion over fiscal years 1995 to 1997.

363

Comment: *During the last 8 years, TVA has held its rates constant, but its debt has increased over $9 billion and TVA has paid over $14 billion in interest expense, a third of its power revenue. To be honest, TVA should tell people that it did not save $800 million a year; rather, it borrowed an extra billion. That is how TVA has been holding rates constant. This*

is not a mark of a financially strong organization. TVA has not amortized its debt. How does TVA plan to handle its financial situation?

Comment by: Sam Denham, Maggie Kalen (Tennessee Valley Energy Reform Coalition), Frank Holm, Bryan Deel, Stan Gloeckner (Sierra Club)

Response: During the last 8 years, TVA has held its rates constant by reducing all costs by over $800 million. These costs include the costs of interest on TVA debt. Even though debt has increased, over the last eight years, TVA has been able to pay all the interest on the debt and hold rates constant.

When TVA's debt is compared to the overall capitalization of investor-owned utilities, it is not out of line with its competitors in the utility industry. TVA can raise capital only by issuing debt. Investor-owned utilities, in addition to issuing debt, raise approximately one-half of their capital by selling common and preferred stock. Debt is a recognized necessity of large corporations. See "The Ties that Bind: TVA in a Competitive Electric Market" by Palmer Bellevue.

TVA's debt limit, as set by Congress in the TVA Act, is $30 billion. TVA's current debt is some $3 billion below this debt ceiling. The TVA Board has announced plans to establish a self-imposed debt limit $2 to $3 billion below the $30 billion allowed by Congress. As TVA completes its major capital program to expand capacity the level of capital spending is scheduled to be reduced by $1 billion over fiscal years 1995 to 1997.

364

Comment: *Debt service is driving the resource plan.*

Comment by: Susan Switzer, Alan Jones (Tennessee Environmental Council), Stan Gloeckner (Sierra Club)

Response: Energy Vision 2020 considers debt, along with a number of different evaluation criteria in its consideration of energy resource strategies. The multi-attribute trade-off method allowed all of these criteria to be considered on a consistent basis. All of TVA's final strategies recognize the importance of continued debt management.

TVA's debt, which totals some $27 billion, is not out of line with the total capitalization of other utilities. More importantly, TVA's yearly revenues of more than $5.4 billion are well able to pay the debt service, which was about $1.9 billion last year. This debt does not keep TVA from being competitive. See "TVA's Comments on the General Accounting Office Report" dated June 15, 1995, for further information.

365

Comment: *Short-term solutions currently favored by TVA, such as debt refinancing, can only result in its long-term financial collapse, taxpayer bailout, and privatization.*

Comment by: Howard Switzer (Sun/Earth Tempered Organic Architecture), Arthur Smith, Michael Karp (Northwest Conservation Act Coalition), Alan Ball, Powell & Sharon Foster

Response: The results of the implementation of the short-term plan (see Volume 1, Chapter 10, pages 10.11 to 10.14) do not indicate financial collapse, taxpayer bailout, or privatization. The refinancing that TVA has completed has resulted in a reduced interest cost of $317 million a year.

For the long term, TVA continues to examine a portfolio of resource options that were part of the best strategies identified through the Energy Vision 2020 evaluation process. This portfolio will give TVA the flexibility it needs to respond to the uncertain-

ties of the future. The best options have been determined to meet customer needs by balancing all evaluation criteria including cost, rates, debt, environmental concerns, and economic development, while also managing risk. The short-term plan is based on the long-term plan and describes the specific actions TVA proposes to undertake to meet customer needs through the year 2002. TVA estimates it will need an additional 3,500 megawatts of capacity to meet customer needs through the year 2002. The short-term plan emphasizes those resource options which balance all criteria and minimize the risk associated with uncertain load growth and other key uncertainties.

366

Comment: *The fact that TVA has debt in excess of $25 billion, in and of itself, does not adversely affect TVA's ongoing viability. Continuous growth in the amount of debt that a utility has often is a sign of economic growth of the entity. As the business expands, so do its assets, its equity, and its debt. What is significant, however, is the relationship between the amount of debt of a utility and the total of its assets. The ratio of debt to assets can have a significant impact on a utility's ability to obtain additional financing. TVA's debt ratio of 80 percent may place constraints on TVA's ability to issue new low-cost debt.*

Comment by: Tennessee Valley Public Power Association

Response: TVA's debt ratio may be high compared to other utilities, but it is important to consider that TVA's only option to obtain capital funds other than those generated internally is through issuance of debt. Other utilities have other sources of capital such as equity.

367

Comment: *A consideration in evaluating the amount of debt for a utility like TVA is the ratio of the total debt outstanding to the utility's total assets. TVA's debt level as of fiscal year-end 1994 of $25.5 billion represented 80 percent of its total assets, including short-term debt (short-term debt counts toward the statutory limitation on TVA's debt). Although investor-owned utilities with generation have traditionally targeted their debt ratio to be in the range of 40 to 60 percent, the average debt to assets ratio for publicly-owned utilities with generation is around 74 to 75 percent. The debt ratio is important as it is used by debt rating agencies to evaluate the ability of a utility to service additional debt and to sustain operating losses without affecting the interests of the creditors. This ratio can have a significant impact on a utility's ability to obtain, and its cost to obtain, additional financing. TVA's debt ratio of 80 percent may place constraints on TVA's ability to issue new low-cost debt.*

Comment by: Tennessee Valley Public Power Association

Response: TVA's debt ratio may be high compared to other utilities, but it is important to consider that TVA's only option to obtain capital funds other than those generated internally is through issuance of debt. Other utilities have other sources of capital such as equity. Also, TVA is required by law to charge rates sufficient to ensure full payment of annual debt service (interest expense), and it has accomplished this without a rate increase for nine years.

368

Comment: *If TVA follows through on its plans to not complete Watts Bar Nuclear Plant Unit 2 and Bellefonte Nuclear Plant Units 1 and 2, the level of TVA's debt should come under some amount of control and TVA can work toward reducing its debt ratio.*

Comment by: Tennessee Valley Public Power Association

Response: One of the major reasons for not completing the nuclear units was to help control TVA's debt.

369

Comment: *There appears to be a discrepancy between the publicly stated position of the TVA Board and the preliminary results from Energy Vision 2020 as to whether TVA can hold its debt below either the federally mandated ceiling or the internally set ceiling because TVA's Energy Vision 2020 strategies appear to exceed TVA's debt limits.*

Comment by: Tennessee Valley Public Power Association

Response: As shown in Volume 1, Chapter 9, Figure 9-4, Strategy Trade-Off for Debt in Year 2001 vs. Total Resource Costs, all seven of the key strategies remain well below the internal debt ceiling. Past the year 2001, the long-term resource plan includes recommendations for unique energy supply arrangements such as partnerships with investors supplying capital as well as options to purchase power which have no effect on debt while providing the needed generating capacity.

370

Comment: *Does TVA plan to collect decommissioning costs at the Nuclear Regulatory Commission minimum level or at the medium case level outlined in Energy Vision 2020?*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: TVA's current estimated decommissioning costs are close to the medium case level outlined in Energy Vision 2020. (In 1995 dollars TVA's current estimates are: $282 million for pressurized water reactors and $319 million for boiling water reactors.

PRICE

371

Comment: *TVA has held its rates constant and raised its debt. How is this going to impact rates and ratepayers in the future?*

Comment by: Lynn Leach (Alabama Environmental Council), Ann Harris, John Johnson (Earth First)

Response: TVA intends to maintain the lowest feasible rates in the future. Rates have remained unchanged since 1987 due to improved productivity and efficiency, lowered operating and maintenance costs, refinancing of debt, and reductions in the work force. TVA has more recently taken actions to reduce future borrowings. TVA's debt limit, as set by Congress in the TVA Act, is $30 billion. TVA's current debt is some $3 billion below that debt ceiling. The TVA Board has announced plans to establish a self-imposed debt limit $2 to $3 billion below the $30 billion allowed by Congress. To achieve this, the level of capital spending is scheduled to be reduced by $1 billion over fiscal years 1995

to 1997. Although TVA's debt has increased, the servicing of this debt (interest payments) is fully included in TVA's rates or price of power. TVA expects to be able to continue to successfully manage its debt, and all of the strategies in Energy Vision 2020 enhance TVA's ability to do this.

Like all utilities across the country, TVA is experiencing competitive pressures. For the moment, this pressure stems principally from TVA's largest retail customers and some distributors of TVA power. Large industrial customers are competing in global product markets and, in order to prosper, these firms must aggressively explore options to reduce their costs of production. Energy costs are often a key target. In many circumstances, large industrial customers can lower their costs by installing cogeneration facilities to generate their own electricity. In other circumstances, energy-intensive industries decide to shift production or permanently relocate to areas with lower energy costs. For TVA to retain these price-sensitive industries as customers, its electricity prices must be competitive on a regional and even global basis.

372

Comment: *Several issues were identified during the review of the assumptions and considerations included in Energy Vision 2020 that may cause some degree of upward pressure on TVA's rates in the future, depending on how TVA resolves them. On the other hand, TVA is likely to continue to experience downward pressure on its average system rates as the new competitive environment develops over the next few years.*

Comment by: Tennessee Valley Public Power Association

Response: It is true that since there is currently a surplus of base-load capacity in the industry and the cost of new combined cycle capacity is less than average embedded rates for many utilities, the market will continue to place downward pressure on the price of electricity.

373

Comment: *TVA should increase its rates commensurate with inflation or customer costs to reduce debt.*

Comment by: Don Perry, Catherine Murray (Sierra Club, State of Franklin Group), Sam Denham, Frank Holm

Response: In developing Energy Vision 2020, TVA has considered many criteria, including rates and debt. The long- and short-term plans would result in competitive electric prices and a debt level $2 to $3 billion below the statutory debt limit of $30 billion, which was a goal established by the TVA Board. TVA is continually reviewing approaches to maintain competitive electric prices and manage its debt.

374

Comment: *Raising rates would stimulate conservation and should be considered.*

Comment by: Dolores Howard, Richard Simmers, Patricia Chapman

Response: The effect of changes in TVA's rates was considered in the Energy Vision 2020 analyses. Increasing TVA's rates sufficiently high would likely stimulate more energy conservation, at least in the short term. However, this would adversely affect TVA's ability to be competitive in the future and unduly impact low income customers. Consequently, the Energy Vision 2020 process attempted to strike a balance between various evaluation criteria, including costs, rates, environmental impacts, economic development, reliability,

risk management, debt, and equity among customers. This resulted in short- and long-term plans that include a mix of supply- and demand-side management resources. Demand-side management resources could provide up to 2,200 megawatts by 2010.

375

Comment: *Raising rates to pay off debt, as noted by the United States General Accounting Office, would make TVA less competitive in a deregulated economy.*

Comment by: Bryan Deel

Response: Raising rates for any purpose will make TVA less competitive, although not necessarily unable to compete. The United States General Accounting Office report, which also expresses concerns about TVA's competitiveness due to its debt, asserts that once the costs of non-producing nuclear assets for completing Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 are figured into TVA's revenue requirements "it will be difficult for TVA to offer rates competitive with its neighbors." This statement is incorrect. The General Accounting Office incorrectly translates revenue requirements into electric rates. Energy Vision 2020 indicates that increases in sales will cover the cost of bringing the new units into service.

376

Comment: *For lowest rates, there are four criteria: short-term rates, mid-term rates, long-term rates, and the rate impact measure. Burns & McDonnell/XENERGY and TVA prefer using two of these measures, short-term rates and rate impact measure. Short-term is defined as average rates between now and 2001. Because impacts beyond that time period are more speculative, short-term rates should receive greater focus than medium or long-term rates. The rate impact measure is defined as the present value of rates over the planning horizon and as such includes all rate periods.*

Comment by: Tennessee Valley Public Power Association

Response: In Energy Vision 2020, the long-term plan or portfolio, (Volume 1, Chapter 9, Figure 9-23), balances both short- and long-term rate impacts.

377

Comment: *Despite the use of a multi-attribute process, the only thing that mattered in the evaluation of energy strategies in Energy Vision 2020 was rates.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Mandy Tiesler

Response: Rates were not the only important factor; a number of different criteria were used in the evaluation of energy resource strategies in Energy Vision 2020. These included long-run cost/value, rates, reliability, environment, economic development, financial requirements, risk management, and equity among rate classes. As can be seen in the trade-off graphs in Energy Vision 2020, Volume 1, Chapter 9, Figures 9-4 to 9-10, many strategies were considered in trying to create a balance among all the evaluation criteria. TVA believes the long-term and short-term resource plans achieve this balance in the form of a portfolio of resource options.

Like other utilities, TVA is expecting important changes in the relationship between utilities and their customers. Consumer, legislative, and utility actions across the nation are changing the electric utility industry from a regulated monopoly to a more competi-

tive marketplace. TVA is at the forefront of this change and welcomes the opportunity for growth with improved, responsive services to best meet the needs of its current and new customers.

Competitiveness, as defined in Energy Vision 2020, goes beyond being the lowest cost electricity producer. It also means that TVA must be competitive in the quality and value of its electric services delivered to its customers. Competitiveness is also measured in terms of TVA's contribution to economic development in the region and the region's environmental quality.

378

Comment: *TVA is going to do a cost-of-service study that will force the residential ratepayer to begin to cross subsidize lower industrial rates. TVA is doing this because industrial customers have more leverage.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA's residential ratepayers do not subsidize industrial ratepayers. TVA regularly analyzes the cost of providing electricity to customer classes. Over time, it may be necessary to adjust the way in which revenues from each class of customer cover their costs of service.

Uncertainties

GENERAL

379

Comment: *TVA's practice of narrowing the number of environmental uncertainties to a smaller number is advisable. By selecting only those uncertainties which have the potential to greatly impact future resource decisions, unnecessary analyses of insignificant uncertainties were avoided.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

380

Comment: *With the assistance of the Energy Vision 2020 Review Group, TVA developed an extensive list of uncertainties. For each uncertainty, TVA used its best judgment to derive high, medium, and low estimates.*

The TVA approach to integration avoids the optimization trap and attempts to evaluate a wide variety of strategies using decision analysis techniques. TVA's modeling philosophy is that any reasonable plan must address as many future uncertainties as possible. In addition, plans should contain a "portfolio" of options that provide a hedge against unforeseen events, thereby minimizing risk. Optimization models such as EGEAS and PROSCREEN tend to produce a rush to an extreme whereby the winning supply option is relied upon almost exclusively. TVA's philosophy supports flexibility by creating a planning framework where it is relatively simple to shift between strategies as future events dictate. TVA believes that by carefully re-engineering the process of designing and building resources, decisions can be delayed, thus reducing the chance that subsequent events will judge the resource to be unnecessary.

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

381

Comment: *To its credit, TVA took a comprehensive approach to the development of uncertainties including consultation with outside experts and interested parties. It is not clear that TVA studied non-quantifiable uncertainties such as: (1) will Congress make TVA into a private entity?, (2) will the current Clinton Administration be reelected in 1996, or (3) what will be the regulatory role of state commissions after the TVA wall is removed? It is not always necessary to quantify a variable to include it in Energy Vision 2020. Recreating TVA as a private entity, for example, could be evaluated through extensive study of competition, resulting in a more flexible plan with short lead times and an ability to change direction quickly. Clearly, TVA's planning philosophy is based on a "gut feel" for some of these non-quantifiable uncertainties; but Burns & McDonnell/XENERGY feel that explicitly addressing them would be better.*

Comment by: Tennessee Valley Public Power Association

Response: We agree that it is not always necessary to quantify uncertainties in order to address them in integrated resource planning. Some of these uncertainties were discussed only qualitatively, such as some aspects of wholesale and retail open access, a

changing electric industry structure, and several environmental impacts. Privatization was not explicitly addressed in Energy Vision 2020.

Energy Vision 2020 will guide TVA in this emerging competitive market in making business decisions to meet the long-term energy needs of its customers. Being competitive in price, service, and reliability will allow TVA to meet customers' needs.

382

Comment: *There is little or no documentation of how the ranges for each uncertainty were developed or whether there was an attempt to make the probability that the future lies within each range equal for each uncertainty. Many futures analyses rigorously research each uncertainty and prepare essays that define the uncertainty, describe its history, and speculate as to alternative futures that could occur and why. These essays constitute an "environmental scan" that can be updated as new information becomes available. These essays also form a corporate knowledge base that facilitates communications between planners, managers, and executives. Burns & McDonnell/XENERGY recommend that TVA begin to document their research on uncertainties by preparing and maintaining these essays. With a few exceptions, TVA's uncertainty ranges provided seem reasonable. These exceptions include (1) gas escalation rates after 2005 are higher in the low case than in the high case, (2) the market price of coproduct is the same in the medium and high cases, (3) decommissioning costs are the same in the low and medium cases, and (4) spent fuel storage cost is the same in the low and medium case.*

Comment by: Tennessee Valley Public Power Association

Response: We agree with your comment except that: (1) The gas price forecasts predict volatility in short-term prices and steady escalation for each uncertainty case. The low, medium, and high cases were forecast to be 256 cents per million Btu with a 2.4 percent escalation, 342 cents per million Btu with a 5.3 percent escalation, and 418 cents per million Btu with a 7.9 percent escalation, respectively. (See Volume 1, Chapter 9, Figure 9-2.) (2) The market price of coproduct is different for the high, medium, and low cases as shown in Volume 2, Technical Document 8, Figure T8-24, Range of Values for Coproduct. (3) Decommissioning costs are different in the low and medium cases as shown in Volume 2, Technical Document 8, Figure T8-26, TVA Estimates of Nuclear Plant Decommissioning Cost. (4) The spent fuel storage cost uncertainty considered two cases, first, as a medium case, the current fee of $1 per megawatt-hour is paid to the Department of Energy, and as a high case, the fee is doubled to $2 per megawatt-hour.

383

Comment: *In the materials provided to the Energy Vision 2020 Review Group, several other uncertainties were identified for later quantification. These included a write-off schedule of nuclear unit cancellations, fuel costs for new technologies, interest rates, purchased power, specific environmental costs, and independent power producers/cogeneration. It is not clear that these uncertainties were ever included in later analyses.*

Comment by: Tennessee Valley Public Power Association

Response: Many uncertainties were evaluated in Energy Vision 2020. Most of these uncertainties were reviewed by the Energy Vision 2020 Review Group, but there were several uncertainties that were identified for later quantification.

Fuel costs, the price and quantity of purchased power, environmental costs, and the cost and availability of purchases from independent power producers and cogenerators were evaluated and were included in Volume 2, Technical Document 8, Figures T8-30 to T8-33.

For the remaining uncertainties, internal studies were performed. A study was performed regarding the optimal write-off schedule of nuclear unit cancellation. The recommendation of this study was to pursue a 30-year write-off of unused nuclear assets if and when the deferred nuclear units are abandoned. Interest rates were modeled as an uncertainty, but the results were inconclusive.

384

Comment: *The TVA analysis shows that flexibility is beneficial regardless of strategy.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

MARKET UNCERTAINTIES

385

Comment: *Recent cost-cutting measures, as well as the proposals detailed in this report, should allow TVA to remain competitive and ensure TVA's future success.*

Comment by: R. D. Newman (Bowater Newsprint)

Response: Your comment has been reviewed and noted.

386

Comment: *TVA is already seeing the impact of the Energy Policy Act and its provisions for wholesale wheeling and transmission access. At least one of its distributors has given contract cancellation notice and others have seriously considered doing so. There have been discussions in the Tennessee Valley about the potential for removing the service territory "fence." This would expedite the development of competition for both wholesale and retail customers. This could have either positive or negative impacts on TVA, depending on the aggressiveness of other utilities in the region. However, either way, it will definitely add to the downward pressure on rates. Based on its ranking as one of the lower cost providers of electricity, TVA would appear to be in a relatively good position to compete with other utilities. TVA is positioning itself to be ready for the competition.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

387

Comment: *One of the key factors identified by TVA in its load forecasting process is competition. What will happen if the anti-cherry picking rule is rescinded and the fence removed? While the current forecast includes a discussion of competition, it does not include an in-depth analysis of the issue. The current high, medium, and low competition scenarios are based on a customer survey where large customers were asked if they were very likely, likely, unlikely, or very unlikely to switch to another utility if they were allowed to do so.*

These responses were converted into probabilities and a distribution of possible losses produced. Obviously, this approach is very subjective and does not include customers not currently served by TVA or the Tennessee Valley Public Power Association. There seems to be no comprehensive analysis of competitive conditions, nor has the impact of the wall coming down or of TVA becoming a private entity been adequately addressed in Energy Vision 2020.

Comment by: Tennessee Valley Public Power Association

Response: TVA requested the report by Palmer Bellevue, "The Ties that Bind: TVA in a Competitive Electric Market." This comprehensive analysis discusses TVA's power and non-power programs, the Energy Policy Act of 1992, the forces of competition facing TVA, and obstacles to a competitive TVA.

Energy Vision 2020 specifically addresses competition in many ways including uncertainty in the load forecasts and by identifying options which allow TVA greater flexibility in planning. These options include option purchase agreements, business partnerships for energy resources, and pre-siting and engineering to provide flexibility to implement new technologies.

388

Comment: *The Federal Energy Regulatory Commission issued Dockets RM 95-8-000, "Promoting Wholesale Competition through Open Access Nondiscriminatory Transmission Services by Public Utilities," and RM 94-7-001, "Recovery of Stranded Costs by Public Utilities and Transmitting Utilities." The Federal Energy Regulatory Commission's goal is to issue a final order by December 31, 1995, with transmission tariffs becoming effective 60 days following issuance of the final order.*

While the Federal Energy Regulatory Commission has limited authority over TVA, TVA recognizes that "these proposed rules could have a substantial impact on TVA's conduct of business in the future" (page 1 of TVA's filed comments to the Federal Energy Regulatory Commission). However, TVA plans to implement a 25-year plan without a clear picture of the opportunities and hazards created as a result of this soon-to-be-restructured environment.

Why has TVA not considered modifying the timetable for selecting and implementing its resource strategies to more closely coincide with the implementation of the Federal Energy Regulatory Commission's open access transmission?

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: In Energy Vision 2020, the changing structure of the electric utility industry on both the supply and demand side of the market have been considered. One element of this changing industry structure is the Federal Energy Regulatory Commission's open access proposal. Energy Vision 2020 is not contingent on a single event affecting the electric utility industry, but attempts to consider the major uncertainties facing TVA and the electric utility industry. TVA's proposed long-term plan that uses a portfolio approach and short-term plan that emphasize flexibility will permit TVA to adapt to a variety of changes in the electric utility industry.

On the demand side of the market, TVA's load forecasts recognize the uncertainty in future load growth due to the uncertainty in the future competitive markets (see Volume 1, Chapter 6, pages 6.4 to 6.5 and Volume 2, Technical Document 5). In Technical Document 5, page T5.20, TVA's future competitive success is recognized as the second most important uncertainty in future load and sales levels. The uncertainty in TVA's sales certainly recognizes that at some time in the future, the "fence" and "anti-cherry-picking

amendment" will not exist, opening the TVA market to wholesale competition. Further considerations in this analysis included the current 10-year cancellation notice provision in TVA contracts with its distributors, the potential for both full and partial requirements contracts, and provisions for stranded investment. The potential for retail open access was only considered qualitatively.

On the supply side, the long-term plan utilizes a portfolio approach so that TVA can adapt to the changing marketplace. Additional needs of 3,500 megawatts by 2002 and 16,500 megawatts by 2020 will be met by the supply- and demand-side options identified in the portfolio. (See Volume 1, Chapter 9, Figure 9-23.) The short-term action plan in Energy Vision 2020 recognizes the need for flexibility in the face of market price and quantity uncertainty. The recommended options include both flexible internal and external options. (See Volume 1, Chapter 10, Figure 10-1.) These flexible options are the basis for the short-term action plan.

389

Comment: *We remain concerned that TVA has failed to fully consider the implications associated with competition and open access. It is clear now with the ongoing discussion between TVA and its largest distributors that many will seek unbundled electrical services in future contracts. This will decrease the need for additional TVA power. TVA should not engage in large costly power projects, i.e., Watts Bar Nuclear Plant Unit 1.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: In Energy Vision 2020, the changing structure of the electric utility industry on both the supply and demand side of the market have been considered. One element of this changing industry structure is the Federal Energy Regulatory Commission's open access proposal. Energy Vision 2020 is not contingent on a single event affecting the electric utility industry, but attempts to consider the major uncertainties facing TVA and the electric utility industry. TVA's proposed long-term plan that uses a portfolio approach and short-term plan that emphasize flexibility will permit TVA to adapt to a variety of changes in the electric utility industry.

On the demand side of the market, TVA's load forecasts recognize the uncertainty in future load growth due to the uncertainty in the future competitive markets (see Volume 1, Chapter 6, pages 6.4 to 6.5 and Volume 2, Technical Document 5, Load Forecasts). In Volume 2, Technical Document 5, Load Forecasts, page T5.20, TVA's future competitive success is recognized as the second most important uncertainty in future load and sales levels. The uncertainty in TVA's sales certainly recognizes that at some time in the future, the "fence" and "anti-cherry-picking amendment" will not exist, opening the TVA market to wholesale competition. Further considerations in this analysis included the current 10-year cancellation notice provision in TVA contracts with its distributors, the potential for both full and partial requirements contracts, and provisions for stranded investment. The potential for retail open access was only considered qualitatively.

On the supply side, the long-term plan utilizes a portfolio approach so that TVA can adapt to the changing marketplace. Additional needs of 3,500 megawatts by 2002 and 16,500 megawatts by 2020 will be met by the supply- and demand-side options identified in the portfolio. (See Volume 1, Chapter 9, Figure 9-23.) The short-term action plan in Energy Vision 2020 recognizes the need for flexibility in the face of market price and quantity uncertainty. The recommended supply-side options include both flexible inter-

nal and external options. (See Volume 1, Chapter 10, Figure 10-1.) These flexible options are the basis for the short-term action plan.

Watts Bar Nuclear Plant Unit 1 is needed to meet both the current and projected need for power.

390

Comment: *TVA should address more fully the potential effects of taking down the fence.*

Comment by: Mary English (University of Tennessee)

Response: Please refer to "The Ties that Bind: TVA in a Competitive Electric Market" by Palmer Bellevue. This document discusses the effects of taking down the fence, as well as providing an overview of TVA, an assessment of competition in the electric industry, and obstacles to a competitive TVA. TVA's Energy Vision 2020 addresses the deregulation of the electric industry in Volume 1, Chapter 6 as TVA's Competitive Success. The high, medium, and low load forecasts reflect possible gains and/or losses of customers both inside and outside its present service territory.

391

Comment: *When the TVA fence is removed, the ratepayers stand to be the recipients of a lot of stranded debt when industries and consumers go elsewhere.*

Comment by: Jonathan Scherch, Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA is positioning itself to be competitive in the event that the "fence" is removed. TVA is and expects to be competitive for existing and new customers and will continue to manage its debt.

Energy Vision 2020 recognizes the uncertainty that competition brings to the marketplace. The short-term action plan and the long-term plan (see Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1) include resource options that will provide flexibility to adapt to the uncertain marketplace.

392

Comment: *If TVA allowed free market access, you would see a number of smaller, cheaper power producers.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Energy Vision 2020 recognizes that the market for electricity will become increasingly competitive (see Volume 1, Chapter 1). Recognizing this increased uncertainty created by increased competition, the short-term action plan emphasizes smaller, more flexible options. (See Volume 1, Chapter 10, Figure 10-1.) These smaller, more flexible options are described as flexible external and internal supply-side options in Volume 1, Chapter 7, pages 7.5 and 7.6 and in Volume 1, Chapter 8, pages 8.14 to 8.17 as distributed generation or self-generation and renewable generation. For example, TVA issued a request for proposals to help identify the lowest price power producers in the market today. Responses to this request were received from other utilities, independent power producers, and power marketers.

393

Comment: *Some utilities are offering electricity at the rate of 1.6 cents per kilowatt-hour. In light of that rate and TVA's debt as reported by the United States General Accounting Office, how can TVA be competitive?*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition), Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Sales in the bulk power market occur at many different prices and locations depending on the type of power bought or sold. The price of this power is influenced by time of day, season of the year, and degree of interruptibility of the power. Most of this power is traded on the basis of the marginal cost of power and not the average cost of power. TVA's marginal cost is competitive with many other utilities, and TVA buys and sells power in the bulk power market on an hourly and daily basis. Over the past several years, TVA has been a net seller of power. Thus, TVA expects to remain competitive in these important markets.

394

Comment: *What has been the five-year price trend and historical volatility for bulk power in the Southeastern Electric Reliability Council and surrounding regions?*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: Although TVA has estimates of both the trend in prices and volatility, it does not have access to actual historical price and volatility data because price and other terms and conditions of specific transactions are kept confidential for competitive reasons.

395

Comment: *TVA is not ready for a competitive market. It is very much at the rear of the pack and has a lot of catching up to do.*

Comment by: Monique Mollet, Arthur Smith

Response: TVA recognizes that the electric industry is becoming more competitive. Energy Vision 2020 helps to position TVA to meet the competition. This issue is discussed in Volume 1, Chapter 1.

TVA's long- and short-term plans discussed in Volume 1, Chapters 9 and 10 emphasize the need to provide flexibility in meeting future customer electric needs. This flexibility will allow TVA to adapt to uncertainty in future power markets created by the increasingly competitive environment.

TVA's current competitive position is thoroughly addressed in another report by independent consultants, "The Ties that Bind: TVA in a Competitive Electric Market."

396

Comment: *Over the past 20 years, on the average, coal prices have gone up 5 percent, while natural gas prices have gone up 180 percent, and crude oil has gone up 55 percent.*

Comment by: Barbara Altizer (Virginia Coal Council)

Response: TVA has included price forecasts for coal, natural gas, and fuel oil for the period covered by Energy Vision 2020's analysis process. These forecasts have been prepared in conjunction with nationally recognized consultants in the field of fuel price forecasting.

The methodologies used in generating these forecasts are consistent with the methods used in our fuel procurement process.

397

Comment: *Energy Vision 2020 lists natural gas prices as a key uncertainty. TVA's projected delivered price of natural gas in the year 2000 ranged from $2.90 per million Btu, low case, $3.42 per million Btu, medium case, to $4.13 per million Btu for the high case scenario. TVA's low, medium, and high case escalation rates for natural gas from 2000 to 2020 were 5.1, 5.3, and 4.8 percent, respectively. Given TVA's reference case scenario, the estimated price of natural gas delivered in the year 2020 is $9.61 per million Btu.*

Forward natural gas prices can be fixed using futures or the over-the-counter markets. TVA can currently fix the wellhead price of natural gas (basis Henry Hub), delivered in 2000, at $2.10 per million Btu. The estimated cost of fuel, transport, and distribution charges are $0.06, $0.30, and $0.20 per million Btu, respectively, for delivery to TVA's Allen Plant. The $2.66 per million Btu delivered price is $0.76 per million Btu below TVA's reference price. The 2020 over-the-counter price for gas delivered to TVA's Allen Plant (assuming $0.15 per million Btu fuel, $0.84 per million Btu transport, and $0.56 per million Btu distribution) is $7.01 per million Btu or $2.60 per million Btu less than TVA's reference price. These known forward prices are also below TVA's low case estimates. Much of TVA's bias against natural gas-based generation technologies would be removed if currently quoted forward market prices were used instead of estimates of what prices may be in the future.

If TVA used the low case scenario for gas prices, how would TVA's supply portfolio be affected?

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: The gas prices used to evaluate options and strategies in Energy Vision 2020 are reported correctly in Volume 1, Chapter 9, Figure 9-2 . The gas prices reported in Volume 2, Technical Document 8 are reported incorrectly and will be corrected in the final Energy Vision 2020 document.

The correct prices for the low, medium, and high forecasts for the year 2000 and 2020 are:

Natural Gas Prices ($ per million Btu)

Year	Low	Medium	High
2000	2.56	3.42	4.18
2020	4.11	9.60	19.10

For planning purposes, a range of forecasts of natural gas prices is used in Energy Vision 2020 to represent the uncertainty in future prices. It is recognized that various market and contracting mechanisms can be used to hedge future gas price uncertainty for specific projects. TVA will certainly consider all such mechanisms when actual projects are proposed for implementation. The commenter's projections of $2.66 per million Btu in 2000 and $7.01 per million Btu in 2020 are within the range of forecasts used in Energy Vision 2020.

The low case scenario for future gas prices is evaluated in Energy Vision 2020. These evaluations are presented in Volume 1, Chapter 9, Figure 9-18, and pages 9.28 and 9.29. Lower gas prices would not significantly alter the long-term supply portfolio. (See Volume 1, Chapter 9, Figure 9-23.) The portfolio already contains many supply-side options that use natural gas such as some option purchase agreements, combined cycle plants, combustion turbines, combined cycle repowering of coal plants, and fuel cells.

398

Comment: *TVA's assumptions for future natural gas prices appear to be too high relative to its coal price assumptions. As a potential consumer of large amounts of natural gas, TVA would be able to negotiate competitively priced deliveries and long-term supplies of natural gas at costs lower than those assumed in Energy Vision 2020. The result of a price assumption bias against natural gas could be an under-reliance in Energy Vision 2020 on natural gas-fired technologies such as combined cycle.*

Comment by: Tennessee Valley Public Power Association

Response: Independent consultants have been used to develop the TVA natural gas price forecast. High, medium, and low forecasts were developed for Energy Vision 2020. In Energy Vision 2020, the short-term action plan includes recommendations to further investigate natural gas-fired technologies. This includes the combined cycle repowering of Bellefonte Nuclear Plant and the development of siting and engineering studies for the construction of a greenfield combined cycle plant. (See Volume 1, Chapter 10, Figure 10-1.)

399

Comment: *Although natural gas is a great fuel, I am concerned that too much demand is being placed on the resource despite assurances from the suppliers that there is plenty. With many states going to compressed natural gas as an alternative transportation fuel and many utilities going to combined cycle units fired by natural gas, I think there may be too much dependence on a single resource and TVA could be looking at 1973 again with a different energy source.*

If TVA wants a gas-fired unit, gasify coal or biomass.

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: The long-term plan in Energy Vision 2020 (see Volume 1, Chapter 9, Figure 9-23) recommends several different resource options. These include natural-gas based options, coal-fired options, renewables, and demand-side management. The long-term plan does not overly rely on natural-gas fired generation.

400

Comment: *TVA's estimate of load growth among the residential and commercial customer classes include appliance saturations that are based upon TVA's forecasts of natural gas prices. These prices are higher than currently quoted forward prices. Gas utilities have the ability, in the current market environment, to manage gas price risks for their customers. The city of Clarksville, Tennessee recently entered into a 10-year, prepaid gas contract for one-third of the city's gas needs (Natural Gas Focus, April/May 95). TVA's load growth modeling practices may not reflect changes in pricing opportunities that have resulted from gas industry restructuring.*

If TVA used the low case scenario for gas prices, how would TVA's load growth projections be affected?

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: In Energy Vision 2020, TVA uses a range of load forecasts which represents the uncertainty in economic growth, prices of electricity, TVA's competitive success, and the price of natural gas. The range of load forecasts is shown in Volume 1, Chapter 6, Figures 6-1 and 6-2.

The gas price forecasts used in Energy Vision 2020 bracket the quoted forward price of natural gas (see response to comment number 397). Utilizing state-of-the-art forecasting models and techniques (see Volume 2, Technical Document 5, Load Forecast), the effects of lower natural gas prices are shown in Figures T5-28 and T5-29. With the low forecast of natural gas prices, electricity sales would be 2.6 percent lower in 2000 and 7.8 percent lower in 2015.

401

Comment: *There is currently a glut of natural gas that should continue, and this does not take into account all the gas that is coming out of landfills, coal mines, and all other sources. This should be considered.*

Comment by: John van der Harst

Response: In Energy Vision 2020, the uncertainty in both the future quantity and price of natural gas has been considered. (See Volume 1, Chapter 9, pages 9.28 and 9.29.) It is also recognized that there are other sources of methane. Energy Vision 2020 has considered the production of electricity from landfill methane and coalbed methane as supply options. These options have been included in the long-term plan. (See Volume 1, Chapter 9, Figure 9-23.)

402

Comment: *Leading coal and utility experts are stating that, as restructuring of the United States electric utility industry goes forward, coal-based systems will increasingly enjoy competitive advantage, and those with highly efficient clean coal technologies will be especially well-positioned.*

Comment by: William Bowker (Kentucky Coal Marketing and Export Council), Steven Walsh

Response: TVA's Energy Vision 2020 identifies several clean coal technologies such as integrated gasification combined cycle as being competitive with other supply-side options such as natural gas combined cycle.

In Energy Vision 2020 one of the important aspects of being competitive is having the flexibility to adapt to an uncertain future. Thus, the short-term action plan (see Volume 1, Chapter 10) in Energy Vision 2020 relies heavily on supply-side options which provide flexibility such as option purchase agreements (see Volume 1, Chapter 7, page 7.5) and flexible internal supply-side options (see Volume 1, Chapter 7, page 7.6).

403

Comment: *Once you buy tons of coal, what are you going to do with it when you find there are better ways to generate electricity?*

Comment by: Sheilla Cheyenne

Response: TVA coal contracts are not of a length that would extend beyond the time necessary to install a new technology for energy production.

REGULATORY/ENVIRONMENTAL UNCERTAINTIES

404

Comment: *TVA is not experiencing any of the environmental problems that created a reduction in hydroelectric production at Bonneville Power Administration, Western Area Power Administration, and Southwestern Power Administration. The primary reason TVA is not experiencing any of these problems is because it does not have anadromous fish such as salmon. TVA has also handled all of its dissolved oxygen and minimum flow problems, which it has been researching since 1980 at Norris Dam. TVA does not anticipate losing capacity or energy from its hydro system due to environmental problems in the future.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

405

Comment: *We appreciate TVA's consideration of carbon dioxide emissions in its uncertainty analysis (should carbon dioxide emissions become regulated).*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Your comment has been reviewed and noted.

406

Comment: *While the Energy Vision 2020 report shows improvements in many environmental indices, carbon dioxide emissions increase over time in all strategies. This could be a problem for TVA if Congress imposes limits on carbon dioxide emissions.*

Comment by: Sharon Fidler (League of Women Voters), Eric Hirst (Oak Ridge National Laboratory), Linda Ewald, Stephen Smith (Tennessee Valley Energy Reform Coalition), Eileen McIlvane (Coalition for Jobs and the Environment), Sheila Holbrook-White (Sierra Club, Alabama Chapter)

Response: TVA considered the uncertainty in carbon dioxide regulations in all strategies. The analysis assumed either one of two scenarios would occur: either no additional carbon dioxide regulations or a cap on carbon dioxide emissions, with purchases and sales of carbon dioxide allowances at $10 per ton of carbon dioxide. (Carbon dioxide regulations have been modeled similar to current acid rain regulations, which permit buying and selling of sulfur dioxide allowances). (See Volume 1, Chapter 9, page 9.29.)

The analysis indicates that the lower cost strategies (including the short-term action plan) are robust; they remain lower cost, even with carbon dioxide regulations. These strategies were robust relative to carbon dioxide regulations because they contain options with low carbon dioxide emissions or options which offset carbon dioxide emissions, such as natural gas-based combined cycle plants, fuel cells using landfill methane, renewables, and demand-side management options.

If carbon dioxide or other environmental regulations change, TVA could implement more conservation, more fuel switching, and more renewable resources as identified in the long-term plan portfolio. (See Volume 1, Chapter 9, Figure 9-23.) TVA believes that risk management is an essential part of the planning process and that a successful plan is one that remains robust and flexible to deal with uncertain futures such as carbon dioxide regulations.

407

Comment: *In order to avoid paying carbon taxes, TVA should reduce its carbon dioxide emissions.*

Comment by: Nancy Bell

Response: TVA has and will continue to implement actions that reduce its carbon dioxide emissions below what they would be if certain alternative actions were taken. For example, these actions will reduce carbon dioxide emissions in the year 2000 by 22.7 million tons below what they would otherwise have been.

Carbon taxation was proposed as legislation in 1993 in Congress, but this did not garner much support. Current national policy, which TVA supports, is trending toward more flexible, less economically damaging methods to reduce carbon dioxide and other greenhouse gas emission. For example, President Clinton's Climate Change Action Plan relies heavily on cost-effective and voluntary measures to return national greenhouse gas emissions to the 1990 levels by the year 2000. One part of the Action Plan is the Climate Challenge Program in which TVA has committed to a 22.7 million ton reduction in carbon dioxide emissions.

The possibility of future carbon dioxide regulation was evaluated in Energy Vision 2020 as an uncertainty. It was assumed for purposes of this uncertainty that there would be a cap on carbon dioxide emissions beginning in the year 2000 at 1990 levels. Any carbon dioxide emissions above this cap could be purchased at $10 per ton of carbon dioxide, and any emissions below the cap could be sold for the same price. Because of this cap, there would be a direct reduction of carbon dioxide emissions of 2 million to 3 million tons per year on the TVA system. Also, long-term costs were increased sufficiently to reduce emissions to 1990 levels assuming a cost of $10 per ton of carbon dioxide. The cost of this emission reduction averaged $257 million per year for TVA.

408

Comment: *TVA has grossly underestimated the liabilities associated with global climate change. After this summer there is a consensus within the scientific community that human-induced climate change is undeniable.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Not all respected scientists agree that the climate is being changed by human activities. However, carbon dioxide emissions was one of the criteria against which each of the energy strategies was evaluated. As an example of the effect of carbon dioxide emissions in the evaluation process, the low-cost producer strategy was eliminated during the final evaluation because of its high emissions. (See Volume 1, Chapter 9, page 9.20.) While the minimum carbon dioxide emission strategies did not emerge from the final evaluation, each of the seven key strategies that did emerge has lower carbon dioxide emissions than the reference case.

When the uncertainty in possible future carbon dioxide regulations was considered, several of the seven key strategies remain low-cost compared to other strategies. (See Volume 1, Chapter 9, page 9.29.) These strategies include low carbon dioxide emitting and carbon dioxide off-setting options. The portfolio of options from the seven strategies incorporate the needed flexibility to accommodate possible future liabilities associated with carbon dioxide emissions.

409

Comment: *In conducting its thermal uncertainty analysis, did TVA consider other alternatives for its heated discharges such as cooling ponds?*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: At TVA plants where cooling water treatment is now necessary, other alternatives including cooling lakes were initially considered, but cooling towers were chosen in each case as the best option from an environmental and/or economic perspective. For plants which now have once-through cooling systems, no such analysis has been done at this point. Only cooling towers were considered in the Energy Vision 2020 thermal uncertainty analysis because TVA considers that technology to be the maximum that will be necessary and the one most likely to be applied in specific cases based on TVA experience.

410

Comment: *As TVA may be aware, the Environmental Protection Agency recently published a final regulatory determination on certain wastes from the combustion of coal by electric utility power plants (58 FR 42466-42482 [August 9, 1993]). Several wastes generated at power plants were temporarily exempted from Resource Conservation and Recovery Act Subtitle C until April 8, 1998, pending evaluation by the Environmental Protection Agency. However, it should be noted that if the Environmental Protection Agency decides to regulate these wastes, it could have a potential impact on TVA's waste management planning.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA considered the potential for increased cost in handling and disposing of solid wastes from coal-fired generating facilities as a regulatory uncertainty related to protection of ground and surface waters because of the Environmental Protection Agency's reclassification of utility wastes.

In Energy Vision 2020, the cost for all new coal-fired facilities included provisions for solid waste handling and storage that would comply with an anticipated regulation. For example, new pulverized coal facilities would include dry waste transport and handling systems, impermeably lined storage areas, and leachate collection systems with water treatment capabilities. For the 11 existing coal-fired generating stations, it was assumed that new regulation in the area would require reclaiming currently stored waste, installing new systems (impermeably lined storage areas, leachate collection, and treatment systems), and returning the material to storage.

In Energy Vision 2020, TVA considered the uncertainty of future environmental regulations. (See Volume 2, Technical Document 8, page T8.43.) Consideration of this uncertainty then favored all strategies that included retiring existing plants or repowering existing plants with natural gas-fired technology. It also indirectly favored strategies that minimized new coal-fired generation, since the costs of new coal-fired facilities were increased to include the water protection systems.

411

Comment: *Although not required by the Environmental Protection Agency for power plants at this time, analysis of indirect exposure risk has environmental significance and could potentially become a requirement during the 25-year horizon of Energy Vision 2020.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA considered the uncertainty of future regulations of air toxics as part of the environmental air regulatory uncertainty. (See Volume 2, Technical Document 8, Figures T8-30, T8-31, and T8-32, and pages T8.43 to T8.45.)

ABILITY OF OPTIONS/TECHNOLOGIES TO ADDRESS UNCERTAINTY

412

Comment: *Why is demand-side management not included as a flexible option in Volume 1, Chapter 9, Figure 9-14, Value of Flexibility?*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: In response to public comments, the final Energy Vision 2020 plan identifies several flexible demand-side management options, similar to the flexible supply-side options. These flexible demand-side management options are included in the short-term action plan. (See Volume 1, Chapter 10, Figure 10-1.)

413

Comment: *TVA's approach to using smaller units to meet future growth will provide it with additional flexibility in siting and scheduling the units for construction.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

414

Comment: *TVA's plans to use smaller generating units should have a positive benefit to the loss-of-load probability of the system. In the move to lower generation margins as TVA is planning, smaller generating units will also provide more flexibility during contingencies. The past reliance on large nuclear and coal plants provides certain economies of scale. However, the loss of an on-line unit requires numerous other machines to pick up the loss. At certain dispatch levels, the system may be paying a penalty due to having to back off from optimal operating points in order to have sufficient on-line reserves if a machine trips. Movement to smaller machines may allow machines to be loaded to a more optimal level.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

UNCERTAIN CHARACTERISTICS OF OPTIONS/TECHNOLOGIES

415

Comment: *Nuclear power prevents reliance on imported oil.*

Comment by: Charlie Hopkins (GENESCO)

Response: Energy from United States nuclear energy plants cut demand for foreign oil by over 300 million barrels a year—reducing our dependence on foreign oil suppliers and cutting our trade deficit.

416

Comment: *During the early 1980s Nuclear Regulatory Commission-required design changes were responsible for very high additions and improvements costs and long outages throughout the industry. The costs of these modifications decreased significantly during the mid-1980s and have been more or less constant (at about $10 million per unit per year) for the last seven or eight years. Essentially all the major Nuclear Regulatory Commission issues affecting plant design have been addressed at the TVA units or will be addressed before a unit starts up.*

Comment by: Tennessee Valley Public Power Association

Response: The Nuclear Regulatory Commission has conducted comprehensive inspections on recovery and construction activities of TVA's nuclear units. Extensive operational readiness inspections by the Nuclear Regulatory Commission and TVA were conducted prior to TVA certifying to the Nuclear Regulatory Commission that it was ready to load fuel and begin safe operation. All issues were resolved to the satisfaction of TVA and the Nuclear Regulatory Commission prior to fuel load at Browns Ferry Nuclear Plant Unit 3 and Watts Bar Nuclear Plant Unit 1.

417

Comment: *It is reasonable to assume that the impacts of Nuclear Regulatory Commission-required design changes will remain at current levels in the future.*

An argument can easily be made that existing Nuclear Regulatory Commission requirements are unnecessarily burdensome and that more rational requirements could allow plants to cut costs by as much as 50 percent without reducing safety. In fact, the Nuclear Regulatory Commission has taken some steps to reduce the impact of its requirements. It is expected that industry-average costs will drop by a small amount over the next few years and remain constant thereafter.

Comment by: Tennessee Valley Public Power Association

Response: During the 1980s most modifications to nuclear facilities were driven by new regulations, many of which were issued following the 1979 Three Mile Island accident. A number of these regulations involved expensive modifications to plant systems and equipment. However, the number of new regulations has decreased in recent years, and in general, new regulations have had lower financial impact. This trend is expected to continue. It reflects the maturing of the nuclear industry and increased knowledge about nuclear safety.

418

Comment: *The impacts of known nuclear equipment problems have generally decreased over the last decade while the rate at which new problems have been discovered has also decreased. This has been a major reason for improved capacity factors and reduced additions and improvements costs.*

Comment by: Tennessee Valley Public Power Association

Response: Performance in the nuclear industry and at TVA continues to improve. A discussion of the improvement of TVA's nuclear performance can be found in the section on Nuclear Generation in Volume 1, Chapter 4 and the section on TVA's Nuclear Plants in Volume 2, Technical Document 3.

419

Comment: *TVA has several programs underway that are designed to eliminate some of the unnecessary regulatory requirements at its nuclear plants and to improve the efficiency with which the plants meet the remaining requirements. TVA believes these programs have the potential to reduce the annual operating and maintenance costs at a twin-unit plant by up to ten or twenty million dollars. TVA has been improving the quality of outage planning and maintenance at the operating plants. This also has the potential to reduce operating and maintenance costs significantly.*

Comment by: Tennessee Valley Public Power Association

Response: TVA has a Cost Beneficial Licensing Action Commitment Reduction Program in effect which investigates elimination of unnecessary regulatory requirements that do not affect safety at all of its nuclear power plants. The program identifies and investigates potential cost savings from all possible avenues, but priority is given to outage and maintenance cost and time reductions.

420

Comment: *The costs of modifications at TVA's Nuclear Plants have been very high in recent years. For example, the total outage times—and additions and improvements expenditures—at Browns Ferry Nuclear Plant have been on the order of five times industry averages.*

It appears that TVA plant maintenance and outage planning were below average in the past. TVA personnel believe they have made significant progress improving the quality of maintenance and of outage planning at their units. During the last decade, many units throughout the industry have improved their performances in these areas, and this is one reason that capacity factors have improved while costs have leveled off. It remains to be seen whether future capacity factors (and costs) at the TVA plants are likely to be average, better than average, or worse than average. While it is possible that TVA may improve from worse than average in the past to better than average in the future, very few units have managed to do this in the past. It is uncertain whether the factors that led to high costs and long outages are likely to persist in the future.

Comment by: Tennessee Valley Public Power Association

Response: Physical improvements and modifications to recover TVA's nuclear units have been costly, but the impacts on safety and reliable performance have been positive. Alterations in design, processes, and hardware have improved safety, performance, and costs of nuclear unit operation at Browns Ferry Nuclear Plant Unit 2 and Sequoyah Nuclear Plant. The duration of the Browns Ferry Nuclear Plant Unit 2, cycle 6 outage was 125 days. The duration of the last outage for Browns Ferry Nuclear Plant Unit 2, cycle 7, was 53 days. The projected duration for Browns Ferry Nuclear Plant Unit 2, cycle 8, is 35 days. TVA recovery efforts will be completed with the return to service of Browns Ferry Nuclear Plant Unit 3 in late 1995.

The quality of maintenance and outage planning has improved as noted in the significant improvement in outage duration. TVA is confident that it will be among the best in the nuclear industry in light of the physical improvements and modifications that have already been made or identified to recover its nuclear units. Recognizing the uncertainty of forecasting nuclear capacity factors, TVA has used a range for this in Energy Vision 2020. (See Volume 2, Technical Document 8, page T8.27.)

421

Comment: *It is unlikely that TVA would be able to reduce average operating and maintenance costs to the $55 per kilowatt it has assumed for the low cost case.*

Comment by: Tennessee Valley Public Power Association

Response: The Energy Vision 2020 analysis assumed a 10 percent probability of occurrence for the low estimate of operating and maintenance, which is based on nuclear industry targets.

422

Comment: *Stress-corrosion cracking of recirculation piping has been the single biggest problem affecting boiling water reactors. Most of the piping has been, or will have been, replaced at each of TVA's boiling water reactors (Browns Ferry Nuclear Plant Units 1, 2, and 3), so there should not be major pipe cracking problems at these units in the future.*

Stress-corrosion cracking of the reactor pressure vessel internals could potentially cause long outages and high costs at boiling water reactors in the future. At present, it appears that cracking of the core shroud will not cause major problems. However, the possibility exists for more extensive cracking in the future. This is of particular concern because TVA has not installed hydrogen water chemistry (which can suppress stress-corrosion cracking) at Browns Ferry Nuclear Plant and does not now plan to do so.

Comment by: Tennessee Valley Public Power Association

Response: TVA is currently evaluating the feasibility of installing hydrogen water chemistry at Browns Ferry Nuclear Plant. Operating and maintenance decisions are based on cost-effectiveness of actions to maximize performance.

423

Comment: *Even though TVA is currently getting reasonably good marks from the Nuclear Regulatory Commission, there is no guarantee that its nuclear plants may not have Nuclear Regulatory Commission problems in the future. This is especially true since several plants that have been shut down in recent years appeared to have been doing well, and even had received favorable Nuclear Regulatory Commission reviews prior to shutdown. Therefore, projections of future capacity factors (and costs) for the TVA plants must include some allowances for the possibility of future Nuclear Regulatory Commission-ordered outages.*

Comment by: Tennessee Valley Public Power Association

Response: The capacity factor for expected performance, 67 percent, was based on TVA's actual performance since the outages in the late 1980s. This period included a regulatory outage at Sequoyah Nuclear Plant. In Energy Vision 2020, a range of capacity factors is identified to represent the possibility for a longer regulatory-imposed outage. The low estimate for capacity factors is 55 percent; the high estimate is 86 percent.

424

Comment: *Burns & McDonnell/XENERGY generally agree with TVA's assumptions concerning the costs to complete and operate the unfinished nuclear units. Some of TVA's assump-*

tions appear to be somewhat conservative, while others are somewhat optimistic. However, none of the assumptions is beyond being reasonable.

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

425

Comment: *TVA's medium estimate for additions and improvements cost is $20 million per nuclear station per year with an additional $5 million per unit per year. Thus, estimated additions and improvements costs for a two-unit station are $30 million per year. TVA states this is based on recent industry experience. However, Burns & McDonnell's analyses indicate that recent costs for a two-unit station have been averaging about $40 million per year.*

Comment by: Tennessee Valley Public Power Association

Response: National Economic Research Associates, Inc. and R. J. Rudden Associates, Inc. were retained for the Energy Vision 2020 Review Group to evaluate the key assumptions related to the cost and performance of TVA's nuclear units. Their conclusion regarding addition and improvement costs is that the TVA estimates are reasonable and somewhat higher than their estimates. The details of the analysis and conclusions regarding TVA's estimates of addition and improvement costs are found on pages 6 to 8 of the report titled "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan."

426

Comment: *During the last twenty-five years, actual capital costs for all nuclear units in the United States have been much higher than originally estimated. Cost overruns were almost entirely because of changing regulatory requirements. These regulatory changes affected plant designs (e.g., fire protection and Three Mile Island requirements) and also design and construction practices (e.g., configuration management).*

Comment by: Tennessee Valley Public Power Association

Response: During the 1980s most modifications to nuclear facilities were driven by new regulations, many of which were issued following the 1979 Three Mile Island accident. A number of these regulations involved expensive modifications to plant systems and equipment. In recent years, however, new regulations have decreased, and in general have had a lower financial impact. This trend reflects the maturing of the nuclear industry and increased knowledge about nuclear safety.

427

Comment: *There has been some concern expressed (by MHB, a consultant which reviewed TVA's nuclear program at the request of an Energy Vision 2020 Review Group member) that the costs quoted by TVA do not include some significant overhead expenses (administrative and general). Burns & McDonnell/XENERGY's preliminary inquiries indicate that all significant costs are included in TVA's numbers.*

Comment by: Tennessee Valley Public Power Association

Response: We agree that all significant costs are in the TVA analysis.

428

Comment: *Nuclear decommissioning costs are unacceptably high.*

Comment by: Philip & Winfred Thomforde

Response: Decommissioning costs were fully considered in the integrated resource planning analysis for nuclear options as illustrated in Volume 2, Technical Document 6, Figure T6-1.

TVA and the Energy Vision 2020 Review Group retained National Economic Research Associates, Inc. and R. J. Rudden Associates, Inc. to evaluate the key assumptions related to the cost and performance of TVA's nuclear units. The overall conclusions regarding TVA's estimates of decommissioning and waste disposal costs are that the range of costs estimated by TVA is reasonable, and decommissioning costs represent a relatively small part of nuclear generating costs. Therefore, large increases in the estimated costs would have a very small impact on the overall operating costs of a nuclear plant.

The details of the analysis and conclusions regarding TVA's estimates of decommissioning and waste disposal costs are found on pages 13 to 15 of the report titled "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan."

429

Comment: *TVA's latest estimates for decommissioning its nuclear reactor units that were used in the Energy Vision 2020 analysis were as follows:*

Browns Ferry	*$250 million per unit*	*$750 million total*
Watts Bar	*200 million per unit*	*200 million total*
Sequoyah	*150 million per unit*	*300 million total*
Total		*$1,250 million total*

The source and age of these estimates was unclear; however, they were not taken from the last official decommissioning cost estimates for TVA. Cost estimates of decommissioning for other nuclear units around the country have increased substantially in recent years. TVA has indicated that the lack of experience nationally in actual decommissioning of nuclear reactors made it difficult to project these costs on an objective basis.

Comment by: Tennessee Valley Public Power Association

Response: In Energy Vision 2020, TVA used a medium decommissioning cost estimate in all base case strategies. TVA used a range to represent the uncertainty in decommissioning costs. All estimates are for the decontamination and dismantlement option for prompt removal and dismantling. The low values are based on the Nuclear Regulatory Commission formula of $105 million for pressurized water reactors and $130 million for boiling water reactors in January 1986 dollars, escalated to 1994 dollars. The medium values represent the average of industry estimates escalated to 1994 dollars. The high values are twice the average of industry estimates.

Value	Pressurized Water Reactor	Boiling Water Reactor
Low	$200 million per unit	$250 million per unit
Medium	$300 million per unit	$350 million per unit
High	$600 million per unit	$700 million per unit.

430

Comment: *TVA has provided for the accumulation of funding for the eventual decommissioning of its nuclear power stations since 1982. Investor-owned utilities are required by the Nuclear Regulatory Commission to have decommissioning funds set aside in a trust. However, TVA has a government exemption from the Nuclear Regulatory Commission requirement. Therefore, it has established its decommissioning fund as an internally-managed fund. In 1993, TVA took advantage of an opportunity to sell its decommissioning fund investments at a substantial gain over their book value. TVA has not returned the proceeds to the decommissioning fund and has delayed doing so, pending an analysis of different investment options with higher long-term yields. The remaining balance in the decommissioning fund was $150 million.*

The amount of funding for decommissioning each year is collected from the ratepayers through the current rates. If the decommissioning cost projections were to change significantly, there could be substantial impact on TVA's rates.

Comment by: Tennessee Valley Public Power Association

Response: TVA currently has $260 million invested for its decommissioning fund and plans to invest another $123 million by the end of fiscal year 1996. According to current decommissioning cost estimates, this amount is sufficient, depending on the return on investments, to meet TVA's future decommissioning requirements. TVA continues to review its decommissioning requirements and manages the decommissioning fund investments in accordance with current cost estimates.

431

Comment: *TVA needs to factor in the risks and contingencies of spent fuel storage and the possibility that a high-level repository may never be available. This issue needs to be better discussed.*

Comment by: Dennis Haldeman, Jennifer Lapidus & Hannah Bennett, Geoffrey Crandall (MSB Energy Associates)

Response: The risks and contingencies of spent fuel storage and the possibility that a high level repository may never be available is discussed in Volume 1, Chapter 3, page 3.30. The uncertainty in the cost of spent fuel storage is also addressed in Volume 2, Technical Document 8, page T8.28 and Figures T8-30 to T8-33.

432

Comment: *Are the costs of a catastrophic nuclear accident factored into Energy Vision 2020? For example, the USSR estimated that it would cost $400 billion over a 10-year period for Chernobyl relocation costs alone.*

Comment by: Richard Simmers, Michael Karp (Northwest Conservation Act Coalition)

Response: The costs of a catastrophic nuclear accident are not directly considered in Energy Vision 2020. The design of American nuclear plants is much safer than that of the Chernobyl plant and there is little or no risk of a similar accident occurring in the United States. However, the effect of such an accident on TVA's energy resource planning has been indirectly considered in that one of the possible future events considered in Energy Vision 2020 is a moratorium on generation from nuclear plants. (See Volume 2, Technical

Document 8, Figures T8-30 to T8-33.) Although a nuclear moratorium could have large cost consequences to TVA, such an event is considered to have a very low probability of occurrence.

433

Comment: *Nuclear units should be capable of 80 to 85 percent capacity factors. Industry performance so far has been far below this, although it has improved substantially in recent years.*

Four factors contributed more or less equally to the reduced nuclear industry average capacity factors (58 percent actual versus 80 to 85 percent possible) during the 1970s and 1980s. These were:

- *Generic equipment problems such as pipe cracking in boiling water reactors and steam generator tube corrosion at pressure water reactors*
- *Design modifications and increased testing in response to changing Nuclear Regulatory Commission requirements*
- *Less than optimum outage planning and maintenance at many plants*
- *Nuclear Regulatory Commission-ordered plant outages*

Starting in the early 1980s, the industry has seen significant improvements in the areas of generic equipment problems, design modifications, and outage planning and maintenance.

Comment by: Tennessee Valley Public Power Association

Response: The top quartile of operating nuclear units has achieved capacity factors greater than 82 percent since 1992 with an increasing trend.

434

Comment: *If TVA' s high and low estimates for capacity factor (86 percent and 55 percent) are correct, then the medium estimate should be considerably higher than the 67 percent it has used. The inconsistency arose because the high and low estimates were based on recent industry experience while the medium estimate was based on recent TVA experience, which was below industry averages because of the recent outages at Sequoyah Nuclear Plant.*

Comment by: Tennessee Valley Public Power Association

Response: An evaluation by National Economic Research Associates, Inc. and R. J. Rudden Associates, Inc. concludes that the TVA estimate of 67 percent capacity factor is somewhat lower than their estimates. Your statements concerning the derivation of the capacity factor estimates are accurate. The medium estimate is based on recent TVA performance. In order to band future occurrences, a larger and broader sample based on nuclear industry performance was used to develop the high and low estimates. In developing the range for the nuclear capacity factor, it is not necessary that the low and high estimates deviate equally from the medium estimate.

435

Comment: *An evaluation of the nuclear performance assumptions led to a questioning of the ability of TVA to increase the nuclear plant availability to the level assumed in Energy Vision 2020.*

Comment by: Tennessee Valley Public Power Association

Response: Since return to service from the outages in the late 1980s, Sequoyah Nuclear Plant Units 1 and 2 and Browns Ferry Nuclear Plant Unit 2 have recorded, respectively, a 66 percent, 65.4 percent, and 80.6 percent equivalent availability through September 1995. Energy Vision 2020 assumed an average equivalent availability of 67 percent for its nuclear plants. (See Volume 2, Technical Document 3, Existing Power System.)

436

Comment: *The Energy Vision 2020 Review Group retained various consulting firms to analyze in detail certain issues related to Energy Vision 2020. For nuclear issues, the Review Group retained National Economic Research Associates, Inc. and R. J. Rudden to evaluate the key assumptions related to the cost and performance of TVA's nuclear units.*
National Economic Research Associates, Inc.'s conclusions are summarized as follows:

- *TVA's medium case projections for operating and maintenance costs for Sequoyah, Watts Bar, and Bellefonte Nuclear Plants are reasonable.*
- *TVA's estimates of operating and maintenance costs for Browns Ferry Nuclear Plant appear to be a bit low.*
- *TVA's estimates of additions and improvements costs appear reasonable.*
- *TVA's capacity factor estimates for Sequoyah, Watts Bar, and Bellefonte Nuclear Plants appear to be reasonable and are somewhat lower than National Economic Research Associates, Inc. estimates. On the other hand, TVA's estimates for Browns Ferry Nuclear Plant appear to be a little high, about 5 percentage points higher than National Economic Research Associates, Inc. estimates.*
- *National Economic Research Associates, Inc.'s analyses show a wider range in operating costs and performance than are reflected in TVA's low and high cases.*
- *TVA's estimates for decommissioning and waste disposal costs seem to be somewhat low.*
- *TVA's estimates of the cost and schedule for the recovery of Browns Ferry Nuclear Plant Unit 1 appear reasonable.*
- *TVA's estimates of nuclear fuel costs are reasonable.*

Burns & McDonnell/XENERGY's nuclear specialist reviewed the National Economic Research Associates, Inc. report, and some concern was expressed over the methods used by National Economic Research Associates, Inc. to review TVA's assumptions. Specifically, it appears National Economic Research Associates, Inc. attempted to objectively review TVA's assumptions by relying heavily on statistical analyses of historical nuclear unit performance and costs. A weakness of this methodology is that it fails to address, in some instances, key issues specific to TVA not reflected in the statistical data. Despite these concerns over National Economic Research Associates, Inc.'s methods, Burns & McDonnell/XENERGY generally concur with National Economic Research Associates, Inc.'s conclusions.

Comment by: Tennessee Valley Public Power Association

Response: Any differences between National Economic Research Associates' conclusions and TVA's analysis are relatively minor and therefore do not affect analytical conclusions.

437

Comment: *The ability to build new capacity is in jeopardy due to environmental concerns and the high cost of long lead times.*

Comment by: Ed Brooks (Tennessee Southern Railroad)

Response: It is true that the cost of building new electrical generating capacity is high today. This is due to the high cost of environmental compliance, materials of construction, and labor. It is also true that conventional project planning and execution of a generation project would result in a long lead time between project approval and commercial operation.

We are taking steps to ensure that the costs for new generation capacity will be as low as possible by selecting generating technologies that are the most environmentally friendly and least costly to construct and operate. We are also planning these projects with an emphasis on taking the steps necessary to reduce the lead time between the decision to proceed and commercial operation. These efforts will provide supply-side options that have good environmental characteristics and can be implemented in a cost-effective manner.

The short-term plan emphasizes flexibility. (See Volume 1, Chapter 10, Figure 10-1.) Flexibility can be achieved by reducing the lead time for project construction.

438

Comment: *Both the short-term and long-term plans rely on call options for peaking and base-load power. These are innovative and, to date, largely untried power supply arrangements. In adopting this vehicle, TVA must ensure not only that this power is competitively priced but also that it can be relied upon when the need arises. If TVA is going to count on this power as a firm power source, it must be backed up either by reserves maintained on the TVA system or by reserves provided by the supplier. How these call options will work in practice remains to be seen. It seems to us that only if the power is a call option from another electric utility, and this segment of power is treated by that utility as equivalent to firm load served by that utility, can TVA be truly assured of its future availability.*

Comment by: TVA Retirees Association

Response: Option purchase agreement proposals received by TVA have been evaluated on the basis of their price, flexibility, and transmission capability, as well as their financial, technological, environmental, and economic development attributes. This considers project feasibility and the ability to deliver power to TVA. From the results of these evaluations, the proposals were ranked, and TVA developed a "short list" of the best candidates. TVA will negotiate the price, amount of capacity, and premiums with these candidates.

In option purchase agreement contracts, financial provisions are included that will require the supplier to reimburse TVA for any power not delivered. In addition, all option purchase agreements require 100 percent availability.

439

Comment: *TVA needs to consider the effect of losing hydroelectric generation due to reservoir siltation and dam failure.*

Comment by: Dennis Haldeman

Response: In Energy Vision 2020, TVA's forecast of hydroelectric generation considers many factors including current and expected capacity, expected rainfall, current and expected operating constraints, and current and future flood constraints on generation. TVA does not expect siltation to effect hydroelectric generation during the time period of Energy Vision 2020. TVA continually reviews the safety of the dams and does not expect dam failure.

Evaluation Process

440

Comment: *It is our opinion that TVA went the extra mile to ensure an unbiased evaluation of all possible power supply options and considered a generous range of probabilities. The process of retaining all options until the integration phase eliminated potential bias in the evaluation process, but created an almost overwhelming mass of comparisons. Without patient TVA staff interpretation and graphic presentations of trade-off criteria evaluations, it would have been impossible for the Tennessee Valley Public Power Association to assess the relative merits of the many plans.*

Comment by: Tennessee Valley Public Power Association

Response: Thank you; we appreciate the comments supporting the process of developing Energy Vision 2020.

441

Comment: *The Environmental Protection Agency appreciates the multi-attribute trade-off analysis employed by TVA to refine resource integration alternatives several times (trade-off analysis) to reduce both environmental impacts and costs and to develop reasonable resource strategies. We can also appreciate the complexity of the subject matter and the difficulties/uncertainties in projecting TVA energy sources for the next 25 years.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Your comment has been reviewed and noted.

442

Comment: *Of particular note is TVA's multiple objective approach, whereby demand-side management technologies and programs are considered in light of many corporate and customer service goals. This approach diverges somewhat from the traditional utility approach of viewing demand-side management simply as cost-effective resource acquisition. As a result, TVA is carefully considering other objectives such as rate minimization, customer value, market transformation, and environmental impact reduction. This allows TVA to more carefully consider demand-side management as part of an overall strategy to prepare it, and its wholesale distributors, for greater industry competition.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

443

Comment: *Demand-side management and renewable technologies should be considered on a level playing field with supply-side options.*

Comment by: David Bordenkircher, Clark Buchner (Sierra Club, Tennessee Chapter)

Response: TVA identified and characterized both supply-side options and demand-side management programs, then ranked all these resource options together based on costs, rates, debt, and environmental emissions. All of the cost estimates were based on industry-accepted practices for evaluating demand-side management and supply-side resources. Using the multi-attribute trade-off method, TVA was able to consider supply-

and demand-side options on a level playing field. The best resource options, either supply-side or demand-side, were combined into strategies to meet projected load and other criteria, as well as to address key uncertainties. (For an explanation of the Energy Vision 2020 process and evaluation criteria, see Volume 1, Chapters 2 and 5.)

444

Comment: *It appears that TVA made a significant effort to include a broad range of options that meet a variety of measurement criteria without weighting the criteria to bias the outcome.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

445

Comment: *In general, TVA's approach to developing and analyzing strategies is acceptable. It incorporates numerous uncertainties, solicits a range of perspectives from outside parties, and addresses the fact that many criteria are involved in making a good decision.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

446

Comment: *It is to the Tennessee Valley Public Power Association's benefit that TVA has chosen a broad-based planning approach that considers multiple objectives, with a particular focus on providing customer value, maintaining low rates, and positioning TVA and its wholesale distributors strategically for future industry competition. While this approach has so far resulted in a somewhat unfocused demand-side management plan, it allows for consideration of many options—including load building—without preconceived ideas about which ones should or should not be pursued.*

Comment by: Tennessee Valley Public Power Association

Response: TVA anticipates diverse and changing needs for consumers of TVA power. The wide variety of customer service options considered in Energy Vision 2020 and included in the short-term action plan were designed to accommodate the different needs of residents and businesses served by TVA. (See Volume 1, Chapter 1, Figure 10-1.)

447

Comment: *In the utility industry today, there are numerous approaches to the integration phase of resource planning. The most common approach is "optimization" using products such as EGEAS (an Electric Power Research Institute product supported by Stone and Webster Management Consultants) or PROSCREEN (one of the Energy Management Associates family of models that includes PROMOD and PROVIEW).*

For years, these models have been used to optimize capacity expansion and compute production costs for supply-side strategies. The term optimization itself is an advantage for these models because it implies "best" to many managers and regulators. In fact, it is this assumption which is also a serious weakness of this approach. These models optimize only one criterion at a time, such as lowest rates. They often ignore or understate the impor-

tance of other criteria such as environmental emissions, total resource costs, or reliability because only one variable at a time is optimized.

The TVA approach to integration avoids the optimization trap and attempts to evaluate a wide variety of strategies using decision analysis techniques. TVA's modeling philosophy is that any reasonable plan must address as many future uncertainties as possible. In addition, plans should contain a "portfolio" of options that provide a hedge against unforeseen events, thereby minimizing risk. Optimization models such as EGEAS and PROSCREEN tend to produce a rush to an extreme whereby the winning supply option is relied upon almost exclusively. TVA's philosophy supports flexibility by creating a planning framework where it is relatively simple to shift between strategies as future events dictate. TVA believes that by carefully re-engineering the process of designing and building resources, decisions can be delayed, thus reducing the chance that subsequent events will judge the resource to be unnecessary.

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

448

Comment: *In reviewing the Energy Vision 2020 results, the impacts of low and high load growth on the relative performance of the strategies was tested. TVA's approach to evaluating strategies for alternative futures was to assume that any decisions made in 1996 or 1997 would be locked in and therefore the same regardless of future. After 1997, the MIDAS model would be allowed to select those resources that best fit the new future. While TVA's assumption that any decisions made in 1996 and 1997 would be locked in is reasonable, it assumes that TVA will follow the middle future until at least 1998.*

Comment by: Tennessee Valley Public Power Association

Response: We agree with this assessment, but the more flexible strategies, Q and R, allow decisions made in 1996 and 1997 to be changed depending on future load growth and other events. (See Volume 1, Chapter 9, pages 9.27 and 9.28.)

449

Comment: *With respect to emissions, Burns & McDonnell/XENERGY and TVA focused on carbon dioxide emissions. Nitrogen oxides, sulfur dioxide, and the other environmental measures are also important, but seem to be highly correlated with carbon dioxide. In other words, technologies that produce high carbon dioxide emissions also seem to produce high levels of other emissions.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

450

Comment: *The multi-attribute system was not useful because it did not weigh the environmental externalities appropriately, for example aesthetics, and rates were the driving force.*

Comment by: Mary Carton, Stephen Smith (Tennessee Valley Energy Reform Coalition), Danielle Droitsch

Response: The multi-attribute methodology used for evaluating various strategies for Energy Vision 2020 is a quantitative methodology that does not weigh various evaluation criteria. Instead, it allows the consideration of multiple evaluation criteria and focuses on changing strategies to improve their performance on all evaluation criteria. The evaluation criteria included both rates and environmental impacts.

The multi-attribute analysis used for Energy Vision 2020 did not include aesthetics. The aesthetic considerations for nuclear plants, wind, and other resources were considered qualitatively. Aesthetics for various supply-side options, including nuclear plants and wind energy, are addressed in Volume 2, Technical Document 2.

451

Comment: *When estimating the cost of power for nuclear plants, TVA has not included the capital outlay costs, but it does for renewables. This is dishonest and unscientific.*

Comment by: Eileen McIlvane (Coalition for Jobs and the Environment)

Response: The economic comparisons of the cost of power in Energy Vision 2020 rely on time tested and proven economic analysis techniques. All costs are based on an incremental cost concept. Thus, when comparing the costs of an unfinished nuclear plant to renewables, the capital cost to complete the nuclear plant and the total capital costs of renewable energy are included in the economic analysis. Likewise, if TVA had an unfinished renewable plant, only the cost to complete the renewable plant would be embedded in the economic analysis.

Any money already spent, sunk cost, would not be embedded in the analysis since that money has been spent regardless of whether the nuclear plant is built or a renewable energy option is completed.

452

Comment: *TVA's commitment to bringing on Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3 provides a disincentive to seriously considering demand-side management.*

Comment by: John Johnson (Earth First), Olivia Lim (Southeast Center for Ecological Awareness), Sheila Holbrook-White (Sierra Club, Alabama Chapter), Linda Ewald

Response: TVA has an immediate need for the power from both Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3. In addition, TVA forecasts a need for an additional 3,500 megawatts by the year 2002.

To meet this need, TVA evaluated hundreds of supply- and demand-side options and included in the short-term action plan (see Volume 1, Chapter 10). The short-term action plan includes 650 megawatts of demand-side management by 2002 and as much as 2,200 megawatts in 2010. The demand-side management and other options included in the short-term action plan best balanced several criteria including long-term costs, electric rates, debt, environmental emissions, and economic development.

453

Comment: *In general, TVA's approach to developing and analyzing strategies is acceptable. It incorporates numerous uncertainties, solicits a range of perspectives from outside parties, and addresses the fact that many criteria are involved in making a good decision. Issues that TVA should improve in future analyses include:*

- *Creating alternative futures from which to develop and assess strategies.*
- *Incorporating reliability as an evaluation criterion.*
- *Addressing strategic issues related to competition and the TVA "wall".*
- *Synthesizing results of optimization models such as EGEAS into the results.*

Comment by: Tennessee Valley Public Power Association

Response: TVA's Energy Vision 2020 used a six-step process to develop preferred strategies. Step one identified public issues and relevant concerns. Step two translated these issues and concerns into evaluation criteria, resource options, and uncertainties. Step three crafted resource options into strategies to meet particular criteria or to address key uncertainties. Step four identified possible futures which, for example, could include high load growth, high cost of natural gas, and increasing regulations of emissions. Step five constructed scenarios by combining a single strategy for a single future. Step six, the last step, used trade-off analysis to find the best strategies for the future.

In Energy Vision 2020, TVA identified 972 futures. TVA created these futures based on those uncertainties that could have the greatest impact on the resource strategies TVA might choose to implement.

One of the evaluation criteria used in Energy Vision 2020 was reliability. Since the same reliability requirements must be met by all strategies considered in Energy Vision 2020, system reliability is treated as a constraint on each strategy. Therefore, all strategies considered during this process had adequate and comparable levels of reliability.

TVA has incorporated assumptions about competition into its electricity demand forecast. In the range of forecasts, TVA has identified the potential for the gain or loss of both wholesale and retail markets. For more information on TVA's load forecasts, see Volume 1, Chapter 6 and Volume 2, Technical Document 5. In addition, TVA has identified three different types of resource options well suited to address competition: (1) bulk power purchases and sales from other utilities, (2) purchases of power from cogenerators and independent power producers, and (3) market-based alternatives, such as call options on future capacity additions.

TVA has chosen to develop a long-term plan which consists of a portfolio of resource options from the seven key strategies. Much like a portfolio of stocks that is chosen to manage risk and accomplish specific objectives, the portfolio of resource options enables TVA to meet customer needs at an acceptable level of risk and meet the objective of balancing costs, rates, environmental impact, debt, and economic development. The problem with using an optimization model such as EGEAS, is that the "optimal resource plan" created with particular resources in particular years changes drastically as the future begins to unfold. A portfolio, on the other hand, remains flexible to adapt to changing conditions.

454

Comment: *There is a heavy reliance on unverified assumptions throughout the plan such as nuclear plant performance, coal suppliers and prices, and the competitiveness of emerging renewables.*

Comment by: Dennis Haldeman

Response: The assumptions used in the Energy Vision 2020 process were developed using the best information available and the best resources including TVA personnel, non-TVA experts, and consultants.

Many of these assumptions cannot be forecast with certainty. The most important assumptions were characterized as uncertain, and a range of forecasts was used for each of these uncertain assumptions. Information about these uncertainties is described in Volume 2, Technical Document 8. The evaluation of strategies with these uncertain assumptions is described in Volume 1, Chapter 9.

The key assumptions used in Energy Vision 2020 were extensively reviewed both within TVA and outside of TVA. Within TVA, a Forecast Review Board composed of TVA executives and senior managers reviewed all key assumptions.

The review of the assumptions outside TVA was made by several parties. First, members of the Energy Vision 2020 Review Group reviewed and commented on the key assumptions. Second, two consultants were hired for the Energy Vision 2020 Review Group: one to review the load forecasts and one to review the assumptions related to nuclear plant performance and cost. Third, the Tennessee Valley Public Power Association hired Burns & McDonnell to review all the assumptions and results of Energy Vision 2020. The Burns & McDonnell review appears in a report titled "Report to the Tennessee Valley Public Power Association Power Supply Planning Committee on TVA's Preliminary Integrated Resource Plan." Consultants for the Energy Vision 2020 Review Group and the Tennessee Valley Public Power Association determined that TVA's assumptions were reasonable.

455

Comment: *The various departments within TVA provided input and assumptions regarding the generation plan, load forecasts, fuel price projections, different resource and capital spending scenarios, etc. for the corporate planning process. Many of the assumptions represented simple escalation of historical costs based on educated estimates of growth rates.*

Comment by: Tennessee Valley Public Power Association

Response: This integration of all of TVA's planning assumptions provided a sound basis to begin the integrated resource planning process.

Many of these assumptions cannot be forecast with certainty. The most important assumptions were characterized as uncertain and a range of forecasts was used for each of these uncertain assumptions. Information about these uncertainties is described in Volume 2, Technical Document 8. The evaluation of strategies with these uncertain assumptions is described in Volume 1, Chapter 9.

The key assumptions used in Energy Vision 2020 were extensively reviewed both within TVA and outside of TVA. Within TVA, a Forecast Review Board composed of TVA executives and senior managers reviewed all key assumptions.

The review of the assumptions outside of TVA was made by several parties. First, the Energy Vision 2020 Review Group, reviewed and commented on the key assumptions. Second, two consultants were hired for the Energy Vision 2020 Review Group: one to review the load forecasts and one to review the assumptions related to nuclear plant performance and cost. Third, the Tennessee Valley Public Power Association hired Burns & McDonnell to review all the assumptions and results of Energy Vision 2020. The Burns & McDonnell review appears in a report titled "Report to the Tennessee Valley Public Power Association Power Supply Planning Committee on TVA's Preliminary Integrated Resource Plan." Consultants for the Energy Vision 2020 Review Group and the Tennessee Valley Public Power Association determined that TVA's assumptions were reasonable.

456

Comment: *TVA uses selective science to justify a predisposed position of the profiteers.*

Comment by: Dennis Haldeman

Response: Highly qualified professional scientists and engineers from departments throughout TVA prepared Energy Vision 2020. (See Volume 2, Technical Document 9, List of Preparers.) The wide range of literature cited indicates the openness and breadth of the work underlying the plan. A review of the Energy Vision 2020 assumptions outside TVA was made by several parties. First, the Energy Vision 2020 Review Group reviewed and commented on the key assumptions. Second, two consultants were hired for the Energy Vision 2020 Review Group: one to review the load forecasts and one to review the assumptions related to nuclear plant performance and cost. Third, the Tennessee Valley Public Power Association hired Burns & McDonnell to review all the assumptions and results of Energy Vision 2020. The Burns & McDonnell review appears in a report titled "Report to the Tennessee Valley Public Power Association Power Supply Planning Committee on TVA's Preliminary Integrated Resource Plan." Consultants for the Energy Vision 2020 Review Group and the Tennessee Valley Public Power Association determined that TVA's assumptions were reasonable. In addition numerous experts were used in the development of Energy Vision 2020. These included Barakat and Chamberlin; Clint Andrews, Princeton University; and Steve Connors, Massachusetts Institute of Technology.

457

Comment: *Based on a review of TVA's reliability planning, it appears that:*

1. *Energy Vision 2020 includes planning for reasonable levels of reliability for generation. The assumptions for improvements in nuclear availability are aggressive and need to be carefully monitored.*
2. *The locations of the generating units considered for Energy Vision 2020 strategies should be in the west end of the TVA service territory to minimize transmission reliability benefits and reduce system losses during peak conditions.*
3. *From a system reliability aspect, a reserve level of 13 percent appears to be the minimum that should be considered for the TVA system. This level should include the generation and system interconnection capabilities.*

Comment by: Tennessee Valley Public Power Association

Response: We generally agree with these statements and recommendations. However, as standard industry practice, TVA includes long-term firm power purchases in its reserve margin as well as generation, but short-term non-firm purchases are not included.

458

Comment: *TVA's overall approach to generation and transmission reliability planning involves typical studies performed to determine the need for improvements on the system. TVA uses state-of-the-art planning software. Its approach to assessing reliability is typical of utility planning.*

Comment by: Tennessee Valley Public Power Association

Response: TVA used best industry practices in evaluating generation and transmission reliability.

459

Comment: *At the beginning of this study, the generation and transmission planning groups operated independently from each other for the purposes of developing Energy Vision 2020. This independence could create system inefficiencies, since the system reliability depends on the response of the transmission and generation components during contingencies. Often, improvements in one area may improve overall reliability and could have additional benefits if joint planning between the two units were more closely coordinated.*

Comment by: Tennessee Valley Public Power Association

Response: Energy Vision 2020 looked at reliability on a long-term and short-term programmatic level. As sites are considered for generation projects, the transmission and generation planning groups will work closely to provide the best reliability for the TVA system. In addition, the short-term action plan recommends research and development of distributed or dispersed generation. (See Volume 1, Chapter 10, Figure 10-1.)

460

Comment: *With the current layout of the system generation and customers, any improvements should be analyzed for their total benefit for both the generation and transmission systems.*

Comment by: Tennessee Valley Public Power Association

Response: Since Energy Vision 2020 is programmatic in structure, site-specific decisions will be made later. Where specific conditions are necessary to conduct the review, such as for estimating transmission costs and effects, TVA considered a location at milepost 160 on the Tennessee River, which is in the western part of the TVA system.

461

Comment: *When performing long-range financial forecasting, most utilities use some type of corporate financial model to evaluate the impact of their estimated annual operating results on their year-end financial position over a specified planning period. TVA used two corporate financial modes, FINESSE and MIDAS. Both of these models are comprehensive financial planning tools.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

462

Comment: *Other models such as LMSTM, IRP Manager, and MIDAS have been developed by the Electric Power Research Institute to address the need to model demand-side programs more efficiently and to test a wider range of alternatives. MIDAS has been used extensively by TVA in Energy Vision 2020.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

SHORT-TERM ACTION PLAN

This section includes comments and responses about:
- the merits of proposed actions
- the details of Energy Vision 2020's short-term action plan
- the merits of using more demand-side management options in the plan
- the merits of using more renewable energy options in the plan, including the recommendations of the National Renewable Energy Laboratory
- the purchase of options to purchase energy resources
- the investigation of and research into various options

This section includes two comprehensive responses to a number of comments about the merits of using more demand-side management and renewable options in the plan.

General

463

Comment: *In the short-term action plan, the proposed action will allow TVA to remain competitive and provide low rates to valid customers.*

Comment by: William Pippin (Huntsville Utilities)

Response: Your comment has been reviewed and noted.

464

Comment: *The text describes a "fence" around TVA's market area and states that TVA is "prevented from selling power outside its existing service area…" (see Executive Summary, pages 8 to 9). However, the section on "What Are the Short-Term Actions?" in the "Questions and Answers" bulletin states that "TVA plans to continue to sell power to utilities and others outside its power system…" These statements appear contradictory.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: The "fence" describes the area and other restrictions that were a part of the self-financing provisions enacted in the late 1950s. The "fence" essentially restricts the area in which TVA can sell power, but permits TVA to sell power to utilities with which it was interconnected in 1957. There are 13 utilities to which TVA can sell power in interchange markets. This has been clarified in the final Energy Vision 2020 document.

465

Comment: *In general, the Tennessee Valley Public Power Association is satisfied that TVA has considered a broad range of options in the first five years of the plan. Future options are varied enough that TVA has flexibility in the options to pursue. Unit sizes are small enough that no one approach for expansion dominates TVA's future, as the nuclear program did in the past.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

466

Comment: *Sacramento Municipal Utility District believes TVA's plan correctly identifies the need for a short-range action program that relies heavily on flexible strategies.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District)

Response: Your comment has been reviewed and noted.

467

Comment: *The strategies under consideration by TVA have, in general, a common use of gas-fired combustion turbines and combined-cycle units installed during the first five to seven years. Also, various levels of demand-side management programs are added. Therefore, the strategies, in the early years, have similar risk levels and economics.*

Comment by: Tennessee Valley Public Power Association

Response: In the short-term, TVA must rely on resource options with short lead times. The short-term action plan relies heavily on call options, hydro modernization, and demand-side management programs to meet the needs of its customers in the short term.

468

Comment: *The short-term action plan is far too general to know what TVA plans to do. Interested parties want specific details year-by-year in terms of activities, milestones, and budgets moving from the research and development phase into implementation.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Benjamin Stewart (Faith Lutheran Church), Eileen McIlvane (Coalition for Jobs and the Environment), Michelle Neal (Tennessee Valley Energy Reform Coalition), Geoffrey Crandall (MSB Energy Associates), Naomi Furman Kipp (Legal Services Corporation of Alabama), Eric Hirst (Oak Ridge National Laboratory)

Response: The short-term action plan (see Volume 1, Chapter 10, Figure 10-1) has been revised to specify the activities and key milestones year by year. A timeline for these activities is also shown graphically in Volume 1, Chapter 10, Figure 10-2.

469

Comment: *Without divulging details of individual bid offers, the short-term plan should provide more information about these offers, and power purchases such as capacity, load factor, availability, cost, and timing.*

Comment by: Eric Hirst (Oak Ridge National Laboratory)

Response: TVA is reviewing proposals for option purchase agreements in the form of call options. These proposals include offers for base-load, cycling, and peaking electric energy ranging in capacity from 140 to 1,800 megawatts. The proposed option purchase agreements offer electric energy beginning in 1999 for peak load offers, while some base-load offers extend out 30 years.

Summary information on option purchase agreements and power purchases is contained in the Characterization of Supply-Side Options section of Volume 1, Chapter 7. To identify the specific characteristics of the option purchase agreements or power purchases being considered in the short-term plan would reveal competitive and proprietary information.

Implementation of Customer Service Options

The following comments are addressed in a comprehensive response that appears after comment number 521. Any portions of the comments below related to renewable energy that are not addressed in the comprehensive response have responses in the next section, Implementation of Renewables.

470 **Comment:** *TVA should promote energy efficiency through demand-side management. This region wastes more electricity than the national average. Additionally, other nations with similar standards of living have half the per capita energy use as the United States.*

Comment by: Larry Smith (Mid-South Peace and Justice Center), L. M. Johnson, Sr., Lynn Leach (Alabama Environmental Council), Karen Lovell, C. Strain, Sahara, Yvonne Seperich, Jim Von Bramer, Sam Denham, C. T. Brewster, Walter & Dorothy Stark, Sharron Eckert, Isahl Hemm, Mary Schwarz, John Schwarz, Jr., Robert Peeples, Deborah Cuva, Marion Zachiel, Katherine Osborn, R. & G. Ludwig, Ben & Winn Welch, F. W. Munson, N. E. Whitfield, M. Nathan Perry, Jo Anne Clark, William Emmott, Luther Gulick, A. B. Evans, Mary Anne Terry, Chris Gulick, Faith Young, Myles Jakubowski (Sunbeam Household Products), Ann & Mike Sanders, Ruth Peeples, Stephen Stedman, Ann Lamb, Mandy Tiesler, Robert Schreiber (Common Sense), Alan Jones (Tennessee Environmental Council), Fred Wright, Susana Harwood, John Harwood, Salo, Ray Williams, Karl Grotke, Dottie Hodges, Shirley Schaaf, Tohert, Hermann, Kim Grube, K. Varnum, Garry Shores, Kathy Priore, Karah Bates, M. Case, Amy Perry

471 **Comment:** *TVA should be a showcase for energy saving programs.*

Comment by: Mary Carton, Beth Wallace, Alan Jones (Tennessee Environmental Council)

472 **Comment:** *TVA needs to do more demand-side management. Add many more demand-side management (conservation) action items from Blocks 2 and 3.*

Comment by: Powell & Sharon Foster, Sheila Holbrook-White (Sierra Club, Alabama Chapter), Sharon Fidler (League Woman Voters), Jim Snell, Olivia Lim (Southeast Center for Ecological Awareness), Patricia Chapman, Kathy Dowbiggin, Dolores Howard, Andrew Danzig, Richard Simmers, Kirk Johnson, Carol Kimmons, Dennis Haldeman, Sheilla Cheyenne, Jennifer Lapidus & Hannah Bennett

473 **Comment:** *TVA should practice, teach, and reward energy efficiency and energy conservation.*

Comment by: Suzanne Sims

474 **Comment:** *TVA should rely more on demand-side management and less on supply-side options (such as power plants). Demand-side management is good for TVA and its consumers. In the short-term plan, supply-side megawatts ranged from 1,950 to 2,750. Demand-side only has 600.*

Comment by: Hollis Fenn, Wilson Prichett (Tennessee Valley Energy Management Association), Jamie Pizzirusso, Arthur Webb, Dennis Henke, Kathryn McCoy (Tennessee Energy Education Network), Clark Buchner (Sierra Club, Tennessee Chapter), John Noel, Debra Jackson, Roan Carratu, Maggie Kalen (Tennessee Valley Energy Reform Coalition), Bruce Wood, Geoffrey Crandall (MSB Energy Associates), John Johnson (Earth First), Dolores Howard, Jennifer Lapidus & Hannah Bennett, Michelle Neal (Tennessee Valley Energy Reform Coalition)

475 **Comment:** *Some experts say fossil fuels will be gone in 25 years or the price of getting them out will be equal to having them. Adaptation to this will require a lot of public education and TVA should increase demand-side management measures above the few in the plan.*

Comment by: Nancy Bell

476 **Comment:** *By using energy more efficiently and conserving it, there will be less impact on the region's environment.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

477 **Comment:** *More demand-side management options will help reduce short-term rate impacts.*

Comment by: Sheila Holbrook-White (Sierra Club, Alabama Chapter), Sharon Fidler (League of Women Voters)

478 **Comment:** *The high sales/low rates emphasis of Energy Vision 2020 diminishes the role of demand-side management.*

Comment by: Mary English (University of Tennessee), Robert Schreiber (Common Sense), Sharon Fidler (League of Women Voters), Stephen Smith (Tennessee Valley Energy Reform Coalition), Dolores Howard, Alan Ball

479 **Comment:** *TVA should grow by stimulating growth within the region through promoting energy efficiency and becoming a provider of energy services and not just electricity.*

Comment by: Arthur Smith, Bruce Wood

480 **Comment:** *This plan is a paradigm for consumption.*

Comment by: Dennis Haldeman, Sheilla Cheyenne

481 **Comment:** *TVA does not support demand-side management because it is in the business of making money.*

Comment by: Monique Mollett

482 **Comment:** *Energy conservation and efficiency improvements can replace the need for the nuclear plants in the planning stage.*

Comment by: Patrick Byington (Alabama Environmental Council), Michelle Carratu, Fred Wright, Dolores Howard, Sanford McGee (Cumberland Center for Justice and Peace)

483 **Comment:** *Many United States utilities already have demand-side management levels exceeding those projected by TVA—equivalent to only 4.7 percent of peak demand and 2.5 percent of annual sales in 2010.*

Comment by: Eric Hirst (Oak Ridge National Laboratory)

484 **Comment:** *TVA needs to implement Blocks 1 and 2 of its demand-side management programs. Yet TVA is not even doing all of Block 1.*

Comment by: Danielle Droitsch

485 **Comment:** *TVA should implement all 39 of the identified energy efficiency options, thus saving 5,500 megawatts of electricity. Implementing only Block 1 is anemic. Unimplemented demand-side management options are stranded benefits.*

Comment by: Linda Ewald, Monique Mollet, Hamp Dobbins, Jr., Patrick Byington (Alabama Environmental Council), Michelle Neal (Tennessee Valley Energy Reform Coalition), Jamie Pizzirusso, Stephen Smith (Tennessee Valley Energy Reform Coalition), Powell & Sharon Foster, Mary Byrd Davis (Ygdrasil Institute)

486 **Comment:** *We are aware that not all of the 39 conservation programs developed are cost-effective using today's accounting, but more programs than currently appear in the draft*

are cost-effective and serve the long-term interest of the Valley. What is needed is a clear signal from you, that more conservation measures should be in the final plan.

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

---

487 **Comment:** *Increase rates to encourage conservation and reduce debt.*

Comment by: Linda Cataldo Modica, Hamp Dobbins, Jr., Steven Walsh, Elizabeth Garber, Dolores Howard

---

488 **Comment:** *Providing incentives or tax credits for solar energy and conservation did not work last time because as soon as the money stops, they stop participating. The answer is to raise rates to encourage energy conservation.*

Comment by: Dolores Howard

---

489 **Comment:** *We are impressed with the creativity that TVA staff showed pursuing the request for proposals for option purchase agreements, refinancing of TVA's debt, and new technologies such as partnering on integrated gasification combined cycle with coproducts. Unfortunately, we have not seen the same enthusiastic response to the challenges and opportunities of demand-side management. Although we are impressed with the work done by Craig Smith and his staff, we challenge TVA to use the Energy Vision 2020 process to produce the same kinds of creative demand-side management programs that have been produced on the supply side. Demand-side management is a stated focus area of the Energy Vision 2020 process, yet if only Block 1 of the proposed demand-side management options "make the cut," we feel TVA will have missed an opportunity to apply the same creative thinking highlighted above to future programs geared at improving energy efficiency in the TVA region.*

Comment by: Sharon Fidler (League of Women Voters)

---

490 **Comment:** *If TVA had not eliminated its energy conservation program, it would have saved as much energy as two nuclear plants would produce.*

Comment by: Sharon Force

---

491 **Comment:** *TVA needs to revive its residential conservation programs.*

Comment by: David Bordenkircher, Phillip & Winfred Thomforde, Kathleen O'Donohue, Richard Bond, Sharon Force, Kathyrn McCoy (Tennessee Energy Education Network), Carolyn Novkov, Dianna Young, Beth Wallace, Arthur Smith, Catherine Murray (Sierra Club, State of Franklin Group), Hollis Fenn, Michelle Carratu, Michelle Neal (Tennessee Valley Energy Reform Coalition), Mary Carton

---

492 **Comment:** *The amount of insulation in buildings in Tennessee and throughout the United States is inadequate. Weatherization improves air quality and the quality of housing, and improved retail value of homes. TVA should dedicate more resources to this area.*

Comment by: Don Scharf (Sierra Club, Middle Tennessee Group)

---

493 **Comment:** *The demand-side management programs proposed by TVA focus narrowly on minimizing rate increases. Because of its large size, federal status, and the ability to influence state and local building codes and manufacturing decisions, TVA should expand its programs to include more market transformation.*

Comment by: William Arney, Sharon Fidler (League of Women Voters), Stephen Smith (Tennessee Valley Energy Reform Coalition), Eric Hirst (Oak Ridge National Laboratory), Debra Jackson, Sheila Holbrook-White (Sierra Club, Alabama Chapter), Carol Kimmons

494 **Comment:** *TVA should attack poverty in the region by improving the efficiency of the housing stock. We suggest that 70 percent of all low income homes in TVA's service area be targeted for this over the next 10 years.*

Comment by: Geoffrey Crandall (MSB Energy Associates)

495 **Comment:** *It is nice that TVA has a pilot program (although only $50,000 is allocated) for low income customers, but it should have a full-scale program.*

Comment by: Martha McGill, Stephen Smith (Tennessee Valley Energy Reform Coalition), Geoffrey Crandall (MSB Energy Associates)

496 **Comment:** *TVA should work on cooperative ventures with local agencies to identify the needs of low income customers and implement weatherization, energy audits, grants, inspections, retrofitting, fuel funds, and credit transfers that focus on weatherization rather than pilot them. This should be coordinated with community action to prevent duplication.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition), Michael Karp (Northwest Conservation Act Coalition), Martha McGill, Naomi Furman Kipp (Legal Services Corporation of America)

497 **Comment:** *TVA should link its plan to the Weatherization Assistance Program, although that program is in serious question in Washington. We want to work with TVA to obtain more funding for weatherization.*

Comment by: Geoffrey Crandall (MSB Energy Associates), Elaine Stancil, Richard Bond

498 **Comment:** *TVA's new homes energy efficiency program will not provide efficiency incentives to the majority of homes and businesses.*

Comment by: Shelia Holbrook-White (Sierra Club, Alabama Chapter)

499 **Comment:** *I understand the position television faces with respect to demand-side management strategies. On one hand, TVA needs to sell power to generate revenues to deal with problems like its debt. On the other hand, from a public interest point of view, TVA should be pursuing energy conservation.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition), Sheilla Cheyenne, Michael Karp (Northwest Conservation Act Coalition), Alan Jones (Tennessee Environmental Coalition), Linda Ewald

500 **Comment:** *Rather than buying commercials on television that tell me to consume, I want to be rewarded for being efficient. TVA should be promoting energy conservation. Low income customers cannot afford more consumption.*

Comment by: Richard Bond, Stephen Smith (Tennessee Valley Energy Reform Coalition), Michelle Neal (Tennessee Valley Energy Reform Coalition), Catherine Murray (Sierra Club, State of Franklin Group), Arthur Webb, Hamp Dobbins, Jr., Dennis Henke, Eric Lewis (Solar Works), Susan Bailey, Olivia Lim (Southeast Center for Ecological Awareness), John Johnson (Earth First), Paul Elliott, Maggie Kalen (Tennessee Valley Energy Reform Coalition)

501 **Comment:** *During the public meetings, there has been an overwhelming call for a greater investment in energy conservation, efficiency, and the sustained orderly development of renewables.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

502 **Comment:** *TVA should rely more on energy efficiency and renewables. This will help reduce carbon dioxide and other emissions. It appears that TVA in the area of demand-side management and renewables together would provide only 4 percent of its generation.*

Comment by: Eric Hirst (Oak Ridge National Laboratory), Stephen Smith (Tennessee Valley Energy Reform Coalition), Dara Chernicky, Anne Redwine, Bruce Wood, Don Scharf (Sierra Club, Middle Tennessee Group), Hester Cope (Alabama Environmental Council), Leith Patton, Linda LaForest (Tennessee Citizens for Wilderness Planning), Jason Gurley, Mary Bryd Davis (Ygdrasil Institute), Michelle Neal (Tennessee Valley Energy Reform Coalition)

503 **Comment:** *Because of the public support for the environment and less pollution, TVA can compete by providing customers renewables and conservation options.*

Comment by: Eileen McIlvane (Coalition for Jobs and the Environment), Alan Ball

504 **Comment:** *TVA should invest in more resources like demand-side management and renewables that have zero emissions rather than on technologies such as cascaded humidified advanced turbines.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

505 **Comment:** *There are global limits to non-renewable resources and health effects associated with the use of coal. There is acid rain, a hole in the ozone layer, deforestation caused by acid rain, and smog. Hydroelectric power causes the flooding of ecosystems. Too much coal is being used, and we would like to see more commitment to non-hydro renewable resources and encouragement of individual energy conservation.*

Comment by: Benjamin Stewart (Faith Lutheran Church), Rodney Webb, Beth Wallace, Sheila Holbrook-White (Sierra Club, Alabama Chapter)

506 **Comment:** *Energy efficiency and renewables produce more jobs than a power plant, reduce energy bills, and improve the quality of life and thus should be the most important part of a sustainable energy policy.*

Comment by: Mary Ellen Bowen, Rowland Huddleston, John Noel, Clark Buchner (Sierra Club, Tennessee Chapter), Retha Ferrell, Yvonne Seperich, Jean Cheney

507 **Comment:** *All strategies rely too heavily on continued coal technologies, which have environmental problems. None are strong enough on conservation and renewables.*

Comment by: Michelle Carratu, Kathleen O'Donohue, Alan Jones (Tennessee Environmental Council), Arthur Smith, Beth Wallace, Carolyn Novkov

508 **Comment:** *In lieu of converting Bellefonte Nuclear Plant, TVA needs to use customer service or renewable options. There is too much uncertainty and market risk associated with converting Bellefonte Nuclear Plant.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

509 **Comment:** *TVA should set a date for phasing out its fossil and nuclear plants and replacing them with energy conservation, efficiency measures, and renewable energy sources.*

Comment by: Sharon Force, Sheilla Cheyenne

510 **Comment:** *Full-scale energy efficiency and renewable investments will not only help save base-load needs, it will help TVA reduce the amount of capacity and help everyone in the region, not just bondholders of TVA's debt.*

Comment by: Beth Zilbert (Greenpeace)

511 **Comment:** *Conservation and new energy sources involving advanced technology must be emphasized. This includes solar hot water heaters, direct installation of energy-efficient lighting, and efficient central air conditioners. This should include T-8 lamps because when reflectors, electronic ballasts, and T-8 lamps are combined, a 50 percent energy savings is produced.*

Comment by: Powell & Sharon Foster, Michelle Neal (Tennessee Valley Energy Reform Coalition), R. G. Ford (Energy Design Corporation), Steven Walsh

512 **Comment:** *Implementation of conservation methods such as demand-side management, beneficial electrification, green lights programs, etc., would further reduce the need for new generation. However, new/newer forms of energy generation (e.g., wind, photovoltaics, geothermal, and tidal renewables) should also be pursued since they conceptually appear to be more environmentally friendly to air and water resources than conventional fossil-fuel power plants.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

513 **Comment:** *The best way to hedge what is going to happen in a deregulated industry is to use demand-side management technology and renewable energy technologies.*

Comment by: Danielle Droitsch

514 **Comment:** *As TVA seeks to be more competitive, it should as a federal corporation pay attention to the potential loss of stranded benefits such as protection of low income customers, commitments to research and development and to renewables, and a commitment to protecting the environment.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Michelle Neal (Tennessee Energy Reform Coalition)

515 **Comment:** *We suggest 2 to even 5 percent of gross operating revenue be invested in demand-side management and renewables that are cost-effective. Of that, perhaps 0.2 to 0.5 percent of gross operating revenue should be targeted to low income.*

Comment by: Geoffrey Crandall (MSB Energy Associates), Michelle Neal (Tennessee Valley Energy Reform Coalition), Carol Kimmons

516 **Comment:** *TVA should meet 25 percent of its future demands with energy conservation and renewables.*

Comment by: Sharon Force, Beth Wallace

517 **Comment:** *The Clinton administration is committed to conservation of natural resources and energy efficiency and intends to evaluate the benefits of alternative energy sources. TVA should listen to this message.*

Comment by: Mary Ellen Bowen

518 **Comment:** *Public power has a special role to play in developing sustainable energy in the future for this country. TVA has been, in the past, the leader in public power, and I think, in making some critical decisions and will remain a leader in the future.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District)

519 **Comment:** *The vision for power marketing authorities is to provide the market tools for renewables and energy-efficiency technologies. That is the way TVA could save money and actually be competitive.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

520 **Comment:** *Although conservation and renewables may be more expensive initially, overall they will be more cost-effective in the long run and will check TVA's debt; otherwise, the environmental damage will continue, cleanup and construction costs will increase, and TVA may lose customers.*

Comment by: Jim Von Bramer, Patrick Byington (Alabama Environmental Council), Myles Jakubowski (Sunbeam Household Products)

521 **Comment:** *Although I am concerned about the environment and the health of my family, I understand that living in a modern society with electricity requires some compromises to the environment. We need to refocus TVA's mission on energy conservation and renewable energy such as hydroelectric energy.*

Comment by: Susan Switzer

COMPREHENSIVE RESPONSE ON CONSERVATION

In Energy Vision 2020, TVA carefully evaluated demand-side management resources. Increasing energy efficiency and using energy more wisely will better promote a sustainable future and help to reduce environmental impacts. Accordingly, TVA has included 650 megawatts of demand-side management options in the short-term action plan covering almost 20 percent of the projected needs by the year 2002. This could increase to 2,200 megawatts in the year 2010. TVA identified 39 energy efficiency and load management options for consideration in the Energy Vision 2020 planning process. These options are described in Volume 1, Chapter 8. The options targeted the residential, commercial, and industrial sectors and addressed all the major electric end uses. TVA is implementing two types of demand-side management options. First, demand-side management options will be immediately implemented to meet customer needs. Second, TVA will implement flexible demand-side management options similar to the flexible supply-side options.

Over 2,000 energy resource strategies were created from the identified supply- and demand-side management resource options. These strategies, including strategies which emphasized demand-side management options, were evaluated across a number of different criteria, using the multi-attribute trade-off method. The criteria included long-run cost/value, short- to long-term rate impacts, reliability, environmental impacts, economic development including jobs, financial situation/debt, risk management, and equity among rate classes. (Additional information about these evaluation criteria can be found in Volume 1, Chapter 5.) The strategies which performed best across all criteria were then used to formulate TVA's proposed short-term action plan and long-term plan (the portfolio of options).

TVA's long-term plan, shown in Volume 1, Chapter 9, Figure 9-23, focuses on a portfolio of resource options designed to balance several criteria including costs, rates, environment, debt, and economic development. This portfolio provides a set of options with the flexibility to adapt to uncertain load growth, future market prices, changes in environmental regulation, and changes in markets.

TVA's proposed short-term action plan, summarized in Volume 1, Chapter 10, Figure 10-1, supports its long-term goals. The short-term action plan has been revised to include options which would be implemented immediately and future resource options whose role would be analyzed to meet future needs. Through actions taken in the short-term action plan, TVA will be developing a marketing infrastructure along with knowledge of program concepts, technologies, and delivery strategies to enable TVA to meet changing market conditions. TVA will build capabilities and develop partnerships with distributors, trade allies, and local agencies to deliver large scale demand-side management programs. The plan focuses on market transformation in tandem with the customer service options for longer lasting and more widespread efficiency impacts in the Valley. Full scale and flexible programs implemented in the short-term action plan will provide the foundation of programs that can be relatively quickly scaled up or down as conditions warrant.

All of the customer service options that performed well across the Energy Vision 2020 evaluation criteria are included in TVA's proposed plan. TVA prioritized the options in Blocks 1 and 2 because of their low cost and low impact on rates, but also included options from Block 3 in its short-term action plan following comments on the preliminary plan from members of the Energy Vision 2020 Review Group. Customer service options from Block 2 and Block 3 were included to address lost-opportunities for efficiency improvements (e.g., new construction), market transformation activities (e.g., trade ally incentives to promote commercialization of efficient new technologies), and equity (e.g., low income efficiency). The energy efficiency options not included in the proposed plan had higher levels of uncertainty, cost, or rate impacts and were not deemed viable as part of the short-term strategy. The blocks of customer service options are explained in Volume 1, Chapter 8, Figures 8-19 and 8-20.

The short-term action plan calls for the continuation and expansion of TVA's current programs as well as implementation of several new programs. These options use education, incentives, and development of an enhanced market infrastructure to promote increased energy efficiency. TVA currently offers the Residential Energy Efficiency Program. The Residential Energy Efficiency Program has four components; *energy right* New Homes, Heat Pump Financing and the Quality Contractor Network, and Manufactured Housing. The *energy right* New Homes program offers builders and new home buyers technical assistance and incentives for higher-efficiency building envelopes and heating and cooling equipment. New programs for residential customers include a home audit for students and residents and a low income program.

For commercial and industrial customers, the plan includes a large-scale Commercial and Industrial Energy Services option. This option is based on the Comprehensive Measure Financing option from Block 1. It has been expanded to over twice its original level to include new construction, process efficiency improvements, and equipment replacement for a broader group of customers. The expanded program addresses new markets for energy services and includes funding for incentives targeted to lost opportunities and market transformation activities. The expanded option captures much of the energy efficiency potential identified in Block 2 with significantly lower rate impacts.

The customer service options identified for immediate full scale implementation provide 600 megawatts of capacity in 2002 and 1,450 megawatts in the year 2010.

TVA is also implementing several flexible demand-side management options. The options will be implemented at a reduced scale at first, but will allow TVA to ramp up quickly in response to resource needs. The flexible customer service options provide 50 megawatts of capacity in 2002 and can provide as much as 750 megawatts in 2010 if needed. The total savings from energy efficiency and load management activities could be up to 2,200 megawatts. These options provide the most cost-effective demand-side resources available, with positive environmental and economic development impacts. When combined with the supply-side resources identified in the short-term action plan, these options support TVA's long-term goal to provide reliable, flexible, environmentally-sound low-cost energy at competitive rates.

522

Comment: *I encourage TVA to continue its demand-side management programs.*

Comment by: Michael Browder (Bristol Tennessee Electric System)

Response: TVA welcomes support of demand-side management programs. The Energy Vision 2020 short-term action plan recommends implementation of programs that can help both businesses and households increase the efficiency of their energy consumption.

523

Comment: *TVA should be implementing rather than piloting programs that have been tried and found effective by other utilities or TVA in the past.*

Comment by: Michael Karp (Northwest Conservation Act Coalition), Powell & Sharon Foster, Richard Bond, Eric Hirst (Oak Ridge National Laboratory), Mary English (University of Tennessee), Beth Zilbert (Greenpeace), Geoffrey Crandall (MSB Energy Associates)

Response: Demand-side management programs can be started at the pilot (reduced scale) level for various reasons. Some programs are started at the pilot level because of equipment concerns or limitations of availability, others to provide flexibility, and others to evaluate uncertain energy and demand impacts. Some programs are started at the pilot level to evaluate a new delivery mechanism, or to develop the necessary cooperative relationships for cost-effective implementation as in the case of the low income program. Depending on how these various issues are resolved, a pilot program may be scaled up to a full program.

In Energy Vision 2020, flexible demand-side management programs have replaced pilot programs. The flexible demand-side management options will be implemented at a reduced scale at first, but can ramp up quickly in response to resource needs. The programs are similar to the flexible supply-side options. These flexible demand-side programs have two phases of development. In the first phase, the programs are tested in the marketplace as experiments or pilot programs. The flexible demand-side management programs would add 50 megawatts by 2002 and potentially 750 megawatts by 2010.

524

Comment: *Doing conservation in the short term will help bridge from coal and nuclear to renewables. We can live well and grow without using more electricity.*

Comment by: Retha Ferrell

Response: Coal and nuclear generation will continue to be important components of TVA's generation mix in the future. Collectively, they are currently responsible for 70 percent of TVA's generating capacity. Demand-side management can also play an important role in meeting additional needs in the future. Conservation programs help in meeting this need with up to 2,200 megawatts of potential savings projected by 2010.

TVA has included a number of renewable options, up to 2,500 megawatts, in its proposed short- and long-term plans. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) TVA is also proposing in the final Energy Vision 2020 plan additional research into and development of a number of renewable resources.

Three additional investigation or research activities in renewables are recommended. First, TVA will develop a wind turbine project in two phases. The first phase will investigate wind resources. The second phase will build a wind turbine at one site depending on the results of the first phase. Second, TVA will investigate a biomass refinery that will produce fuel and chemical coproducts. This biomass refinery could burn refuse-derived fuel, wood waste, and energy crops. Third, TVA will investigate a biomass energy facility that will burn a combination of garbage (compost) and wood waste.

525

Comment: *TVA should show planned expenditures, customer participation, and energy and demand effects year-by-year for each customer service program or each customer class and incorporate a process to evaluate how actual implementation compares to plans.*

Comment by: Eric Hirst (Oak Ridge National Laboratory), Lynn Leach (Alabama Environmental Council), Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Planned expenditures, customer participation, and energy and demand effects are available year by year for each customer service option in Volume 2, Technical Document 7. Evaluation of demand-side management programs is very important to improve the delivery and tracking processes over time and enhance program cost-effectiveness. TVA has established an evaluation organization to develop plans and procedures for this function. Detailed evaluation plans for specific programs will be developed when the programs are approved for implementation.

526

Comment: *I am concerned about TVA's selling power outside the region.*

Comment by: Yvonne Seperich

Response: TVA exchanges, or buys and sells power, with neighboring electric systems through 57 interconnections. Off-system sales to the thirteen utilities to which TVA can sell power provide an opportunity to use TVA's generating resources when they are not needed to meet TVA customer needs. Off-system sales provide additional revenue to reduce the costs of power to TVA customers. The purchase of power is sometimes necessary to meet heavy demand; at other times, it may be more economical for TVA to purchase excess power from a neighboring utility than to generate it. TVA also "wheels" power at a fee for other utilities. Wheeling is transporting power from one utility to another through TVA's transmission system.

Implementation of Renewables

The following comments are addressed in a comprehensive response that appears after comment number 573. Portions of the comments below related to conservation/demand-side management that are not addressed in the comprehensive response have responses in the previous section, Implementation of Customer Service Options.

527 **Comment:** *TVA should be implementing renewable energy options such as solar and wind power rather than studying the options. Right now there is a host of renewable resources on the cusp of being cost-effective. It is suggested that TVA invest 1 to 2 percent of its annual budget in renewable technologies. According to Kenetech Windpower, TVA could generate 2,000 megawatts from wind machines situated outside of national park and national forest lands.*

Comment by: Beth Wallace, Olivia Lim (Southeast Center for Ecological Awareness), Ruth Peeples, Susan Switzer, Sharon Force, Anne Redwine, Betty Martin (Friends of the River), Suzanne Sims, Catherine Murray (Sierra Club, State of Franklin Group), Stephen Smith (Tennessee Valley Energy Reform Coalition), Brian Bury, Mark Johnson, Michelle Neal (Tennessee Valley Energy Reform Coalition), Walter & Dorothy Stark, Powell & Sharon Foster, Hamp Dobbins, Jr., Kim Grube, Howard Switzer (Sun/Earth Tempered Organic Architecture), Amy Perry, M. Case, Karah Bates, Kathy Priore, Monique Mollet, K. Varnum, John Harwood, Hermann, Tohert, Shirley Schaaf, Dottie Hodges, Karl Grotke, Ray Williams, Salo, Garry Shores, Jim Von Bramer, L. M. Johnson, Sr., John Schwarz, Jr., Mary Schwarz, Isahl Hemm, Sharron Eckert, Deborah Cuva, C. T. Brewster, Robert Peeples, Yvonne Seperich, Mary Byrd Davis (Ygdrasil Institute), Sahara, C. Strain, Karen Lovell, Lynn Leach (Alabama Environmental Council), Ann & Mike Sanders, Susana Harwood, Stephen Stedman, Jo Anne Clark, Myles Jakubowski (Sunbeam Household Products), Faith Young, Chris Gulick, Mary Anne Terry, A. B. Evans, William Emmott, Larry Smith (Mid-South Peace and Justice Center), M. Nathan Perry, N. E. Whitfield, F. W. Munson, Ben & Winn Welch, R. & G. Ludwig, Katherine Osborn, Marion Zachiel, Luther Gulick, Sharon Fidler (League of Women Voters)

528 **Comment:** *TVA should rely more on renewable energy.*

Comment by: Edwin Curtis, Dolores Howard, Susan Bailey, Fred Wright, Kathy Dowbiggin, Jeff Peterson, Mike Eastman, Tom Fitzgerald (Kentucky Resources Council, Inc.), Linda Ewald, Kathleen O'Donohue, Patricia Chapman, Susan Jata, Andrew Danzig, John Hurgeton, Jim Sells, Rela Edwards, Jonathan Scherch, Sheilla Cheyenne, Mandy Tiesler, Bruce Wood, Lee Gable, Dennis Henke, Clark Buchner (Sierra Club, Tennessee Chapter), John Noel, Debra Jackson, Alan Jones (Tennessee Environmental Council), Doris Gunn, Maggie Kalen (Tennessee Valley Energy Reform Coalition), John van der Harst, Calvin Moore, Steven Walsh

529 **Comment:** *The next 25 years need to be years of alternative power sources—less profit and more compassion.*

Comment by: Paul Elliott

530 **Comment:** *Why is there not funding for renewable resources in amounts that match the funding that has gone into nuclear and coal?*

Comment by: Calvin Moore

531 **Comment:** *The plan should have specific goals for renewables as recommended by the National Renewable Energy Laboratory, and its May 31, 1995 letter should be added to the record.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Sharon Fidler (League of Women Voters), Danielle Droitsch

532 **Comment:** *TVA should rely on renewables in lieu of coal-fired and nuclear capacity. The millions saved from this can be used to pay off some TVA debt and to support clean power programs and the development of hydrogen and electric vehicles.*

Comment by: Linda Cataldo Modica, Scott Banbury, John Johnson (Earth First), Myles Jakubowski (Sunbeam Household Products)

533 **Comment:** *I would like to see a contrast between alternative energy resources and nuclear in terms of their effect on the economy. You would have to include decommissioning and spent fuel storage costs. On the other hand, alternative energy would produce a lot of jobs for small businesses.*

Comment by: Rowland Huddleston

534 **Comment:** *Sacramento Municipal Utility District has substantial commitments to renewable resources. This has allowed us to meet peak power needs in a diversified manner and stimulate the commercialization of these technologies. By making early and sustained investments, we help drive down these technology costs, making them cost-effective. Sacramento Municipal Utility District encourages TVA to make moderate but sustained investments in these technologies.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District)

535 **Comment:** *In the past, TVA implemented passive solar and solar water heater programs using architects and manufacturers from outside the Valley. Then Marvin Runyon cut all these programs. Reimplement these successful programs rather than researching them.*

Comment by: Paul Elliott, Howard Switzer (Sun/Earth Tempered Organic Architecture)

536 **Comment:** *At one time TVA had a very successful residential solar program. Participants could take the amount of money saved over a 10-year period from use of the system and apply this to offset installation costs. The cost to TVA was nothing. They stopped this program; now solar water heaters are being taken off of roofs because people do not know how to operate them. Now TVA is promoting the sale of power to make money. TVA should revive these programs.*

Comment by: Eric Lewis (Solar Works), Michelle Carratu

537 **Comment:** *I already have solar panels on my roof. It is a viable technology. Solar energy should be pushed up in TVA's priorities.*

Comment by: Sanford McGee (Cumberland Center for Justice and Peace), Dolores Howard

538 **Comment:** *There should be more discussion of solar energy in the document.*

Comment by: Al Fritsch (Appalachia–Science in the Public Interest)

539 **Comment:** *TVA should prepare a separate report on renewable technologies to be stacked up against Energy Vision 2020.*

Comment by: Jonathan Scherch

540 **Comment:** *TVA should employ more people in the renewable energy field.*

Comment by: Beth Wallace, Stephen Smith (Tennessee Valley Energy Reform Coalition)

541 **Comment:** *TVA should provide incentives (e.g., rebates, prizes, and grants) to encourage the use of alternative energy sources because of the benefits that accrue to the entire system.*

Comment by: Mike Eastman, Powell & Sharon Foster, Eileen McIlvane (Coalition for Jobs and the Environment), Larry Smith (Mid-South Peace and Justice Center), Hollis Fenn, Walter Stenberg

542 **Comment:** *To be an environmental leader, TVA needs to be more active in small-scale solar thermal and photovoltaics projects.*

Comment by: Sheila Holbrook-White (Sierra Club, Alabama Chapter), Richard Simmers, Kathryn McCoy (Tennessee Energy Education Network), Sharon Fidler (League of Women Voters)

543 **Comment:** *Encourage insulation made of post-consumer newsprint as an alternative to landfilling or burning newsprint.*

Comment by: Don Scharf (Sierra Club, Middle Tennessee Group)

544 **Comment:** *Gasified garbage, whole-tree biomass, and grass biomass would provide all of the energy needed through 2020.*

Comment by: C. L. McKinney (Creret, Inc.)

545 **Comment:** *If municipalities generate electricity using refuse-derived fuel and biomass, TVA would not have to incur debt to add capacity.*

Comment by: Don Perry

546 **Comment:** *TVA needs to look at biomass (grass, weeds, hay). Two tons of biomass will give you a ton of coal Btus cheaper than a ton of coal and will give all farmers in the Valley another cash crop.*

Comment by: C. L. McKinney (Creret, Inc.), Don Perry

547 **Comment:** *TVA needs to look at gasified garbage to produce electricity. This will help lower garbage fees.*

Comment by: C. L. McKinney (Creret, Inc.), Don Perry

548 **Comment:** *TVA has considered the competitive environment first and alternative energy resources last. I consider this backwards. Other utilities are looking toward other energy resources to deal with this uncertain environment.*

Comment by: Danielle Droitsch

549 **Comment:** *There is a potential for many small, but highly reliable methane-fueled facilities throughout the Valley at landfills and wastewater treatment plants.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

550 **Comment:** *TVA should take into account future environmental regulations such as the carbon tax when it mitigates risks in the plan. Risks can be mitigated by building renewable plants and investing in energy conservation.*

Comment by: Linda Ewald, Stephen Smith (Tennessee Valley Energy Reform Coalition), Eileen McIlvane (Coalition for Jobs and the Environment), Sheila Holbrook-White (Sierra Club, Alabama Chapter), Sharon Fidler (League of Women Voters)

551 **Comment:** *When the fence comes down, TVA needs to be able to produce energy that is cost-effective and cost-competitive. But to be a leader in the utility industry, TVA needs to promote alternative energy systems.*

Comment by: David Bordenkirch, Jonathan Scherch, Barbara Soliday

552 **Comment:** *Renewable energy cannot replace coal and nuclear, but we have to get started. TVA should do some demonstration projects.*

Comment by: Alan Jones (Tennessee Environmental Council)

553 **Comment:** *TVA needs to emphasize solar and renewables in lieu of nuclear power.*

Comment by: Andrew Danzig

554 **Comment:** *During the public meetings there has been an overwhelming call for a greater investment in energy conservation, efficiency, and the sustained orderly development of renewables.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

555 **Comment:** *TVA should rely more on energy efficiency and renewables. This will help reduce carbon dioxide and other emissions. It appears that TVA in the area of demand-side management and renewables together would provide only 4 percent of its generation.*

Comment by: Hester Cope (Alabama Environmental Council), Dara Chernicky, Anne Redwine, Bruce Wood, Stephen Smith (Tennessee Valley Energy Reform Coalition), Leith Patton, Linda LaForest (Tennessee Citizens for Wilderness Planning), Jason Gurley, Michelle Neal (Tennessee Valley Energy Reform Coalition), Mary Byrd Davis (Ygdrasil Institute), Eric Hirst (Oak Ridge National Laboratory), Don Scharf (Sierra Club, Middle Tennessee Group)

556 **Comment:** *TVA should meet 25 percent of its future demands with energy conservation and renewables.*

Comment by: Beth Wallace, Sharon Force

557 **Comment:** *TVA should invest in more resources like demand-side management and renewables that have zero emissions rather than on technologies such as cascaded humidified advanced turbines.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

558 **Comment:** *There are global limits to non-renewable resources and health effects associated with the use of coal. There is acid rain, a hole in the ozone layer, deforestation caused by acid rain, and smog. Hydroelectric power causes the flooding of ecosystems. Too much coal is being used, and we would like to see more commitment to non-hydro renewable resources and encouragement of individual energy conservation.*

Comment by: Sheila Holbrook-White (Sierra Club, Alabama Chapter), Beth Wallace, Benjamin Stewart (Faith Lutheran Church), Rodney Webb

559 **Comment:** *Energy efficiency and renewables produce more jobs than a power plant, reduce energy bills, and improve the quality of life and thus should be the most important part of a sustainable energy policy.*

Comment by: Yvonne Seperich, Mary Ellen Bowen, Rowland Huddleston, Jean Cheney, John Noel, Retha Ferrell, Clark Buchner (Sierra Club, Tennessee Chapter)

560 **Comment:** *All strategies rely too heavily on continued coal technologies which have environmental problems. None are strong enough on conservation and renewables.*

Comment by: Alan Jones (Tennessee Environmental Council), Michelle Carratu, Kathleen O'Donohue, Arthur Smith, Beth Wallace, Carolyn Novkov

561 **Comment:** *In lieu of converting Bellefonte Nuclear Plant, TVA needs to use customer service or renewable options. There is too much uncertainty and market risk associated with converting Bellefonte Nuclear Plant.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

562 **Comment:** *TVA should set a date for phasing out its fossil and nuclear plants and replacing them with energy conservation, efficiency measures, and renewable energy sources.*

Comment by: Sharon Force, Sheilla Cheyenne

563 **Comment:** *Full-scale energy efficiency and renewable investments will not only help save base-load needs, it will help TVA reduce the amount of capacity and help everyone in the region, not just bondholders of TVA's debt.*

Comment by: Beth Zilbert (Greenpeace)

564 **Comment:** *Conservation and new energy sources involving advanced technology must be emphasized. This includes solar hot water heaters, direct installation of energy-efficient lighting, and efficient central air conditioners. This should include T-8 lamps because when reflectors, electronic ballasts, and T-8 lamps are combined, a 50 percent energy savings is produced.*

Comment by: Powell & Sharon Foster, R. G. Ford (Energy Design Corporation), Steven Walsh, Michelle Neal (Tennessee Valley Energy Reform Coalition)

565 **Comment:** *Additionally, implementation of conservation methods such as demand-side management, beneficial electrification, green lights programs, etc., would further reduce the need for new generation. However, new/newer forms of energy generation (e.g., wind, photovoltaics, geothermal, and tidal renewables) should also be pursued since they conceptually appear to be more environmentally friendly to air and water resources than conventional fossil-fuel power plants.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

566 **Comment:** *The best way to hedge what is going to happen in a deregulated industry is to use demand-side management technology and renewable energy technologies.*

Comment by: Danielle Droitsch

567 **Comment:** *As TVA seeks to be more competitive, it should as a federal corporation pay attention to the potential loss of stranded benefits such as protection of low income customers, commitments to research and development and to renewables, and a commitment to protecting the environment.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Michelle Neal (Tennessee Valley Energy Reform Coalition)

568 **Comment:** *We suggest 2 to even 5 percent of gross operating revenue be invested in demand-side management and renewables that are cost-effective. Of that, perhaps 0.2 to 0.5 percent of gross operating revenue should be targeted to low income homes.*

Comment by: Geoffrey Crandall (MSB Energy Associates), Michelle Neal (Tennessee Valley Energy Reform Coalition), Carol Kimmons

569 **Comment:** *The Clinton Administration is committed to conservation of natural resources and energy efficiency and intends to evaluate the benefits of alternative energy sources. TVA should listen to this message.*

Comment by: Mary Ellen Bowen

570 **Comment:** *Public power has a special role to play in developing sustainable energy in the future for this country. TVA has been, in the past, the leader in public power, and I think, in making some critical decisions and will remain a leader in the future.*

Comment by: Edward Smeloff (Sacramento Municipal Utility District)

571 **Comment:** *The vision for power marketing authorities is to provide the market tools for renewables and energy efficiency technologies. That is the way TVA could save money and actually be competitive.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

572 **Comment:** *Although conservation and renewables may be more expensive initially, overall they will be more cost-effective in the long run and will check TVA's debt; otherwise, the environmental damage will continue, cleanup and construction costs will increase, and TVA may lose customers.*

Comment by: Jim Von Bramer, Patrick Byington (Alabama Environmental Council), Myles Jakubowski (Sunbeam Household Products)

573 **Comment:** *Although I am concerned about the environment and the health of my family, I understand that living in a modern society with electricity requires some compromises to the environment. We need to refocus TVA's mission on energy conservation and renewable energy such as hydroelectric energy.*

Comment by: Susan Switzer

COMPREHENSIVE RESPONSE ON RENEWABLES

In Energy Vision 2020, TVA carefully evaluated renewable energy resources. Renewable resources can help reduce potential environmental impacts, help mitigate the risk of more stringent environmental regulations affecting use of TVA fossil units, and foster a more sustainable use of energy. Accordingly, TVA has included a number of renewable options, up to 2,500 megawatts, in its proposed short- and long-term plans. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) TVA is also proposing in the final Energy Vision 2020 plan additional research into and development of a number of renewable resources.

Three additional investigation or research activities in renewables are recommended. First, TVA will develop a wind turbine project in two phases. The first phase will investigate wind resources. The second phase will build a wind turbine at one site depending on the results of the first phase. Second, TVA will investigate a biomass refinery that will

produce fuel and chemical coproducts. This biomass refinery could burn refuse-derived fuel, wood waste, and energy crops. Third, TVA will investigate a biomass energy facility that will burn a combination of garbage (compost) and wood waste.

TVA evaluated many renewable resource options in Energy Vision 2020. These included: a refuse-derived fuel stoker, a large solar photovoltaic fixed flat plate power plant, landfill methane, 33- and 39-meter variable speed advanced wind turbines, a refuse-derived fuel companion boiler at TVA's Watts Bar Fossil Plant, a biomass whole tree (short rotation woody crops) energy boiler power plant, and biomass cofiring at TVA coal-fired units. Other options evaluated included: additional hydro generation at existing projects, modernization of existing hydro units, and new hydro generation projects. In addition to supply-side renewable options, TVA considered a number of renewable customer service options: a residential solar water heater program, a commercial new construction program emphasizing renewables, and customer-owned renewable energy generation including landfill gas/fuel cells, small-head hydro, biomass/wood waste, end-use solar photovoltaics, and photovoltaics/technology advancement. (Additional information about these options can be found in Volume 2, Technical Document 7.)

Over 2,000 energy resource strategies were created from the identified supply- and demand-side management resource options. These strategies, including strategies which emphasized renewable options, were evaluated on a number of different criteria, using the multi-attribute trade-off method. The criteria included long-run cost/value, short- to long-term rate impacts, reliability, environmental impacts, economic development including jobs, financial situation/debt, risk management, and equity among rate classes. (Additional information about these evaluation criteria can be found in Volume 1, Chapter 5.) The options from the strategies that performed well on all criteria were then used to formulate TVA's proposed short-term plan and long-term plan (the portfolio of options). Options from Strategy T, which contained a number of renewable resources, were used in the portfolio. (See Volume 1, Chapter 9, Figure 9-3.) Renewable energy options will help mitigate the risks associated with the uncertainty of additional environmental regulations including those dealing with greenhouse gases.

TVA's proposed portfolio includes up to 2,500 megawatts of renewable energy. Landfill methane and refuse-derived fuel are two of the nine options proposed as base-load power options for 1996 to 2005. Wind turbines are one of the five options proposed as base-load power options for the years 2005 to 2020. (See Volume 1, Chapter 9, Figure 9-23.) The proposed short-term plan includes implementation of both cost-effective biomass cofiring at TVA coal-fired units and biomass facilities that use refuse-derived fuel and wood waste, and the modernization of existing hydro units. The short-term plan also includes research and development of a wind turbine project, a landfill methane recovery with a fuel cell project, and several biomass projects. On the demand side, the short-term plan proposes further research into and development of end-use solar photovoltaics. (See Volume 1, Chapter 10, Figure 10-1.)

At the request of members of the Energy Vision 2020 Review Group, TVA asked the National Renewable Energy Laboratory (NREL) to review resource options that TVA was evaluating for Energy Vision 2020 and to recommend actions that TVA could take to improve its approach to the consideration of renewable resources. TVA was able to take most of NREL's recommendations into account as it completed work on the draft Energy Vision 2020 plan. The following table sets forth NREL's recommendations and TVA's response.

NREL Recommendations	TVA's Response
Seek out and exploit all currently cost-effective applications of renewable energy on the TVA system, where cost-effectiveness tests would include potential "non-cost" benefits of renewables in addition to direct monetary measures.	Energy Vision 2020 evaluated renewable options for a number of criteria, including cost-effectiveness. The long- and short-term resource plans include all renewable options which performed well across all of the evaluation criteria.
Develop a corporate renewable energy strategy. Such a strategy would articulate the longer-term importance of pursuing development of renewable energy resources and how the activities that TVA is involved in today are readying and positioning the company to access these resources as they become more widely cost-effective. This strategy might also include the establishment of both short-term and long-term goals for renewables, e.g., a short-term goal (5 to 10 years) of 2 percent of installed capacity from non-hydro renewables and a long-term goal (20 years) of 5 to 10 percent of installed capacity. An initial step toward meeting the short-term goal would be to conduct a "green RFP."	TVA thinks that a separate renewable energy strategy is unnecessary and that it is preferable to include renewables as an element of its overall energy strategy.
TVA should develop a more formalized structure within the company with responsibility for planning, integration, oversight, and reporting on all renewables-related activities.	TVA currently has a department whose responsibility is the long-range planning and integration of all resource activities, including renewable supply-side options. Other groups in TVA such as its Technology Advancement department are responsible for investigating and developing new technologies, such as new renewables. This department provides data to TVA's planning process.
Continue improvements in the identification and modeling of renewable energy attributes for planning purposes.	TVA will continue to identify and model all renewables, as well as other energy resources.
TVA has taken a national leadership role in investigating the utilization of wood resources for utility applications. TVA should become involved in other renewable energy industry groups and collaboratives, such as the National Wind Coordinating Council (NWCC), the Utility Photo Voltaic Group (UPVG), and the USH_2O (solar water heating) Utility Interest Group.	As part of TVA's research into renewable energy, TVA is a member of the Utility Biomass Energy Commercialization Association and the Electric Power Research Institute's (EPRI) Renewable and Storage Business Unit. The EPRI business unit provides information on wind, photovoltaics, and other renewables. Both these groups were chartered with the intent of developing renewable energy.
Undertake wind energy monitoring activities at the most attractive sites, both within and in close proximity to the TVA service territory.	TVA has received proposals for wind energy projects which contain detailed wind energy monitoring information. TVA's short-term action plan includes further wind resource investigation as part of a wind turbine project.
Investigate the potential to use photovoltaics in both off-grid and targeted grid-connected applications.	Research and development of photovoltaics, including dispersed generation, have been included in Energy Vision 2020's short-term action plan.
Initiate a survey activity to assess the level of customer interest in renewables, including customer willingness to pay more, if necessary, to acquire these resources.	TVA will take this recommendation into consideration.
Continue activities to assess distributed valuation, including the potential values of distributed renewables options.	Research and development of programs to target distributed generation have been included in the short-term action plan.

NREL Recommendations	TVA's Response
Initiate a study of how the operation of the TVA system might be reoptimized to enhance the value of different renewables options, particularly intermittents.	Research and development of renewables, including wind, have been included in the short-term action plan. Modeling the effects of the intermittent renewables on the TVA system will be part of the analysis to value these options.
Conduct a "lessons learned" review of the earlier residential solar hot water program to assess what types of TVA-specific data and information can be applied to an updated analysis of solar water heating potential.	The table in Volume 2, Technical Document 7, page T7.7, shows a rebate program for solar water heaters to have a high total resource cost of 22.1 cents per kilowatt-hour for relatively small projected beneficial system impacts (11 megawatts in winter and 4 megawatts in summer). This option was characterized taking into account both TVA's historical experience and recent national experience.

574

Comment: *To gain experience and create market pull, TVA should implement solar and wind resources in the short-term action plan.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Paul Elliott, Elizabeth Garber, Linda Cataldo Modica, Eric Hirst (Oak Ridge National Laboratory), Carolyn Novkov

Response: During the 1980s, TVA conducted a wind energy program which included wind monitoring and operation of wind turbines. The resulting experience and data indicated that wind energy was not viable in this region with the wind resources and technology that were known then. While technology has advanced since then, there is no actual site data to confirm the existence of a viable wind resource in this region. The investigation of a wind turbine project, which is part of the short-term action plan, together with knowledge of the latest technology, will help TVA to determine whether the prospects for wind energy justify building this wind turbine. The short-term action plan also includes investigation into end-use solar photovoltaics.

575

Comment: *Alternative energy means in the Investigation/Research and Development section of the plan need to be moved to implementation with tangible goals and budgetary commitments.*

Comment by: Susan Bailey, Jamie Pizzirusso, Powell & Sharon Foster

Response: Renewable energy resources in the Investigation/Research and Development section of the short-term action plan are not mature technologies. As these technologies

mature, the cost and reliability should improve, making them better options for both TVA and its customers.

For each activity in the short-term action plan, TVA has developed milestones and will track key milestones and budget commitments during implementation.

576

Comment: *With respect to renewable resources, TVA should provide implementation schedules and tangible goals.*

Comment by: Sheila Holbrook-White (Sierra Club, Alabama Chapter), Olivia Lim (Southeast Center for Ecological Awareness), James Barr, Sharon Fidler (League of Women Voters), Patrick Byington (Alabama Environmental Council), Peggy Snow, Eric Lewis (Solar Works)

Response: Key milestones or goals have been included in the final short term plan. (See Volume 1, Chapter 10, Figure 10-1.)

Implementation of Supply-Side Options

577

Comment: *I support the modernization of hydroelectric plants as a part of the short-term action plan. This produces more kilowatts without new environmental damage.*

Comment by: Alan Ball, Michelle Carratu, Bruce Wood, Steven Walsh, Stephen Smith (Tennessee Valley Energy Reform Coalition), Ann Lamb

Response: Your comment has been reviewed and noted.

578

Comment: *Installation of gas-fired combustion turbines and combined cycle units, and the use of low-cost purchases if available, appear to be the best short-term options. We are pleased that TVA has accepted our recommendation to consider siting these units in the western portion of the TVA system to reduce losses and improve transmission reliability.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

579

Comment: *Due to the large amount of base-load resources currently operated by TVA and the expected completion of Browns Ferry Nuclear Plant Unit 3 and Watts Bar Nuclear Plant Unit 1, it appears prudent for TVA to consider additions of combustion turbine peaking units as its next resource addition.*

Comment by: Tennessee Valley Public Power Association

Response: The results of Energy Vision 2020 show that TVA will need to acquire sources for peaking power before any new base-load capability is required. Combustion turbines are included in Energy Vision 2020.

580

Comment: *We approve of buying the call options as a clean option compared to building additional current-technology plants.*

Comment by: Bruce Wood, Powell & Sharon Foster

Response: Your comment has been reviewed and noted.

581

Comment: *I am concerned about TVA's plans to contract with independent power producers because of TVA's history of poor management of contractors.*

Comment by: Stan Gloeckner (Sierra Club)

Response: Option purchase agreements give TVA the right but not the obligation to receive power from other sources, including independent power producers who have submitted successful proposals. A principal advantage of an option purchase agreement with an independent power producer is that the risks associated with the finance, construction, and operation of the electric power facility rest entirely with the independent power producers developing the facility.

582

Comment: *As an independent power producer, we are building plants that use wood chips and mill byproducts that coincidentally generate between 50 and 80 megawatts of exportable energy. However, TVA and other utilities are not providing realistic wheeling rates to transmit this power to customers who want alternative sources of power. TVA should be part of the process that makes this happen, rather than a victim.*

Comment by: Scott Pogue

Response: TVA and other utility systems develop transmission rates based on the costs of providing the service. TVA offers such rates for the movement of energy produced by others across or through the TVA system. Rates that are developed for the transmission of wholesale power are often subject to review by the Federal Energy Regulatory Commission, which is concerned with the regulation of the wholesale market of electric energy under the Federal Power Act, including the price for transmission service. Transmission rates being developed by private investor-owned utilities subject to the authority of the Federal Energy Regulatory Commission that are going into effect are those found to be consistent with the cost-based methodology approved by that regulatory commission. TVA, while not an investor-owned system, has generally followed the Federal Energy Regulatory Commission methodology in developing rates for the transmission of wholesale power across the TVA system.

While rates vary from system to system since costs are different, TVA's transmission service rates are reasonable when compared with those being offered by other systems of comparable size.

Investigation/Research and Development

583

Comment: *Development of electric vehicles could decrease environmental impacts.*

Comment by: Ann Lamb

Response: TVA supports Chattanooga's electric bus program. TVA has provided funding to the program and is currently providing use of a test track facility for electric vehicles. TVA is also working with the University of Alabama, Huntsville's Electric Vehicle program to identify opportunities to work cooperatively in the future.

TVA plans to continue research and development of electric vehicles as part of its proposed short-term action plan. (See Volume 1, Chapter 10, Figure 10-1.) TVA evaluated three options to promote more widespread use of electric vehicles. TVA will track the development and commercialization of electric vehicle technologies and will promote those technologies as appropriate.

584

Comment: *TVA should show real commitment to electric vehicles in the future, such as the University of Alabama, Huntsville's Electric Vehicle program, and Chattanooga's electric bus program, and get back its electric vehicle test site. Former TVA Chairman David Freeman wanted to have 50,000 electric vehicles in the Tennessee Valley to help balance the power load.*

Comment by: David Bowman (Huntsville News), Michelle Neal (Tennessee Valley Energy Reform Coalition), Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA supports Chattanooga's electric bus program. TVA has provided funding to the program and is currently providing use of a test track facility for electric vehicles. TVA is also working with the University of Alabama, Huntsville's Electric Vehicle program to identify opportunities to work cooperatively in the future.

TVA plans to continue research and development for electric vehicles as part of its proposed short-term action plan. (See Volume 1, Chapter 10, Figure 10-1.) TVA evaluated three options to promote more widespread use of electric vehicles. TVA will track the development and commercialization of electric vehicle technologies and will promote those technologies as appropriate.

585

Comment: *TVA needs to be looking at new technologies to address the greenhouse gas problem including technologies that would help Third World countries such as community-based power plants.*

Comment by: Stan Gloeckner (Sierra Club)

Response: In evaluating various options for power generation, Energy Vision 2020 took into consideration potential greenhouse gas emissions. TVA considered several renewable options (e.g., biomass cofiring, wind energy, landfill methane, coalbed methane, and customer service photovoltaics) which have potential to benefit the greenhouse gas situation. Further work on these options is included in the short-term action plan (see Volume 1, Chapter 10, Figure 10-1).

Some of these technologies could be useful in Third World countries.

586

Comment: *TVA should establish a pilot program for wind resources.*

Comment by: Sandy Loyd, Elizabeth Garber

Response: The Energy Vision 2020 short-term action plan now includes a wind turbine project that will be implemented in two phases. (See Volume 1, Chapter 10, Figure 10-1.) The first phase will identify the available wind resources. In the second phase, a wind turbine will be constructed depending on the outcome of the first phase.

587

Comment: *TVA should monitor energy-efficiency research and development of items such as sulfur lighting.*

Comment by: Hollis Fenn

Response: In addition to the many research and development actions in support of customer service options identified in the short-term action plan, TVA has also listed end-use technologies still under consideration and emerging end-use technologies. Those technologies, which include sulfur lighting, are listed in the end-use technology database in Volume 2, Technical Document 7. TVA will maintain and add to this database by monitoring the technological development and the commercialization of emerging technologies and will include cost-effective new technologies in programs as applicable.

588

Comment: *The short-term action plan calls for extensive research and development programs covering a number of supply-side and customer service options. For TVA to undertake all of these programs, a large expenditure of funds and manpower would be required. Much research and development on power supply resources is underway around the country and world. TVA should take maximum advantage of research and development by the Electric Power Research Institute, science laboratories, other utilities, universities, etc., and thereby avoid much duplication of effort and reduce expenditures. In many cases, TVA could support monetarily the efforts of others rather than undertaking the research and development directly. As in past cases, TVA can provide an important service by cooperating with others by allowing prototype test units to be built on TVA's system.*

Comment by: TVA Retirees Association

Response: TVA takes full advantage of outside research. TVA participates in groups which pursue research and development of new technology, as well as groups which explore improvements to existing technology. For example, TVA is a member of the Electric Power Research Institute.

LOAD FORECAST AND NEED FOR POWER

This section includes comments and responses about:

- the accuracy and range of TVA's load forecasts, including the assumptions and methodology used in forecasting future demands for Energy Vision 2020
- the need for power in the future in the TVA region

Results/Accuracy of TVA's Load Forecast

589

Comment: *TVA should be commended for being "brave" enough to show such a large range in its load forecasts. Most utilities succumb to management's desire for "certainty" and show a very narrow confidence interval. The historical performance of forecasters in the utility industry would indicate that TVA's wider bands are appropriate.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

590

Comment: *Burns & McDonnell's analysis of the load forecast resulted in the conclusion that the median forecast used by TVA was higher than justified by our analysis. However, the range of uncertainties around the median included a sufficiently broad band as to include a forecast considered reasonable for the TVA region.*

Comment by: Tennessee Valley Public Power Association

Response: The medium forecast is the result of TVA's forecast procedure as described in the Load Forecast Summary (see Volume 2, Technical Document 5). TVA agrees with the use of uncertainty analysis to fully evaluate future decisions.

591

Comment: *To test uncertainty, TVA produces both a high and low economic forecast. The high forecast predicts annual growth of 4.5 percent for the 1993 to 2015 time period, while the low forecast predicts 1.2 percent annual growth.*
Burns & McDonnell/XENERGY's conclusions are as follows:

- *TVA follows thorough and reasonable procedures for estimating economic growth*
- *TVA's middle forecast is consistent with the growth patterns seen over the past 25 years*
- *TVA's high and low forecast probably create a wider bound than is necessary*

Comment by: Tennessee Valley Public Power Association

Response: TVA produces both a high and low economic forecast to account for uncertainty. TVA's purpose in producing these high and low forecasts is to establish the upper and lower bounds, respectively, of a range for which the probability of future economic growth being outside of that range is 10 percent. Because of the large number of factors affecting the economy and the degree of uncertainty associated with these factors, this is

a wide range. The range for the regional forecast should be expected to be wider than the range for the national forecast because of additional uncertainty due to the poorer quality of available historical economic data at the subnational as opposed to the national level and the fact that the national forecast is a main driver of the regional forecast (and thus uncertainty associated with the national forecast is being added to that of the regional forecast).

How wide the probability range of the forecasts should be is defined by how they are used. These forecasts are used by TVA as part of the uncertainty analysis for the load forecast. In this analysis, probabilities are associated with these upper and lower bounds defined by the high and low economic forecasts, as well as for other factors affecting the load forecast. Through the uncertainty analysis, desired probability ranges (with greater or less uncertainty associated with them) can then be derived for the load forecast.

592

Comment: *How do these economic growth rates compare with history? During the high growth period of 1967 to 1973, the Tennessee Valley grew at an annual rate of 4.6 percent, roughly equal to the current high forecast for 1993 to 2015. While this level of growth occurred for a six-year period (1967 to 1973), there is no evidence that it could be sustained for the full 22 years of the forecast horizon. In addition, there is no evidence that the Tennessee Valley has ever grown at a rate of 1.9 percent faster than the country as a whole for that significant a period of time. Therefore, the high forecast of 4.5 percent is perhaps too high, but certainly serves as a useful upper bound.*

Comment by: Tennessee Valley Public Power Association

Response: The high forecast serves as the upper bound to the range of probable forecasts and is used in uncertainty analyses.

593

Comment: *The low forecast of 1.2 percent annual growth is clearly below any that has occurred in the three recent historical periods. Again, the low forecast may be too low, but it at least serves as a useful lower bound.*

Comment by: Tennessee Valley Public Power Association

Response: The low forecast serves as the lower bound to the range of probable forecasts and is used in uncertainty analyses.

594

Comment: *TVA's load forecast appears too high. Even the medium load growth projection is based on optimistic assumptions about regional economic growth. We think the low or medium low forecasts are much more likely to occur. Therefore, TVA should plan for a lower growth rate with the flexibility to respond to upward growth only if necessary.`*

Comment by: Sharon Fidler (League of Women Voters)

Response: TVA recognizes that there is a great deal of uncertainty in forecasting future loads or sales. TVA uses a range of forecasts to capture this uncertainty. (See Volume 1, Chapter 6.)

TVA also agrees that we should plan for the low growth rate and provide flexibility to respond to higher growth. This flexibility to respond to uncertain load growth is a cor-

nerstone of the short-term action plan (see Volume 1, Chapter 10). In the short-term action plan, future electric load will largely be met with flexible internal and external supply-side options (see Volume 1, Chapter 7). If load growth is as expected, then TVA can implement these options; if load growth is low, then it will not be necessary for TVA to implement these options.

Assumptions/Variables Used in TVA's Load Forecast

595

Comment: *The 1993 through 2015 forecast also shows significant increases in heat pump saturations at the expense of resistance heating and window air conditioning. These assumptions seem reasonable. In addition, TVA incorporates reasonable assumptions for efficiency improvements based in part on the requirements of the Energy Policy Act of 1992.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

596

Comment: *The bounds on TVA's expected forecast are relatively wide and, as such, should incorporate all reasonable growth scenarios. The expected forecast, however, seems to be biased high by relying on increased gas prices to drive customers toward electric heat, hot water, and other end uses. TVA also assumes a continuation of the economic advantage that the region has had over the rest of the country.*

Comment by: Tennessee Valley Public Power Association

Response: Independent forecasts were used in preparing the natural gas price forecasts. (See Volume 2, Technical Document 5, Figure T5-9.) The factors that led to TVA's "economic advantage" are expected to continue into the next century (see Volume 2, Technical Document 5, page T5.5). The uncertainties in natural gas prices and economic growth were considered in Volume 2, Technical Document 5, Figures T5-28 and T5-29.

597

Comment: *It seems surprising that air conditioning saturation forecast is only 71 percent for the commercial sector compared to 92 percent for the residential sector. One would normally expect higher air conditioning saturation in commercial facilities such as offices, hospitals, grocery stores, etc.*

Comment by: Tennessee Valley Public Power Association

Response: The commercial sector includes warehouses, loading areas, and other similar work areas that are not ordinarily air conditioned. The data in the commercial sector is measured on a square footage basis, while the residential sector is measured on a unit basis. The percentage of commercial operations that are air conditioned may be higher than the percentage of total square footage that is air conditioned.

598

Comment: *TVA has apparently received gas forecasts from organizations such as DRI/McGraw Hill, the American Gas Association, and the Gas Research Institute. But if gas prices do not rise relative to electric prices, OSHRA predicts a considerably lower commercial forecast could result.*

Comment by: Tennessee Valley Public Power Association

Response: The medium load forecast assumes TVA can maintain its price versus natural gas. (See Volume 2, Technical Document 5, page T5.11.) If TVA cannot maintain this position, it is reasonable to assume some lower load could occur.

The impact of the uncertainty in natural gas prices on TVA's load forecasts is shown in Volume 2, Technical Document 5, Figures T5-28 and T5-29.

599

Comment: *TVA forecasts the industrial sector to grow at 3.3 percent per year from 1993 to 2000 and 1.6 percent annually from 2000 to 2020. This is considerably greater than the historical growth rate of 0.4 percent, which occurred from 1970 to 1993 and the recent annual growth of 0.3 percent from 1990 to 1993.*

It is not clear why TVA is forecasting such high growth for the industrial sector. In fact, TVA's low forecast of 0.4 percent from 1993 to 2000 is roughly equivalent to the actual growth from 1970 to 1993.

Comment by: Tennessee Valley Public Power Association

Response: Total industrial sales include sales by distributors to industry and sales by TVA to directly served customers. The directly served customers tend to be large consumers. Historically the directly served customer class has experienced a decline in sales for the period 1979 to 1994. This is primarily due to declines in two industries, primary metals and chemicals. The distributor portion of manufacturing grew at 2.8 percent for 1979 to 1994 and is expected to continue at a lower 2.2 percent through 2020. This, coupled with a 1.6 percent growth in directly served manufacturing, comprises the 2.0 percent growth in manufacturing sales for 1994 to 2020. (See Volume 2, Technical Document 5, Figure T5-25.)

600

Comment: *There are some additional energy cost savings measures that are already being implemented in the TVA region that are going to have a significant effect on TVA's load in the future and are not a part of this plan of yours.*
Some of them are:

- *Replacement of electric resistance space heating with gas (natural and propane) heat.*
- *Replacement of electric resistance hot water heating with gas (natural and propane) hot water heaters.*
- *Replacement of commercial electric cooking appliances with gas (natural and propane) ones.*

In our own circle of experience we have familiarity with megawatts of such projects being implemented in the last five years.

We feel like the continuing trend to install gas replacements for electric resistance space heating, water heating, and commercial cooking appliances will have a significant

impact on TVA's future load and are concerned that this trend is not considered in this model and that the model will give you incorrect results for the future needs in the region.

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: As part of developing the forecast for energy demand in the future, TVA tracks the fuel shares for gas and electricity for different end uses. The expected fuel share is based on the fuel cost projections, technological advancements and efficiency improvements, and historic trends. Improvements in the efficiency of many electric technologies makes electric use very competitive with gas for many end uses.

601

Comment: *TVA has been a leader in the development and implementation of innovative forecasting techniques. While TVA's modeling efforts are superb and often well above the standard for the utility industry, efforts to supply the models with current region-specific data are lacking, particularly in the commercial and industrial sectors.*

COMMEND, for example, requires data on EUIs (energy intensities in kilowatt-hours per square foot), floorspace, and market share by end use and building type. To date, TVA relies on data from a 1989 mail survey, Electric Power Research Institute southeast regional data, and data supplied by consultants from other utilities. In addition, the marketing and demand-side management group at TVA collected audit data for several years ending in 1989, but participants were self-selected and the data therefore was not used in the forecasting process.

Comment by: Tennessee Valley Public Power Association

Response: TVA has developed region-specific detailed data where a cost-effective method of data collection was available.

602

Comment: *TVA's regional economic simulation model produces the economic forecasts and relies on two major inputs: the DRI national economic forecast and TVA industrial electricity prices. TVA's regional economic simulation model has a high degree of industry detail, and TVA has supplemented the results of the model with detailed essays describing the history and future of each industry in the Tennessee Valley at the two-digit Standard industrial classification level. The process itself seems sound. It suffers the same drawbacks of most forecasts, however, in that it relies on past experience to project the future. The model, for example, continues to show growth rates for the Tennessee Valley considerably in excess of the national average. While this is reasonable given the recent past, it seems clear that such extraordinary growth cannot continue indefinitely.*

Comment by: Tennessee Valley Public Power Association

Response: This is an accurate general description of the TVA economic model used in the forecasting process. The forecasting process uses the historical information available, but the process is not strictly a projection of historical time series growth rates into the future. Model results are supplemented with industry analyses; these are used to explain the region's economic structure and its likely evolution in the future. Current economic conditions are also continually monitored to assess if there is evidence that significant changes to this likely path are occurring.

The forecast calls for growth rates for the Valley through the rest of the decade to be "considerably in excess of the national average." However, this is not due to the projec-

tion of recent historical growth rates, but rather because the conditions that led to those historical rates of growth are likely to continue into the future. For example, as stated in TVA's Economic Outlook report, the relatively new auto and related manufacturing industries in the region have been a prime driver of this growth. Recent evidence shows that the region is likely to remain in an excellent competitive position relative to these industries with several announcements of large investments in these industries to occur over the next few years.

These very fast rates of growth are not likely to continue indefinitely. TVA's regional forecast calls for the Valley's economic growth rate to slow considerably and come much closer to the national average after the end of the decade as the region's newer manufacturing industries mature. Because the Valley is expected to continue to be manufacturing-intensive and this sector tends to be more productive, the Valley is expected to outpace the nation over the long term in the future as it has in history.

603

Comment: *TVA is forecasting annual peak load growth of 2.5 percent for the period 1993 to 2000 with a forecast range of 0.7 to 3.6 percent. This is very close to the forecast of sales (energy) growth, which is forecast to be 0.7 to 4.0 percent with an expected value of 2.7 percent. It is not unexpected that the two forecasts are so close. TVA assumes in large part that the end-use or sector load shapes of today will be the same tomorrow. The only changes in system load shape are when certain sectors grow faster than others.*

Comment by: Tennessee Valley Public Power Association

Response: These are the assumptions in the Energy Vision 2020 forecast.

604

Comment: *TVA's economic projections, which substantially exceed past and national growth, are used to justify spending more money on Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3.*

Comment by: Robert Schreiber (Common Sense)

Response: TVA's load and economic forecasts are not dependent on a particular technology or project. For the period 1985-1994, the TVA region experienced 3.9 percent average annual economic growth as measured by the Gross Regional Product. This compares very favorably to the 2.5 percent average growth in the Gross National Product for the United States. We expect this trend to continue with the TVA region growing 3.5 percent through 2000 and the United States growing at 2.5 percent. This is a reasonable expectation because the region will continue to have strong manufacturing growth (see Volume 2, Document 5, page T5.5), due to good location, low wages, and abundant resources relative to the United States.

Load Forecast Methodology

605

Comment: *In general, TVA's models and methodologies are consistent with those used by many of the largest and most sophisticated utilities in the country. Their use of multiple models and their application of uncertainty analysis is commendable.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

606

Comment: *Over the years, the TVA forecasting system has continued to evolve as newer methods became available. TVA has been an active proponent and supporter of the development of improved models, often serving on Electric Power Research Institute review committees and volunteering as a beta test site for new models. While pushing the frontier forward, TVA has also been prudent about placing full reliance on a new model.*

Comment by: Tennessee Valley Public Power Association

Response: New approaches adopted by TVA using econometric and end-use models and provisions for uncertainty led to better forecasting accuracy. (See Volume 2, Technical Document 5, pages T5.3 to T5.4.) The use of multiple models assists in avoiding blind spots by taking advantage of strengths of different forecasting models. (See Volume 2, Technical Document 5, page T5.8.)

607

Comment: *Much of today's forecasting literature concludes that some improvements in forecast accuracy can be obtained through the use of multiple models. While the reasons for these improvements are uncertain, it seems that the diversity of approaches and assumptions that results from multiple forecasting methods at least intuitively explains the increased accuracy. TVA's forecasting group uses multiple models.*

Comment by: Tennessee Valley Public Power Association

Response: TVA uses multiple models to avoid blind spots associated with one model. (See Volume 2, Technical Document 2, page T5.8.)

608

Comment: *TVA has worked hard at improving its economic forecasting. In 1985, it began a program with universities around the Tennessee Valley to share economic information. These universities review both the regional forecast and the forecasts for their subregions on an annual basis.*

Comment by: Tennessee Valley Public Power Association

Response: This is an accurate statement of this aspect of TVA's economic forecasting process.

609

Comment: *TVA can further improve its approach to forecasting by incorporating additional low-cost forecasting approaches including expert judgment and time series analysis into the process. These methods would add diversity to the current approach, which consists primarily, if not exclusively, of econometric and end-use models. While the current forecasting models should continue to be the primary forecasting tools, other approaches can serve the purpose of broadening the thinking of the planning staff and management.*

Comment by: Tennessee Valley Public Power Association

Response: TVA incorporates expert judgment in the forecast of specific industries, and is considering expanding these efforts into residential and commercial forecasts in the near future.

610

Comment: *The approach to uncertainty used by TVA in load forecasting is very credible and generally a step above what is usually found in the industry. In particular, the method of accounting for interaction is commendable. Despite this extensive look at uncertainty, the method of presenting the forecast as a bell-shaped distribution tends to lead management to plan for the middle result. It may make sense for the forecasting group to present an even number of possible forecasts (e.g., four forecasts) without an assignment of probabilities.*

Comment by: Tennessee Valley Public Power Association

Response: TVA develops a range of load forecasts with probabilities so that additional power supply analyses can also use a probabilistic approach. It should be noted, however, that the sensitivities to the load forecast uncertainty identified in Energy Vision 2020 did not rely on the assignment of these probabilities, and were considered as three independent forecasts. (See Volume 1, Chapter 9, pages 9.27 to 9.28.)

611

Comment: *"Uncertain events" should be introduced into the process. These uncertain events are defined as events which have a low probability of occurrence but a high impact on the future forecast or plan. Often, these events are ignored because forecasters and planners are concentrating on the middle or most likely future. The process of identifying uncertain events is another opportunity for outside involvement, particularly for Tennessee Valley Public Power Association members. A brainstorming exercise involving community leaders and/or Tennessee Valley Public Power Association members to generate possible uncertain events could prove useful to TVA forecasts.*

Comment by: Tennessee Valley Public Power Association

Response: TVA considered many uncertainties when developing Energy Vision 2020. These uncertainties are identified in Volume 2, Technical Document 8, pages T8.20 to T8.45. Some of these uncertainties have what TVA considers a low probability of occurrence, for example, a nuclear moratorium. These uncertainties were developed based on public input, including discussions with the Power Supply Committee of the Tennessee Valley Public Power Association.

612

Comment: *The approach to determining load forecast uncertainties is also very dependent on the selection of the subjective probabilities for the high, medium, and low levels for each variable. There is no statistical basis for the selection of the conditional probabilities showing the relationship between oil prices and electric prices. This is not necessarily bad, but the selection process should be well documented and include a diversity of opinions. In addition, no sensitivity analysis is presented from which to judge whether the selection of these probabilities seriously affects the resulting probability distribution of forecasts.*

Comment by: Tennessee Valley Public Power Association

Response: TVA developed the subjective probabilities by using a diversity of opinions. In the future, TVA expects to develop cost-effective improvements to this process.

613

Comment: *The number of variables considered in determining load forecast uncertainties should be expanded to include non-quantifiable variables related to factors such as technological advances, the regulatory/political environment, changes in management, competitive forces, etc. One method to incorporate a wider array of variables including non-quantifiable variables is called "scenario analysis."*

Scenario analysis can be used in both TVA's forecasting process and integration process, and thereby provide a consistency between these activities. The BASICS methodology developed by Battelle Columbus Division is one method that has been used in the utility industry. Scenario analysis is also a useful technique for involving the distributors and other groups in the process.

Comment by: Tennessee Valley Public Power Association

Response: TVA will certainly consider these types of refinements in the future.

614

Comment: *For the period 2000 to 2020, TVA forecasts 1.9 percent annual growth in peak with a range from 0.0 percent to 3.2 percent. Again, this is very close to the energy forecast which shows 1.7 percent annual growth with a range from -0.3 to 3.2 percent. TVA is not unlike other utilities. In general, it is the industry standard to produce an energy forecast and then to create a peak forecast with similar growth rates. It is very difficult, without an in-depth analysis of expected behavioral, price, and technological changes at the end-use level, to do much else.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

615

Comment: *The review of the TVA load forecast process identified several areas where Burns & McDonnell/XENERGY felt that TVA's process could be enhanced. In general, it is felt that TVA should:*

1. *Conduct interviews with Tennessee Valley Public Power Association members to assess their view of the future and the assumptions used in the forecast. Tennessee Valley Public Power Association members should participate in the identification of key vari-*

ables, the assignment of initial probabilities, and the discussion of interrelationships between variables.

2. *Conduct interviews with large industrial customers to estimate their future consumption.*
3. *Establish a comprehensive system of on-site audits and mail surveys to collect TVA service area-specific data for forecasting and market assessment.*
4. *Enhance the uncertainty analysis by:*
   - *including Tennessee Valley Public Power Association members and outside stakeholders in the development of the subjective probabilities for each uncertainty*
   - *expanding the number of variables considered to include non-quantifiable factors*
   - *introducing low probability, high impact events to the forecast to test their effect*
5. *Incorporate a lower forecast of natural gas prices resulting in lower forecast saturations for electric heating and water heating equipment for the commercial and industrial sectors.*
6. *Consider a lower economic forecast, one more consistent with the national average.*
7. *Compare the historical accuracy of TVA forecasts to other utilities. Also, compare forecast growth rates to other area utilities.*
8. *Improve the analysis of competition and deregulation in the forecast.*
9. *Review the price elasticity assumptions in COMMEND and REEPS to make sure the data are used properly.*
10. *Implement a feedback loop between the forecast and the integrated resource plan, where an adjusted electricity price is fed back into the forecast.*

Comment by: Tennessee Valley Public Power Association

Response: A number of these recommendations have been incorporated in Energy Vision 2020 and the others will be considered in the future as appropriate.

Need for Power

616

Comment: *In TVA's procedure for estimating the region's future power requirements, the medium forecast presents the most likely outcome within a range of variables affecting future power demands. Under this medium forecast, Energy Vision 2020 shows a growth rate of about 2 percent annually, indicating a need for 16,500 megawatts of additional capacity by the year 2020. This means that power supply sources equal to 65 percent of today's system will have to be added by then.*

Comment by: TVA Retirees Association

Response: TVA's generating capacity in 1994 was 25,553 megawatts. With the addition of two nuclear units in 1996, (Browns Ferry Nuclear Plant Unit 3 and Watts Bar Nuclear Plant Unit 1), the total capacity will be about 28,000 megawatts. The indicated need of 16,500 megawatts of additional capacity by the year 2020 is about 60 percent of the total system in 1996.

617

Comment: *TVA has underestimated the need for new generating capacity because it gives too much credit for current generating capabilities.*

- *The need could be 4,000 megawatts greater than 16,000 megawatts because TVA has purchased 3,000 to 4,000 megawatts in order to meet system demands.*
- *Without substantial capital expenses, the reliability of the fossil units may be less than projected.*
- *Availability could be affected depending on how life extension of the 5 nuclear units (Browns Ferry Nuclear Plant Units 2 and 3, Sequoyah Nuclear Plant Units 1 and 2, and Watts Bar Nuclear Plant Unit 1) is treated. I might suggest that the report have a "hold" point around the year 2005 to revisit this issue. You have noted that a pressurized water reactor is a less likely candidate for life extension due to the pressure transients. With respect to Watts Bar Nuclear Plant Unit 1, I am not convinced that life of the plant will be 40 years with respect to the date of issuance. What is the status of the Nuclear Regulatory Commission's ruling on licensing extension, and how will this rule impact TVA?*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division), J. E. Butt

Response: TVA has evaluated the factors listed in this comment that could influence the need for capacity.

First, during peak load periods, it is frequently less expensive to make power purchases in place of running more expensive combustion turbines, or using interruptible contract rights. Adding enough capacity resources to prevent this would be the more costly route and would likely lead to the need to increase electricity rates. The additional capacity of Browns Ferry Nuclear Plant Unit 3 and Watts Bar Nuclear Plant Unit 1, which are planned to be on-line in 1996, will help TVA meet higher peak loads such as occurred in the summer of 1995.

Second, the long-range equivalent availability factor used in Energy Vision 2020 for the fossil units is 85 percent. TVA's fossil units had an equivalent availability factor of 85 percent in 1993. There are ongoing and planned projects for the fossil plants to maintain and improve their reliability and efficiency.

Third, nuclear unit life extension was a possible scenario. This was one of many important planning assumptions which will be reviewed on a regular basis. The Nuclear Regulatory Commission revised 10-CFR-54, which is a rule on license extension, and this rule was issued in 1995. The Nuclear Energy Institute developed guidelines for implementation of the rule. An industry wide demonstration project is planned in early calendar year 1996. TVA's assessment of the revised rule is that it is a workable approach to license renewal. We believe that any process questions will be resolved in time to support preparation of license extension applications for our nuclear units.

618

Comment: *I do not understand how we went from a situation where we had plenty of power to almost a deficit.*

Comment by: Kirk Johnson

Response: In the 1980s and early 1990s, TVA had sufficient power to meet customer needs. During this same period, the demand for electric power continued to grow, but TVA has not added more capacity since 1981. With continued load growth and no new capacity

additions, power deficits would continue to exist without Watts Bar Nuclear Plant Unit 1 and Browns Ferry Nuclear Plant Unit 3.

619

Comment: *Based on last winter and this summer's request to curtail power, TVA is facing a power crisis now. I understand that TVA's margin of capacity is one of the lowest in the nation.*

Comment by: Ed Brooks (Tennessee Southern Railroad)

Response: Browns Ferry Nuclear Plant Unit 3 and Watts Bar Nuclear Plant Unit 1 will help in situations such as those in the summer of 1995 when TVA experienced record high peak loads. This additional capacity will increase our capacity margin to meet power system needs in the next few years.

Some of TVA's larger customers have interruptible power contracts which provide power at a discount. TVA has exercised its rights to interrupt service to these customers based on these contracts. These contracts benefit both TVA and the customer. TVA saves the cost of additional peaking capacity, which would have a low capacity factor.

TVA plans for a reserve margin of 13 percent from 1998 to 2010, which is comparable to other utilities in the United States.

620

Comment: *TVA indicated in the 1994 Southeastern Electric Reliability Council's Coordinated Bulk Power Supply Program OE-411 report that the capacity margin on its system was dropping to the 9 percent level by 2003. The reduction of the capacity margin below the 15 percent level is a general trend being seen by other utilities in the United States.*

Comment by: Tennessee Valley Public Power Association

Response: In the summer of 1994, TVA updated its reliability index, which is used to determine desired reserve margins. The 1995 Southeastern Electric Reliability Council's Coordinated Bulk Power Supply Program OE-411 report shows a capacity reserve of 13 percent for the year 2003. This is after the peak loads have been reduced for expected interruptions of the Economy Surplus Power customers.

621

Comment: *The Energy Vision 2020 evaluation of options is based upon a reserve margin of 15 percent for 1996-1997, 13 percent for 1998-2010, and 12 percent reserve margin thereafter. The report states that this decline in requirements is due to improved availability of generating sources. The addition of smaller size units contemplated by the plan should result in good reliability for these particular units. However, with the existing coal-fired units nearing 70 years of age by the year 2020 (even with improvements), and with an emphasis in the plan on innovative and less mature options, it is difficult to be optimistic that overall availability and reliability of the system will actually be improving over time. New technology usually translates into more testing time and more outage time to make adjustments and corrections. This inevitably will reduce unit availability and require higher reserve margins.*

Comment by: TVA Retirees Association

Response: The decline in forecast reserve margins is largely due to improvements in the existing fossil system and additions of highly reliable new capacity. The Energy Vision 2020 long-term plan includes periodic renovation of the existing fossil generation units. TVA believes that there should be no reason that the units should not be a long-term reliable source of electricity, as long as they are maintained properly. The short-term action plan identifies the addition of capacity which is highly reliable. (See Volume 1, Chapter 10, Figure 10-1.) For example, the option purchase agreements are designed to have 100 percent availability.

622

Comment: *Site-specific National Environmental Policy Act documents tiering off of the present programmatic environmental impact statement must have a documented justification of the need for power. This justification must be supported and approved by any existing state authority such as a public service commission or equivalent. A need for power discussion is particularly important for those proposed power sources with environmental impacts, even if impacts are mitigated.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Any site-specific National Environmental Policy Act documents, which tier off of Energy Vision 2020, will discuss the "need for power" that justifies the particular energy resource option which TVA proposes to implement. The analysis of the need for power in Energy Vision 2020 will largely provide the basis for such a discussion, consistent with the concept of tiering. As a federal utility, TVA power supply planning and energy resource decisions are not subject to review or approval by state public service commissions. Although such commissions' views on proposed TVA actions are welcome, TVA would not request their approval for such actions.

CUSTOMER SERVICE OPTIONS

This section includes comments and responses about:

- the development and characterization of customer service options in Energy Vision 2020
- the merits of beneficial electrification
- the role of education in demand-side management
- the effect of electric rates on energy conservation
- the merits and effect of interruptible rates
- the merits of various end-use renewable energy options
- the importance of promoting energy efficiency, low income energy conservation and energy efficiency programs

General

623

Comment: *I am glad you are considering customer energy efficiency and load management in your plan.*

Comment by: Arthur Smith

Response: Energy efficiency and load management measures can make a significant contribution in meeting the future energy needs of the Tennessee Valley at the lowest economic and environmental cost. Energy efficiency and load management measures accomplish Energy Vision 2020 goals by meeting various customer and load shape objectives including peak clipping, valley filling, load shifting, strategic conservation, and load shape flexibility. The short-term action plan recommends implementation of 650 megawatts of demand-side management by 2002 and up to 2,200 megawatts by 2010.

624

Comment: *TVA has chosen an approach to demand-side management planning that is generally consistent with industry standards. It is a relatively detailed and data intensive approach, and relies on significant internal and outside expertise. (TVA has used 6 different demand-side management consultants, in addition to in-house staff, to either perform or review selected planning tasks.)*

Comment by: Tennessee Valley Public Power Association

Response: TVA used the best available information in the development of customer service options for consideration in Energy Vision 2020. As customer service options are implemented, TVA will monitor and evaluate several program aspects. As better information becomes available, planning estimates will be updated and refined to reflect actual program experience.

625

Comment: *The 50 demand-side management program options developed by TVA are comprehensive in that they cover virtually every customer segment and end use, and offer*

numerous different delivery mechanisms, ranging from direct installation to a mail order catalog program, to real-time pricing.

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

626

Comment: *Demand-side management objectives included lowest rates, lowest costs (total resource cost test), minimize debt, minimize customer inconvenience, enhance customer satisfaction, maximize reliability, and minimize emissions. In essence, these objectives are the same ones used by TVA in the development of Energy Vision 2020.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

627

Comment: *In general, we support your effort to quantify customer service technologies and offer our assistance in so much as is possible in sharpening these inputs so that your overall projections and plans are as much on target as it is possible to be with these type of plans.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: Many of the options included in the Energy Vision 2020 short-term action plan include developing beneficial partnerships with trade allies. Through these partnerships we will gain valuable program experience that will help us refine program offerings and update program planning assumptions.

628

Comment: *TVA should provide technical assistance regarding energy needs to local industry. This can help industry to preserve jobs and ensure low-cost, efficient, environmentally sound supply.*

Comment by: Roger Odom (Lenzinc Fibers Corporation), Bill O'Brien (B. F. Goodrich)

Response: Many of the customer service options identified in the Energy Vision 2020 short-term action plan include assistance to identify opportunities to improve the efficiency of electric end uses. The Commercial and Industrial Energy Services option encourages the application of energy-efficient technologies to meet the financial, environmental, and productivity needs of Valley businesses and industries. This program provides technical assistance, as well as financing and incentives, to assist industry and to ensure low-cost, efficient, and environmentally sound supply and use of electric power.

629

Comment: *TVA should look at the experiences of other utility demand-side management and renewables programs such as Bonneville Power, Ontario Hydro, and Pacific Gas and Electric. TVA should consider bringing in experts to help design and optimize these programs.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition), Dennis Haldeman, Michelle Carratu, Hamp Dobbins, Jr., Walter & Dorothy Stark, Philip & Winfred Thomforde

Response: TVA identified 39 energy efficiency and load management options for consideration in the Energy Vision 2020 planning process. The options targeted the residential, commercial, and industrial sectors and addressed all the major electric end uses. In developing these options, TVA examined the best programs from around the country, including the programs offered by Bonneville Power Administration, Ontario Hydro, and Pacific Gas and Electric. TVA identified the features of the most successful programs and incorporated them into the customer service options developed. TVA developed options to satisfy several evaluation criteria including resource cost, rate impact, and customer value.

TVA also considered a comprehensive list of supply-side options, including several renewable options. The completeness of TVA's list was verified by review of 20 other utility integrated resource plans, as described in Volume 1, Chapter 7, page 7.4. Some of the renewable options considered included biomass, end-use solar photovoltaics, wind, and landfill methane.

630

Comment: *TVA should provide interest-free loans for the purpose of solar water heaters, photovoltaic systems, and energy-efficient appliances including gas clothes dryers, ovens, and ranges.*

Comment by: Linda Cataldo Modica

Response: TVA reviewed a large number of energy efficiency technologies and program concepts to deliver these technologies to customers. These included interest-free loans and other incentives or rebates. The short-term action plan includes implementation of 650 megawatts of demand-side management by the year 2002 and up to 2,200 megawatts by 2010 using a variety of rebates and incentives including financing. In the identified Low Income program option, a number of energy conservation measures would be provided cost-free to low income customers. As part of its short-term action plan, TVA will investigate end-use solar photovoltaics.

Customer service options that would promote fuel switching for certain appliances were also analyzed. This analysis indicated that electricity would be more cost-effective than natural gas, except for water heating.

631

Comment: *A potentially significant drawback to TVA's approach to characterizing its market and demand-side management technology costs and impacts is its heavy reliance on secondary data sources. While building simulation results have been adjusted to match TVA's forecast, these adjustments have either relied on very limited and dated information (the most recent data is the commercial and industrial equipment survey from 1989), or simply used ratio adjustments, with no knowledge of what components were actually inaccurate. Of perhaps greater concern is that no technology or customer data has been weighted to better represent TVA's customer population. For example, secondary data on technology impacts could have been stratified by customer size and building type and weighted to TVA's customers so that overall potential impacts would more closely reflect the demand-side management potential in TVA' s service territory.*

Given that TVA has not actively pursued demand-side management resources since 1988, it is not unusual or surprising that primary customer data is lacking, as it is for many other United States utilities. Given this lack of data, the timing requirements for the

Energy Vision 2020 process, and the potential cost of significant data collection, reliance on secondary data is appropriate. However, it is unclear whether this data has been properly adjusted and weighted to best represent TVA's customer population.

Comment by: Tennessee Valley Public Power Association

Response: In developing TVA's technology costs and impacts for demand-side management programs in Energy Vision 2020, TVA considered three residential building types and ten commercial building types. Separate costs and impacts for each technology were developed for each building type. Using primary data from the TVA regions, the average cost and impact for each technology were weighted based on the estimate of the mix of building types.

632

Comment: *As with its technology assessment, TVA's program development relies heavily on secondary data. TVA has done a commendable job of assessing the demand-side management experience of other utilities and in considering this experience in its own program development. TVA has done little market research, however, to assess how different programs would be received by its own customers, local trade allies, and wholesale distributors. Additional market research (possibly including focus groups, informal group interviews, and phone or mail surveys) could significantly help TVA in assessing the likely response to different program delivery mechanisms and incentive approaches. Assessment of trade ally reactions is particularly critical for some of TVA's proposed programs that rely heavily on trade ally involvement for successful implementation. The impact of demand-side management is highly dependent on the acceptability of the programs to the distributors and their customers. Future demand-side management efforts should include increased data gathering from the distributors and their customers as input to TVA's assumptions.*

Comment by: Tennessee Valley Public Power Association

Response: Detailed implementation plans will be developed for the customer service options in the Energy Vision 2020 recommended short-term action plan. (See Volume 1, Chapter 10, Figure 10-1.) Primary research would be conducted to develop program features that will ensure that program goals are met. Partnerships with power distributors and trade allies are critical to the success of demand-side efforts. Market evaluation will be performed using primary data collection methodologies such as surveys, focus groups, and listening sessions. Data will be collected from power distributors, end-use consumers, and trade allies prior to the actual implementation of any program to assess program delivery mechanisms and market potentials.

633

Comment: *TVA's overall estimates for program option impacts and spending are quite aggressive when viewed as an actual demand-side management plan (2005 cumulative impacts are roughly 10 percent of projected sales and peak demand; this compares quite favorably with the most aggressive utilities in North America). Given the relatively low penetration estimates and fragmented nature of its current program designs, it is likely that TVA's final demand-side management goals will be significantly less than what is potentially achievable in its service territory.*

Comment by: Tennessee Valley Public Power Association

Response: All of the resource options considered in Energy Vision 2020 were assessed based on several evaluation criteria. Those criteria included total resource cost, impact on rates, environmental impacts, and flexibility. Resource strategies were developed using different resource options to satisfy and balance these evaluation criteria. The energy efficiency options included in the short-term action plan compared well against other resource options. Other energy efficiency options, because they had higher levels of uncertainty, cost, or rate impacts, were not viable as part of a future resource strategy.

634

Comment: *TVA has a dismal record of demand-side management in Memphis Light, Gas and Water's service area.*
How will TVA's proposed demand-side management programs be better than previously offered programs?

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: For programs included in the Energy Vision 2020 short-term action plan, TVA will develop implementation plans in partnership with distributors. In those implementation plans, several issues will be addressed. Those issues include TVA and distributor roles in delivering customer service options, impacts of the options on distributors' costs and revenues, and possible incentives to encourage and reward distributor participation in programs. TVA recognizes that the electric marketplace is becoming more competitive. Both distributors and TVA are affected by this. TVA is committed to working with distributors to develop options that enhance distributor and TVA operations and competitiveness. TVA will work with the Tennessee Valley Public Power Association committees and with individual distributors to identify particular needs. This process has already begun.

635

Comment: *The review of the demand-side management process identified the following areas where it was felt TVA could improve the process.*

1. *Establish a comprehensive data collection system that includes on-site audits for the commercial and industrial sector and mail surveys for the residential sector.*
2. *Interview Tennessee Valley Public Power Association members to determine what program designs work and review cost assumptions based on real world experience.*
3. *Pursue approaches with Tennessee Valley Public Power Association that allow recovery of lost revenues and marketing/administrative costs.*
4. *Conduct market research to determine how different programs would be received by customers, local trade allies, and wholesale distributors.*
5. *Review assumptions regarding customer participation, measure penetration, and free-ridership based on experience from other utilities who have successfully implemented similar programs.*
6. *Reassess marketing costs based on a "bundled" approach. Often cost reductions occur as programs are marketed together.*
7. *Evaluate programs from the distribution perspective using the distributors' avoided costs and retail rates.*

Comment by: Tennessee Valley Public Power Association

Response: 1. TVA has had a comprehensive saturation survey since 1979 which regularly collects information about the residential and commercial and industrial sectors. Information is collected about consumers' energy use, residence/building characteristics, and sociodemographics/firmographics. As TVA begins implementation of the customer service options included in Energy Vision 2020, TVA will devise a data collection plan to capture customer information obtained through the programs. TVA will use this information to refine and update future planning assumptions.

2. For all programs included in the Energy Vision 2020 short-term action plan, TVA will develop implementation plans in partnership with distributors. In those implementation plans, several issues will be addressed. Those issues will include detailed program designs and cost assumptions.
3. The implementation plans developed in partnership between TVA and distributors will address the delivery mechanisms for customer service options, impacts of the options on distributors' costs and revenues, and possible incentives to encourage and reward distributor participation in options.
4. Prior to going to market with any demand-side management program, specific market evaluations will be undertaken with end-use consumers, trade allies, and power distributors. Such data gathering is a critical component of any evaluation effort prior to and during program implementation.
5. The experience of other utilities with demand-side management programs has been researched and research will continue to be conducted as TVA implements the customer service options in the Energy Vision 2020 short-term action plan.
6. Options were developed for planning purposes. In the analysis of customer service options, TVA noted that while some technologies may be promoted using similar delivery strategies, there may be significant differences in the costs and impacts of those technologies. In most cases, the cost-effectiveness of the customer service options considered in Energy Vision 2020 was driven by the technology costs and impacts. Decisions to aggregate or disaggregate technologies within options were made to improve the overall cost-effectiveness of the options. In implementation, several options or technologies would be integrated under a single umbrella program. This approach allows TVA to capture lost opportunities and to realize synergies between programs. Administrative costs for options were developed considering more comprehensive program implementation. Care was taken not to overload options with high administrative costs, and to reflect potential scale efficiencies in the option cost estimates.
7. The implementation plans developed in partnership between TVA and distributors will address the impacts of the customer service options on distributors' costs and revenues, using the distributors' avoided costs and retail rates.

636

Comment: *Some of TVA's previous residential conservation programs did not pay for themselves, added to the cost of electricity for all customers, and were a significant financial drain on TVA. Residential energy programs should be funded by residential ratepayers or financed through the private sector or distributors and not add to the cost of electricity of all customers as past residential programs and pilots have been.*

Comment by: Tennessee Valley Industrial Committee

Response: Most of TVA's earlier residential energy conservation programs were initiated during the late 1970s and 1980s in response to the oil crisis. These programs reduced the peak demand for electric power by over 1,000 megawatts. The demand-side programs that have been identified for the residential sector in the short-term action plan have evolved significantly from these early programs. These new programs were identified based on their resource cost, the ability to minimize any rate impact, and their potential to enhance customer value.

The new and expanded Energy Vision 2020 residential programs are designed to work in partnership with the private sector and distributors of TVA power. These programs focus on equipment leasing, maintenance services, catalog and mail order delivery of energy efficient products, and development of the retail infrastructure. By emphasizing education and the customer value created by the residential programs, participants can better understand the full benefits provided to them. These programs allow program beneficiaries to pay more of the cost of the programs thus reducing potential cost increases to non-participants.

637

Comment: *Industrial customers may need to be shielded from residential demand-side management costs through rate design. However, the rate design should consider the benefit to industrial customers of more available power at key times.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: The Energy Vision 2020 residential programs were selected based on their resource cost, the ability to minimize any rate impact, their potential to enhance customer value, and other criteria. The residential options are designed to work in partnership with the private sector and distributors of TVA power. These programs focus on equipment leasing, maintenance services, catalog and mail order delivery of energy-efficient products, and development of the retail infrastructure. By emphasizing education and the customer value created by the residential programs, participants should better understand the benefits provided to them. This allows program beneficiaries to pay more of the program costs, thereby reducing potential rate impacts on other customer classes.

TVA periodically conducts cost-of-service studies to determine the proper allocation of costs for each rate class. The cost-of-service study would consider the availability of power, total energy consumption, load factor, and power factor in determining the optimal pricing strategy. TVA tries to allocate the costs of all resources required to provide reliable electric service, both supply-side and demand-side, in a fair and equitable manner.

638

Comment: *The validity of the entire Energy Vision 2020 process should be seriously questioned due to TVA's lack of consideration on reforming distributor service agreements. Throughout Energy Vision 2020, TVA has assumed a continuation of all existing requirements in its relationship with its distributors. To meet the distributors' future needs for power, TVA would either build generation internally or contract with external suppliers. This assumption is inconsistent with TVA's own "Phase 2" recommendation outlined in the Palmer Bellevue study.*

Contract reform was an integral part of the natural gas industry restructuring process. Pipelines negotiated reduced volumetric takes from producers as the large end

users and local distribution companies contracted for transportation-only services. The pipeline systems that negotiated settlements early and without excessive litigation were the ones with minimum take or pay and transition surcharges.

It is unrealistic for TVA, the nation's largest wholesale supplier, to expect that similar events in the wholesale electric industry are not likely to occur. TVA's vague treatment of this issue as an uncertainty, a probabilistic approach to competitive success, underscores TVA's lack of proactivity in wholesale contract reform. Memphis Light, Gas and Water urges TVA to consider bilateral discussions with its distributors to reform its service agreements.

Why did TVA not consider wholesale contract reform options in its Energy Vision 2020 process along with its other, and potentially more costly, resource options?

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Henry Nickell (Memphis Light, Gas and Water Division)

Response: Energy Vision 2020 is a strategic level document and analysis and specific contracting mechanisms were not evaluated. However, consequences of the actions referenced in this comment have been encompassed by the analyses done for Energy Vision 2020.

In Energy Vision 2020, the changing structure of the electric utility industry on both the supply and demand sides of the market have been considered. On the demand side of the market, TVA's load forecasts recognize the uncertainty in future load growth due to the uncertainty in the future competitive markets. (See Volume 1, Chapter 6, pages 6.4 and 6.5 and Volume 2, Technical Document 5, Load Forecasts.) In Technical Document 5, page T5.20, the future TVA competitive success is recognized as the second most important uncertainty in future load and sales levels. The uncertainty in TVA's sales certainly recognizes the recommendation of the Palmer Bellevue study that at some point in the future the "fence" and the "anti-cherry picking amendment" would not exist, opening the TVA market to wholesale competition. Further considerations in this analysis included the current 10-year cancellation notice contract, the potential for both full and partial requirement contracts, and provisions for stranded investment. The potential for retail open access was only considered qualitatively.

On the supply side of the market, the short-term action plan in Energy Vision 2020 recognizes the need for flexibility in the face of market price and load forecast uncertainty. The recommended supply-side options include both flexible internal and external options. (See Volume 1, Chapter 10, Figure 10-1.) These flexible options are the basis of the short-term action plan.

639

Comment: *TVA should do water conservation through things like "grey-water" systems and cistern systems.*

Comment by: Kathleen O'Donohue

Response: TVA encourages water conservation in conjunction with energy conservation (i.e., low flow shower heads). Presently, TVA has no program to encourage conservation of treated (potable) water by substitution of grey-water or rain water collected in cisterns for non-potable uses such as lawn watering.

640

Comment: *TVA should recruit retirees from other sections of the country to retire in the Valley.*

Comment by: John Sharp, Jr.

Response: Retirees are a recognized important and growing component of the economy. TVA, through its Economic Development Office, works with Valley communities to help them develop their economic development strategy given their particular circumstances.

641

Comment: *I support increased funding for nitrate research at TVA's Muscle Shoals facility.*

Comment by: James Barr

Response: Your comment has been reviewed and noted.

Beneficial Electrification

642

Comment: *TVA and the distributors have been working closely and doing a lot of research and development on beneficial electrification.*

Comment by: Michael Browder (Bristol Tennessee Electric System)

Response: Distributors of TVA power are key to development of beneficial electrification services. TVA also works with the Electric Power Research Institute and other agencies to conduct energy research on new technologies that increase the efficiency and productivity of energy use or reduce environmental impacts associated with energy consumption. In the short-term action plan, TVA identified beneficial electrification opportunities that are most likely to meet these goals.

643

Comment: *We suggest that the 4.7 and 2.5 values that are embedded in the current plan are gross numbers. Why have they not been netted out against the load growth promotion activities proposed by TVA?*

Comment by: Geoffrey Crandall (MSB Energy Associates)

Response: Block 1 of the customer service options is approximately 4.7 percent of the peak demand and 2.5 percent of the annual energy sales in the year 2010. While TVA has prioritized the options in Block 1 because of their low cost and low impact on rates, TVA has also included options from Blocks 2 and 3 in its short-term action plan. Options from Blocks 2 and 3 were included in the short-term action plan to address lost opportunities and to promote market transformation and equity among customers. By including many of the options in Blocks 2 and 3, TVA also builds the capabilities to deliver large-scale demand-side management programs based on future resource needs and costs.

The short-term action plan recommends 650 megawatts of demand-side management by the year 2002 and up to 2,200 megawatts of demand-side management by 2010.

644

Comment: *Why is off-system sales considered a resource and why is it listed as a customer service action in Volume 1, Chapter 10, Figure 10-1?*

Comment by: Eric Hirst (Oak Ridge National Laboratory)

Response: Off-system sales provide an opportunity to use TVA's generating resources when they are not needed to meet TVA customer needs. Off-system sales provide additional revenue to reduce the costs of power to TVA customers. Reductions in the cost of power from off-system sales add customer value; thus, off-system sales were treated as customer service options.

Demand-Side Management

EDUCATION

645

Comment: *TVA needs to go back to its energy education programs for alternative energy sources and conservation.*

Comment by: Sam Denham, Andrew Danzig, Michelle Neal (Tennessee Valley Energy Reform Coalition), Elaine Stancil, Stephen Smith (Tennessee Valley Energy Reform Coalition), Sanford McGee (Cumberland Center for Justice and Peace), Sheilla Cheyenne, Kathleen O'Donohue, Alan Ball

Response: TVA has included several new and expanded customer service options in the Energy Vision 2020 short-term action plan. The customer service options are directed to both residential and commercial and industrial customers of TVA and the power distributors. These options use education and incentives to encourage more efficient use of electricity. The customer service options are expected to provide 650 megawatts of alternative energy resources by 2002 and up to 2,200 megawatts by 2010.

646

Comment: *TVA should provide in the weekly newspaper information including rates, billing procedures, fuel use, reservoir management, etc. This would improve public relations and the public's understanding of TVA's objectives.*

Comment by: L. George Hannye, Bryan Deel, Stephanie Calvert

Response: TVA regularly communicates with the public through several media on different subjects. For example, TVA publishes many brochures and pamphlets that deal with the benefits of electricity, (e.g., *energy right* program). TVA also has an information line that is updated daily (TVA Today) and can be accessed at (615) 751-4000, or (423) 632-4000. This line provides information about TVA events, load demands, and power system output. There is also a 24-hour hotline on lake information [1-800-238-2264 or (423) 632-2264]. In addition, there is an information line on hydro unit discharge schedules that is popular with fishermen [(615) 632-6065].

647

Comment: *The public should be educated about mitigating environmental risks through demand-side management.*

Comment by: Sheila Holbrook-White (Sierra Club, Alabama Chapter), Sharon Fidler (League of Women Voters)

Response: Included in the long-term plan and short-term action plan of Energy Vision 2020 are the Student Self-Audit and Self-Audit programs. A significant feature of these programs is education of the public, including environmental education. TVA has participated with the Electric Power Research Institute in the development of software that compares the environmental emissions of different end-use equipment and differing fuels. Data from this software would be used in the audit programs to educate the public on the environmental impacts of home appliances. For example, heating a 1,500 square foot home with a typical heat pump will create 2,259 pounds of carbon dioxide per year at the generating facility. In comparison, a gas furnace will create 2,647 pounds of carbon dioxide per year, of which 2,042 pounds will be released at the home. Moreover, it is typically easier to control a point source of pollution (a power plant) than to control dispersed emissions (thousands of gas furnaces).

648

Comment: *TVA should also educate the public about "sick building syndrome"—buildings can be built too tight to save energy. Energy conservation can go too far.*

Comment by: Richard Simmers

Response: The American Society of Heating, Refrigerating, and Air Conditioning Engineers, a recognized organization for the development of residential and commercial building standards, has recently updated its recommendations for building ventilation. The new standards recommend higher levels of ventilation because of increased building efficiency, increased occupation, and increased use of office equipment. TVA supports compliance with the American Society of Heating, Refrigerating, and Air Conditioning Engineers standards and has plans to conduct training for architects and engineers on the new standards.

649

Comment: *I am concerned about light pollution which obscures the night sky. We have excessive, unneeded, and inefficient outdoor lighting. Rather than running commercials promoting the waste of energy, TVA should have commercials which educate the public about properly designed and efficient outdoor lighting.*

Comment by: Bruce Gant

Response: Energy Vision 2020 contains programs to encourage energy-efficient outdoor lighting for communities that require additional security and other lighting-related needs. (See Volume 1, Chapter 8.) However, both individual outdoor lighting decisions, and the associated effect on "light pollution" are issues that are best addressed and resolved at the local level.

650

Comment: *TVA needs to use its advertising dollars for commercials and education which explain the benefit that raising rates would have on encouraging energy conservation and reducing TVA's debt. TVA should explain how conservation measures can offset any increase in the rates. This would include measures such as turning off lights, appliances, and heating and cooling systems where unnecessary, and wearing proper clothing, energy-efficient lights, passive solar heating, and weatherization.*

Comment by: Dolores Howard

Response: The purpose of TVA's advertising program is to highlight how competitive TVA's electric rates are compared to other parts of the nation. Another relevant point of consideration is TVA's commitment to holding customer rates steady for another year. Competitive, stable rates allow TVA and its state partners to successfully recruit industry to the Valley, thus creating jobs. This is part of TVA's mission—to foster economic development in the Valley.

As proposed in Energy Vision 2020, TVA's customer service options address activities TVA and distributors would work on cooperatively to advertise and promote energy-efficient measures such as weatherization and audits to identify and install energy-efficiency measures or changes to save energy. (See Volume 1, Chapter 8.)

ENERGY EFFICIENCY

651

Comment: *TVA should have an internal conservation program that links to the federal program to save energy consumption in federal buildings by 20 percent by the year 2000.*

Comment by: Geoffrey Crandall (MSB Energy Associates), Hollis Fenn

Response: TVA has an Internal Energy Management Program. As part of this effort, there is an Energy Conservation Committee to guide and implement energy-efficiency initiatives for TVA facilities. A TVA-wide Internal Energy Management Policy and an Energy Plan have been developed. The 20-year plan targets total energy savings of 660,650 megawatt-hours per year.

652

Comment: *Why has TVA not linked its plan to the Institutional Conservation Program? There is a lot of federal money in this program. There is no mention in the plan for addressing the institutional sector such as schools and hospitals.*

Comment by: Geoffrey Crandall (MSB Energy Associates)

Response: TVA is committed to working with state and local organizations to achieve the greatest benefit from demand-side management programs. The funds under the Federal Institutional Conservation Program are dispersed through the individual State Energy Offices after proper guidelines and requests for funds have been met. However, the current budget proposal for the Federal Institutional Conservation Program is in Congress and a 50 percent reduction from last year has been proposed.

The institutional sector is addressed in Energy Vision 2020 as part of the commercial sector. Many of the energy efficiency and beneficial electrification options, identified for the commercial sector apply equally to the institutional sector. TVA is currently working

with school systems to install and test ground source heat pump systems. These systems show considerable promise in providing efficient and cost-effective heating and cooling for buildings in the institutional sector.

653

Comment: *I commend TVA for participating in the Environmental Protection Agency's Green Lights and Energy Star programs internally. If conservation is good for TVA, why do you not promote conservation with your customers, for example, distributors themselves?*

Comment by: Andrew Danzig, Leslie Shankman-Cohn

Response: TVA has included several customer service options in the short-term action plan to encourage more efficient use of energy. (See Volume 1, Chapter 10, Figure 10-1.) Options were included in the short-term action plan to target all customer segments including residential, commercial, and industrial customers. TVA will encourage both distributors and the customers they serve to participate in the options offered.

As a Green Lights partner, TVA encourages Valley businesses to participate in the Environmental Protection Agency's programs. TVA has sponsored and conducted training inside and outside of TVA to promote Green Lights and to certify new surveyor allies.

654

Comment: *The replacement of incandescent lamps with high pressure sodium lamps in the building interior (the last measure listed in Volume 2, Technical Document 7, LED exit signs and electroluminescent exit signs) would require the color corrected high pressure sodium lamps for aesthetic reasons and that comes in the 50-watt size and larger, not the 35-watt size.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: TVA addressed in Energy Vision 2020 the replacement of incandescent lamps with high pressure sodium lamps for both interior and exterior applications. TVA will investigate and promote the use of higher wattage high pressure sodium lamps in instances where they provide potentially higher value to the customer, (i.e., some indoor applications).

655

Comment: *Tennessee Valley Industrial Committee industries have made investments in energy-efficient equipment and continue to do so. The residential sector does not use electricity as efficiently as TVA's industrial customers.*

Comment by: Tennessee Valley Industrial Committee

Response: TVA recognizes the Tennessee Valley Industrial Committee industries' investments in energy-efficient equipment. TVA sees opportunities for continued improvements in the industrial sector, as well as other customer segments. The Energy Vision 2020 short-term action plan includes customer service options for all end-use customer segments. The customer service options for each segment were developed based on how electricity is used in the segment and the specific customer needs. Most of the energy efficiency options are targeted to the residential and the commercial sectors, acknowledging the greater efficiency potential in those sectors.

656

Comment: *TVA should be assisting small businesses to be more energy efficient.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: The Small Commercial Retrofit program, proposed in Energy Vision 2020, would focus on promoting energy efficiency and renewable technologies that benefit the local business community, TVA, and the customer by reducing costs, improving reliability, and enhancing customer satisfaction and competitiveness. This program would provide participants with an on-site audit where the auditor would install cost-effective lighting, water heating, and weatherization measures. The auditor would also identify and recommend any other applicable cost-effective, energy-efficient opportunities that may exist in the customer's facility. The auditor would refer the customer to other programs offered by TVA and/or power distributors that promote energy efficiency.

Additionally, the Commercial Heating,Ventilation, and Air Conditioning Maintenance program, proposed in Energy Vision 2020, would offer commercial customers maintenance contracts for their heating, ventilation and air conditioning systems. This would cover regular maintenance of the customer's heating, ventilation, and air conditioning equipment by TVA or a contractor. Proper maintenance of the system would result in energy savings and improved performance for the customer.

The Commercial and Industrial Energy Services option included in the short-term action plan includes targeted incentives to help achieve the energy efficiency goals of hard-to-reach small business customers. (See Volume 1, Chapter 10, Figure 10-1.)

657

Comment: *To fulfill its duty, TVA needs to help citizens become energy efficient just so they can pay their bills.*

Comment by: Myles Jakubowski (Sunbeam Household Products)

Response: Energy Vision 2020 includes numerous energy efficiency programs to encourage the adoption of conservation measures. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

The Residential Low Income program is included in both the long-term and short-term plans of Energy Vision 2020. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) This program is designed to help low income customers become more energy efficient by installing weatherization measures free of charge in their homes. Additionally, many of TVA's distributors currently offer a "warm neighbor" program to assist low income customers with their energy payments.

658

Comment: *TVA should make available to its customers energy-efficient lighting devices at a wholesale price.*

Comment by: Hollis Fenn, Catherine Murray (Sierra Club, State of Franklin Group), Sanford McGee (Cumberland Center for Justice and Peace), Carol Kimmons

Response: TVA has identified in its short-term action plan an Energy Efficiency Products Catalog program that would allow customers to purchase smaller, easily installed technologies that are not readily available in the marketplace. The program serves many purposes. First, the catalog will inform Valley consumers of the benefits and applications of

energy-efficient products, including lighting, and offer them the opportunity to purchase these products at a reduced price. The catalog also aims to stimulate the development of the retail infrastructure by increasing the demand for the energy-efficient products. This program will begin in 1996, with full-scale implementation expected to follow in 1997.

659

Comment: *TVA needs a program to retrofit older homes away from electric resistance heat.*

Comment by: Arthur Smith

Response: TVA presently offers a program under which low interest loans are available through participating power distributors for the purchase of heat pumps for existing homes. This program is available to many Valley residents in homes with older electric resistance heating systems, such as baseboard and ceiling heat, which are less energy efficient than current heat pumps.

The percent of Valley homes with electric resistance heating has declined steadily, from 37 percent in 1979 to 24 percent in 1992. During this same period, residences equipped with heat pumps have increased from 8.6 percent to 22.4 percent. The overall electric heating saturation has remained approximately 46 percent.

660

Comment: *TVA and distributors have been working together on demand-side management programs. We find that in the heat pump program, people use one-half to one-third of the power that they previously used under other systems.*

Comment by: Michael Browder (Bristol Tennessee Electric System)

Response: Distributors are a very important part of a successful demand-side management program. For example, the heat pump program has been successful at promoting high efficiency heat pumps and quality installations. The heat pump program is recommended for expansion in the short-term action plan and the long-term plan for Energy Vision 2020.

661

Comment: *Section 113 of the Energy Policy Act, paragraph B, subpart 1 requires a full range of existing and incremental resources be considered. TVA failed to examine the viability of fuel switching or fuel substitution as a demand-side management resource. Vermont, Michigan, and Wisconsin have explicitly quantified the impact of fuel switching in their resource plans. In Michigan they found an energy savings equivalent to a 700-megawatt base-load power plant, by converting water heaters, clothes dryers, and ranges from electricity to gas. Rather, in the form of beneficial electrification, TVA's draft is looking at just the opposite. TVA is looking at load building by switching gas customers to electric.*

Comment by: Geoffrey Crandall (MSB Energy Associates)

Response: Although TVA does not agree that Section 113 of the 1992 Energy Policy Act requires that TVA consider fuel switching as part of the Energy Vision 2020 process, TVA did, in fact, consider the viability of fuel switching, both in the context of an uncertainty and as a demand-side management option. TVA's analyses show that electricity is more economically efficient or equivalent to natural gas with respect to all applications with the exception of water heating.

662

Comment: *TVA should promote use of natural gas for home heating as a more efficient, less polluting source of energy compared to coal-produced electricity.*

Comment by: Catherine Murray (Sierra Club, State of Franklin Group), Benjamin Stewart (Faith Lutheran Church)

Response: TVA has a mix of generating stations including nuclear, coal, and hydro power. Energy Vision 2020 recommends that TVA maintain a portfolio of generation options to meet system needs and environmental concerns. If all of TVA's generation were coal, then natural gas heating would produce less overall pollution. TVA analyzed the emissions for heating a home, given TVA's overall generation mix, with a heat pump compared to a gas furnace. Heating a 1,500 square foot home with a heat pump will create 2,259 pounds of carbon dioxide per year at the generating facility. In comparison, a gas furnace will create 2,647 pounds of carbon dioxide per year, of which 2,042 pounds will be released at the home. Another important environmental consideration is that it was typically easier to control a single point source of pollution (a power plant) than to control dispersed emissions (thousands of gas furnaces).

People choose the fuel they use for space heating for many different reasons. For example, safety, cleanliness of the fuel, convenience, efficiency, and comfort are just a few of the reasons. In many areas of the Tennessee Valley, a high-efficiency heat pump is the most economical heating source for a customer, and customers may not be aware of the technological advances in heat pump efficiencies that have resulted in operating cost reductions.

663

Comment: *It is unclear how some load building efforts will help customers. For example, why should a customer be better off with electric heat than with gas heat and why should a federal agency seek to influence a fuel choice?*

Comment by: Eric Hirst (Oak Ridge National Laboratory), Robert Schreiber (Common Sense)

Response: The beneficial electrification options rely primarily on education, technical assistance, and promotion of high-efficiency options to encourage end-use customers to consider electric technologies.

People choose the fuel they use for cooking, water heating, and space heating for many different reasons. For example, safety, cleanliness of the fuel, convenience, efficiency, and comfort are just a few of the reasons. Additionally, TVA's analyses show that electricity is more economically efficient or equivalent to natural gas for all these applications with the exception of electric water heating. In many areas of the Tennessee Valley, a high-efficiency heat pump is the most economical heating source for a customer. Customers may not be aware of the technological advances in heat pump efficiencies that have resulted in operating cost reductions.

Like off-system sales, the beneficial electrification options provide an opportunity to operate TVA's generating resources optimally and maintain competitive rates for TVA and distributors. The beneficial electrification options also create customer value by promoting technologies with both energy and non-energy benefits for customers.

664

Comment: *TVA should not be promoting use of electricity for applications where natural gas is more efficient, such as electric cooking, electric water heating, and electric heating, and possibly heat pumps. TVA needs to educate customers about this.*

Comment by: Arthur Smith, Steven Walsh

Response: The beneficial electrification options rely primarily on education, technical assistance, and promotion of high-efficiency options to encourage end-use customers to consider electric technologies.

People choose the fuel they use for cooking, water heating, and space heating for many different reasons. For example, safety, cleanliness of the fuel, convenience, efficiency, and comfort are just a few of the reasons. Additionally, TVA's analyses show that electricity is more economically efficient or equivalent to natural gas for all these applications with the exception of electric water heating. In many areas of the Tennessee Valley, a high-efficiency heat pump is the most economical heating source for a customer. Customers may not be aware of the technological advances in heat pump efficiencies that have resulted in operating cost reductions.

Like off-system sales, the beneficial electrification options provide an opportunity to operate TVA's generating resources optimally and maintain competitive rates for TVA and distributors. The beneficial electrification options also create customer value by promoting technologies with both energy and non-energy benefits for customers.

665

Comment: *The Environmental Protection Agency wishes to stress the importance of conservation measures to reduce the need for new power generation and the attendant environmental impacts. The Environmental Protection Agency notes and appreciates the extensive analysis of demand-side management strategies in Energy Vision 2020. However, some other available options do not appear to have been considered in the document. As natural resources continue to fall under the pressures of an expanding population, conservation measures appear to be a viable option for the power industry as a whole.*

The Environmental Protection Agency recommends TVA's exploration and/or inclusion of an analysis of strategic tree planting as a demand-side management strategy to reduce summer cooling costs for residential and commercial buildings. The utilization of trees to affect ambient temperatures around homes and buildings has been documented in "Cooling Our Communities: A Guidebook On Tree Planting and Light-Colored Surfacing." This publication identifies opportunities which are consistent with the demand-side management approach.

Tree planting also contributes to lower urban temperatures as well as to the sequestration of carbon emitted from fossil-fuel plants. This may provide a mechanism for addressing some of the externalities of energy production from such plants. TVA may wish to consider sponsoring tree plantings to sequester carbon dioxide.

The Environmental Protection Agency also suggests consideration of light-colored surfacing as a demand-side management option. This approach involves reducing the amount of solar radiation absorbed by impervious surfaces and reflecting it back into space. This provides lower urban temperatures and reduces the amount of ozone production from photochemical reactions between carbon dioxide, nitrogen oxides, sulfur oxides and solar energy. The light-colored surfacing concept is being considered by the State of California as a method to improve air quality.

If more detailed information is desired, a copy of the Lawrence Berkeley Laboratory Report (LBL-31587) can be obtained from :

GPO Document #055-000-00371-8
Superintendent of Documents
P.O. Box 37194
Pittsburgh, PA 15220-7954
ATTN: New Orders

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA's cost-effective demand-side management measures provide benefits to customers and increase the flexibility of the power system. The Energy Vision 2020 short-term action plan recommends that TVA implement 650 megawatts of demand-side management by 2002. Tree planting for shading and carbon dioxide sequestering is an option that TVA will analyze for individual customers through the Residential Self-Audit and Commercial and Industrial Energy Services options included in the short-term action plan. In addition, TVA analyzed the effect of new carbon dioxide regulations assuming that carbon dioxide allowances would cost $10 per ton or that the equivalent could be spent on such carbon dioxide mitigation activities such as tree planting. TVA also analyzed light colored roofs for commercial buildings. In general, this technology was not cost-effective because of increased energy consumption requirements for heating. TVA recognizes that this is an option that may be cost-effective for individual customers based on their specific operating characteristics. Again, TVA will analyze this technology for individual customers through the Commercial and Industrial Energy Services option.

666

Comment: *TVA should subsidize shade trees and wind breaks in residential areas. This would conserve energy and offset environmental damage caused by current methods of generating electricity.*

Comment by: Retha Ferrell

Response: TVA's cost-effective demand-side management measures provide benefits to customers and increase the flexibility of the power system. The Energy Vision 2020 short-term action plan recommends that TVA implement 650 megawatts of demand-side management by 2002. (See Volume 1, Chapter 10, Figure 10-1.) Tree planting for shading and carbon dioxide sequestering is an option that TVA will analyze for individual customers through the Residential Self-Audit and Commercial and Industrial Energy Services options included in the short-term action plan. Wind breaks also have benefits in certain situations. However, the energy impacts are very site-specific and difficult to quantify.

667

Comment: *TVA should provide free energy audits for all households.*

Comment by: Linda Cataldo Modica

Response: The Residential Self-Audit program and Residential Student-Audit program are included in the short-term action plan. These programs will provide customers an opportunity to perform their own audit. TVA will analyze the audit information and make recommendations for energy savings.

668

Comment: *To encourage conservation, TVA should offer rebates or rate adjustments to those who design more energy-efficient new or remodeled buildings or for the use of more energy-efficient appliances. What effect would this have on the need to build new capacity?*

Comment by: Andrew Danzig, Bruce Wood, Don Scharf (Sierra Club, Middle Tennessee Group), Debra Jackson, Eileen McIlvane (Coalition for Jobs and the Environment)

Response: The short-term action plan recommends that incentives or financing be offered to both residential and commercial customers to design more energy-efficient new or remodeled buildings. These recommendations are contained in the Residential New Homes program and the Commercial and Industrial Energy Services option. It is difficult to forecast the penetration of specific program components like these; however, TVA expects a substantial reduction in load demand as a result of the total demand-side management program identified in the short-term action plan. In total, these are projected to save 650 megawatts of capacity by the year 2002 and up to 2,200 megawatts by 2010.

669

Comment: *I have problems with rewarding the building industry for including energy-efficient options. They seldom do this in a smart manner. Rather, we should educate the end user who will want homes which are more energy-efficient and then builders will build them.*

Comment by: Dolores Howard

Response: As stated in Energy Vision 2020, TVA's residential energy-efficiency options would emphasize the responsibility of the dealer/contractor to provide a quality energy-efficient technology installation. (See Volume 1, Chapter 7.) The Quality Contractor Network provides training for dealers, execution of post-inspection checklists, and awards for maintaining high installation standards. Standards will be established for all program installations to ensure the satisfaction of the consumer and the efficient operation of the system. Inspections during the building process will ensure adherence to program standards. The Self-Audit program included in the Energy Vision 2020 short-term action plan includes educational information to help end-use customers make better decisions regarding energy use.

670

Comment: *A building envelope technology that is making significant penetration in our experience is to replace huge old banks of single pane windows with state of the art "Low E" and insulated glass and "Window Wall" technologies. You might want to expand the table to include this measure category.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: TVA analyzed replacement of standard efficiency windows with high efficiency windows for new buildings. While it was a cost-effective option in new construction, window film used in commercial buildings captures much of the energy and demand savings at a much lower cost. TVA recognizes that many applications of efficient technologies may be cost-effective on a site-specific basis. The Commercial and Industrial Energy Services option will include a process for analyzing these.

671

Comment: *TVA should provide flexible demand-side management options for non-participants.*

Comment by: Sharon Fidler (League of Women Voters)

Response: The customer service options included in the Energy Vision 2020 short-term action plan provide a low-cost resource to meet the demand for electricity, enhance customer value, and have minimal impact on rates. (See Volume 1, Chapter 10, Figure 10-1.) By minimizing the impact on rates, TVA reduces the impact of customer service options on non-participants. In addition, many of the options included in the short-term action plan focus on market transformation. Market transformation efforts make energy-efficient technologies more available in the marketplace for both program participants and non-participants.

672

Comment: *Some kind of tax credits or energy credits should be given to industries and homes and businesses to implement conservation and efficiency programs. I think that would create jobs through weatherization of every structure in the Valley, and it would save electricity.*

Comment by: John Johnson (Earth First)

Response: Energy Vision 2020 includes numerous energy efficiency programs to encourage the adoption of conservation measures. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) The creation of jobs was considered for all final strategies. The analysis included jobs created by both demand-side management programs and supply-side technologies.

673

Comment: *TVA has chosen an unbundled approach to program option development whereby it develops individual program components and screens them independently. This unbundled approach has advantages in that it allows cost-effectiveness testing and ranking of each component and prevents justifying poor options by combining them with other very cost-effective ones. It also has some potential disadvantages, however. It prevents development of comprehensive programs that build on a single point of contact with the customer to capture potential lost opportunities and maximize measure penetration. It also limits capturing synergies between programs. For example, audit programs can be combined with direct installation, rebate, or finance programs so that the audit effectively becomes a marketing and delivery mechanism, rather than a program in itself.*

Comment by: Tennessee Valley Public Power Association

Response: Options were developed for planning purposes. In the analysis of customer service options, TVA noted that while some technologies may be promoted using similar delivery strategies, there may be significant differences in the costs and impacts of those technologies. In most cases, the cost-effectiveness of the customer service options considered in Energy Vision 2020 was driven by the technology costs and impacts. Decisions to aggregate or disaggregate technologies within options were made to improve the overall cost-effectiveness of the options.

In implementation, several options or technologies would be integrated under a single umbrella program, similar to the current Residential Energy Efficiency Program offered by TVA. The Residential Energy Efficiency Program includes a heat pump pro-

gram, new homes program, and a manufactured housing program under one umbrella for the reasons suggested in this comment. When a customer is installing a new heat pump, TVA requires a home to meet certain weatherization standards to ensure optimal equipment selection and performance. This example illustrates the approach that allows TVA to capture lost opportunities and to realize synergies within and between programs. Administrative costs for options were developed considering more comprehensive program implementation. Care was taken not to overload options with high administrative costs, and to reflect potential scale efficiencies in the option cost estimates.

674

Comment: *We agree that further refinement of the first two blocks of demand-side management, which include effective load management and generally accepted low-cost conservation, is needed. This effort should be accomplished in concert with the Tennessee Valley Public Power Association's Energy Services Committee, since success of these programs will depend on distributor acceptance and implementation.*

Comment by: Tennessee Valley Public Power Association

Response: TVA has included in the short-term action plan several options from Blocks 1 and 2 of the customer service options. (See Volume 1, Chapter 10, Figure 10-1.) Some of the options will be implemented full-scale and several of the options will be implemented as flexible demand-side management options. These flexible demand-side management programs provide an opportunity to build the capabilities to deliver large scale demand-side programs. These further afford TVA the opportunity to test alternative delivery strategies to better assess the market potential associated with each. Flexible programs also provide an opportunity to work with the distributors of TVA power to develop partnerships and resolve implementation issues.

For all programs in the Energy Vision 2020 short-term action plan, TVA will develop implementation plans in partnership with distributors to assure greater acceptance. In those implementation plans, several issues will be addressed. Those issues include TVA and distributor roles in delivering customer service options, impacts of the options on distributors' costs and revenues, and possible incentives to encourage and reward distributor participation in options.

675

Comment: *Program customer participation, measure penetration, and free ridership estimates were developed based on the experience of other utilities. In general, these estimates seem low, and the rationale and assumptions used in developing them should be further explored. It is possible that they are based on results from many older programs that had not benefited from the significant lessons learned over the past decade of demand-side management implementation throughout North America, and do not reflect the current state-of-the-art in demand-side management implementation potential.*

Comment by: Tennessee Valley Public Power Association

Response: In developing customer service options, TVA benchmarked against the best programs offered nationally and previous programs offered in the Valley. TVA looked at both prospective participation estimates and participation levels measured from actual program experience. TVA considered the best features of the best programs and estimated the potential penetration combining those program attributes. In addition, TVA

assessed the effectiveness of each delivery mechanism in overcoming the market barriers that exist and prevent adoption of energy efficient technologies.

Considering this, the participation rate and measure penetration rate estimates included in the plan provide a fair basis for assessing the potential impacts of the customer service options. As programs are implemented, TVA will monitor and evaluate several program aspects, including participation rates and measure penetration rates. As better information becomes available, planning estimates will be updated and refined to reflect actual program experience.

676

Comment: *We disagree with the commercial and industrial customer service program market penetration estimates in the plan. For example, we believe that more than 15 percent of the facility owners in the Valley will be interested in insulating the roofs of their buildings.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: There is considerable uncertainty associated with the market penetration of specific demand-side technologies. The penetration estimate of individual energy-efficiency options was based on several factors. Those factors included: option cost-effectiveness, the potential net benefits of an option, the persistence of energy savings over time, technical feasibility; and the current penetration of standard and efficient technologies. The penetration of roof insulation for commercial and industrial customers was limited by the current penetration of roof insulation and technical feasibility. The expected market penetration potential for roof insulation was addressed in two options: the Heating, Ventilation, and Air Conditioning Technology Rebate option and the Measure Financing option. TVA's penetration estimates for these programs range from 15 to 30 percent of the target market, depending on which options are selected.

677

Comment: *The 60 percent specialized chiller and cooling tower penetration figures in your table are for a much more limited population than the rest of the figures and should be clearly footnoted as such. Incidentally, you might want to add large schools to this footnote along with offices and hospitals.*

With cooling towers, we have found that the simple replacement of the 20 year old one with the latest (quite often with a downsizing because the original one was oversized) results in a significant savings in energy usage. We wonder if you might want to include replacement of the cooling tower in this measure category.

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: This is noted at the bottom of the table in Volume 2, Technical Document 7, page T7.44.

TVA recognizes that many unique efficiency opportunities will be cost-effective based on a customer's facility and specific operating characteristics. The Commercial and Industrial Energy Services option will include a process for assessing these.

678

Comment: *In Volume 2, Technical Document 7, page 7.42, we feel that the heading "Annual Eligible Population" on the middle table should be footnoted to show that it is in thousands of square feet and is approximately one-tenth of the total square footage of*

commercial and industrial buildings in the TVA area (approximately the annual percentage confronting replacement of lighting systems each years).

Also, we feel that your percentage assumptions for the "Free Driver Rate" (which we now understand to mean the percentage of those who will implement these technologies but for various reasons (like adversity to bureaucracy and paperwork) choose to avoid participation in the TVA programs) which is showing 0 percent is probably too low. We would like to suggest at least 10 percent and that any lower value would tend to underestimate penetration of these lighting technologies into the marketplace. Similarly for the "Free Rider Rate" which is reflective of the present situation with no TVA programs, the future of 15 percent is too low. We might suggest 25 percent.

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: On page T7.4 of Volume 2, Technical Document 7, the section, Option Descriptions, provides a guide to interpreting the data presented for each of the customer service options.

Both the free driver rate and the free rider rates are based in part on the current penetration of energy efficient technologies in the marketplace. Despite the fact that energy efficient lighting technologies are very cost-effective, they have a very low penetration currently. As programs are implemented, TVA will monitor and evaluate several program aspects, including free driver rates and free rider rates. As better information becomes available, planning estimates will be updated and refined to reflect actual program experience.

679

Comment: *Under LED exit signs and electroluminescent exit signs the market penetration is probably overstated, while the one for fluorescent exit signs is probably understated. Electroluminescent signs are very expensive and the economics on them very poor and LED retrofit kits supply so little light that they can only be used in the thinnest signs. Our experience would indicate values of 20 percent, 5 percent, and 50 percent, respectively.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: The estimate of penetration for each measure was based on the measure's cost-effectiveness, technical feasibility, the persistence of energy savings over time, and the current penetration of the base and efficient technologies. Significant technological advancements have been made with LEDs allowing simple retrofits of existing exit signs. Because of the longer life of LEDs, you get both greater energy savings initially and greater persistence of energy savings over time. The persistence of energy savings from electroluminescent exit signs is even greater than that for LEDs.

As programs are implemented, TVA will monitor and evaluate several program aspects, including measure penetration rates. As better information becomes available, planning estimates will be updated and refined to reflect actual program experience.

680

Comment: *In Volume 2, Technical Document 7, page T7.43 we feel that your "Measure Penetration" value for T-8/electronic ballasts is too high because the figure for reflectors/delamp/electronic ballasts is too low. Our experience is that the two numbers for penetration should be more like 50 percent and 50 percent.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: The estimate of penetration for each measure was based on the measure's cost-effectiveness, technical feasibility, the persistence of energy savings over time, and the current penetration of the base and efficient technologies. While reflectors result in additional energy savings, they have a significantly higher first cost than the T-8/electronic ballasts. In addition, reflectors require a higher level of maintenance. Without proper maintenance, lighting levels deteriorate and energy savings do not persist.

As programs are implemented, we will monitor and evaluate several program aspects, including measure penetration rates. As better information becomes available, planning estimates will be updated and refined to reflect actual program experience.

681

Comment: *We feel that with the new roofing technologies like spray insulation foam roofing, the penetration value for addition of insulation in the roof shown at 15 percent low and should be more like 50 percent.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: The estimate of penetration for each measure was based on the measure's cost-effectiveness, technical feasibility, the persistence of energy savings over time, and the current penetration of the base and efficient technologies.

As programs are implemented, TVA will monitor and evaluate several program aspects, including measure penetration rates. As better information becomes available, planning estimates will be updated and refined to reflect actual program experience. TVA recognizes that many efficiency opportunities will be identified based on the characteristics of a customer's facility and operations, and through development of new technologies and processes. The Commercial and Industrial Energy Services option will include a process for assessing these opportunities.

682

Comment: *To make the document clearer, we feel that you should include building envelopes in HVAC/Building Envelope section's heading in Volume 2, Technical Document 7, page 7.44. Building envelope measures should be a significant percentage of this category.*

Comment by: Wilson Prichett (Tennessee Valley Energy Management Association)

Response: Savings from building envelope measures account for a significant portion of the savings from this option. Program names were selected to suggest the types of measures and incentives that might be available and may not include all possibilities. While heating, ventilation, and air conditioning (HVAC) is usually used to refer to equipment measures it is also suggestive of possible building envelope measures as well. We will change the name of the option in the Technical Document for clarity.

Low Income Programs

683

Comment: *Industrial customers have the capital to make demand-side management investments, but many of us, especially low income customers, do not.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: To assist residential customers, many of the demand-side management programs would offer financing. The Low Income program included in both the long-term and short-term plans of Energy Vision 2020 installs certain weatherization, as well as other practical measures, free of charge for low income customers. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

684

Comment: *TVA's Low Income Weatherization program cannot and should not be a band-aid resulting from the additions of fluorescent lighting and low-flow shower heads.*

Comment by: Martha McGill

Response: TVA is working with community action agencies to implement the Residential Low Income program, which is included in both the long-term and short-term plans of Energy Vision 2020. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) The program provides for quickly surveying a low income residence, installing cost-effective weatherization measures, and providing education about saving energy. Included in the program are compact fluorescent lights, low flow showerheads, as well as pipe insulation, water heater tank wraps, heating, ventilation, and air conditioning maintenance, and attic insulation where cost-effective.

685

Comment: *It seems that now there are local utilities and agencies providing separate weatherization and audit programs. If these were done by one entity the monetary savings could be used to fund low income programs.*

Comment by: Richard Bond, Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA plans to work with the community action agencies and other state and local agencies to leverage existing low income efforts and funding. Working together, we can provide the best service possible to low income customers.

686

Comment: *How will TVA identify who qualifies for its low income consumer program? What income guidelines would be used? Are renters eligible or just homeowners? What measures are included, if any, to urge landlords, both private and Section 8, to implement and utilize energy saving measures?*

Comment by: Naomi Furman Kipp (Legal Services Corporation of Alabama)

Response: TVA is working with community action agencies to develop the detailed implementation plan for the Residential Low Income program which is included in the long-term plan and the short-term action plan of Energy Vision 2020. (See Volume 1, Chapter 9, Figures 9-23 and Chapter 10, Figure 10-1.) As designed, the program would include

renters and homeowners, and target 16 percent of Valley residences as low income. Details concerning eligible customers and renter/landlord interaction will be developed and finalized as part of the detailed implementation plan.

687

Comment: *Do not encourage heat pumps rather than weatherization for low income persons who cannot afford heat pumps.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

Response: TVA does not encourage the installation of heat pumps in low income applications when the energy savings would be insufficient to allow the customer to make the payments for a heat pump. The Low Income Weatherization program proposed in Energy Vision 2020 does not provide for the installation of heat pumps. The Low Income program included in both the short-term action plan and the long-term plan provides for simple, cost-effective measures for both the customer and for the power system. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

688

Comment: *A possible answer to the dilemma of providing services to low income customers during deregulation is what is known as a "systems benefit charge." There are various ways to handle this charge under the devise of many names, but whatever the form, it must be both nonbypassable and competitively neutral. So, placing a charge on the use of the distribution system (with distribution defined broadly to include both high and low voltage end-use consumers) answers both concerns. This approach to paying for system benefits is also how utilities' allowable stranded costs should be recovered. In essence, system benefits charges can be implemented relatively quickly and easily. Implementation preserves benefits while giving regulators time to assess what services are effectively produced in a competitive electric market. Removing the risk that restructuring places on these benefits will allow all stakeholders to engage in a more productive dialogue.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: As the electric utility industry is restructured from a regulated monopoly to a more competitive industry, the benefits provided by utility services to low income customers are not likely to be provided by utilities in the future. These services, if continued, will more likely be provided in the same manner as other government-supplied benefits. Even though TVA is entering a more competitive market, TVA has included a flexible demand-side management program in Energy Vision 2020 to assist low income consumers. In addition, many of the concerns expressed regarding low income customers are being addressed by various power distributor programs already in place such as "warm neighbor" programs and work with community action groups.

689

Comment: *If restructuring shifts responsibility for paying costs onto captive customers, the revenues needed should be collected only with state legislative approval.*
In their deliberations over the restructuring of the electric industry, state and federal regulators are urged to adopt the following policies, at a minimum, necessary to protect residential customers on fixed and low incomes:

1. *Affordable Access*
   Any alternative structure must include all of the following:
   A. *Maintain the obligation of utilities and/or other providers to serve as the provider of last resort for vulnerable customers, such as fixed and low income consumers;*
   B. *Enable fixed and low income customers to obtain electricity essential to health and safety;*
   C. *Require utilities and/or other providers to provide affordable service to low or fixed income customers;*
   D. *Provide comprehensive energy conservation and efficiency grant programs. These must improve the efficiency of energy services for fixed and low income customers, address indoor air quality, and make optimum use of the existing network of low income weatherization providers;*
   E. *Provide affordable deposit and deferred payment policies; and*
   F. *Prevent mandatory use of service limits, prepayment cards, or other forms of degraded service.*
2. *Fair Billing and Collection Procedures*
   Any alternative industry structure must ensure freedom from abusive and unfair collection procedures and from unfair disconnect practices. It must:
   A. *Provide adequate notice of proposed termination of service;*
   B. *Provide reasonable payment arrangement options for current and deferred bills;*
   C. *Provide access to customer service representatives who are knowledgeable in the areas of customer assistance, bill assistance, different rate and weatherization programs, energy education, and payment options;*
   D. *Prohibit disconnections that threaten the health and safety of vulnerable customers;*
   E. *Maintain the right to appeal an unfair utility action to an impartial regulator.*
3. *Participation In Setting Public Policy*
   Low and fixed income customers must be able to participate in collaborative or any other form of decision-making relative to electric industry restructuring issues, with funding for full participation.
4. *Environmental Justice*
   Historically, low income and minority communities have been disproportionately harmed by local generation and transmission siting. Any alternative industry structure must avoid adverse environmental and safety impacts on low income and minority communities.
5. *Long-Term Perspective*
   Any alternative industry structure must provide a balanced portfolio of energy resources that are affordable, sustainable, reliable, environmentally and socially responsible, and economically efficient. Such an alternative industry structure must prevent environmental degradation and minimize employment. Long-term goals must not be sacrificed for a short-term perspective which may reduce rates for some customers while increasing bills for fixed and low income customers and exposing them to unacceptable environmental risks.
6. *Fair Allocations of Costs and Benefits*
   A. *The costs resulting from past decisions in the electric industry, especially those that built load and industrial customers' demand, must not be borne by the low-income customer.*
      - *Stranded investments must be borne by providers, industrials, and investors through non-by passable charges.*

- *Stranded costs must be borne by utilities now through rate reductions for all customers without waiting for final resolution of the restructuring issue.*

B. *All customers, including fixed and low income customers, must share in the benefits of a restructured electric industry. Restructuring must not go forward unless bills go down for everyone.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Many of the concerns expressed regarding low income customers are being addressed by various power distributor programs already in place such as "warm neighbor" programs and work with community action groups. The Energy Vision 2020 short-term action plan and the long-term plan also include a low income program to help these consumers conserve energy. (See Volume 1, Chapter 10, Figure 10-1.) The long-term portfolio of options would provide a balance of resources that are affordable, sustainable, reliable, environmentally and socially responsible, and economically efficient. (See Volume 1, Chapter 9, Figure 9-23.) The multi-attribute trade-off method used in the planning process allowed TVA and the public, including the Energy Vision 2020 Review Group, to analyze the trade-offs associated with these objectives and to make informed decisions. The resulting long-term portfolio developed in this process should provide TVA with the knowledge and flexibility to meet the challenges of a changing world and the concerns expressed in this series of resolutions.

690

Comment: *TVA should encourage its distributors to be more conscious of low income issues and promote permanent solutions such as bill averaging and rate discounts.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition), Naomi Furman Kipp (Legal Services Corporation of Alabama)

Response: TVA encourages the distributors of TVA power to be conscious of low income issues and concerns. Currently, many distributors offer "bill averaging" programs and "warm neighbor" programs to assist their low income customers.

691

Comment: *Utility bills should allow individuals to donate money to help fund low income electric bills. This should be TVA-wide and publicized.*

Comment by: Richard Bond

Response: Currently, many distributors of TVA power offer "warm neighbor" programs to assist low income customers with their energy payments. TVA encourages distributors to be conscious of low income issues and concerns. There are also several organizations that would be happy to receive donations from Valley residents to assist low income families.

692

Comment: *TVA should work with its distributors to identify unclaimed customer refunds and overcollections and target these monies toward something like low income weatherization programs. This would not affect rates and has been done in Michigan by the Edison Company.*

Comment by: Geoffrey Crandall (MSB Energy Associates)

Response: Using unclaimed monies for a designated purpose such as weatherization is an interesting idea. The use of unclaimed monies is generally regulated by individual state laws. This idea has been communicated to the distributors of TVA power for their consideration.

693

Comment: *TVA is doing a poor job of protecting the low income residential customer. There was not a low income representative on the Energy Vision 2020 Review Group. TVA should have some low income programs. The low income programs should have free lighting and home insulation for the low income, elderly, and disabled.*

Comment by: Debra Jackson, Elaine Stancil, Peggy Snow, Betty Vincent, Carolyn Novkov, Linda Cataldo Modica, Michelle Neal (Tennessee Valley Energy Reform Coalition), Stephen Smith (Tennessee Valley Energy Reform Coalition), Dennis Henke, Susan Bailey

Response: A low income customer option has been included in the Energy Vision 2020 short-term action plan and long-term plan. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.) Under this program, site visits would be made, and energy-efficient lighting, attic insulation, water heater wraps, pipe insulation, faucet aerators, low-flow shower heads, and caulking would be installed. There would be no cost to recipients. TVA has already initiated discussions with state and local community action agencies to prepare for implementation of the Low Income program. TVA will work in cooperation with the community action agencies and other state and local agencies to identify the needs of this customer group and to deliver the program cost-effectively. In any future stakeholder groups, TVA would certainly consider a low income representative.

Load Management

694

Comment: *Bristol Tennessee Electric System working with TVA already has 6,000 water heaters that can be cut off if there is a shortage. That is an example of an opportunity for saving energy, lessening the need to build new plants.*

Comment by: Michael Browder (Bristol Tennessee Electric System)

Response: Bristol has a very good water heater program. Bristol and other TVA power distributors currently participate in the direct load control of residential water heaters. Residential water heater load management is included in the long-term plan and the short-term action plan.

695

Comment: *Electric water heaters should have switches for cycling.*

Comment by: Retha Ferrell

Response: TVA presently has a radio control system that cycles water heater load to reduce power demand during hours of peak electrical usage. Energy Vision 2020 proposes to

expand participation in the program which is targeted to residential customers with electric water heaters in participating power distributor areas.

696

Comment: *TVA should work more with distributors to reduce peak use and reduce resistance through the wires. Everything should not be controlled from a central location.*

Comment by: Debra Jackson, Nancy Bell

Response: TVA is examining this issue by partnering with power distributors to study distributed generation and storage options to reduce peak system load and losses and increase peak system reliability. Distributed generation and storage consist of power generation facilities located close to energy users. These are normally small-size units (less than 50 megawatts) and may include both generation and energy storage technologies. TVA and distributors are also incorporating direct load control of water heaters and air conditioners to reduce peak demand. This program is recommended to be continued and expanded in Energy Vision 2020.

697

Comment: *As a conservation measure, TVA should establish a plan for 15-minute rotating blackouts for all customers.*

Comment by: John Sharp, Jr.

Response: TVA currently has over 1,700 megawatts of curtailable load through Limited Interruptible Power and Economy Surplus Power rates. TVA's interruptible load was critical this summer in allowing TVA to balance demand for electric power with the available supply during the recent period of high temperatures. TVA plans to pursue additional load management capability in the Energy Vision 2020 short-term action plan through increased residential direct load control, promotion of commercial thermal storage technologies, and a commercial group load curtailment strategy. Instituting 15-minute rotating blackouts for all customers is not considered an appropriate conservation measure. Such blackouts would be disruptive to the economy and critical services.

Rates/Pricing

698

Comment: *TVA's interruptible power rates are effective demand-side management because they offer lower rates to industries, allowing power to be interrupted when system peak approaches system capabilities. As a result, homes, hospitals, and other users could operate air conditioners and cooling systems without fear of power shutdown.*

Comment by: Tennessee Valley Industrial Committee

Response: We agree. TVA has been able to reduce its system power requirements by an estimated 1,780 megawatts by industrial customers' response to interruption notices. This allowed TVA to continue to provide other consumers with firm power supply.

699

Comment: *Interruptible rates and peaking out represent poor utility planning. More energy efficiency and demand-side management would avoid this.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA disagrees. These interruptible rates provide a cost-effective strategy for balancing demand for electric power with the available supply during extreme system peaks. Interruptible rates are an important demand-side management option that helps to avoid the need to construct new generating facilities that would be used only a few hours each year. TVA currently has over 1,700 megawatts of curtailable load through Limited Interruptible Power and Economy Surplus Power rates. The TVA power system is planned to provide a reliable source of power without interruption to customers unless otherwise specified in their contracts.

700

Comment: *TVA should use creative rate designs to modify demand. Why did TVA not evaluate changing its wholesale rates and retail rate structure to provide incentives that would be cost-competitive with other resource alternatives?*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Henry Nickell (Memphis Light, Gas and Water Division), Sharon Fidler (League of Women Voters)

Response: TVA has developed a series of wholesale and retail time-of-day rate options which are designed to shift consumption to off-peak hours when the cost of generating electricity is lower than on peak. Declining block rates were also considered in Energy Vision 2020. A declining block rate charges less for electricity when usage exceeds a certain amount. These rates reflect the lower cost of supplying additional power to existing customers and can be used to encourage new beneficial uses of electricity. (See Volume 1, Chapter 8.)

701

Comment: *While not explicitly addressed in TVA's demand-side management plan, an integral and important issue is the incentives or disincentives for implementing demand-side management faced by TVA's wholesale distributors. TVA recognizes the inherent disincentive for demand-side management created by its wholesale rate structure. Because distributors generally receive a mark-up on each kilowatt-hour sold, energy efficiency, load management, and self-generation all have potential negative impacts on wholesale distributors' balance sheets, and rates, resulting from lost revenue.*

TVA has expressed a willingness to consider proposals for removing the disincentive, and possibly creating incentives, for distributors to pursue demand-side management. This should be investigated as part of the Energy Vision 2020 review process. Approaches could include recovery of all direct expenses for program implementation as well as reimbursement of lost revenue. Another possibility distributors could investigate is shifting the margin they recover on rates to base-load sales, with the result of decoupling net revenues from short-term sales. If the distributors' financial disincentives to demand-side management can be overcome, the significant customer service benefits of demand-side management should provide distributors with a significant incentive to aggressively pursue a demand-side management plan.

Comment by: Tennessee Valley Public Power Association

Response: TVA has included several customer service options in its short-term action plan. (See Volume 1, Chapter 1, Figure 10-1.) These options are designed to improve energy efficiency, help customers manage their demand, and to promote beneficial new uses of electricity. The variety of options allows distributors to choose those options that help them meet their individual load shape objectives.

TVA will develop implementation plans in partnership with distributors for each of the customer service options included in the short-term action plan. In those implementation plans, several issues will be further addressed. Those issues include TVA and distributor roles in delivering customer service options, impacts of the options on distributors' costs and revenues, and possible incentives to encourage and reward distributor participation in programs. TVA will work with the Tennessee Valley Public Power Association committees and with individual distributors. This process has already begun.

702

Comment: *What incentives do distributors have to participate in demand-side management programs given TVA's current end-use billing rate structure?*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: TVA will develop implementation plans in partnership with distributors for the customer service options in the short-term action plan. Those implementation plans will further address several issues. Those issues include: TVA and distributor roles in delivering energy services, the impacts of customer service options on distributor costs and revenue, and possible incentives to encourage and reward distributor participation.

703

Comment: *Discussion of TVA pricing practices is much too sketchy. The links between prices and the resource plan are not specified. I suspect that TVA's pricing is not consistent with its costs. Changing pricing policy would allow TVA to consider acquiring more demand-side management than the anemic amount suggested—equivalent to only 4.7 percent of peak demand and 2.5 percent of annual sales in 2010. Many United States utilities have already exceeded those levels of demand-side management performance. Setting energy prices close to short-term marginal costs would eliminate much of the lost-revenue effect of demand-side management and thereby greatly reduce demand-side management's upward pressure on rates.*

Comment by: Sharon Fidler (League of Women Voters), Eric Hirst (Oak Ridge National Laboratory)

Response: As with many electric systems today, TVA's average costs are higher than either short-run or long-run marginal costs. In the current environment, demand-side management activity may cause revenue erosion. However, the marginal cost of new capacity is so low that basing prices on marginal cost could encourage additional consumption. Following Energy Vision 2020, TVA will conduct a cost-of-service study. There are many more considerations in setting prices than just the impact of demand-side management. TVA will monitor and change its resource plans as pricing policies change.

Block 1 of the customer service options is approximately 4.7 percent of the peak demand and 2.5 percent of the annual energy sales in the year 2010. While TVA has prioritized the options in Block 1 because of their low cost and low impact on rates, TVA has also included options from Blocks 2 and 3 in its short-term action plan. Options from Blocks 2 and 3 were included in the short-term action plan to address lost opportunities

and to promote market transformation and equity among customers. By including many of the options in Blocks 2 and 3, TVA also builds the capabilities to deliver large-scale demand-side management programs based on future resource needs and costs.

The short-term action plan recommends 650 megawatts of demand-side management by the year 2002 and up to 2,200 megawatts of demand-side management by 2010.

704

Comment: *TVA is proposing a declining block rate. This encourages customers to use more which is anti-conservation and an out-of-date approach. We question the legality of such a rate structure that is biased toward large customers and which discriminates against low income and residential customers. All mention of this should be removed from the plan.*

Comment by: Geoffrey Crandall (MSB Energy Associates)

Response: TVA considered a declining block rate in Energy Vision 2020 but did not include it in either the long-term plan or the short-term action plan. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

705

Comment: *Rates should increase with the amount of electricity you use. Those using the lowest amount of electricity should have the lowest rates.*

Comment by: Arthur Webb, Retha Ferrell

Response: The majority of distributors bill residential consumers on flat rates, where all electricity is billed at the same price. A few distributors apply inverted rates that price increased usage at a higher rate. Although consumers may respond to higher prices by using less electricity, this may not be an efficient response, since the higher price could discourage the use of highly energy-efficient appliances like heat pumps.

706

Comment: *An experiment conducted by psychologists at Princeton found that meters in the home reduced electric consumption by 19 percent, which is approximately the nuclear contribution now.*

Having variable rates for low-demand times of the day and week would level out the use of electricity, which would reduce the needed generation capacity of peaks.

Comment by: Fred Wright

Response: An effort was made without success to locate documentation of the Princeton experiment to assist in preparing a response to this comment. It appears from the comment, however, that an experiment at Princeton apparently involved placing "smart meters" in residences. These meters are typically used in conjunction with time-of-use rates and notify the customer which rate period is in effect.

TVA has considered the use of wholesale and retail time-of-use rates in Energy Vision 2020. (See Volume 1, Chapter 7.) Such rates are designed to shift consumption to off-peak hours when the cost of generating electricity is lower than peak times of consumption. To be effective in shifting demand from peak periods to off-peak periods, there must be a significant differential between peak and off-peak rates. TVA's mix of generating resources results in a lower operating cost difference (and thus a lower rate difference) between peak and off-peak periods than many other utilities experience.

Therefore, TVA's potential for shifting demand for electricity with time-of-use rates is less than for other utilities.

TVA is also working with a distributor to develop a real-time pricing experiment, using state-of-the-art systems.

707

Comment: *There should be a program where people are willing to pay more for energy provided by renewables, environmental options, and energy conservation such as Sacramento Municipal Utility District's photovoltaic program. TVA should provide a green rate.*

Comment by: Claire Cronin, Nancy Bell, Michelle Neal (Tennessee Valley Energy Reform Coalition), Will Kidd (Sunsource Unlimited, Inc.), Edward Smeloff (Sacramento Municipal Utility District), Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: For residential customers, this program concept holds potential if program participation levels are high enough to offset the program's administrative costs. TVA plans to monitor the participation rate for such programs offered by the Sacramento Municipal Utility District and other utilities and further evaluate the option for the Tennessee Valley.

708

Comment: *Some people are willing to pay more for reliability, while others would pay more for greater environmental protection.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA currently has rates in which the price of power is differentiated by degree of interruptability or reliability. TVA intends to monitor and further evaluate the development of rate options where people are paying more for environmentally friendly resource options (green rate programs).

Renewables

709

Comment: *Consider Southern California Edison's Solar Neighborhood Program (photovoltaics).*

Comment by: Kathryn McCoy (Tennessee Energy Education Network), Don Scharf (Sierra Club, Middle Tennessee Group)

Response: We have considered several renewable options in Energy Vision 2020, and have included further research into photovoltaics in the short-term action plan. (See Volume 1, Chapter 10, Figure 10-1.) TVA will monitor the technological development and commercialization of photovoltaics in other areas of the country.

710

Comment: *What are the energy savings of solar water heating and sun rooms?*

Comment by: Philip & Winfred Thomforde

Response: TVA analyzed several options to encourage use of alternative energy sources including solar water heaters and sun rooms. For residential customers, TVA analyzed a solar water heating option where TVA would pay customers a rebate to install solar-assisted water heating equipment. Based on experience within the TVA region and elsewhere, a solar water heater would save 2,500 kilowatt-hours per year. The estimated energy savings for sun rooms would be 1,600 kilowatt-hours per year. Without a back-up heat source, a sunspace could save between 2 and 3 kilowatts per home. However, solar resources are not available at all times, especially in the winter, and a back-up heat source would be needed.

Solar water heaters are analyzed in Volume 2, Technical Document 7. The initial analysis of sun rooms indicated that they were not cost-effective; therefore they were eliminated from detailed analysis.

711

Comment: *Analyze the deployment of solar systems on the roofs of existing residential and commercial buildings. If only half the Valley residents were used, 6,500 megawatts could be produced. Considered Southern California Edison's Solar Neighborhood Program (photovoltaics).*

Comment by: Don Scharf (Sierra Club, Middle Tennessee Group), Kathryn McCoy (Tennessee Energy Education Network), Al Fritsch (Appalachia–Science in the Public Interest)

Response: TVA has considered several renewable options in Energy Vision 2020 and has included further research into photovoltaics in the short-term action plan.

Currently, photovoltaics is not a cost-effective technology for general deployment. Photovoltaics may be an effective technology in the Tennessee Valley when deployed as a distributed resource. TVA has experimented with roof-mounted and integral roof photovoltaic systems, the quality of the connection needed (direct current conversion to alternating current), and the safety issues related to having photovoltaics connected to the system (which cannot easily be turned off). These experiments indicated that roof-mounted photovoltaics were not cost-effective. TVA will continue to evaluate this technology, especially as a solution for remote applications. TVA will monitor the technological development and commercialization of photovoltaics in other areas of the country.

In Energy Vision 2020, TVA analyzed several options where TVA would pay customers a rebate to install solar-assisted water heating equipment. Solar water heaters are analyzed in Volume 2, Technical Document 7.

712

Comment: *TVA should play a role in developing the market for efficient home energy systems off the grid. This is an alternative to adding carbon dioxide from burning coal. That is environmental leadership.*

Comment by: Don Scharf (Sierra Club, Middle Tennessee Group), John Johnson (Earth First)

Response: TVA is partnering with some distributors to study distributed generation, which would include the evaluation of off-grid systems.

713

Comment: *Do not let people with photovoltaics sell their power to the grid.*

Comment by: Kirk Johnson

Response: Photovoltaic systems, if connected to the grid, would have to comply with safety and power quality requirements that would be specified in a contract to purchase the power. These contract specifications would avoid undesirable connections to the system that might reduce the effective operation of the power system.

714

Comment: *Promote clotheslines, a solar technology, instead of dryers.*

Comment by: Ann Lamb

Response: TVA included a Residential Self-Audit program in the Energy Vision 2020 short-term action plan. This program will assist customers by estimating the energy consumption for all major appliances, including dryers. Customers will be able to determine the energy savings available to them from use of clotheslines rather than dryers. Any customer may choose to take advantage of this very low-cost energy saving opportunity.

715

Comment: *TVA should assist in setting up a regional workshop conference on alternative energy in Chattanooga.*

Comment by: Sanford McGee (Cumberland Center for Justice and Peace)

Response: TVA sponsored a conference on energy efficiency in Chattanooga in 1993 and would consider sponsoring another in the future. Education and training are important aspects of the short-term action plan included in Energy Vision 2020.

SUPPLY-SIDE OPTIONS

This section includes comments and responses about:

- the identification and characterization of supply-side options in Energy Vision 2020, including coal-fired, gas-fired, and hydroelectric resource options
- the merits of nuclear generation options
- the Kenetech wind farm project
- the merits of large photovoltaic and wind stations
- the effect of various options on global climate change or the greenhouse effect
- the merits of purchased power options, including the purchase of call options
- smaller-scale distributed generation options

General

716

Comment: *In general, Burns & McDonnell/XENERGY conclude that TVA's treatment of its available power supply options was very thorough. The breadth of alternatives considered by TVA in Energy Vision 2020 was probably larger than that of most, if not all, integrated resource plans developed to date by electric utilities. For available power supply options, TVA has considered emerging technologies, mature technologies, central-station generation, distributed generation, renewable resources, independent power producers, and others. It appears TVA has not omitted from consideration any significant supply-side options.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

717

Comment: *In general, the supply-side options considered in the strategies by TVA were diverse and included many existing and developing technologies.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

718

Comment: *TVA has included a thorough mix of both traditional and non-traditional supply-side alternatives in Energy Vision 2020. By evaluating non-traditional alternatives, TVA must contend with technologies in different stages of commercial development. For Energy Vision 2020, TVA stipulated that a new technology option must be sufficiently well developed that credible estimates are available for the date of commercial availability, cost, and performance of the option.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

719

Comment: *TVA did not screen the options to a smaller number. The main reason given for this was that TVA used different measurement methods to evaluate the performance of each supply-side option under different criteria. Because the "best" plan changed based on the measurement and criteria used to rank the supply-side options, TVA did not want to eliminate certain options from future consideration. TVA felt it could not eliminate any of the supply-side options under consideration because of the multiple criteria used to rank the options.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

720

Comment: *It will be very difficult to adequately assimilate all of the information that TVA developed in its analysis of options.*

Comment by: Tennessee Valley Public Power Association

Response: Integrated resource planning is complicated and utilizes a large amount of data. Energy Vision 2020 tried to make this as simple and understandable as possible.

721

Comment: *In general, Burns & McDonnell/XENERGY agrees with the approach TVA has taken in developing its resource capital cost and operating cost assumptions. TVA has identified an unusually large number of supply-side alternatives for consideration in Energy Vision 2020. With this large number of alternatives, it would be extremely difficult to develop detailed cost information on each alternative. Accordingly, TVA is relying to a large extent on information contained in the Electric Power Research Institute's Technical Assessment Guide. The Technical Assessment Guide is widely used by electric utility planners for resource information in the absence of a more detailed set of assumptions or cost data.*

Where more detailed information was available, TVA used that information instead of the Technical Assessment Guide information. This is a preferred practice, but care must be taken to ensure that all assumptions are developed on a consistent basis.

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

722

Comment: *It appears TVA has attempted to go beyond the regions specified in the Electric Power Research Institute's Technical Assessment Guide for estimating capital costs. TVA has indicated that, where site-specific capital cost estimates were necessary, a site location at milepost 160 on the Tennessee River was used. For the purposes of evaluating supply-side options in a long-term planning study such as Energy Vision 2020, this capital cost estimating technique is acceptable. However, assuming all new generation (with certain site-specific exceptions such as repowering at Bellefonte Nuclear Plant) is located at milepost 160 does not allow TVA to capture the associated transmission system impacts of actual potential unit sites. Certain portions of the TVA system could benefit more than oth-*

ers from having generation locally sited. Before final decisions are made to proceed with the construction of any new resources, TVA will need to assess site-specific system impacts.

Comment by: Tennessee Valley Public Power Association

Response: We generally agree with this assessment. However, the short-term action plan recommends siting new generating facilities in the western part of the system because of transmission benefits. (See Volume 1, Chapter 10, pages 10.4 to 10.5.)

723

Comment: *There should be units located on the west end of the system to aid in reducing losses and supporting the transmission system. These units should be located as close to load centers as practical.*

Comment by: Tennessee Valley Public Power Association

Response: The short-term action plan recommends that new generating facilities be sited in the western part of the system because of transmission benefits. (See Volume 1, Chapter 10, pages 10.4 to 10.5.)

724

Comment: *One option that TVA should consider is reducing its outage and capital project planning costs by using small, highly efficient firms on an as needed or lump sum basis in lieu of permanent staff or full time contract personnel.*

Comment by: Paul Amon (Amon Consulting)

Response: TVA makes appropriate use of outside contractors when it is more efficient and cost-effective to do so.

Coal

725

Comment: *Clean coal technologies mitigate environmental impacts and improve operational efficiencies. This fuels economic growth and satisfies environmental concerns. The Department of Energy's Clean Coal Technology Program is demonstrating that these technologies can meet current and projected stringent environmental standards. (See DOE "Clean Coal Technology Demonstration Program: Program Update 1994" April 1995, pages 1-10.)*

Comment by: William Bowker (Kentucky Coal Marketing and Export Council), Jan Jones (Tennessee River Valley Association), J. Richard Hommrich (Volunteer Barge & Transport, Inc.)

Response: Clean coal technologies, many of which are being developed in the Department of Energy's Clean Coal Technology Program, have been evaluated in Energy Vision 2020. (See Volume 1, Chapter 7.)

726

Comment: *All potential options for increased use of coal from Valley states should be carefully explored because of the economic importance of coal in this region.*

Comment by: William Bowker (Kentucky Coal Marketing and Export Council)

Response: TVA continuously explores the potential for utilizing economically priced coal mined in the TVA region. This approach has three positive impacts:

1. TVA obtains low-priced fuel for electrical operation.
2. Transportation costs are reduced.
3. Economic development of the TVA region is fostered.

Preference to regional coals is given when prices are equal to coals from other states. However, other coals are purchased when they are less costly on a delivered basis to TVA's plants.

727

Comment: *As a provider of barge service, Volunteer Barge and Transport, Inc. believes that the public is best served by utilizing low-cost water service for delivery of coal to the plants to provide low-cost electricity for the Tennessee Valley economy.*

Comment by: J. Richard Hommrich (Volunteer Barge & Transport, Inc.)

Response: Barge transportation has always been an important element of TVA's coal transportation.

Natural Gas

728

Comment: *Quick-start gas units could provide both generation and transmission benefits.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

Hydroelectric

729

Comment: *While the reduction in the planned hydro unit outage rate due to upgrades should also reduce maintenance costs, it was not clear whether or not sufficient water storage exists to operate the units the additional hours provided by the improved availability.*

Comment by: Tennessee Valley Public Power Association

Response: The hydro modernization program has the following objectives:
1. improve the efficiency of the hydro units,
2. increase their output, and
3. reduce maintenance costs and improve availability.

The improvement in efficiency will result in more energy being extracted from a given amount of streamflow without changing water storage capability. The availability improvements from the modernization program will similarly help in utilization of river resources by reducing the amount of water that needs to be spilled rather than passed through a hydro unit due to unit outage.

730

Comment: *The information available on proposed new hydroelectric plants, the addition of new units to existing plants, and new pumped-storage plants is minimal. The cost estimates are based on preliminary studies conducted 10 to 25 years ago. More definitive and current studies will have to be conducted by TVA before decisions are made on the options.*

Comment by: Tennessee Valley Public Power Association

Response: Much of the cost data for new hydro unit improvements and pumped-storage plants are from studies that are dated. However, for Energy Vision 2020, TVA also compared TVA's estimates to those of the Electric Power Research Institute's Technical Assessment Guide. These estimates were judged to be adequate. However, we are currently in the process of updating TVA's studies. Before these resources are put in place, more detailed studies will be performed to ensure we have an accurate picture of project economics and impacts.

731

Comment: *The environmental and possible flooding problems that could result from adding units at Raccoon Mountain could be difficult to resolve. Considerable additional flow would be released from the units which could flood out the next downstream hydro project under some conditions.*

Comment by: Tennessee Valley Public Power Association

Response: Currently, generation from TVA's Raccoon Mountain Pumped-Storage Project is limited under serious flooding conditions. During a preliminary analysis of the hydraulic impacts of an expansion of Raccoon Mountain Pumped-Storage Project, TVA examined the historical frequency of actual limitations on Raccoon Mountain Pumped-Storage Project generation due to serious flooding conditions. With the current plant capacity, generation would be limited an average of less than 1 percent of the time during a given year. Therefore, TVA concluded that the generation constraints for the proposed expansion due to wet hydrology would probably not be serious and should not preclude further consideration of this project.

Nuclear

732

Comment: *Browns Ferry Nuclear Plant Unit 1 should never restart because the cost of bringing it back to service would not justify the benefits. TVA should begin writing it off.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition), Beth Wallace, Bruce Wood, J. E. Butt, Sharon Force

Response: Energy Vision 2020 recommends that TVA not, by itself, recover Browns Ferry Nuclear Plant Unit 1 as a nuclear unit. Instead, TVA will keep open alternatives that would meet the goals and objectives of Energy Vision 2020 including minimizing rates, increasing flexibility, minimizing costs, and limiting debt.

733

Comment: *Watts Bar Nuclear Plant Unit 2 should be completed as a nuclear unit. Its value as anything else is limited because of the use of common systems and areas.*

Comment by: J. E. Butt

Response: In December 1994, the TVA Board decided that TVA would not, by itself, complete Watts Bar Nuclear Plant Unit 2 as a nuclear unit. Instead, TVA will keep open alternatives that would meet the goals and objectives of Energy Vision 2020 including minimizing rates, increasing flexibility, minimizing costs, and limiting debt. Alternatives include completing Watts Bar Nuclear Plant Unit 2 as a nuclear unit with partners, converting it to another technology, or replacing the capacity. Knowledge gained from the Bellefonte Nuclear Plant conversion study and future information on nuclear performance and costs are among factors that will be carefully considered as alternatives are evaluated, and eventually the most cost-effective long-term use for Watts Bar Nuclear Plant Unit 2 will be determined.

734

Comment: *I propose that TVA negotiate with the Department of Energy to burn excess weapons material and produce tritium using Watts Bar Nuclear Plant units.*

Therefore, my recommendation is to complete Watts Bar Nuclear Plant Unit 2 equivalent to Watts Bar Nuclear Plant Unit 1 so it can burn mixed oxide fuel. The Watts Bar Nuclear Plant has trained staff to operate Unit 2 with minimal additional support.

Also, TVA should work with the Department of Energy to consider finishing the Bellefonte Nuclear Plant units. If completed, TVA would have a substantial amount of nuclear generation after 2020 to approximately 2040. A greater vision!

Comment by: Whiting Delk

Response: In December 1994, TVA decided it would not, by itself, complete Bellefonte Nuclear Plant Units 1 and 2 and Watts Bar Unit 2, as nuclear units.

TVA is keeping open alternatives for the uncompleted nuclear units that would meet the goals and objectives of Energy Vision 2020 including minimizing rates, increasing flexibility, minimizing costs, and limiting debt. Alternatives include converting them to another technology or replacing the capacity. TVA will continue to be receptive should outside entities propose an acceptable financial arrangement to complete these units as nuclear facilities.

735

Comment: *I object to TVA's proposed use of diluted weapons-grade material in powering nuclear plants. Please remove this from Energy Vision 2020.*

Comment by: Myles Jakubowski (Sunbeam Household Products)

Response: As explained in the section on Uranium Procurement in Volume 2, Technical Document 1, page T1.117 a substantial reduction in the quantity of nuclear warheads in the world is expected. Highly enriched uranium from nuclear warheads will be diluted to low enriched levels, allowing it to be used in commercial nuclear plants.

736

Comment: *Corrosion of steam generator tubes has been the single biggest problem affecting Westinghouse pressure water reactors. TVA is assuming that steam generators will have to be replaced at all four of its Westinghouse pressure water reactors (Sequoyah Nuclear Plant Units 1 and 2 and Watts Bar Nuclear Plant Units 1 and 2), and it allowed for this in the Energy Vision 2020. These assumptions are reasonable.*

Comment by: Tennessee Valley Public Power Association

Response: Corrosion of steam generator tubes has been the single biggest problem affecting Westinghouse pressurized water reactors. Steam generator replacement was included in Energy Vision 2020 and will continue to be evaluated for cost-effectiveness.

737

Comment: *During the 1970s and 1980s, industry-wide operating and maintenance costs rose much more quickly than inflation. These increases were driven almost entirely by the responses to continually changing Nuclear Regulatory Commission requirements.*
Over the last four to six years, both TVA's nuclear operating and maintenance costs and industry-average costs have been essentially constant (in real terms). This stabilization of operating and maintenance costs is primarily the result of:

- *A substantial decrease in the rate at which the Nuclear Regulatory Commission has imposed new operating requirements.*
- *Significant efforts by most utilities to improve the efficiency with which they meet existing requirements.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

738

Comment: *Capital expenditures reflecting total investment in plant facilities for each resource option included allowed capitalized overheads. However, TVA did not include capitalized overheads in the costs associated with the nuclear resource options. TVA did not believe that this made a difference in the results of its evaluations of nuclear resources.*

Comment by: Tennessee Valley Public Power Association

Response: TVA included capitalized overheads in the costs associated with the nuclear resource options in every strategy.

739

Comment: *Cost comparisons do not reflect the billions of dollars of subsidies provided for the development of nuclear power, nor do they include future costs of waste disposal and plant decommissioning.*

Comment by: Andrew Danzig

Response: The TVA power program receives no congressional appropriations, and there was no direct subsidy to TVA for its nuclear power program. All costs of completing and operating TVA nuclear units, including the costs for waste disposal and decommissioning are included in the Energy Vision 2020 analysis.

740

Comment: *In Energy Vision 2020, why did TVA not explore contracting with utilities that have an above average performance record of operating nuclear plants to manage its nuclear operating risks?*

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: As a result of technical and operational problems and regulatory concerns, TVA shut down its operating units in 1985 and conducted an extensive review of its nuclear program. TVA determined that the primary cause of the problem was a lack of a sufficient number of experienced nuclear managers who could provide leadership and proper direction for TVA's nuclear activities. In response, TVA restructured its organization and assigned responsibility for all nuclear power activities to a single organization based in large part on a new management team. TVA also developed a Nuclear Performance Plan to provide a comprehensive recovery plan.

As discussed in the section on Nuclear Generation in the chapter on Existing Power System (see Volume 1, Chapter 4), TVA's nuclear performance has improved considerably over the last few years due to the leadership and direction of the new management team. TVA obtains contract assistance for work performed by crafts that are not part of the TVA work force and work requiring particular knowledge or expertise that TVA employees do not have.

741

Comment: *The accumulated costs associated with canceled TVA nuclear units totaled approximately $4.2 billion and were written off sporadically over the period 1981 through 1990. Approximately $3.0 billion of this amount was written off against non-operating income and was, therefore, not recovered in TVA's rates.*

Another $0.8 billion was charged to expense and, thus, flowed through TVA's utility service revenues. The remaining amount of $0.4 million was reclassified as Plant Held for Future Use. This amount represented the estimated cost of land, improvements, and buildings at the Hartsville site which was determined to have potential for other generation use by TVA. TVA has not identified publicly any plans for putting this investment to use. There was no indication that this site was considered for any of the resource strategies in Energy Vision 2020. However, when a decision is reached as to the disposition of these assets there could be significant implications on TVA's rates.

Comment by: Tennessee Valley Public Power Association

Response: The Hartsville site is being held in inventory as a possible site for future generation. The use of this site will be reviewed periodically.

742

Comment: *I have a concern about the waste disposal issue. My position on this subject is that if it is a problem TVA creates in the region, TVA should solve that problem in the region. Shipping the waste long distances to someone else's backyard is not a responsible course of action.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: TVA's plans for dealing with nuclear waste are discussed in the section on Nuclear Waste in Volume 2, Technical Document 1, page T1.122. TVA manages its wastes safely and in accordance with all applicable laws and regulations.

Renewable

743

Comment: *TVA should consider in its research and development additional renewable or green energy sources such as:*

- *Solar and wind technologies in real applications, not experimental stations*
- *Biomass, including hot water heaters that use a compost pile as a source of heat*
- *Electrolysis in making hydrogen as motor vehicle fuel or other fuel*
- *Using waste heat from its generating plants*
- *Geothermal*
- *Ocean energy*
- *Advanced air conditioning without freon.*

Comment by: Andrew Danzig, Walter Stenberg, Retha Ferrell, Beth Wallace, Carolyn Novkov, Sandy Loyd, David Bordenkircher, Michelle Carratu, Jim Snell, Mike Eastman, Elizabeth Garber

Response: Energy Vision 2020 includes additional research and development into several renewable technologies. This includes solar, wind, biomass, and waste heat from TVA generating plants. This research and development is reflected in the short-term action plan. (See Volume 1, Chapter 10, Figure 10-1.) TVA continues to assess most new technologies such as electrolysis and advanced air conditioning without freon. There are some generation technologies such as geothermal and ocean energy which are not important for the TVA region.

744

Comment: *TVA should install hydrogen bat generators down the side of Brindlee Mountain.*

Comment by: Mark Richardson

Response: We have no information about "hydrogen bat generators" and cannot respond specifically to this idea at this time without more information from the commenter. In general, however, we note that TVA uses numerous means to stay abreast of new technologies and evaluate their possible use by TVA. We are confident that if this concept has

potential benefit in utility applications, it will later be identified and given appropriate consideration by TVA.

745

Comment: *TVA's past experience with photovoltaics needs to be closely considered.*

Comment by: John Wood

Response: The short-term action plan includes a research and development study of specific end-use applications of solar photovoltaics. Past TVA experience will be considered as part of this study.

746

Comment: *TVA should consider more solar and wind options in its plan over the next 25 years. For example, in Minnesota wind will be produced for 3 cents per kilowatt-hour levelized over 30 years. Sacramento Municipal Utility District is producing solar power for $4.71 per watt, and it is reasonable to assume that it will decrease to $2 to $3 per watt by 2000. We anticipate that wind costs are going to go down. In contrast, fossil fuel prices will go up.*

Comment by: Will Kidd (Sunsource Unlimited, Inc.), Barbara Soliday, Stephen Smith (Tennessee Valley Energy Reform Coalition), Catherine Murray (Sierra Club, State of Franklin Group), Arthur Smith, Dolores Howard

Response: The available wind and solar energy, and thus the feasibility of using these energy sources, varies greatly throughout the country. The available wind in Minnesota is considerably greater than in the TVA region. The available sunshine in the Sacramento Municipal Utility District region is also considerably greater than in the TVA region. Thus, the economics which apply in those locations do not apply to the TVA region. Energy Vision 2020 evaluated wind and solar options for bulk power generation based on the available wind and sunshine in the TVA region, and found that their potential for that purpose in this region is rather limited.

TVA considered two options to encourage the use of customer-owned photovoltaics by providing technical assistance and incentives. The potential for use of photovoltaics was analyzed at both the current cost level and at a cost of $3 per watt, as photovoltaic prices are predicted to drop in the near future. Because of technology costs and limited availability of solar resources, TVA found that use of photovoltaics was limited to highly specialized or remote applications.

In Energy Vision 2020, the short-term action plan includes research and development of several renewable technologies including wind, biomass, landfill methane, and end-use solar photovoltaics. (See Volume 1, Chapter 10, Figure 10-1.)

747

Comment: *Why did TVA reject an offer from Kenetech Windpower who proposed to build a 400-megawatt wind plant in West Virginia for less than 4.5 cents per kilowatt-hour and would have reduced emissions significantly?*

Comment by: Danielle Droitsch, Stephen Smith (Tennessee Valley Energy Reform Coalition), Michelle Neal (Tennessee Valley Energy Reform Coalition), Powell & Sharon Foster, John Johnson (Earth First), Clark Buchner (Sierra Club, Tennessee Chapter), Sandy Loyd, Alan Jones (Tennessee Environmental Council), Howard Switzer (Sun/Earth Tempered Organic Architecture)

Response: From a cost perspective, TVA has other options available to produce or acquire electricity at costs below 4.5 cents per kilowatt-hour. The cost of alternative options ranges from 2.5 to 3.5 cents per kilowatt-hour. TVA's current average cost of generation is only 4.2 cents per kilowatt-hour.

The Energy Vision 2020 short-term action plan includes a wind turbine project in the TVA region. This project will be developed in two phases. The first phase will investigate wind resources in the TVA area. The second phase will build a wind turbine depending on the results of the first phase.

748

Comment: *TVA experience has shown the power service area does not have an adequate and dependable, year-round wind resource. I hope that TVA is cautious and does not make needless expenditures to gather the same experiences in the future. Technology has improved but not enough to overcome the limitations of geography.*

Comment by: John Wood

Response: The wind resource investigation included in the short-term action plan will include a review of TVA's past experience and data in order to avoid such repetition.

749

Comment: *Where are the wind resources? If they are not accessible in the TVA service region, do not use them. Wind farms are different to look at, but not necessarily aesthetic.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: The location and aesthetic effects of potential wind energy sites are discussed in Volume 2, Technical Document 2, page 2.46. As indicated, the TVA region does have limited wind resources. One area with potential for wind energy use is on the Cumberland escarpment in northeast Tennessee. Another is in southwest Virginia near Johnson City.

750

Comment: *Biomass should also be considered as a feedstock for chemical production.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: The short-term action plan has been revised to include the investigation of a biomass refinery project which would produce both chemicals and a boiler fuel which would be used to produce electricity.

751

Comment: *TVA has refused to enter the waste-to-energy field. Every city, town, and county in the region is having to address their solid waste management problems, but the most obvious solution (waste-to-energy) is denied to them because TVA is not willing to involve itself in the firestorm that siting and permitting a waste-to-energy plant will produce. An example is the fact that TVA has let a decent fluidized bed unit sit idle for years at Paducah, Kentucky. At least two attempts to evaluate the site for waste-to-energy have not produced reasonable cost estimates. It is hard to believe that when you start with the land, building, feed equipment, boiler, and air pollution control system in hand that you cannot make that work, even if you do have to replace the controls, modify the boiler, and*

add a generator. This site should serve as a regional solid waste combustion unit serving that corner of the system and possibly as a waste tire combustion center taking tires shipped by barge.

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: As noted in this comment, disposal of solid waste is a significant problem in some areas of the country and is becoming more costly. Waste-to-energy plants are one option which local governments may use to address this problem. For example, Nashville operates such a facility. TVA recognizes the potential benefits of such plants to the region. The proposed long-term action plan in Energy Vision 2020 identifies refuse-derived fuel as a future option. (See Volume 1, Chapter 9, Figure 9-23.)

752

Comment: *On average the cost per kilowatt-hour for burning garbage is twice that of nuclear plants and garbage-generated energy is unpredictable. It is worthless to TVA, does not displace coal or gas, yet under Public Utilities Regulatory Policy Act, TVA is forced to buy such energy from the Nashville Thermal Plant. Recycling and composting of the fuel for Nashville Thermal would save more energy than the plant.*

Comment by: John van der Harst

Response: TVA purchases power under the Public Utilities Regulatory Policy Act at published prices. These prices are based on TVA's avoided costs. TVA purchases power from qualified facilities, including the Nashville Thermal Plant, at these standard rates.

753

Comment: *TVA should consider harvesting undesirable tree species for fuel. This will improve forest stands and provide another cash crop to timberland owners.*

Comment by: C. L. McKinney (Creret, Inc.)

Response: TVA has analyzed wood, primarily waste wood (such as sawdust) as a fuel supplement. The short-term action plan (see Volume 1, Chapter 10, Figure 10-1) calls for performing cost-effective biomass cofiring. The short-term action plan also recommends further research into other biomass uses, such as short rotation woody crops. TVA does not contemplate using whole trees as a fuel source.

754

Comment: *I am opposed to biomass. It is too expensive to dry it out. The people that generate the most bark, chips, and sawdust already have wood-fired boilers.*

Comment by: Kirk Johnson

Response: Waste wood used as biomass fuel does not ordinarily have to be dried. The heat content is enough to evaporate the moisture and still provide useful energy to a boiler. If the delivered cost of biomass fuel is quite low, the useful energy can still be economical.

755

Comment: *From looking at Volume 1, Chapter 3, Figure 3-15, it does not appear that TVA purchases a lot of fuel inside the service region. TVA should try to purchase as much fuel as possible from inside the region. Cofiring wood with coal will help this situation, but TVA should be doing this at every coal-fired plant. The wood is available and, in some cases, TVA can go higher than 5 percent heat input.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: TVA purchases coal from the most economical sources. The referenced figure identifies the location of TVA's 1994 coal suppliers by county.

It is expected that most if not all of the wood used in cofiring at TVA plants will be from inside the TVA service region. The wood waste cost is a strong function of the transportation distance, so it is likely that the area supplying wood waste to a plant utilizing biomass cofiring will be limited to a 50- to 75-mile radius about the plant. Based on wood resource assessments completed for the TVA region, there may be enough wood waste at favorable prices to support wood cofiring at up to 10 percent for some of TVA's units. For other units, cofiring will be limited to substantially less. Decisions regarding the amounts of wood waste that will ultimately be cofired at various plants will be based on more rigorous, plant-specific evaluations of the cost and availability of wood waste.

756

Comment: *Where are the coalbed methane resources? If they are not accessible in the TVA service region, do not use them.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: The methane concentration varies widely among coal seams. In the TVA region, the coal seams most promising for methane use include eastern Tennessee, northern Alabama and Mississippi, and eastern and western Kentucky.

757

Comment: *In addition to the biomass-to-energy options, you may want to consider recycled plastics as an energy source as reported in Energeia, v6(4), 1995 from the University of Kentucky, Center for Applied Energy Research.*

Comment by: Andrew Danzig

Response: TVA did not specifically evaluate the use of recycled plastic as an energy source. However, the long-term plan identifies refuse-derived fuel as a future resource option. (See Volume 1, Chapter 9, Figure 9-23.) Plastics typically contribute significantly to the energy value of the solid waste stream. However, the recycling of plastics for non-energy uses is becoming more prevalent and plastics are increasingly being removed from the solid waste stream.

Environmental

758

Comment: *TVA coal-fired plants should have efficient scrubbers.*

Comment by: Richard Simmers

Response: Energy Vision 2020 considered several options for mitigating sulfur dioxide emissions. These included efficient scrubbers, switching to low-sulfur fuels, and repowering of coal-fired units. (See Volume 1, Chapter 7, pages 7.9 to 7.10.) TVA has already installed scrubbers on six of its units. The efficiency of these scrubbers at the six units varies from 86 to 95 percent, with the two most efficient scrubbers also being the most recent scrubber installation, TVA's Cumberland Fossil Plant.

759

Comment: *Wind power should be considered as a Clean Air Act Phase II control strategy.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Wind power has been included in Energy Vision 2020 as a Clean Air Act Phase II control strategy in the form of off-site repowering. On-site repowering of existing fossil plants has not been considered due to the space constraints typically associated with large wind powered plants. Off-site consideration of wind is included in Strategy T. (See Volume 2, Technical Document 2, Figure T2-1.) As such, wind power received the same consideration for displacement of future energy and capacity supply as other supply-side options included in Energy Vision 2020.

760

Comment: *TVA's right-of-way maintenance should not include tree cutting or use of herbicides.*

Comment by: Catherine Murray (Sierra Club, State of Franklin Group)

Response: Power lines, like highways and other public infrastructure, must be kept clear of trees and vegetation. A single tree coming into contact with a large high-voltage transmission line could cause thousands of people to lose electricity in their homes, businesses, schools, and hospitals. In addition, power lines felled by trees are extremely dangerous to anyone in the vicinity. TVA therefore selectively cuts trees near the edge of rights-of-way that could endanger transmission lines.

TVA tries to eliminate herbicide use to areas where mechanical cleaning is not feasible. All herbicides used by TVA are registered by the Environmental Protection Agency for this specific use. They are strictly applied according to Environmental Protection Agency methods by licensed applicators at the lowest volumes necessary. TVA also attempts to notify residents when herbicides will be applied.

761

Comment: *TVA should permit chip mills, provided clear cutting is mitigated somehow.*

Comment by: Sandy Loyd

Response: TVA does not have regulatory control over or responsibility over chip mills. It does not "permit" chip mills. It does respond to requests for TVA property upon which chip mills would be located and to requests for approval of water use facilities associated

with chip mills. In accordance with these responsibilities and the National Environmental Policy Act, TVA appropriately considers the potential effects of clear cutting and the merits of mitigating adverse effects.

762

Comment: *TVA should immediately halt all logging on Land Between The Lakes and avoid removing forest cover on all TVA property.*

This forest cover is necessary to act as a carbon sink to offset the maximum amounts of carbon dioxide pumped into the atmosphere by TVA and industry in this region. I think that doing this, and utilizing Land Between The Lakes and areas around the reservoirs as a carbon sink will be an offset for an inevitable carbon tax. It will also show an example in preservation of biological diversity for this region.

Comment by: John Johnson (Earth First)

Response: TVA recently released a final environmental impact statement on natural resource management at its Land Between The Lakes. This evaluated the potential consequences of forest management, including timber harvesting, effects on biodiversity, and greenhouse gas emissions.

TVA recognizes the potential of forestry and other carbon sequestration projects for offsetting a portion of the carbon emissions from fossil fuel power plants. In fact, TVA is participating with about 50 other electric utilities in the Utility Forest Carbon Management Program. This program identifies and funds cost-effective forestry and related carbon sequestration projects. TVA has contributed $150,000 to this program and is committed for an additional $75,000 in 1996. TVA also plans to hold discussions with state forestry agencies to identify other cost-effective carbon sequestration opportunities in the Tennessee Valley in which TVA could participate.

763

Comment: *TVA should set up carbon sink incentives for landowners in the Tennessee Valley to offset TVA's carbon emissions.*

Comment by: Dennis Haldeman

Response: TVA recognizes the potential of forestry and other carbon sequestration projects for offsetting a portion of the carbon emissions from fossil fuel power plants. In fact, TVA is participating with about 50 other electric utilities in the Utility Forest Carbon Management Program. This program identifies and funds cost-effective forestry and related carbon sequestration projects. TVA has contributed $150,000 to this program and is committed for an additional $75,000 in 1996. TVA also plans to hold discussions with state forestry agencies to identify other cost-effective carbon sequestration opportunities in the Tennessee Valley in which TVA could participate.

764

Comment: *TVA is the nation's largest emitter of carbon dioxide, the primary greenhouse gas implicated in global climate change. TVA has failed to develop a plan to meet commitments to return carbon dioxide emission levels to 1990 levels. Renewables could aid in this commitment.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA is participating in the Administration's Climate Challenge Program. It has committed to reduce its generation of greenhouse gas emissions by approximately 22 million tons by the year 2000. This is one of the strongest commitments made by any of the electric utilities participating in this program. These reductions are expected to be achieved through a number of ways, including improvements in energy efficiencies and the use of renewables (e.g., biomass cofiring). Energy Vision 2020 takes this into account, and the long-term plan considers other renewable and energy efficiency programs which could further reduce projected greenhouse gas emissions. (See Volume 1, Chapter 9, Figure 9-23.) Energy Vision 2020 evaluated two minimum carbon dioxide strategies. One of these strategies (Strategy B) would maintain average carbon dioxide emissions from 1996 through 2020 at approximately 100 million tons or just slightly greater than TVA's emissions in 1994. However, this strategy, although reducing carbon dioxide emissions, led to higher costs and higher short-term electric rates. (See Volume 1, Chapter 9.)

Peaking/Storage

765

Comment: *After a cursory review of TVA's assumptions, Burns & McDonnell generally agrees with the data accumulated for the supply-side options. However, one option not included in the list of possibilities is conversion of the existing combustion turbines to combined cycle operation.*

Comment by: Tennessee Valley Public Power Association

Response: TVA's existing combustion turbine fleet is more than 20 years old. TVA did a preliminary screening on repowering these combustion turbines compared to new combined cycle units. The new units were determined to be less expensive on a life-cycle cost basis. Thus, we did not include repowering the old combustion turbines in the options for Energy Vision 2020.

766

Comment: *Combustion turbines will experience a gradual degradation in net heat rate and net output as they age. This can be corrected by rebuilding the combustion turbines every three years. These degradations can be on the order of 2.5 to 3.0 percent of the original values. It does not appear that the heat rate and output values cited in Energy Vision 2020 include the effect of these deratings.*

Comment by: Tennessee Valley Public Power Association

Response: TVA recognized early in the process of preparing data for input to Energy Vision 2020 that the large number of alternatives to be analyzed would preclude inclusion of details on annual variations in performance. In the case of combustion turbines, there is a cycle over a period of three years or so over which there is some variation in performance. The forecast of operation and maintenance costs and capital additions and improvements included sufficient funds to maintain the performance of the combustion turbines.

767

Comment: *Duplicate Raccoon Mountain on top of Brindlee Mountain in the Morgan City area.*

Comment by: Mark Richardson

Response: The initial investigations of sites available where pumped-storage could be considered a viable option included some 160 sites. These sites had to meet the initial screening criterion of providing a minimum of 700 feet vertical separation between a possible upper and lower reservoir. The Brindlee Mountain location did not meet the criteria since it provides only 450 feet of vertical separation.

768

Comment: *Energy Vision 2020 should discuss the proposed private pumped-storage project and any other such proposed power projects. It is unclear, for example, how a large power source that is planned for the Tennessee Valley could operate in the Valley without selling power to TVA. If TVA must or ultimately elects to purchase power from the proposed hydro, such purchase would be inconsistent with Energy Vision 2020, which indicates that no new hydro facilities are planned (see Volume 1, Chapter 9, page 9.25 and Volume 2, Technical Document 2, page T2.45).*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: The review and approval of both the Federal Energy Regulatory Commission and TVA must be obtained before the two privately-proposed pumped-storage facilities in the Sequatchie Valley can proceed. It is contemplated at this time that such review will be in the form of an environmental impact statement. TVA may or may not purchase power from these facilities if they are ultimately built and operated. If TVA does not purchase power from the facilities for use on its system, such power could be wheeled to other utility systems outside the TVA region. The referenced pages correctly state that TVA is not planning new hydroelectric plants in its Energy Vision 2020 strategies. This does not preclude other public or private entities from proposing such plants. The TVA purchase of power from such plants would not be inconsistent with the referenced statements or Energy Vision 2020, which purposefully incorporates flexibility in future energy resource option decision-making. As appropriate and consistent with the National Environmental Policy Act, TVA would tier from Energy Vision 2020 to any resource option, whether proposed by TVA or others.

Independent Power Production/Purchased Power

769

Comment: *TVA should purchase and sell power off-system economically.*

Comment by: Larry Smith (Mid-South Peace and Justice Center)

Response: TVA will continue to use sales and purchases of electricity to and from other utilities when it is economical to do so. (See Interchanges with Neighboring Utilities section of Volume 2, Technical Document 3, page T3.9.)

770

Comment: *The TVA system does not have the excess interconnection capacity to import a substantial amount of the distributors' load.*

Comment by: Tennessee Valley Public Power Association

Response: Although TVA has established a high level of interconnected transmission capacity with neighboring utilities (greater than 25,000 megavolt amperes), the capability to import blocks of power into the TVA system from neighboring regions is limited by transmission "bottlenecks." These limitations occur at import levels that are low relative to TVA's total distributor load at peak times.

771

Comment: *TVA should consider private industry generating power to sell to TVA. Private industry can generate power cheaper than the government.*

Comment by: C. L. McKinney (Creret, Inc.)

Response: TVA considers the purchase of power from private industry. TVA continually receives proposals from private industry and evaluates the proposals to determine if they are viable supply options. TVA currently purchases excess energy from 11 dispersed power customers throughout the Tennessee Valley.

The purchase of power from private industry was addressed in Energy Vision 2020. (See Volume 1, Chapter 7, pages 7.5 to 7.8.)

772

Comment: *I support the proposed Phillips Lignite Project in Choctaw County as a way to help the residents of the county. I care about whatever TVA can do to help us with economic development.*

Comment by: Don Threadgill

Response: A lignite-fired plant was considered in Energy Vision 2020. (See Volume 2, Technical Document 6, Figure T6.1.) TVA is continuing to work with the developers of the referenced lignite project to further study the viability of the project.

773

Comment: *TVA is considering external sources of power provided by independent power producers. TVA's distributors are municipalities and cooperatives that carry tax exempt status. The cost of capital for a distributor is less than that of an independent power producer. If distributors were to build generation facilities which could be used during periods when TVA would otherwise purchase external sources of power, savings equal to the difference in the after-tax rate of return could occur.*

Why did TVA not look at allowing distributors the opportunity to construct generation instead of investor-owned independent power producers?

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: In Energy Vision 2020, hundreds of supply- and demand-side options were considered including conventional supply-side options; purchases from other utilities, independent power producers, and power marketers; and distributed generation. (See

Volume 1, Chapters 7 and 8.) In addition, TVA solicited options through extensive public participation efforts, including distributors of TVA power.

In Energy Vision 2020, the specific contracting mechanisms for the development of projects or technologies were not considered. TVA's current contracts with its customers are full-requirements contracts and do not allow distributor-owned generation.

774

Comment: *TVA should be doing a better job of working with the wood products industry to encourage development of financially solid businesses that can reliably cogenerate. TVA should adopt policies that encourage this industry by either taking their wood waste for its cofiring program at a respectable price or helping them set up cogeneration systems that have high reliability and paying up to TVA's average system cost of production (not avoided costs) for power produced beyond their needs. This could be done by a formula that takes size, demonstrated reliability, and environmental responsibility into consideration. I do not think TVA should deal with dedicated independent power producers, other than waste-to-energy, beyond the requirements of the Public Utilities Regulatory Policy Act or wheel their power out of the region.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: TVA is currently cofiring wood waste at its Allen Steam Plant and will begin cofiring wood waste at its Colbert Steam Plant within the next several months. These are test burns which will help verify the viability of this fuel. TVA is also working with several wood product industries that are installing cogeneration systems and want to sell power to TVA. Energy Vision 2020's recommended short-term action plan contains cost-effective biomass as an option. (See Volume 1, Chapter 10, Figure 10-1.)

Under the Public Utilities Regulatory Policy Act, TVA is required to buy power from qualified facilities at its avoided cost. In addition, if a qualified facility wants to sell their power outside the region, TVA has a price to wheel the power out of the region.

Bids/Option Purchase Agreements

775

Comment: *TVA may be paying excessive premiums for its call options. There are several factors which affect the price of an option: strike price, underlying market price, price volatility, time to expiration, and interest rates. Volatility and time to expiration usually have the greatest impact on option prices. Price volatility can be affected by the ability of market participants to enter into and exit out of a contractual agreement without paying significant transaction costs. Currently, bulk power is traded in a spot market by a limited number of buyers and sellers. As the Federal Energy Regulatory Commission opens transmission access, the number of market participants should increase. Added liquidity could help to lower premiums on option prices. Also, since the value of a "long" call option decreases with time, the longer TVA waits to enter into an option, the lower the premium.*

What are the prices of the call and put options quoted to TVA?

What are the implied volatilities of the call and put options quoted to TVA?

Comment by: Henry Nickell (Memphis Light, Gas and Water Division)

Response: TVA has taken every measure reasonable to ensure that premiums paid for call options are as low as possible. While volatility and time to maturity are significant factors impacting the value of an option, TVA has found from direct experience that another important factor is the difference between the exercise or strike prices of the call option and expected future spot prices. It is only true that the value of a call option (both long and short) diminishes with time if prices remain at the same level as when the call option was purchased or if prices decline. The value of a call option will increase in accordance with increases in the price of the underlying asset, in this case the price of electricity. Thus, if TVA were to wait to buy call options and prices were to increase, then the price of the call option would be higher. Of course, the converse is true if prices were to decline. TVA has evaluated the likelihood of both price increases and decreases and is taking a balanced approach by relying on a combination of resource alternatives to satisfy future supply requirements to include forward contracts, internal alternatives, spot market purchases, and call options.

In TVA's "Request for Proposal for Option Purchase Agreements," TVA stated that the information contained in all proposals would be kept strictly confidential. For this reason and for reasons of competitive position, TVA cannot release this information. Similarly, revealing the implied volatilities of the call and put options quoted to TVA would violate the confidentiality of the information from TVA's "Request for Proposal for Option Purchase Agreements."

Distributed Generation

776

Comment: *The report needs to provide more information on the use and economics of gas turbines as dispersed generation. Gas turbines have about one-sixth the capital cost per kilowatt-hour of coal plants and one-twentieth of nuclear plants.*

Comment by: John van der Harst

Response: While gas turbines have low capital cost, that advantage tends to be offset by much higher fuel costs than for coal and nuclear plants. Many of the supply-side options are based on gas turbines. Among these were a small cogeneration plant (see Volume 2, Technical Document 6, Figure 6-1, option 1.1.2.4) and a small combined cycle plant (option 1.1.2.5). In addition, Energy Vision 2020 considered small gas turbines for cogeneration and self-generation among the customer service options (see Volume 2, Technical Document, pages T7.70 to T7.72 and T7.114). TVA is also conducting a study to evaluate the potential cost and benefits of distributed generation alternatives.

777

Comment: *TVA should be encouraging distributed generation through the use of things like fuel cells, which are smaller production units that distributors could control. This is going to be a necessary component in the era of increased competition.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: TVA is currently conducting an investigation of possible distributed generation applications and is working to develop better generating technologies (such as fuel cells)

for these applications. The short-term action plan (see Volume 1, Chapter 10, Figure 10-1) includes further research and development on distributed generation, including fuel cell technologies.

778

Comment: *I believe a 20- to 50-megawatt waste wood-fired unit in the Tupelo area might be appropriate to consider. There are fairly large quantities of waste wood in northeast Mississippi. TVA is considering cofiring wood with coal at Allen and Colbert Steam Plants. The rule of thumb on wood fuel is that transport beyond 50 miles is not usually economical. Therefore, a wood-fired unit located somewhere just below Tupelo could be supported and not interfere with TVA's cofiring strategy.*

Comment by: David Stephenson (Southeastern Regional Biomass Energy Program)

Response: Electricity from wood-fired plants has historically been expensive in most locations, although more reasonable costs have been reported recently. The short-term action plan includes cofiring of wood waste in existing coal-fired power plants. Cofiring achieves the same low fuel costs and emissions benefits that would result from wood-fired plants, without the capital cost of a new plant. (See Volume 1, Chapter 10, Figure 10-1.)

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section includes comments and responses about:

- various aspects of the environmental quality of the TVA region
- the effect of coal combustion on air quality related problems, including acid rain, visibility, adverse effects in the Great Smoky Mountains National Park, forest health impacts, and global climate change
- water quality in TVA reservoirs and the TVA region
- socioeconomic conditions
- the treatment of environmental consequences in Energy Vision 2020, including the impact of radioactive wastes

Affected Environment

AIR RESOURCES

General

779

Comment: *Since the passage of the Clean Air Act in 1970, we are using 81 percent more coal, but emissions are down a total of 26 percent.*

Comment by: Barbara Altizer (Virginia Coal Council)

Response: TVA is not aware of the basis for the 81 percent figure in the comment. Through the addition of scrubbers and fuel switches to medium and low sulfur coal between 1976 and 1990, TVA has been able to significantly reduce sulfur dioxide emissions. By 1994, TVA's sulfur dioxide emissions were reduced from that in 1976 by about 54 percent, while at the same time in 1994, approximately 5 percent more coal was consumed than in 1976. By 2005, TVA's sulfur dioxide emissions are projected to be only 20 percent of their 1976 level. Nitrogen oxides emissions are just now beginning to be reduced under Phase 1 of the 1990 Clean Air Act Amendments, but TVA anticipates reductions in system-wide nitrogen oxides emissions by the year 2000 of 40 to 50 percent for roughly the same amount of coal consumed in 1994.

780

Comment: *TVA and other regional utilities are causing air pollution problems in the Great Smoky Mountains National Park. They have regional haze problems with visibility as much as 60 to 70 percent below what it should be. In the summer months, visibility is down to 10 miles when it should be as much as 60 to 100 miles. That is being traced back to sulfates from coal-fired plants. There are also ground-level ozone problems damaging trees, and they are considering posting the park for ozone hazards to visitors because they are exceeding the 120 parts per billion ozone standard. Much of that is due to nitrogen oxides emissions from coal-fired plants. There are also fine particulate and mercury emissions from coal-burning. Demand-side management and energy efficiency would lessen these impacts.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: Electric utilities including TVA, as well as industry and other sources, contribute to the air emissions causing visibility degradation in the Southeast such as regional haze. One important pollutant contributing to visibility degradations is sulfur dioxide, which forms sulfate particulate. TVA has reduced sulfur dioxide emissions by more than 50 percent since 1976. An 80 percent reduction will be accomplished when TVA finishes implementing control strategies to comply with the 1990 Clean Air Act Amendments. TVA also expects to reduce nitrogen oxides emissions, which can contribute to ozone formation by about 50 percent.

Energy Vision 2020 addresses visibility impairment and TVA's contribution to this and other air quality problems. (See Volume 2, Technical Document 1, pages T1.65 and T1.91.)

781

Comment: *While you correctly discuss the effect of power plant emissions on visibility reduction (see Volume 2, Technical Document 1, pages T1.63 to T1.66), you have ignored one more impact of air pollution on tree growth rates: reduced photosynthetically active radiation. According to Aber and Federer (1992), deciduous and evergreen trees in the eastern United States have growth rates controlled by three primary factors outside of soil nutrient levels: soil water, ambient temperature, and photosynthetically active radiation. Since there is generally plenty of soil moisture in the eastern United States, soil moisture is not generally the limiting factor here, except during periods of drought. They have done a careful study in a number of forests in the eastern United States, measuring these three parameters as well as tree growth rates. They found that for a 10 percent reduction in photosynthetically active radiation, deciduous trees experienced a 4.4 (±2.9) percent reduction in growth, while for evergreen trees, the value was 7.0 (±2.4) percent. Grant (manuscript in preparation) has taken their results along with aerosol loadings in the eastern United States and estimated that deciduous trees would have growth rates reduced by 3.8 (±2.9) percent, while evergreen trees would see a 6.7 (±2.7) percent reduction. While this is a small effect, it is both measurable and consistent with the general growth rate declines noted for the region.*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: The hypotheses here regarding the impact of power plant emissions on photosynthetically active radiation are very interesting. We have never heard the issue raised before. Given that the ideas have not been published to date nor have any experimental data, we look with interest toward future research in this area.

782

Comment: *You cannot cite an Environmental Protection Agency document. My copy of the Citation of the Environmental Protection Agency's 1995 draft ozone criteria document states clearly on the cover and on each page: "Do not quote or cite." Did you get a different version than I did? The problem with citing draft documents is that the conclusions can change. In addition, they do not yet have the approval of the agency. One way around the citing prohibition is to develop arguments in your document based on the underlying literature quoted in the Environmental Protection Agency document. (See Volume 2, Technical Document 1, Figure T1.54, page T1.84.)*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: You are correct in noting that the Ozone Criteria document (Environmental Protection Agency 1995) is a document "in review" and it would be inappropriate to cite preliminary conclusions from the draft document. However, as a compilation of the current literature, the draft Environmental Protection Agency document is a more appropriate source. The citation of this document was used to provide the most current information available in Energy Vision 2020.

783

Comment: *The article, McLaughlin et al., 1995, is not included in the citation listing, (see Volume 2, Technical Document 1, page T1.150).*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: The text has been changed appropriately.

784

Comment: *"Nitrogen oxides emissions have been weighted three times greater for their impact to crop and forest productivity than sulfur dioxide emissions."*

While this statement in Volume 2, Technical Document 1, page T1.90, may be qualitatively correct at some regional emission/deposition rates, it is not clear that it is quantitatively correct. For example, sulfates in clouds are more important for affecting the cold hardness of red spruce than are nitrates (Sheppard 1994). Also, sulfur can only reduce soil pH to about 4.2, while nitrogen can reduce it below 4.2 (Shultz 1989). A better justification of the 75:25 ratio should be provided, along with an estimate of its range and uncertainty.

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: A three-to-one ratio for weighting nitrogen oxides emissions compared to sulfur dioxide emissions was decided because sulfur dioxide is a component of acid deposition, while nitrogen oxides is a component for both acid deposition and ozone. Currently, ozone is considered to be the most significant air pollutant in the southeastern United States.

Acid Deposition/Rain

785

Comment: *A measure of forest sustainability is mortality rates. Recent mortality rate trends have been up, which is not good for sustainability.*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: Forest growth statistics take into account tree mortality information. TVA agrees that mortality rate information is very important for measuring forest sustainability. However, information on stand age, species composition, insect infestation, disease outbreaks, and other factors must also be included before determining if rates are abnormal and whether cause-effect relationships can be implicated.

786

Comment: *The National Acid Precipitation Assessment Program 1991 concluded that the vast majority of forests in eastern North America are not in decline, although atmospheric deposition may be implicated in the premature mortality of high elevation red spruce in the Northeast. Evidence of red spruce decline and pollution involvement in the southern Appalachians is less substantial.*

First, the National Acid Precipitation Assessment Program 1991 was written under political direction, often with blatant disregard to the underlying scientific findings (Loucks, 1992). Thus, reliance on the findings of the National Acid Precipitation Assessment Program on this or any other matter is strongly suspect.

Second, the effects of air pollution, including acid deposition and ozone, have been fairly well documented for red spruce in the southern Appalachian Mountains, e.g., Eager and Adams (1992).

Third, many other trees are also in decline due to the effects of air pollution, (e.g., oaks). If we look at the growth rates of oaks in Arkansas, North Carolina, and Tennessee, using tree rings as the indicator, we see from the data published by Starkey et al. (1987) that there was an increase in growth rates in the 1930s and 1940s, followed by declines below the pre-1930s growth rates in the 1980s. My interpretation is that acid deposition is responsible for both the increases in the 1930s and 1940s and the subsequent decline. Acid precipitation does two things to increase the nutrient availability to trees at first: it provides mineralized nitrogen (in agreement with a statement in Volume 2, Technical Document 1, page T1.77) and it releases exchangeable divalent base cations (calcium, potassium, magnesium) into the soil solution. After awhile, however, increasing soil acidity reduces the calcium-to-aluminum ratio to below about 1, where the trees are more likely to take in the toxic aluminum rather than the beneficial base cations, and there are other effects on soil fauna and flora which reduce the availability of soil nutrients and the ability of the trees to assimilate them; hence, the period of decline. A good overview is found in Sverdrup and Warfvinge (1993).

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: Many of the results of the National Acidic Precipitation Assessment Program fell short of being conclusive, but rather indicated various "trends" or "correlations" in the data, such as the gradient studies reported in Loucks (1992). As Dr. Loucks points out, such studies "were not designed to show causality by themselves." Whenever data are inconclusive, there will always be controversy in the interpretation of results.

With regard to whether the forests of eastern North America are truly in "widespread decline," this issue certainly receives some support from certain studies, but overall has not been clearly demonstrated. Even Dr. Loucks (1992) states that, "analysis of the historic periodic "declines," observed in several forest species regularly over centuries, is such that the present pattern of tree death cannot yet be distinguished from past patterns."

As to whether acid deposition is the cause of any "declines," evidence to date is circumstantial or of limited geographical or temporal extent, with the exception of red spruce. The existence of a correlation does not, of course, prove causation, but is simply grounds for generating hypotheses. Individuals may impose their own interpretations on the results, but the forest scientific community awaits more evidence that any of these "declines" have been caused by acid deposition.

With regard to the role of acid deposition in altering nutrient cycles and other ecosystem functions, the section of Energy Vision 2020, Volume 2 on "Acid Deposition-Forests" thoroughly describes the types of perturbations that acid deposition is currently affecting

(see Volume 2, Technical Document 1, pages T1.76 to T1.80). This discussion includes impacts on the base cation cycling, on nitrogen cycling, and on the availability of soil nutrients. The interaction of calcium and aluminum are also addressed on page T1.77.

787

Comment: *The National Acid Precipitation Assessment Program did not find a regional decline of southern pines.*

That should not be used to imply that there is no decline in southern pines, since the National Acid Precipitation Assessment Program was politically directed. Anderson et al. (1988) did find the effects of air pollution on eastern white pine in the southern Appalachian Mountains, with symptomatic trees having 49 percent less mean volume than healthy trees.

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: Decline is a specific term used in plant pathology (Manion 1981) and can be evaluated at a tree, community, or regional level. The National Acidic Precipitation Assessment Program did not find a regional decline of southern pines. Eastern white pine is not considered a southern pine species.

788

Comment: *My general opinion is that the draft plan/environmental impact statement greatly understates the effects of power plant emissions on the vitality of forests. Whether this is a deliberate attempt to mislead the public and decision-makers or done out of lack of knowledge is not clear. However, since TVA has a large forest research unit, it is hard to imagine that its staff is unaware of the large body of literature examining the multitude of effects of ozone and acid precipitation on trees, as well as the reports of extensive impacts on the forests of the eastern United States which can be related to air pollution.*

There are several recent reports of declines in forest vitality in the eastern United States. A popular account is given in Charles Little's The Dying of Trees. It discusses Camel's Hump, Vermont, Mt. Mitchell in North Carolina, and Lucy's Woods in West Virginia in the eastern United States, all of which are severely impacted by air pollution. Another account can be found in the periodic United States Forest Service Forest Inventory Analysis Reports for the southeastern states, where both standing tree stock and mortality rates can be found. Since 1960, mortality rates for red oak have doubled, those for white oak have tripled, those for hickory have quadrupled, and for all hardwoods, the rate is more than double. It is highly likely that air pollution has played an important role. More recently, it has been realized that the Allegheny Mountains forests are suffering severe dieback due to acid precipitation. While this finding has not yet received publicity, Phil Wargo with the United States Forest Service in Connecticut (203-230-4312) can provide information on it. The fact that there are several cases in the eastern United States that are experiencing forest decline due to air pollution belies the so-called findings of the National Acid Precipitation Assessment Program, which were politically, rather than scientifically, motivated (e.g., Loucks 1992).

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: TVA disagrees that Energy Vision 2020 understates the possible effects of power plant emissions on the vitality of forests. Changes in forest health in specific southern areas such as Mt. Mitchell and Lucy's Wood have not been directly linked to air pollution (Eagar and Adams 1992). Instead, a multiple stressor complex that includes exotic

insects, disease, degradative land use practices, atmospheric deposition, and other factors have been implicated. Mortality calculated for United States Forest Service Forest Inventory Analysis documents is not a rate function. Instead, mortality is defined as the volume of sound wood in trees that have died of natural causes (United Service Forest Service 1988). Furthermore, there are no direct and indirect linkages made in those documents between mortality and air pollution.

In a telephone conversation with Dr. Phil Wargo on October 26, 1995, he confirmed that his research indicates that forests, in and near the Allegheny National Forest, are declining. While his work has not been published in the peer-reviewed literature, he stated that insect defoliation, drought, disease, outdated practices, and low soil nutrition were the primary causes of decline. Soil nutrition levels may be indirectly linked to atmospheric deposition, but Dr. Wargo did not have data to substantiate that hypothesis.

789

Comment: *There is a pervasive forest health decline occurring in the area from airborne deposition, assaults from acid rain, and increasingly noticed, being known as nitrogen saturation, primarily from utility companies and from pulp mills.*

Comment by: Dennis Haldeman

Response: The assertion that "there is pervasive forest health decline… [in hardwoods]" is counter to the National Acidic Precipitation Assessment Program report to Congress (National Acidic Precipitation Assessment Program, Report 16, 1990). This document is a summary of over ten years of work on forest health. A multitude of studies are cited in this document. The conclusions of the National Acidic Precipitation Assessment Program report do not indicate that there is "pervasive decline."

The assertion that "airborne deposition" is leading to nitrogen saturation is unfounded. The nitrogen saturation hypothesis is simply that: a hypothesis that as yet is untested. The Scandinavian countries and parts of Europe are attempting to define what may constitute critical loads that may subsequently result in nitrogen saturation. Little research has been done in the United States concerning nitrogen saturation, but several studies have suggested that high elevation forests may be susceptible to nitrogen saturation. These observations come from reports of high soil nitrogen levels in spruce fir forests in the eastern United States; however, a wide range of possibilities exist as to why these specific sites may exhibit high nitrogen levels, including greater mineralization rates and decreased nitrogen uptake. Overwhelmingly, the scientific literature supports what forest scientists have known for decades, that forests are nitrogen-limited and respond positively to nitrogen additions.

790

Comment: *Data from Mt. Mitchell should have been added to Volume 2, Technical Document 1, Figure T1-35. Such data are available in Aneja and Li (1991). Values averaging above 60 parts per billion by volume are common.*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: The temporal ozone pattern observed at Mount Mitchell is very similar in shape to the flat pattern observed at Cove Mountain and numerous other high elevation sites. The greatest differences are in the magnitude of concentrations. We chose not to include data from other sites in the interest of keeping the figure uncluttered and easily understandable for persons not familiar with the subject.

791

Comment: *Assuming 24 to 48 hours for summertime sulfate formation and transport, sources 400 to 800 kilometers away are likely contributing to sulfate deposition in the Tennessee Valley. Aerosols are removed from the atmosphere by dry deposition or rainout in clouds. The lifetime of aerosols is often stated to be 7 days, not 1 to 2 days. Thus, the impact region for emissions from TVA should be much larger than 400 to 800 kilometers, which would include the Great Smoky Mountains National Park and beyond.*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: It is true that the total impact region for sulfate derived from TVA emissions extends farther downwind than 400 to 800 kilometers. The distance cited in Energy Vision 2020 and the cited travel time of 24 to 48 hours represent the range over which the TVA contribution to sulfate deposition would be greatest. As downwind distance increases, the relative contribution of TVA emissions to the total atmospheric loading of sulfate decreases. Thus, at seven days, the relative contribution of TVA emissions of total downwind sulfate deposition is minute. TVA impacts on acid deposition and visibility are expected to be greatest within 800 kilometers downwind, which can include the Great Smoky Mountains National Park, where sulfur dioxide dry deposition is at a maximum (sulfur dioxide dry deposition velocities being much greater than those of sulfate). Sulfate, especially under stagnant transport conditions, can accumulate and contribute to periods of severe visibility degradation. In addition, stagnation can lead to especially concentrated washout of sulfate in summertime thunderstorms.

792

Comment: *Why were data from the Great Smoky Mountains National Park not included in Volume 2, Technical Document 1, Figure T1-40, page T1.62.*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: Data points in Volume 2, Technical Document 1, Figure T1-40 were selected to represent the range of geographic variability at low elevations. Selected data points also had to represent long periods of record, which were not available for Great Smoky Mountains National Park at low elevations (see Volume 2, Technical Document 1, page T1.62).

793

Comment: *With carbon dioxide present in the atmosphere at 330 parts per million, the acidity of rain due to the presence of carbonic acid is 5.6. At current carbon dioxide levels of 355 parts per million, the pH is still near 5.6. Where does the figure of 5.2 come from?*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: The "natural" pH of rain water is affected by things other than carbon dioxide. Volcanic emissions, forest fires, sea spray, and biogenic emissions inject various quantities of sulfur dioxide, other sulfur compounds, chlorides (including hydrochloric acid), nitrogen oxides, and organic acids into the atmosphere. When combined, these substances account for an average "natural" pH value that is slightly less than 5.6. A National Research Council report (1983) gives a lower end of the range for "natural" pH of 4.9. The estimate of 5.2 falls within this range.

794

Comment: *Calcium is an essential plant nutrient. Magnesium is also essential for photosynthesis and potassium is essential for regulating osmotic pressure. Normally, forest soil scientists discuss the (calcium + potassium + magnesium)/aluminum ratio, with a considerable body of data showing that when this ratio drops below about 1, tree growth rates begin their decline. What is needed is a soils condition survey of the eastern United States that would measure divalent base cation concentrations in soil solutions for the various upper soil layers (O, A, E) and use them with a model to estimate the present and future condition of the soils in the region in relation to effects on tree vitality. Volume 2, Technical Document 1, Figure T1.83 is inadequate since only aluminum and calcium are used, it is for only one site, and nothing is stated about the effects on tree growth for the various molar ratios presented. If, as is sometimes done, calcium is used as shorthand for calcium + potassium + magnesium, then all values above a ratio of 1 are generally not good for trees.*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: We recognize that magnesium and potassium are important soil nutrients. In fact, the potential for aluminum to interfere with the uptake of magnesium is pointed out at the bottom of column one, page T1.77 in Volume 2, Technical Document 1.
It is more common to discuss the calcium/aluminum ratio, although the (calcium + magnesium + potassium)/aluminum ratio is sometimes used. Early work in this area (Foy et al 1969, Lund 1970, Rost-Siebert 1983, and Hutterman and Ulrich 1984) focused on the calcium/aluminum ratio. The topic has recently been reviewed at length by Cronan and Griga 1995; (see this paper for above references).

We agree that the long-term soils condition survey for the eastern United States is badly needed. Because of the effort to reduce federal funding, finding financial support for such a survey is unfortunately very difficult. The Forest Health Monitoring Program, within which TVA is an active participant, has such a soil survey as one of its goals. Volume 2, Technical Document 1, Figure T1-52, was intended simply as an illustration of how aluminum/calcium ratios would shift under different emission scenarios, not as a definitive representation of all sites in the eastern United States. The use of aluminum/calcium ratios is adequate in TVA's opinion. (See review article by Cronan and Griga [1995]). We agree that aluminum/calcium ratios above 1 are generally not good for trees, though species vary greatly in their tolerances of low calcium/high aluminum.

Global Climate Change

795

Comment: *TVA's participation in the Climate Challenge program should not be driven by political reasons. Rather, participation should be based on a clear understanding of the advantages and disadvantages of participation. Unless limits on greenhouse gas emissions become mandatory, TVA could increase its costs over its competitors' by pursuing reductions in greenhouse gas emissions. Some proponents of greenhouse gas limitations may feel that TVA should set an example for the rest of the industry to follow in making greenhouse gas reductions, even at the expense of higher overall costs. The Tennessee Valley Public Power Association members, on the other hand, may not be willing to accept higher costs for the sake of voluntarily reducing greenhouse gas emissions.*

Comment by: Tennessee Valley Public Power Association

Response: As stated in the Climate Challenge Memorandum of Understanding, one of the principles upon which the program is based is that the actions utility participants take "will be cost-effective and will take into consideration impacts on rate payers and share holders and the competitive situations of the utilities with regard to costs and rates." Within the utility industry, there are many technically and economically sound activities that a utility can implement as part of its normal business practices that also reduce greenhouse gas emissions. Most of the actions included in TVA's Climate Challenge commitment have been evaluated as cost-effective actions independent of their impact on greenhouse gas emissions. For example, TVA has included in its commitment heat rate improvements at fossil fuel units, the hydro modernization program, restarting Browns Ferry Nuclear Plant Units 2 and 3, completion of Watts Bar Nuclear Plant Unit 1, biomass cofiring, certain demand-side management programs, and transmission system efficiency improvements. The biomass cofiring, hydro modernization, and the demand-side management programs are also included in the Energy Vision 2020 short-term action plan. The actions included in TVA's Climate Challenge commitment will not negatively impact rates.

TVA is committed to Climate Challenge and wants to do everything possible to make it a successful program. While the scientific evidence relating human produced greenhouse gas emissions to global warming is considered inconclusive by some, many think it is prudent to take cost-effective action to reduce greenhouse gas emissions and not wait until scientific evidence is more conclusive.

796

Comment: *TVA is directly responsible for the greenhouse effect. TVA is number one in the United States and if you take China out of the loop, probably the world in producing carbon dioxide.*

Comment by: Bryan Deel, Bruce Wood, Sharon Force, John Noel

Response: The United States accounts for about 23 percent of the world's greenhouse gas emissions. Electric utilities account for about 35 percent of the United States greenhouse gas emissions. TVA emits about 4 percent of the United States electric utility greenhouse gas emissions. Therefore, TVA contributes about 0.3 percent of the world's total greenhouse gas emissions. The contribution of nuclear and hydro power to the TVA generation mix helps keep greenhouse gas emissions lower than they would otherwise be.

797

Comment: *In Volume 2, Technical Document 1, page T1.70, the statement that nuclear emits no carbon dioxide is wrong. Calculate the coal used for powering uranium enrichment plants and the carbon dioxide and other emissions produced. In 1990 an estimated 10.7 million tons were burned to enrich uranium. This resulted in 661,000 tons of sulfur dioxide and 195,000 tons of nitrogen oxides. It is estimated that 3 percent of all sulfur dioxide emitted in the United States is associated with enriching uranium. It is estimated that the enrichment process consumes 25 percent of the electricity produced by nuclear power plants. Even after Phase I of the Clean Air Act, a nuclear power plant will still cause about as much acid rain as a new coal-fired plant with scrubbers on an emissions-per-kilowatt-hour basis. Uranium enrichment produces approximately 22 million tons of carbon dioxide annually.*

Comment by: Al Fritsch (Appalachia–Science in the Public Interest)

Response: The generation that supports uranium enrichment would produce some amounts of various pollutants. The statement in Volume 2, Technical Document 1, page T1.70 was intended to apply only to the direct emission of carbon dioxide from nuclear plants.

TVA estimates that less than 5 percent of the total electrical output from a commercial nuclear power plant would be required for nuclear fuel enrichment processes. These figures are based on currently available gaseous diffusion enrichment technology. The more modern centrifuge and laser-based enrichment technologies would reduce the enrichment energy requirement significantly.

The emissions from a coal-fired plant would, accordingly, be more than 20 times the emissions resulting from enriching fuel for a nuclear power plant where the energy source for enrichment is a coal-fired plant. The situation improves when a portion of the energy is supplied by a nuclear plant.

WATER RESOURCES

798

Comment: *Volume 1, Chapter 3, Figures 3-13 and 3-14 and Volume 2, Technical Document 1, Figures T1-64 and T1-65 provide useful information regarding the principal water quality concerns and waterbody use impairments in TVA reservoirs and watersheds. Was the determination of use impairments conducted by TVA or was this information taken from the state 305(b) reports or other sources? If use impairments were determined by TVA, Energy Vision 2020 should include a brief description of the process used in evaluating use impairments. This description should include a discussion of the data sources (e.g., TVA, states, U.S. Geological Service) and criteria used in the evaluation (e.g., state water quality standards).*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA has conducted comprehensive aquatic monitoring throughout the Tennessee Valley since 1990. The two primary objectives of this effort are to evaluate the ecological health of major streams and reservoirs ("vital signs monitoring") and to examine how well these water resources meet the goals of the Clean Water Act ("use suitability monitoring"). The water quality concern and use impairment information depicted in Figures 3-13 and 3-14 were derived by TVA primarily using data and analyses generated through this program. Data from other TVA monitoring activities were also used, including TVA's Aquatic Plant Management and Reservoir Releases Improvement Programs. The basis used to make judgments about conditions were state water quality standards and fish consumption advisories issued by the states. Most of this information and data are captured in TVA's annual River Pulse reports. The text has been revised for clarification.

799

Comment: *Energy Vision 2020 states that TVA monitoring has shown no "significant negative effects" from heated discharges. How is "significant negative effects" defined in the context of Energy Vision 2020? (See Volume 1, Chapter 3, page 3.21, Surface Water, TVA Heat Releases.)*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: In the context of Energy Vision 2020, "significant negative effects" means demonstrable damage to established water uses or aquatic ecological integrity. The text has been revised for clarification.

800

Comment: *Energy Vision 2020 states that nonpoint sources "contribute as much as five times more dissolved oxygen-consuming wastes than point sources." (See Volume 2, Technical Document 1, page T1.96, Rainfall and Runoff Pollutants.) Is this intended as a general statement or is it specific to the TVA region? Also, is this statement intended to apply to average conditions or is it specific to rain events? Finally, while the constituents of power plant wastewater may not contain loading of oxygen-demanding materials equal to nonpoint sources, reservoir releases may contribute significantly to the in-stream dissolved oxygen deficit. Has an analysis been conducted comparing the impact on the instream dissolved oxygen deficit from low dissolved oxygen reservoir releases with the dissolved oxygen deficit contributed by nonpoint sources?*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: The statement that nonpoint sources contribute as much as five times more dissolved oxygen-consuming wastes as point sources is intended as a general statement that applies to the TVA region. However, this statement is generally accurate nationwide, based on studies by the Environmental Protection Agency and others, such as the Environmental Protection Agency's 1983 report, Nationwide Urban Runoff Program. Nonpoint sources of pollutants have typically been associated with rainfall events, either directly from surface runoff or from delayed groundwater discharge to streams. TVA has not conducted a comparative analysis of the relative dissolved oxygen deficit contributions for nonpoint sources, point sources, or natural sources on specific reservoirs.

801

Comment: *Because of historical energy policies, TVA's reservoirs are eutrophic. TVA does not follow Environmental Protection Agency standards for classifying the condition of its lakes.*

Comment by: Dennis Haldeman

Response: Based on monitoring data from 1994, TVA classified conditions for aquatic life as "good" in six and "fair" in three of the nine mainstream Tennessee River reservoirs. There are a variety of factors unrelated to trophic status that influence the ecological health rating of these reservoirs.

In 1983, TVA developed two tropic state indices: one for mainstream "run-of-the-river" reservoirs on the Tennessee River, and one for storage reservoirs on tributaries to the Tennessee River. These new indices were developed because the tropic state indices used at the time to evaluate natural lakes—such as the one used by the Environmental Protection Agency—were judged to be inappropriate for evaluating reservoirs. The characteristics and behavior of reservoirs are significantly different from natural lakes in terms of both (1) the concentrations of nutrients associated with excessive productivity and (2) the extent to which excessive productivity changes the water quality parameters that scientists monitor. The TVA trophic state indices allow much more accurate prediction of the response of reservoirs to nutrient addition.

802

Comment: *The Nashville District United States Army Corps of Engineers operates nine multi-purpose reservoirs which incorporate hydroelectric production facilities on the Cumberland River and tributaries. Approximately half the power production from eight of these projects is marketed through the Southeastern Power Administration to TVA. We do not anticipate any significant changes in these power resources. We have, however, completed a hydropower optimization feasibility study at Lake Cumberland which focused on uprating the existing six units at Wolf Creek Powerhouse for peaking operation. On the middle Cumberland River our reservoir regulation integrates the need for adequate cooling water at TVA's Gallatin and Cumberland City Fossil Plants on Old Hickory Lake and Lake Barkley, respectively. In addition, we have performed a preliminary analysis of pumpback at Laurel Lake on the Upper Cumberland River.*

Comment by: Bradley Hoot (Department of the Army)

Response: Appropriate text changes have been made to Volume 2, Technical Document 1, Comprehensive Affected Environment, to incorporate a discussion of your studies on the Cumberland River hydroelectric system.

803

Comment: *Regarding the navigability of the Cumberland River (see Volume 2, Technical Document 1, page T1.101), the Cumberland River is considered navigable to its origin, the confluence of Clover Fork and Poor Fork at Mile 694.2. The limits of commercial navigation (maintained 9-foot channel) are at Mile 381.0, at Celina, Tennessee.*

Comment by: Bradley Hoot (Department of the Army)

Response: The appropriate changes have been made to the text.

804

Comment: *In Volume 2, Technical Document 1, page T1.102, in paragraph 4, column 1, it states the tailwaters of Lake Cumberland, Dale Hollow, Center Hill, and Laurel Lakes "provide good to excellent trout (Salvalinus namaycush) fisheries." The species (Salvalinus namaycush) is the lake trout which, since 1977, has been stocked in Dale Hollow Lake and to a lesser extent in the Obed River below Dale Hollow Dam. The rainbow trout (Oncorhynchus mykiss) and the brown trout (Salmo trutta) are routinely stocked in large numbers in the referenced tailwaters by the State of Tennessee and Commonwealth of Kentucky. These two species are the focus of the popular fisheries in these tailwaters.*

Comment by: Bradley Hoot (Department of the Army)

Response: The appropriate text changes have been made.

LAND RESOURCES

805

Comment: *Watts Bar Nuclear Plant's evacuation plan should be included in Energy Vision 2020.*

Comment by: Mandy Tiesler, Jean Cheney, Jamie Pizzirusso

Response: The evacuation route and plan for evacuation for Watts Bar Nuclear Power Plant are found in the "State of Tennessee Multi Jurisdictional Emergency Plan." Copies are located at TVA emergency centers, local county emergency centers, and the Tennessee Emergency Center in Nashville.

Each year TVA provides information, including maps and evacuation routes, to residents within a 10-mile radius of each nuclear plant. For Watts Bar Nuclear Plant, the information is mailed each November.

806

Comment: *Children continue to be exposed to low-level radiation which is cumulative, working up through the food chain.*

Comment by: Jean Cheney

Response: Together, natural and man-made radiation expose the average American to about 360 millirem a year. Nuclear energy is only one—and among the least—of the many sources of radiation. People are exposed to radiation from radon in the air; from radioactive potassium in our food and water; from uranium, radium, and thorium in the earth's crust; and from cosmic rays and the sun. Natural background radiation accounts for almost 85 percent of the average total annual exposure.

Nuclear energy exposes even the people living nearest the plants to under 0.1 millirem a year. The radiation exposure from Three Mile Island caused an average exposure of 1.5 millirem to people within 50 miles of the plant. This is a small fraction of what most of us receive each year from naturally occurring radioactive materials in soil, rocks, air, food, and water.

TVA has a responsibility to safety first. The plants are designed, built, and operated to high standards and adhere to strict regulations to ensure the health and safety of the public and TVA employees.

FUEL

807

Comment: *The coal industry is subject to heavy environmental regulations and has come a long way.*

Comment by: Barbara Altizer (Virginia Coal Council)

Response: The environmental impacts of coal mining have been greatly reduced through compliance with the Surface Mining Reclamation and Control Act and through industry initiatives.

SOCIOECONOMIC RESOURCES

808

Comment: *Bad financial decisions are responsible for worker layoffs and reductions, and not environmental requirements.*

Comment by: Retha Ferrell

Response: Worker layoffs and reductions are typically a response to changing markets and an entity's particular competitive position within its markets, and are usually not the

result of any single condition. Many factors can add to costs and deteriorate competitive positions. To the extent that environmental regulations add to cost, this also changes the market and the competitive position of entities. Environmental regulation may decrease the demand for one product (e.g., high-sulfur coal) and increase the demand for another (e.g., clean coal technology). Jobs may thus be created in one industry while being lost in another. However, unemployment is likely to occur due to displaced workers not having the needed skills for other available jobs.

809

Comment: *There are great economic benefits to the region of Kentucky that produces coal provided to TVA.*

- *In 1994 Kentucky supplied 28 million tons of the 39.1 million tons of the coal delivered to TVA.*
- *This provided 4,300 mining jobs earning $168 million annually. (These jobs average more in earnings, than any other industrial sector.)*
- *This resulted in a multiplier effect of 17,000 jobs.*
- *This produced $29 million in severance taxes.*
- *Total tax revenues from associated economic activity are approximately $87 million.*
- *In total, this creates about $1.4 billion in annual output of goods and services.*
- *Other coal deliveries to TVA from Tennessee and Virginia produced 370 mining jobs.*

Comment by: William Bowker (Kentucky Coal Marketing and Export Council)

Response: There are economic development benefits associated with coal production as a result of TVA purchases. In Energy Vision 2020, the economic development effects due to all final strategies, including those effects resulting from mining activity in the TVA region generated by energy options requiring coal purchases, have been analyzed.

810

Comment: *Low-cost, reliable electricity has been and continues to be the prime driver of economic growth in the region and benefits everyone.*

Comment by: Jan Jones (Tennessee River Valley Association), J. Richard Hommrich (Volunteer Barge & Transport, Inc.), William Bowker (Kentucky Coal Marketing and Export Council)

Response: In the economics literature, as well as in TVA studies, the cost of electricity has been found to be a significant factor in economic development. Economic development effects due to electricity prices were analyzed as part of each strategy in Energy Vision 2020.

811

Comment: *The economies of Tennessee, half of Alabama, and a third of Mississippi are carrying TVA's $28 billion debt, and these states finished low in every economic indicator. This represents the fundamentally corrupt nature of TVA.*

Comment by: Bruce Wood

Response: TVA's power service area incorporates significant portions of Alabama, Kentucky, and Mississippi, and almost all of Tennessee, as well as much smaller pieces of three other states. These four states together compose the East South Central region of the country, which by some measures of economic well-being, such as per capita income levels, ranks

at the bottom of the regions of the United States. Tennessee has the best ranking of the four states, and even it only ranks thirty-third in terms of per capita income levels.

However, these measures are more a reflection of where these states have started from economically. In times of economic growth, these states have performed much better than other states. All four states are in the top ten in terms of per capita income growth in the 1990s. They also rank in the middle in terms of levels of gross state production, reflective of their high manufacturing capacity, which has propelled their strong economic growth. In order to improve their rankings in terms of economic welfare, continued economic growth is necessary. Reliable, low-cost electricity has been a contributor to the states' economic growth. This will continue to be the case in the future, and TVA must plan to meet the growing needs of the states.

812

Comment: *In the past TVA was hung up about the socioeconomic benefits of large projects and this influenced them not to cancel projects when they were not needed.*

Comment by: Kirk Johnson

Response: As a regional resource development agency, one of TVA's responsibilities is to foster the economic development of the TVA region. It therefore views socioeconomic benefits as very important. Energy Vision 2020 demonstrates this. Economic development was one of a number of criteria that TVA used to evaluate possible energy resource strategies. Other criteria included costs, rates, environmental impacts, debt, reliability, risk management, and equity among customers. All of these evaluation criteria were consistently applied using the multi-attribute trade-off method, and the Energy Vision 2020 final strategies performed well on all criteria.

813

Comment: *The TVA region's economic condition is worse than depicted in Energy Vision 2020. People are underemployed or sub-employed.*

Comment by: Charles Sanford (Sanford & Associates)

Response: In its analyses of the Valley economy, TVA uses standard economic statistics and definitions from the U.S. Departments of Commerce and Labor. These statistics are the same as those used for the United States as a whole and for other parts of the country and for which there are long time series available. The historical unemployment data that TVA uses is from the United States Department of Labor. The Department has acknowledged that these data do not reflect underemployment, and in this way fails to fully capture the prevailing labor market conditions. Regardless, these statistics do fully represent relative conditions between the Valley, the United States, and other areas of the country, as well as changes in conditions over time. It is these attributes that are important to the Energy Vision 2020 economic analyses where comparisons between strategies are being made.

Environmental Consequences

GENERAL

814

Comment: *The Environmental Protection Agency rates the draft Energy Vision 2020 an "EC-2" (Environmental Concerns; more information requested). Specifically, we are concerned about potential impacts because of the uncertainty of predicting the energy sources and their attendant impacts for the next 25 years. However, we can appreciate the difficulty in making such predictions on a programmatic scale and generally agree with the TVA approach to upgrade existing sources, conservation, and to add some new sources in the short term, and to consider new alternatives such as renewables for the long term. This could even be considered for the addition of a new unit to a conventional power plant, such as at Shawnee. The information provided in the draft Energy Vision 2020 is considerable, although some additional information is requested above. This includes consideration of the human health risk of indirect exposure from energy generation sources in your analysis and the upstream/downstream impacts associated with proposed modifications of existing hydroelectric units. Although site-specific National Environmental Policy Act documents would address some of these issues, some additional information on these issues would already be appropriate in the final Energy Vision 2020.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA's goal is to provide an effective energy resources planning process with the environment as an integral consideration. The uncertainties of the electric utility industry do indeed make projections of impacts difficult. This is why flexibility was determined to be key to TVA's future success.

TVA has responded to each specific comment by the United States Environmental Protection Agency. The index to this volume provides a numbered list of these comments and their page location.

815

Comment: *Never before has such a comprehensive balancing of natural and human resources been undertaken in determining energy production options for this or any other large region of our country. With a commitment to provide full compliance with environmental laws (and beyond where possible), we can expect our region's natural resource heritage to be ensured.*

Comment by: TVA Retirees Association

Response: It was TVA's intent to develop a comprehensive plan.

816

Comment: *The agency has performed an impressive multi-parameter environmental assessment that evaluates all environmental impacts of alternative strategies against a base or reference "no-action" alternative. The impacts considered are land, water, and air, as well as socioeconomic. The analytical approach used involved trade-off considerations which allowed the public to set value criteria for judging impacts and benefits. This allowed TVA to select mitigative strategies that resulted in the highest environmental benefit considering financial, rate, economics, and other criteria. It would appear that this*

ensures higher environmental performance in the future compared to "base case" considerations. This approach is thoroughly discussed in Volume 2, Technical Document 2 and the environmental controls associated with each strategy are presented in Figure T2-1. These considerations have been, of necessity, broad in nature. However, the agency commits to further detailed evaluation as well as mitigation of impacts whenever specific resource options are utilized. Meeting all environmental protection laws while reviewing environmental commitments under the public review of the National Environmental Policy Act is certain to minimize future environmental costs.

Comment by: TVA Retirees Association

Response: It was TVA's intent to conduct a broad, yet comprehensive environmental review.

817

Comment: *TVA's multi-parameter environmental assessment that evaluates all environmental impacts of alternative strategies is a comprehensive balancing of natural and human resources.*

Comment by: TVA Retirees Association

Response: The intent of using the multi-attribute trade-off analysis method, as pointed out, was to allow trade-offs between each of numerous quantitative environmental evaluation criteria (parameters) and each of several other evaluation criteria to be examined across all strategies. Importantly, additional environmental factors not quantified for multi-attribute trade-off analyses were evaluated qualitatively.

818

Comment: *TVA's treatment of environmental issues in Energy Vision 2020 appears to be very thorough.*

Comment by: Tennessee Valley Public Power Association

Response: Your comment has been reviewed and noted.

819

Comment: *The draft Energy Vision 2020 provides a comprehensive coverage of the multi-state affected environment and potential environmental effects of the Energy Vision 2020 strategies.*

Comment by: Bradley Hoot (Department of the Army)

Response: Your comment has been reviewed and noted.

820

Comment: *The Virginia Department of Environmental Quality anticipates no significant environmental impacts for the Commonwealth of Virginia from the projects proposed in Energy Vision 2020. We have no objections to the proposed plan and support TVA's use of integrated resource planning as a useful management tool for future long-term energy supply planning efforts.*

Comment by: Tom Griffin (Commonwealth of Virginia)

Response: Your comment has been reviewed and noted.

821

Comment: *The project document includes lengthy discussions of the planning process and objectives but does not provide project-specific information on impacts of the various management alternatives considered. While the North Carolina Wildlife Resources Commission recognizes that the intent of the document is to outline an overall strategy for energy production and resource management in the Tennessee Valley, the scale of the analysis does not allow us to assess impacts to North Carolina's fish and wildlife resources resulting from project alternatives.*

Comment by: Chrys Baggett (North Carolina State Clearinghouse)

Response: As site-specific actions are proposed, environmental reviews will be conducted and coordinated with the State of North Carolina agencies as appropriate. These reviews will ensure that potential impacts to fish and wildlife resources are adequately assessed.

822

Comment: *As a programmatic environmental impact statement, we understand that at this time environmental impacts can in general only be qualified (and not quantified) and can be compared by alternative. However, future substantive TVA federal actions (e.g., construction and operation of a new power plant) would likely require site-specific National Environmental Policy Act documentation in which impacts are both qualified and quantified (e.g., potential conversion of the Bellefonte Nuclear Plant and construction of a new power plant unit at Shawnee Fossil Plant).*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Site-specific environmental reviews according to the National Environmental Policy Act will be conducted as appropriate for future actions.

823

Comment: *Human health concerns need to be considered in any site-specific National Environmental Policy Act documents for any proposed energy projects such as new power plants. At a minimum, such an analysis would need to include a screening for emitted hazardous chemicals and comparisons against any existing "standards," or the equivalent. If no "standards" exist, some appropriate screening should still be provided. Because of the association of mercury with fossil-fuel power plants, mercury should be emphasized in such screening studies. Depositional modeling should be conducted for all metals exceeding its "standard" or for which there is reason for concern (we would encourage such analysis for mercury even if levels are predicted to be below a given "standard"). If one or more chemicals exceeds its "standard" or there is reason for concern, the human risk for direct exposure impacts (inhalation) of power plant air emissions should be determined. Additionally, indirect human impacts such as ingestion of food (crops, cattle) grown in areas affected by the deposition of power plant emissions is strongly encouraged since it has been shown that the indirect exposure risk is greater for many substances than for direct exposure.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: The programmatic environmental impact statement for Energy Vision 2020 is not intended to address site-specific evaluations. Subsequent project-specific reviews will address human health concerns and will use appropriate standards to benchmark evaluations.

824

Comment: *The Environmental Protection Agency notes that human health was considered in the Energy Vision 2020 evaluation, specifically, through air emission inhalation and water ingestion. Given the importance of assessing indirect exposure risks, we recommend that TVA also strongly consider inclusion of indirect exposure risks to human health in their Energy Vision 2020 analyses.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: The important indirect pathway to human health risk for the purpose of Energy Vision 2020 was addressed—the ingestion of contaminated fish. (See Volume 2, Technical Document 1, page T1.105.) Ingestion was one of the impact area indices for water quality. The impacts of airborne mercury and other toxic metals were considered in weighting for the human health-ingestion index. The pathway of most potential impact on human health for airborne mercury is considered to be through eating fish in which the metal has accumulated. Other indirect pathways for airborne toxic metals, such as through cattle grazing, were not included in either the air quality or water quality indices. Their relative contribution to the weighting of the indices would have been less than that of fish ingestion.

Subsequent environmental reviews will address indirect health impacts and pathways as appropriate.

825

Comment: *The short-term action plan, developed from the long-term action plan, exhibits several environmentally friendly options. These include the potential conversion of the Bellefonte Nuclear Plant to an integrated gasification combined cycle demonstration technology; biomass cofiring; power purchasing; modernization of hydro facilities; and engineering and siting work on coproduction, combined cycle, and other facilities. In general, these efforts need not significantly impact the environment if properly pursued.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Your comment has been reviewed and noted.

826

Comment: *For fossil-fuel plants, new fuel sources such as coalbed and landfill methane would be beneficial to promote recycling as well as a reduction in greenhouse gases in the atmosphere, while use of biomass as a cofiring fuel would utilize domestic resources.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: These fuel sources are included in the Energy Vision 2020 long-term plan and short-term action plan. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

827

Comment: *Considering the long term (30-50 years) of the required Federal Energy Regulatory Commission's license for hydros, a re-evaluation of the environmental impacts with appropriate mitigation should be conducted at relicensing.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA hydroelectric facilities and dams are not licensed or approved by the Federal Energy Regulatory Commission. These TVA facilities are not subject to relicensing. As appropriate and consistent with the National Environmental Policy Act, proposed TVA actions at or involving its hydroelectric facilities and dams consider potential environmental impacts and ways of mitigating impacts.

828

Comment: *I think that the draft environmental impact statement needs to fully assess the long-term off-site and cumulative and synergistic effects of the TVA power system and all human industrial activities in the Tennessee Valley Authority service area.*

Examples include pollution in the Tennessee River. One of the cumulative impacts is batch releases from the nuclear plants with all the releases from DuPont and the other industries that see fit to utilize the Tennessee River as their toilet.

Comment by: John Johnson (Earth First), Dennis Haldeman

Response: Energy Vision 2020 addresses potential cumulative environmental effects by first assessing the condition of the existing environment. Second, the cumulative environmental consequences of all proposed supply-side and demand-side options were then addressed on a quantitative or a qualitative basis.

Wastewater discharges from TVA facilities (as well as industry) are permitted under the National Pollution Discharge Elimination System as administered by the states. These permits are designed to protect, preserve, or restore the water uses identified by state stream classifications.

829

Comment: *TVA's plan fails to consider reasonably foreseeable impacts caused by increasing demand, which is in violation of the National Environmental Policy Act.*

Comment by: Dennis Haldeman

Response: Energy Vision 2020 considers reasonably foreseeable effects (impacts) as required by the National Environmental Policy Act. Examples illustrating this include the following:

Reasonably foreseeable impacts due to air emissions and wastewater discharges were evaluated using air and water quality impact environmental indices (See Volume 2, Technical Document 2, Environmental Consequences.)

Air quality effects include those related to the formation of secondary air pollutants, the changes to TVA's contribution to the regional inventory of such pollutants, and the pollutant's fate in the environment. These secondary pollutants include sulfate and nitrate particulate and ozone. Potential indirect effects from these pollutants are the effects of acid deposition and ozone exposure to natural and man-made resources.

Water quality effects addressed by the water quality indices include changes in food chain biomagnification in fish of toxic metals discharged from coal-fired (including air deposition) and nuclear power plants, and reservoir sediment releases. Also, indirect water quality impacts from changes in coal procurement and the related coal mining were considered.

The air and water quality indices for alternative energy strategies showed improvement in comparison to the reference strategy. (See Volume 2, Technical Document 2, Figures T2-14 and T2-27.)

Land resource impacts were also addressed as appropriate in the plan. This included land use conversion due to changes in coal mining resulting from TVA's coal procurements.

Economic development effects stemming directly from TVA actions (i.e., job creation from power plant construction and operation, and from demand-side management) were evaluated for all energy strategies. The indirect or multiplier effects of the payroll from these job creations on the local economy were quantified. The indirect effect of the procurement of goods and services (i.e., power plant fuel, replacement parts, and equipment) were also evaluated. Additionally, the more subtle but important indirect effect of TVA's future cost of electricity on economic development was quantified for each strategy.

830

Comment: *New epidemiological research findings by the Centers for Disease Control and various other domestic and foreign sources over the next 25 years, as well as new corresponding regulations and/or policies promulgated by the Occupational Safety and Health Administration, the Environmental Protection Agency, the Department of Energy, the Department of Defense, the Federal Highway Administration, and others will likely influence TVA's selection of resource options within its portfolio and its approach to minimizing human health risk. In this regard, we encourage TVA to develop, implement, and keep current a policy based on such research and regulations.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: The uncertainties of future environmental regulations and environmental and health problems identified in the future are among the reasons that TVA identified flexibility in energy resource planning as critical to the Energy Vision 2020 plan. Various TVA staff regularly monitor and review health and environmental developments. TVA also relies on sister federal agencies, such as the Environmental Protection Agency, the Centers for Disease Control, and Department of Energy, to help it keep abreast of such developments.

831

Comment: *Not all the criticisms of the plan I have read about from the environmental community seem valid. One suggestion is to beef it up with more "sustainable development" language. To my knowledge the term was not used.*

The plan's main goal was well-stated, (i.e., "going beyond simply providing low-cost power by considering economic development and the environment as part of TVA's mandate to be a leader in total resource development"). This is the essence of sustainable development—the linking of economic development and the environment. In effect, TVA is a sustainable development agency.

Comment by: Tom Forsythe

Response: TVA received several comments concerning sustainable energy policy. Responses to these comments address omission of the term "sustainable" in TVA's discussion.

832

Comment: *TVA has demonetized the environmental cost of the power operations and stopped externalizing them and making us, the public, and the biological diversity of this Valley pay for that.*

Comment by: John Johnson (Earth First)

Response: Environmental control costs based on current regulatory programs were internalized and thereby considered in power operations costs. Although not monetized, a full range of environmental externalities were assessed in the multi-attribute trade-off analyses. These analyses ensured that environmental externalities were assessed on the same basis as other evaluation criteria. As a result, the final strategies and the preferred alternative, a portfolio of options, mitigate potential environmental impacts. (See Volume 1, Chapter 9.)

833

Comment: *The choice of call options is a good decision because it provides flexibility. However, option purchase agreements need to be evaluated on their environmental impacts. If they are independent power producers, they should be held to a high environmental standard because they may be less regulated than TVA.*

Comment by: Stephen Smith (Tennessee Valley Energy Reform Coalition)

Response: The flexibility afforded TVA by using call options to meet future load growth is one of the primary reasons for their use.

Proposals have been evaluated relative to their potential environmental impacts in Energy Vision 2020 and will be further evaluated prior to the decision to accept a proposal. All of these energy suppliers will have to meet federal, state, and local requirements which are formulated to protect the environment.

834

Comment: *As we move into the twenty-first century, an emphasis on sustainable development—continued economic growth and development balanced with protecting the environment—will influence United States energy policy. As related to energy issues, a sustainable energy supply envisions and requires the following attributes:*

- *A fuel source which is dependable, reliable, and stable for the foreseeable future*
- *Related development, production, transport, generation, and waste disposal facilities that are safe, reliable, and long lasting*
- *Compatibility with maintaining the natural environment in a healthy condition*

Comment by: Linda Church Ciocci (National Hydropower Association)

Response: TVA has developed an energy plan that balances several evaluation criteria including controlling cost, managing debt, increasing economic development, maintaining competitive rates, mitigating risk, improving system reliability, and minimizing environmental impacts.

AIR RESOURCES

835

Comment: *Site-specific National Environmental Policy Act documents subsequently resulting from the programmatic environmental impact statement should incorporate demand-side management and other conservation methods as appropriate. Documents for power sources involving fuel combustion should include an analysis of greenhouse gas emissions for the fuel mix proposed. We recommend that the 1992 National Environmental Policy Act manual for "Climate Change and Environmental Assessment: Technical Manual for*

Environmental Protection Agency's Programs and the National Environmental Policy Act" (March 1991; revised June 1992) be used as guidance for such analyses.

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: As appropriate, future TVA actions will consider the benefits of demand-side management and conservation, and potential effects on greenhouse gas emissions. Energy Vision 2020 already addresses these subjects in considerable detail, and we intend to tier from this programmatic review to subsequent project-specific reviews.

836

Comment: *As TVA is aware, state permits must be secured from the appropriate states concerning acid rain and Prevention of Significant Deterioration/New Source Review permits if/when specific projects involving air impacts are proposed for construction and operation.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA will, of course, comply with these requirements.

837

Comment: *Improved TVA fossil plant efficiency will reduce environmental impacts and fuel costs.*

Comment by: Linda Cataldo Modica, Ann Lamb

Response: Energy Vision 2020 contains a number of proposed actions that would improve fossil plant efficiency, including the possible repowering of units. TVA is also taking steps to improve plant efficiencies as part of its response to the Climate Challenge Program. (See Volume 2, Technical Document 2, Environmental Consequences.)

One example of a possible repowering or conversion technology evaluated in Energy Vision 2020 is integrated coal gasification combined cycle. Integrated coal gasification combined cycle is the cleanest, most fuel-efficient way currently available to utilize coal to produce electricity. Integrated coal gasification combined cycle's emission rates for sulfur dioxide, nitrogen oxides, and carbon dioxide are sufficiently low for it to be considered as a Clean Coal Technology by the Department of Energy. Integrated coal gasification combined cycle is typically able to achieve sulfur dioxide removal rates of 99 percent or better, resulting in emission rates of 0.03 pounds of sulfur dioxide emitted per million Btu of coal fired. Utilization of advanced combustion turbine technology results in nitrogen oxides emission rates on the order of 0.03 pounds of nitrogen oxides emitted per million Btu of coal fired. These emission rates are significantly lower than that achievable by more conventional coal-fired power plants. In addition, integrated gasification combined cycle plants are more efficient than their conventional counterparts. The higher efficiency results in less fuel consumption and consequently lower emission rates of carbon dioxide, as well as sulfur dioxide and nitrogen oxides.

838

Comment: *I am concerned about air pollution problems, including those in the Great Smoky Mountains, caused by TVA's existing coal-fired plants. The plan does not adequately address these problems.*

Comment by: William Emmott, Luther Gulick, A. B. Evans, Catherine Murray (Sierra Club, State of Franklin Group), Jo Anne Clark, M. Nathan Perry, Chris Gulick, Faith Young, Myles Jakubowski (Sunbeam Household Products), Ann & Mike

Sanders, Ruth Peeples, Walter & Dorothy Stark, Mary Anne Terry, Susana Harwood, Shirley Schaaf, Dottie Hodges, Karl Grotke, Ray Williams, Stephen Smith (Tennessee Valley Energy Reform Coalition), John Harwood, Linda LaForest (Tennessee Citizens for Wilderness Planning), Anne Redwine, John Johnson (Earth First), Bruce Wood, Sharon Force, Hamp Dobbins, Jr., Rodney Webb, M. Case, Salo, Sahara, Karah Bates, Tohert, Garry Shores, K. Varnum, Kathy Priore, Kim Grube, Amy Perry, Hermann, L. M. Johnson, Sr., Lynn Leach (Alabama Environmental Council), F. W. Munson, C. Strain, N. E. Whitfield, Deborah Cuva, Ben & Winn Welch, R. & G. Ludwig, Karen Lovell, Marion Zachiel, Yvonne Seperich, Robert Peeples, John Schwarz, Jr., Mary Schwarz, Isahl Hemm, Sharron Eckert, Stephen Stedman, C. T. Brewster, Katherine Osborn

Response: TVA is also concerned about air pollution and has long led research efforts in controlling air pollution from coal-fired power plants. In response to the requirements of the Clean Air Act, TVA has substantially reduced its emissions since 1976. Particulate emissions have been reduced by 90 percent. Sulfur dioxide emissions were reduced by 50 percent from 1976 through 1990 and are expected to be reduced a total of 80 percent when TVA completes the actions being taken to comply with the 1990 Clean Air Act Amendments. Nitrogen oxides emissions are also expected to be reduced by about 50 percent in response to the 1990 amendments. Other actions are being taken to reduce TVA's use and release of chlorine compounds. These emission reductions help ameliorate a number of pollution problems: ozone (smog), acid rain, visibility impairment, and depletion of stratospheric ozone (the ozone hole).

These actions are described in Energy Vision 2020. (See the Air Pollutants section of Volume 2, Technical Document 1 for discussion of trends in emissions of sulfur dioxide and nitrogen oxides.) For estimated TVA contributions to pollutant loading in the Valley, the following are discussed in Volume 2, Technical Document 1: tropospheric ozone (see pages T1.52 to T1.53), sulfate and nitrate deposition (acid rain) in the Great Smoky Mountains National Park (see page T1.62), and sulfate particle loading (visibility) in the Great Smoky Mountains National Park (see page T1.65).

TVA projects that the strategies in Energy Vision 2020 compared to TVA's 1995 emission levels would reduce sulfur dioxide by up to 57 percent, and nitrogen oxides by up to 16 percent. Greenhouse gas emissions are expected to increase but would be up to 13 percent less than the reference strategy and would be less on a per kilowatt-hour basis compared to the present system. This occurs despite a projected increase in coal combustion on the TVA system of up to 35 percent more than current combustion rates.

839

Comment: *Utilities across the nation are responsible for 72 percent of sulfur dioxide, 33 percent of nitrogen oxides, 36 percent of carbon monoxide, 33 percent of particulate matter, and 25 percent of mercury. This needs to be looked at.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

Response: Energy Vision 2020 examined the potential effect of various energy resource options and strategies on emissions. (See Volume 1, Chapter 9 and Volume 2, Technical Document 2.)

840

Comment: *TVA's contributions to visibility in the Smokies may not be as small as they think it is. At some point in the near future, modeling of nitrogen oxides and sulfur dioxide emissions needs to be done.*

Comment by: Arthur Smith

Response: TVA, the Electric Power Research Institute, and other southeastern utilities are addressing the Great Smoky Mountains visibility issue at this time through a jointly funded research effort in partnership with the National Park Service. Data are currently lacking that are necessary to adequately model sulfur dioxide and nitrogen oxides emissions affecting the Great Smokies. Although not quantified through detailed ambient air quality modeling, the analyses done for Energy Vision 2020 conclude that TVA's typical contribution to visibility problems in the Smokies are likely to be relatively small because of prevailing meteorological conditions, the location of TVA coal-fired plants, and because the production of visibility-impairing sulfates from emitted sulfur dioxide is slow. TVA nitrogen oxides emissions contribute only insignificantly to visibility impairment. The ongoing research effort will help to improve the understanding of this issue.

Energy Vision 2020 recognizes the benefits of locating any additional generating capacity in the western part of the TVA system, farther from the Great Smoky Mountains. (See Volume 1, Chapter 10, page 10.4 to 10.5.)

841

Comment: *In Volume 2, Technical Document 1, page T1.33 and in Volume 1, Chapter 3, page 3.13, a 40 percent drop from 500,000 tons per year to 305,000 tons per year is shown to occur between 1998 and 2000. In Volume 2, Technical Document 2, page T2.23, the yearly nitrogen oxides emissions for a number of strategies is shown. The average post-2000 emission rate is about 425,000 tons per year, with only one strategy showing 385,000 tons per year. The figure in Volume 2, Technical Document 2, page T2.27 shows only about a 20 percent drop in nitrogen oxides emissions per unit of energy generated. Now the optimistic figure has the footnote that the reductions of 40 percent will occur if TVA complies with the 1990 Clean Air Act Amendments. From the discussion accompanying the figures in Volume 2, Technical Document 2, pages T2.23 and T2.27, it is clear that TVA does not intend to comply with the 1990 Clean Air Act Amendments regarding emissions of nitrogen oxides. I recommend that at a minimum, the text accompanying the figures in Volume 2, Technical Document 1, page T1.33 and in Volume 1, Chapter 3, page 3.13 be modified to show that TVA will not, in fact, achieve such reductions. I would prefer that the figure be changed to show expected reductions, rather than mandated reductions that will not be realized.*

Comment by: William Grant (Sierra Club, Virginia Chapter)

Response: TVA will certainly comply with all requirements of the 1990 Clean Air Act Amendments, including nitrogen oxides reduction requirements. However, the Environmental Protection Agency has not established the nitrogen oxides removal limits for Phase II Group 1 (wall and tangential fired) boilers and for Group 2 (cyclone, cell burners, etc.) boilers. These limits are expected to be finalized by January 1, 1997. TVA's treatment of the uncertainty related to these future limits is the cause of the apparent inconsistency discussed in the comment.

In Volume 1, Chapter 3, and Volume 2, Technical Document 1, TVA described the affected environment in which Energy Vision 2020 decisions are being made. TVA attempted to project the actual level of nitrogen oxides emissions for the reference case (which assumes full compliance with all Clean Air Act requirements) for comparison with historical emissions. In order to make this a meaningful comparison, we used our best judgment of what the Environmental Protection Agency would establish as the limits in 1997 and included these limits in our projections (further assuming these reductions would be required by 2000). Volume 1, Chapter 3, Figure 3-9, and Volume 2, Technical

Document 1, Figure T1-26, show emission projections that include these anticipated reductions of approximately 40 percent.

In the calculations made to compare the performance of alternative energy strategies, the focus is on differences between the strategies and the absolute emissions level is less important. For these calculations, we did not attempt to quantify the additional emissions reductions that will be required as a result of the 1997 Environmental Protection Agency rulemakings. Therefore, the emissions portrayed in Volume 2, Technical Document 2, Figures T2-18 and T2-22 are not identical to those given in the earlier figures.

842

Comment: *There are health impacts associated with coal gasification, which has been proposed for Bellefonte, as well as with coal-fired plant emissions.*

Comment by: Bruce Wood, C. L. McKinney (Creret, Inc.)

Response: Coal gasification, such as that used in the integrated gasification combined cycle technology, generally has low emissions. This is why it is viewed as a clean coal technology. Any emissions from use of this technology would have to meet a number of environmental requirements that are formulated to protect public health and welfare.

843

Comment: *TVA's world-class scientists and economists should be mandated to eliminate TVA's emissions of carbon and sulfur.*

Comment by: Linda Cataldo Modica

Response: It would be very economically costly to eliminate all carbon and sulfur emissions from the TVA system and would be an extremely difficult task. This could be done in two ways: (1) replacement of all existing TVA fossil plants and combustion turbines with non-emitting technologies (nuclear, hydro, or renewables) and/or (2) removal of all carbon dioxide and sulfur dioxide gases from TVA's existing coal plants and combustion turbines. TVA has considered such options in the past and found that both of these options are extremely capital cost-intensive and uneconomical. TVA reduced sulfur dioxide emissions 50 percent between 1976 and 1990 by adding scrubbers and switching fuels to medium and low sulfur coal. Sulfur dioxide emissions will be reduced to about 20 percent of the 1976 level by the addition of the recently installed Cumberland Fossil Plant scrubbers, one or more future scrubbers, and fuel switches by approximately 2005. Upon completion of these activities, TVA will have significantly reduced its sulfur dioxide emissions. As explained in Volume 2, Technical Document 2, Environmental Consequences, TVA has committed in the Climate Challenge Program to manage its potential carbon dioxide emissions in order to achieve a 22.7 million ton reduction compared to the reference case.

More could conceivably be done to reduce TVA's sulfur dioxide and carbon dioxide emissions, but TVA has to strike a balance between various objectives including controlling cost, managing debt, increasing economic development, maintaining competitive rates, mitigating risk, improving system reliability, and monitoring environmental impacts. Many of TVA's customers have indicated that electricity rates are their major and foremost concern, and we expect rates to become increasingly important as competition increases. Consequently, TVA is continuously looking for ways to enhance the environment in a cost-effective manner.

844

Comment: *We believe that global warming is a serious threat to humanity, and TVA's resource portfolio shows substantial increases in carbon dioxide emissions. Additional information should be provided about greenhouse gas emissions including TVA's participation in the Department of Energy Climate Challenge Program.*

Comment by: John Johnson (Earth First), Nancy Bell, Eric Hirst (Oak Ridge National Laboratory), Linda LaForest (Tennessee Citizens for Wilderness Planning)

Response: There remains considerable uncertainty regarding the possible effect of carbon dioxide and other emissions on global climate. However, at the Earth Summit in Rio de Janeiro, Brazil in June 1992, the United States and over 150 other nations signed the United Nations Framework Convention on Climate Change, establishing the objective of stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous man-made interference with the climate system. In October 1993, the President announced the Climate Change Action Plan, which has the goal of returning United States greenhouse gas emissions to 1990 levels by the year 2000. As part of this action plan, the United States Department of Energy initiated the Climate Challenge, which is a voluntary program to manage United States electric utility greenhouse gases through reduction, avoidance, or sequestering of greenhouse gases.

On April 20, 1994, the Climate Challenge Memorandum of Understanding was signed by the Department of Energy, four utility organizations, and TVA. Subsequently, 104 individual Climate Challenge Participation Accords have been signed with the Department of Energy that represent 487 utilities including TVA. The efforts taken by TVA and the other 450 plus Climate Challenge participants will mitigate possible negative effects utility emissions may have on global climate in a more cost-effective manner than other control measures such as emissions regulations or carbon taxes. TVA is committed to a 22.7 million ton reduction in carbon dioxide by the year 2000 in the Climate Challenge Participation Accord. These reductions are projected from TVA's 1987 to 1990 baseline emissions and the emissions projected by a year 2000 modified reference case. Primarily, TVA greenhouse gas reductions by the year 2000 come from increased use of nuclear power, biomass cofiring, demand-side management programs, fossil-fuel power plant efficiency improvements, transmission system improvements, and hydroelectric power plant modernization.

Although actual carbon dioxide emissions increase under all strategies (see Volume 2, Technical Document 2, Figure T2-20), the rates of increase have been mitigated by Climate Challenge actions and are also less than increases under the Energy Vision 2020 reference strategy. Additionally, the carbon dioxide emitted per unit of electric energy produced would be 10 to 15 percent lower than TVA's present power system (see Volume 2, Technical Document 2, Figure T2-24) by the year 2005. This increase in efficiency throughout the planning period is due to: (1) increased production of nuclear power, (2) hydroelectric power plant modernization, (3) addition of more efficient fossil-fired plants, (4) increased use of renewables, and, (5) in some strategies, the repowering of existing coal-fired plants with more efficient energy conversion systems. The final document has been changed to provide this information.

The possibility of future carbon dioxide regulation was also evaluated in Energy Vision 2020 as an uncertainty. It was assumed for purposes of this uncertainty that there would be a cap on carbon dioxide emissions beginning in the year 2000 at 1990 levels. Any carbon dioxide emissions above this cap could be purchased at $10 per ton of carbon dioxide and any emissions below the cap could be sold for the same price. Because of this cap, there would be a direct reduction of carbon dioxide emissions of 2 million to

3 million tons per year on the TVA system. Also, long-term costs were increased sufficiently to reduce emissions to 1990 levels assuming a cost of $10 per ton of carbon dioxide. The cost of this emission reduction averaged $257 million per year for TVA.

845

Comment: *Why do carbon dioxide emissions increase each year from 1996 through 2004 then decline in 2005 and increase from 2005 to 2020?*

Comment by: Eric Hirst (Oak Ridge National Laboratory)

Response: Referring to Volume 2, Technical Document 2, Figures T2-2 and T2-20, increases in equivalent carbon dioxide emissions are due to the addition of fossil-fired supply-side options at various times. Decreases are due to implementing supply-side options with equivalent carbon dioxide reductions at various times. These options include coalbed methane recovery, landfill methane recovery, and biomass.

846

Comment: *According to the Environmental Protection Agency's fourth Annual Green Lights Report, energy-efficient lighting would prevent carbon dioxide emissions equivalent to those of 43 million cars.*

Comment by: Michelle Neal (Tennessee Valley Energy Reform Coalition)

Response: One of the actions that TVA is taking to conserve electricity is participation in the Green Lights Program. In fact, TVA is a charter federal partner in the program. Program participants are required to survey all of their facilities to determine where and what type of more efficient lighting would be cost-effective. A goal of the program is to ultimately implement (by 2005) all of the lighting replacements for which there would be at least a 10-year economic payback.

TVA is proposing to take additional actions to improve its efficiencies and to conserve energy in the short- and long-term plans of Energy Vision 2020. (See Volume 1, Chapter 9, Figure 9-23 and Chapter 10, Figure 10-1.)

847

Comment: *Motor vehicle emissions cause air pollution in the Great Smoky Mountains. Maybe TVA should be promoting electric cars. Electric vehicles are not zero-emission vehicles. The plants that produce electricity also produce pollution.*

Comment by: Al Fritsch (Appalachia–Science in the Public Interest), Barbara Altizer (Virginia Coal Council)

Response: TVA has included electric transportation research in the short-term action plan. (See Volume 1, Chapter 10, Figure 10-1 and Volume 2, Technical Document 7, page 7.93.) This would include electric buses and vans for commercial, industrial, and municipal customers and electric cars for residential customers in selected areas. While the option is generally perceived as a means of reducing emissions and improving the environment, the environmental advantages and disadvantages of the program will be considered in evaluating the research and pilot program data. For example, the potential for increased point source emissions from power plants to accommodate the increased electrical demand would be determined because this could offset the reductions from use of electric vehicles. In addition, if this option is pursued, the spatial and temporal shifts in emissions (such as reducing ground-level volatile organic compounds emissions from vehicles in ozone nonat-

tainment areas and increasing emissions of nitrogen oxides from large point sources in other areas) and resultant impacts on the environment would be examined.

848

Comment: *TVA should reduce sulfur dioxide, nitrogen oxides, and carbon dioxide emissions, using wood and agricultural waste, but not garbage or whole logs.*

Comment by: John Johnson (Earth First)

Response: In the short-term action plan of Energy Vision 2020, TVA proposes to cofire wood waste biomass with coal. (See Volume 1, Chapter 10, Figure 10-1.) This option provides greenhouse gas reductions. Other steps are being taken to achieve large reductions in sulfur dioxide and nitrogen oxides emissions to meet requirements of the 1990 Clean Air Act Amendments. In its investigation of refuse-derived fuel and biomass projects, TVA will evaluate potential environmental impacts.

849

Comment: *Air indices were developed to help characterize how TVA power system operations in combination with other alternative energy strategies might affect air quality. The development of indices was innovative in that it allowed assignment of relative importance to each air emission based on TVA's contribution in affecting overall human health and the environment in general. The weighting methodology is detailed in Volume 2, Technical Document 1, Comprehensive Affected Environment. Due to uncertainty in scientific understanding of how TVA emissions contribute to overall pollutant exposures and how changes in exposure result in changes in impacts, the indices were primarily developed to express differences in relative importance of the impacts themselves. The weightings are provided in Volume 2, Technical Document 1, Figure T1-57. The indices reflected the following impact areas:*

1. *Human health*
2. *Visibility impairment*
3. *Forests and crops*
4. *Material damage*
5. *Greenhouse gas (potential impacts)*

The approach had the advantage of giving greatest importance in the analysis of strategies to those emissions of greatest concern for causing impacts. In all strategies, the indices after analysis reflected improvement over the "base case." It was significant that all strategies also improve on the index for greenhouse gases compared to the reference strategy. Actual emissions were also estimated for each alternative strategy. Reductions were found for all options as reflected in Volume 2, Technical Document 2, Figures T2-15 and T2-16. Air quality impacts have been sharply minimized by decisions to comply with Phase II of the Clean Air Act as well as control options associated with carbon dioxide reduction. TVA's commitment to the United States Department of Energy Climate Challenge will further enhance this protection. Given TVA's modeling capability, the selection of specific options can be expected to satisfy these commitments when those details are known.

Comment by: TVA Retirees Association

Response: TVA developed the air indices to be responsive to the air emissions and impacts of concern.

WATER RESOURCES

850

Comment: *While we agree that the idea of upgrading of hydro units is generally a good one, and that hydros (as opposed to fossil-fuel power plants) do not produce significant water pollution or require National Pollutant Discharge Elimination System permits, they can produce substantive reservoir and downstream impacts. It is unclear, for example, if the minimum flows of the upgraded hydros would increase, decrease, or stay the same. In general, instream studies should be conducted for these hydros in coordination with the United States Fish and Wildlife Service to determine appropriate flows for the given habitat and fishery (Instream Flow Incremental Method studies), and with the state/Environmental Protection Agency to determine minimum flows for assimilative capacities (National Pollutant Discharge Elimination System permitting).*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: In 1991, TVA conducted a comprehensive review of its Tennessee River and reservoir system operation. As a result of that review, TVA decided, among other things, to improve dam tailwater conditions by maintaining minimum flows below 16 dams and to aerate releases below 16 dams to increase dissolved oxygen. This initiative was approved prior to the Energy Vision 2020 process and is being undertaken without regard to whether or not a hydro modernization project is planned at a particular hydro plant, although the choice of aeration technique may be influenced by plans for upgrading. Where such projects are planned, minimum flows will not be significantly changed. The minimum flows established at each hydro plant were based on Wetted Perimeter studies. Instream Flow Incremental Method studies have been done by TVA at some, but not all, TVA hydro plants.

The effects of this initiative were accounted for in Energy Vision 2020.

851

Comment: *Groundwater would need to be considered in site-specific documents for power generation sources such as power plants that involve the use of groundwater for make-up water for cooling towers or cooling reservoir water, or for on-site potable water and sanitation. Seepage from cooling reservoirs into groundwater systems would also need to be modeled and monitored to ensure consistency with any state groundwater quality standards. Alternatives to groundwater use should also be considered and may be particularly important at certain sites where groundwater quantity is a concern.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA will consider groundwater resources and their protection in future site-specific environmental reviews, as appropriate.

852

Comment: *The following comment is based on projected project impacts described in Volume 2, Technical Document 2, Environmental Consequences. It is based on our concerns regarding impacts to fish and wildlife resources from reservoir operations and land use on TVA projects in North Carolina.*

The project document mentions recent TVA efforts to improve dissolved oxygen levels in reservoir releases. The North Carolina Wildlife Resources Commission continues to participate in evaluation of efforts to improve water quality in TVA project tailwaters. We are

also committed to active, watershed-level management of land and water uses that affect water quality and recreational activities on TVA project reservoirs. Comparative discussion of water quality impacts from the various alternatives does not appear to address the effects of different demands on hydropower operations. Impacts on quality of dam releases and reservoir retention times would have relevance for North Carolina waters and should be discussed.

North Carolina Wildlife Resources Commission is concerned regarding impacts of project operations on river flow rates and reservoir levels. Magnitude and timing of reservoir releases may have significant effects on fishery resources, both within reservoirs and in tailrace areas. Habitat availability in both areas is directly impacted by flow rates, with impacts to fisheries ranging from reduced reproductive success to loss of species in severally impacted areas. The document should place greater emphasis on the effects of each long-term operations strategy on hydropower demand, tailrace flow variability, and reservoir water level fluctuation. No comparison of strategies based on water quantity issues is given, and recommendations on preferred strategies are not possible.

Comment by: Chrys Baggett (North Carolina State Clearinghouse)

Response: The existing minimum flow rates below each TVA hydro plant were established as part of TVA's 1991 Lake Improvement Plan and will be met for the upgraded plants. Overall water flow and discharge patterns will change after hydro modernization projects are implemented at individual dams. The appropriate level of site-specific environmental review will be undertaken for each individual project at the appropriate time, including effects on hydro power demand, tailrace variability and reservoir water level fluctuation.

Hydro modernization involves upgrading the efficiency of existing units and no new units would be added. Existing dissolved oxygen and minimum flow targets will be maintained. Modernization projects are planned at 88 of the 109 TVA hydro units including most of those in North Carolina. Such projects will eventually be implemented at all hydro units.

853

Comment: *Indices were developed for water resources impacts. Three water quality impacts were considered: (1) human health impacts by ingestion, (2) impacts on water supply and waste assimilation, and (3) direct impacts on fish, aquatic life, and diversity. In Volume 2, Technical Document 2, a comprehensive discussion of potential and existing pollution and related issues and impacts is provided. In Volume 2, Technical Document 2, Figure T2-27, the indices for each strategy and impact area are provided. In general, there are no significant changes in water quality expected for any of the strategies. For those strategies where coal-fired production increases from existing plants, the impacts are seen to increase slightly.*

A complete discussion of impacts is provided, but the only significant change in water quality occurs where existing coal-burning plants continue to be utilized. Similarly, strategies that increase the use of coal increase projected water impacts, but it is expected that the changes will be small under new regulations.

Since no strategies involve new hydroelectric facilities, no further water resource impacts should result from damming of rivers. The strategy of increasing efficiency of hydroelectric facilities is environmentally beneficial. Like air emissions, new, more efficient coal-fired facilities are expected to reduce thermal and other releases below the reference case.

Comment by: TVA Retirees Association

Response: Your comment has been reviewed and noted.

LAND RESOURCES

854

Comment: *All land-based impacts are expected to be minimal based on the evaluation of existing and future sites. The commitment to avoid impacts or mitigate actions taken will preserve or enhance the natural resource base as energy resource decisions are made for the future.*

Comment by: TVA Retirees Association

Response: Your comment has been reviewed and noted.

855

Comment: *It is difficult to assess impacts of operations alternatives on land use on North Carolina TVA projects. In general, we are concerned regarding habitat loss from construction of new facilities and transmission lines. Specific impacts of projects on land resources will depend on final construction designs and cannot be assessed at the scale involved in the existing document. We anticipate that any future production facilities or utility line expansions will be subject to interagency review.*

Comment by: Chrys Baggett (North Carolina State Clearinghouse)

Response: Environmental reviews of specific generations and transmission facilities will be coordinated with State of North Carolina agencies as appropriate.

856

Comment: *I am concerned about radioactive waste from TVA's Nuclear Plants. There is no safe means of disposal.*

Comment by: David Bordenkircher, John Harwood, Ruth Peeples, Walter & Dorothy Stark, L. M. Johnson, Sr., Betty Martin (Friends of the River), Scott Banbury, Clark Buchner (Sierra Club, Tennessee Chapter), Faith Young, Michelle Carratu, Susan Switzer, Susan Bailey, John Johnson (Earth First), Ann & Mike Sanders, Susana Harwood, Beth Wallace, Salo, Ray Williams, Karl Grotke, Dottie Hodges, Shirley Schaaf, Tohert, Hermann, Kim Grube, K. Varnum, Garry Shores, Kathy Priore, Karah Bates, M. Case, Amy Perry, Jean Cheney, John Schwarz, Jr., Lynn Leach (Alabama Environmental Council), Karen Lovell, C. Strain, Sahara, Yvonne Seperich, C. T. Brewster, Stephen Stedman, Sharron Eckert, Stephanie Calvert, Mary Schwarz, Myles Jakubowski (Sunbeam Household Products), Robert Peeples, Deborah Cuva, Marion Zachiel, A. B. Evans, Isahl Hemm, Mary Anne Terry, Katherine Osborn, Luther Gulick, William Emmott, Jo Anne Clark, M. Nathan Perry, N. E. Whitfield, F. W. Munson, Ben & Winn Welch, R. & G. Ludwig, Chris Gulick

Response: The Nuclear Waste section of Volume 2, Technical Document 1, page T1.122 describes high-level and low-level waste and how TVA will manage radioactive waste from its nuclear plants. The Nuclear Plant Impact section of Volume 2, Technical Document 2, page T2.46 describes the environmental consequences from the operation of TVA nuclear plants.

Used fuel has been stored safely at nuclear plant sites since the late 1950s, when the first nuclear energy plants began making electricity. TVA plans to continue to store spent nuclear fuel on-site at plant locations where it is generated until the Department of Energy accepts physical custody for ultimate disposal.

TVA is among the best in the industry at reduction of low-level waste using compaction, incineration, and decontamination techniques. TVA ships low-level waste to a disposal facility near Barnwell, South Carolina in specially designed boxes, drums, or

steel containers. There has never been a serious transportation incident involving the disposal of radioactive material.

The Barnwell facility was scheduled to be closed on December 31, 1995, and TVA had planned for on-site storage until the new facility in North Carolina opened in 1998. On July 1, 1995, South Carolina left the Southeast Compact and opened the facility to waste generators in all states except North Carolina until the site reaches capacity in approximately 7 to 10 years. TVA plans to continue to use the Barnwell disposal facility or the North Carolina facility for the foreseeable future.

The Energy Vision 2020 document has been modified due to the change in Barnwell's status.

857

Comment: *Power generating sources need not be intrusively noisy (e.g., solar, wind, wave options), but generally have a degree of noise associated with them (e.g., power plant, hydro options). Noise is commonly associated with single events associated with facility construction and operation, which can be intrusive, as well as with fuel delivery to the facility. Site-specific evaluations of proposed projects should consider alternative sites having minimal nearby sensitive receptors, ensure compliance with Occupational Safety and Health Administration regulations and local noise ordinances, assess attributable noise impacts, and propose mitigation as appropriate. Such energy generation sources should also be in compliance with the Environmental Protection Agency target noise levels and the noise guidelines developed by the Federal Highway Administration and the Department of Housing and Urban Development, where appropriate. The Environmental Protection Agency target noise levels are detailed in the so-called "Levels" document (USEPA, 1974. "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety." EPA/550-9-74-004).*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: Noise assessment will be a part of any site-specific environmental reviews, as appropriate.

858

Comment: *TVA should address more fully how it will pay for the cost of decommissioning its nuclear plants and the decommissioning process should be described and how the plant will look.*

Comment by: Richard Simmers, John van der Harst, Jeannine Honicker, Mary English (University of Tennessee)

Response: TVA's policy on the collection of funds for decommissioning is explained, and activities associated with the decommissioning fund are described in the section on TVA's Nuclear Plants in Volume 2, Technical Document 3, page T3.8.

Investment of power funds have been made since 1982 to provide for accumulation of funds for decommissioning nuclear plants. TVA's policy is to collect funds for decommissioning through rates based on a constant dollar amount adjusted for inflation over the life of the operating license of a nuclear plant. Decommissioning expense has been recovered from ratepayers annually based on the present value of amounts not provided through earnings on the fund.

The proposed future use of a nuclear plant site is an important factor in determining how a plant site will look after decommissioning. At this time, it is premature to specify how sites may be used.

Decommissioning options considered in Energy Vision 2020 are:

1. The DECON Option involves the prompt removal of fuel assemblies, source material, radioactive fission and corrosion products, and all other radioactive and contaminated materials above the Nuclear Regulatory Commission unrestricted release levels, from the plant. The reactor pressure vessel and internals would be removed, along with removal and demolition of the remaining systems, structures, and components with contamination control employed as required. The site may then be released for unrestricted use. This is the most expensive of the three options.
2. The SAFSTOR Option involves removing all fuel assemblies, nuclear source material, radioactive liquid, and solid wastes from the plant. The remaining physical structure would then be secured and mothballed. External doors and hatches would be locked and secured to prevent unauthorized entry. Systems needed to monitor the facilities would be used throughout the dormancy period. A full-time security force would have to be maintained at the plant. After a time period of up to 60 years, the facility would then be decontaminated to the Nuclear Regulatory Commission unrestricted release levels and the site would be released for unrestricted use. This option is essentially deferred decontamination, which takes advantage of the natural dissipation of almost all of the radiation. Dismantling of structures would occur after the dormancy period.
3. The ENTOMB Option consists of sealing or entombing residual radioactive or contaminated materials and components within a structure that prevents access by unauthorized personnel. All nuclear source material, fuel assemblies, radioactivity liquid wastes, and solid wastes would be removed prior to entombment. The entombment boundary would normally contain those portions of the reactor building above certain levels of radioactivity. A structurally long-lived material, such as concrete, would be used to seal the building. The objective of entombment is to keep the contaminated material and structure encased until the Nuclear Regulatory Commission's unrestricted access levels are reached. This would likely take up to 100 years to achieve and, for a few radioactive isotopes associated with nuclear reactors, a longer period could be necessary. Although the Nuclear Regulatory Commission considers entombment and the other two options to be acceptable, its regulations presently require that decommissioning be completed within 60 years of shutdown. Absent a change in the regulations, it would therefore be necessary to institute some level of decontamination activities at the end of the entombment period to return the site to unrestricted use. In such an event, the SAFSTOR option would resemble the ENTOMB option.

Decommissioning cost estimates in Energy Vision 2020 are based on the most expensive of the options, the DECON option.

859

Comment: *Loss of institutional control at the Department of Energy's high-level permanent repository has not been addressed. There is not signage technology that will endure for 10,000 years.*

Comment by: Dennis Haldeman, Jennifer Lapidus & Hannah Bennett

Response: This is expected to be addressed by the Department of Energy in the development of a long-term storage disposal site. Energy Vision 2020 addresses disposal in Volume 2, Technical Document 1, page T1.122.

860

Comment: *The spent fuel from Watts Bar Nuclear Plant cannot be shipped off-site due to a ruling by the Sixth Circuit Court of Appeals which said the highways cannot be used.*

Comment by: Ann Harris

Response: The Nuclear Waste Policy Act of 1982 required the Department of Energy to develop a permanent geological repository for spent nuclear fuel and to develop a transportation infrastructure for moving the fuel from utility plant sites to the repository. Transport of spent fuel would be required to meet Department of Transportation, Environmental Protection Agency, and Nuclear Regulatory Commission regulations. Currently, spent fuel shipments are being made between existing nuclear plant facilities in several states in compliance with these regulations. Earlier this year, the Department of Energy announced that a repository would not be in operation before the year 2010, therefore, it could not fulfill its obligation to accept spent fuel for storage in 1998. In response to this situation, new legislation has been proposed in both the House of Representatives and the Senate to amend the 1982 Act to allow the Department of Energy to develop an interim storage facility to begin accepting spent fuel by 1998. The proposed legislation also includes provisions for developing the necessary transportation infrastructure to move spent fuel to the interim storage facility and eventually to the permanent repository.

861

Comment: *There are no rules or regulations regarding nuclear waste anywhere in the nation.*

Comment by: Ann Harris

Response: The regulations, legislation, and agencies involved in the management of nuclear waste are discussed in the section on Nuclear Waste in Volume 2, Technical Document 1. Nuclear waste is heavily regulated.

862

Comment: *There are proven links between radioactivity and cancer. People in this area are experiencing a 16 percent increase in breast cancer mortality. Nuclear power is dangerous.*

Comment by: Howard Switzer (Sun/Earth Tempered Organic Architecture), Beth Zilbert (Greenpeace), Monique Mollet, Anne Redwine, Jeannine Honicker, Leith Patton, Hamp Dobbins, Jr., Stephanie Calvert

Response: The report alleging fatalities from breast cancer are increasing in areas affected by nuclear facilities was released by Greenpeace at press conferences in several locations. It was not published in any technical journal and was released without peer review. Other reports issued by Greenpeace have been criticized by respected health physicists for selectively using statistics to support the desired outcome.

The 1995 Greenpeace report, "Nuclear Power, Human Health and the Environment: The Breast Cancer Warning in the Great Lakes Basin" is an example where proof of the assertions was not supported by the analysis according to a peer review by two experts in environmental and cancer epidemiology at the University of Massachusetts. A report issued in March 1995 by the Minnesota Department of Health, Chronic Disease and

Environmental Epidemiology found that breast cancer mortality trends over the period 1950 to 1992 in the 10 counties near nuclear power plants in the state of Minnesota show no discernible difference from the statewide trend.

The largest study of cancer rates, by the National Cancer Institute, found no increased levels of cancer around nuclear plants. Rather this study found that breast cancer mortality increased more in states without nuclear power plants than in states with such facilities.

Repeated surveys around TVA's operating nuclear plants have shown no detectable increase in radiation levels over normal background levels. The nearest plant neighbor gets about 10 times more radiation from watching a color television than from the nuclear facility. TVA does not expect to see cancer rates increase because of the operation of any of its nuclear units.

863

Comment: *The federal government has this year reneged on its plans for a permanent repository.*

Comment by: Susan Switzer

Response: The Nuclear Waste Policy Act of 1982 required the Department of Energy to develop a permanent geological repository for spent nuclear fuel and to begin accepting this fuel for storage by 1998. Earlier this year, the Department of Energy announced that a repository would not be in operation before the year 2010; therefore, it could not fulfill its obligation to accept spent fuel for storage in 1998. In response to this situation, new legislation has been proposed in both the House of Representatives and the Senate to amend the 1982 Act to allow the Department of Energy to develop an interim storage facility to begin accepting spent fuel by 1998. The interim storage facility would use currently available technology to store spent fuel assemblies in heavily shielded containers. This interim storage facility would be continuously monitored and would safely store the spent fuel until such a time as the permanent repository is operational.

864

Comment: *As a former TVA employee, I became aware that TVA did not know what it was doing when it was designing and building its nuclear plants. Pipes in the plants were unknown and in case of fire they would not know which ones to turn on.*

Comment by: Rela Edwards

Response: TVA has identified all critical piping and other systems in its nuclear plants, including those important for fire control. In addition, TVA has a well-equipped and trained fire brigade team on site at each operating nuclear facility 24 hours per day, 7 days per week to respond to all fire emergencies. Fire brigade members are trained in the use and testing of all fire-fighting equipment. Mutual aid agreements with area fire departments are in effect to provide back-up fire support, if necessary.

Pre-fire plans which provide strategy and tactical information and guidelines to support fire emergencies have been developed to meet Nuclear Regulatory Commission and insurance company requirements. The pre-fire plans provide information on locations of available fire-fighting equipment and how to operate fire suppression systems in the area, as well as identifying any hazards which the brigade may encounter. Sketches are provided for each plant area to serve as a quick reference.

865

Comment: *Disregarding the cost factor, nuclear plants must have infallible equipment and infallible workers because a meltdown would leave our cities uninhabitable and the Price-Anderson Act put a ridiculous limit on compensation to home and business owners lucky enough to escape. If nuclear plants were safe, insurance companies would be glad to offer insurance.*

Comment by: Fred Wright

Response: The Price-Anderson Act, which is an amendment to the Atomic Energy Act, requires nuclear power reactor licensees to have and maintain financial protection (i.e., liability insurance) to enable them to respond to public liability claims (e.g., personal injury and property damage) that might result from a nuclear incident associated with the operation of a nuclear power reactor.

TVA purchases a $200 million nuclear liability insurance policy from American Nuclear Insurers. American Nuclear Insurers is comprised of a group of insurance companies (e.g., Aetna, Allstate, Continental, State Farm, etc.) which pools their resources to offer this insurance.

The Price-Anderson Act includes a secondary layer of financial protection consisting of a retrospective premium which can be assessed of each operating nuclear reactor.

These two layers provide $8.9 billion of financial protection available to respond to an incident.

866

Comment: *I have recently read about four more accidents at Russian nuclear plants. So I think we really have to take into account the safety reports at Sequoyah and Watts Bar Nuclear Plants. The plan needs to address nuclear safety.*

Comment by: Anne Redwine, Bruce Wood

Response: Through careful, conservative planning for safety, the potential risk of nuclear reactors has been reduced to a very low level. Nuclear plants supply energy reliably, safely, and with little environmental impact. The Nuclear Regulatory Commission monitors operations every day and conducts comprehensive reviews that cover all aspects of the plant. The nuclear industry and TVA are dedicated to safe and efficient nuclear plant operations.

Two serious accidents have occurred in 30 years of commercial energy production—the Three Mile Island accident and the Chernobyl accident. No one was injured or died as a result of the accident at Three Mile Island. In the United States, nuclear energy plants use a series of physical barriers to prevent the release of radioactivity. About half of the uranium fuel at Three Mile Island melted, but only minute amounts of radioactive material escaped into the environment because the multiple barriers contained the release of radioactivity. The radiation exposure from Three Mile Island was much less than most of us receive each year from naturally occurring radioactive materials in soil, rocks, air, food, and water.

The Chernobyl plant in the Soviet Union had design flaws and no containment structure. As a result of the Chernobyl accident, radioactive material did escape. More than 200 people were hospitalized for radiation exposure and burns, and approximately 30 people died. Reports indicate that more people have died. A plant like Chernobyl could not be licensed in the United States.

867

Comment: *The loss of wetlands, particularly jurisdictional wetlands, should be avoided by all sources of energy generation selected by TVA for the 25-year horizon of the programmatic environmental impact statement. Since the trend of the short-term plan for the TVA preferred resource options appears to be conversion and renovation of existing sites rather than construction of new sources, wetland losses may not be a serious concern for the near term. However, existing facilities may be expanded and the long-term plan construction of new sources such as wind and solar options at new sites could involve wetland filling, while the upstream and downstream water levels of hydros could be altered, which would expose or inundate wetland habitat. Wetland avoidance, restoration, enhancement, creation, and preservation should be incorporated into the TVA energy strategy.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA considers wetlands an important natural resource. In addition, under Executive Order 11990 (Protection of Wetlands), TVA is required, to the extent practicable, to avoid impacting wetlands with new construction. In TVA's activities, a permit is normally required from the United States Army Corps of Engineers under Section 404 of the Clean Water Act prior to disturbing a wetland.

868

Comment: *Environmental problems of the proposal to use caves as compressed air storage facilities have not been studied.*

Comment by: Powell & Sharon Foster

Response: The air storage medium that is the basis for the compressed air energy storage options in Energy Vision 2020 are salt domes, not caves. Caves were not considered as a storage medium for the compressed air energy storage options because of insufficient storage volume and uncertainty about containment integrity (i.e., excess air leakage/loss).

Salt domes are considered effective storage mediums. Salt domes have been employed extensively for several decades by the oil and gas industry as suitable mediums for the storage of these products. Also, the Electric Power Research Institute and the Alabama Electric Cooperative investigated the environmental impacts of air storage in salt domes as a part of the Alabama Electric Cooperative's 110-megawatt compressed air energy storage facility in McIntosh, Alabama. There were no detrimental environmental impacts identified.

869

Comment: *If future studies show harmful effects of electric magnetic fields on humans, the Environmental Protection Agency would expect TVA to take a more aggressive approach towards addressing old transmission lines and substations. The results of such studies can be expected sometime during the 25-year horizon of the programmatic environmental impact statement.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: TVA is closely monitoring, as well as participating in, ongoing electro-magnetic field research. If future studies show harmful health effects, TVA will, of course, take appropriate action.

870

Comment: *The Environmental Protection Agency recommends that the sentence in Volume 2, Technical Document 2, page T2.47 stating that "if chemical control is used, only Environmental Protection Agency-approved nonrestrictive herbicides and licensed applicators would be used," be amended to read that "if chemical control is used, only U.S. Environmental Protection Agency-registered nonrestrictive herbicides and licensed applicators would be used." The Environmental Protection Agency recommends use of manual/mechanical control of right-of-way vegetation in lieu of herbicides in most cases. If herbicides are used, their use should be selective, minimized, and consistent with product label directions. As indicated above, only products registered with the Environmental Protection Agency that are appropriate for the target species and application area should be used.*

Comment by: Heinz Mueller (United States Environmental Protection Agency)

Response: This sentence has been changed in the final Energy Vision 2020 report.

871

Comment: *Garbage burning results in highly toxic ash, destroys recycling markets, and leads to further deforestation.*

Comment by: Dennis Haldeman

Response: Despite efforts to promote recycling, disposal of garbage is still a major problem. Garbage burning does not increase the amount of garbage produced or the consumption of forests. The refuse-derived fuel options considered by TVA (see Volume 2, Technical Document 6, page T6.18) include removal and recycling of about 20 percent of the material. In the absence of refuse-derived fuel burning, the non-recyclable materials as well as many of the recyclable materials would likely be a waste disposal problem for local governments. They would likely end up in landfills, which are becoming more expensive to operate, are difficult to develop, and can pose a variety of environmental problems. Burning refuse-derived fuel can help alleviate those problems.

SOCIOECONOMIC RESOURCES

872

Comment: *Socioeconomic impacts will be clearly negligible or result in enhancement since all strategies are predicted to improve economic conditions significantly above the "No Action" alternative.*

The results of analysis of economic development impacts are presented in Volume 2, Technical Document 2, Figures T2-12 and T2-13 where the changes in income and employment are shown for each strategy. Impacts due to projected expenditures in the region, as well as costs to the consumer were analyzed and the results appear to illustrate that economic growth is to be expected with all alternatives considered.

Comment by: TVA Retirees Association

Response: Your comment has been reviewed and noted.

873

Comment: *In order to assess potential effects on historical and archeological resources, specific locations for proposed projects must be identified and the state historic preservation officers contacted. This is necessary in order to fulfill the requirements of the National Historic Preservation Act.*

Comment by: Herbert Harper (Tennessee Historical Commission)

Response: Energy Vision 2020 analyzes a range of strategies and proposes a portfolio of options but does not propose specific project sites. As specific sites are proposed for use, additional environmental reviews will be performed, including requirements of the National Historic Preservation Act.

874

Comment: *The more coal we burn, the less vital our tourist trade. They do not come here for Wal-Mart, but for natural beauty.*

Comment by: Retha Ferrell

Response: TVA recognizes the importance of the environment and its relationship to tourism in the region. (See Volume 2, Technical Document 1, page T1.115, Recreational Resources.) Through the multi-attribute trade-off method, TVA was able to compare strategies on the basis of their potential effects on the environment as well as their performance on other evaluation criteria such as economic development, and to revise strategies in order to mitigate unacceptable effects. Issues such as air pollution impacts in the Great Smoky Mountains National Park were explicitly addressed in Energy Vision 2020.

Although the analyses done for Energy Vision 2020 indicate that under the final strategies coal combustion would increase, compared to current combustion rates, associated sulfur dioxide and nitrogen oxides would decrease.

REFERENCES

Burns & McDonnell and Xenergy. 1995. "Report to the TVPPA Power Supply Planning Committee on TVA's Preliminary IRP."

Casciani, Jennifer L., Philip R. O'Connor, and Erik B. Jacobson. 1995. "The Ties that Bind: TVA in a Competitive Electric Market." Palmer Bellevue. April.

Cronan, C.F. and D.F. Griga, Use of Calcium/Aluminum Ratios as Indicators of Stress in Forest Ecosystems, J. of Environmental Quality, 24:209-226, 1995.

Eagar, C. and M. B. Adams. 1992. *Ecology and Decline of Red Spruce in the Eastern United States*. Springer-Verlay, New York.

Final Environmental Impact Statement on the Natural Resources Management Plan at Land Between The Lakes, Tennessee Valley Authority, October, 1994.

Final Environmental Impact Statement, Watts Bar Nuclear Plant Units 1 and 2, Tennessee Valley Authority, 1992.

Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, Dockets Nos. 50-390 and 50-391, Tennessee Valley Authority, (NUREG-0498 Supplement No. 1) U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, April 1995.

Irving, P.M. 1991. Acid Deposition: State of Science and Technology. U.S. Government Printing Office, Superintendent of Documents. ISBN 0-16-035925-2.

Loucks, O.L. 1992. Forest Response Research in NAPAP: Potentially Successful Linkage of Policy and Science, Ecological Applic., 2, pp. 117-123.

MacMullan, Barbara A. (National Economic Research Associates, Inc.) and John H. Wile (R. J. Rudden Associates, Inc.) 1995. "An Evaluation of the Nuclear-Related Assumptions Used in the Tennessee Valley Authority's Integrated Resource Plan." March.

Manion, P.D. 1981. Tree Disease Concepts. Prentice-Hall, Inc. Englewood Cliffs, New Jersey.

McCollister, George. 1995. "A Review of TVA's 1994 Electric Load Forecast." Spectrum Economics, Inc. February.

National Acidic Precipitation Assessment Program, 1990, Report 16, "Changes in Forest Health and Productivity in the United States and Canada, In Acidic Deposition: State of the Science," Volume 3, 722 Jackson Place, Washington D.C.

National Research Council. 1983. *Acid Deposition - Atmospheric Processes in Eastern North America*. Washington D.C., p. 13.

Supplemental Environmental Review (Final), Operation of Watts Bar Nuclear Plant Units 1 and 2 (Tennessee Valley Authority, June 1995).

Tennessee Valley Authority. 1990. Tennessee River and Reservoir System Operation and Planning Review: Final Environmental Impact Statement. December 1990. TVA/RDG/EQS-91/1.

Tennessee Valley Authority. 1994. "Economic Outlook: An Assessment of the Valley's Economic Status and Trends." November.

Tennessee Valley Authority. 1994. "Request for Proposal for Option Purchase Agreements." July.

USDA Forest Service. 1988. The South's Fourth Forest: Alternatives for the Future. USDA Forest Service, Washington D.C. Forest Resource Report No. 24.

U.S. General Accounting Office. 1995. "Tennessee Valley Authority - Financial Problems Raise Questions About Long-term Viability." August.

DISTRIBUTION LIST

Energy Vision 2020 has been distributed to the following individuals and organizations:

Distributors of TVA Power

Mr. Thomas E. Adams, Bristol Virginia Utilities Board

Mr. A. H. Akins, Franklin Electric Cooperative

Mr. Michael L. Alderdice, West Kentucky Rural Electric Cooperative Corporation

Mr. Mike Allmand, Ripley Power and Light Company

Mr. E. Mark Ashburn, Smithville Electric System

Mr. Tom Atchley, Lebanon Electric Department

Mr. David G. Atwood, Mountain Electric Cooperative

Mr. Billy C. Austin, Franklin Electric Plant Board

Mr. Jerry W. Bailey, Union City Electric System

Mr. Kenny Baird, Jr., LaFollette Utilities

Mr. W. Barry Baker, Loudon Utilities

Mr. John Leland Baker, Newport Utilities Board

Mr. James O. Baker, Middle Tennessee Electric Membership Corporation

Mr. Dennis Barbe, Clinton Utilities Board

Mr. Phillip Bare, North Alabama Electric Cooperative

Mr. Jimmy L. Barnett, Sheffield Utilities

Mr. Charles R. Barnett, Alcorn County Electric Power Association

Mr. Kenneth S. Baxter, Electric Power Board of Chattanooga

Mr. Lynn Bean, Winchester Utility System

Mr. Dennis Beard, Joe Wheeler Electric Membership Corporation

Mr. Eddie L. Beck, Bowling Green Municipal Utilities

Mr. Paul W. Bennett, Trenton Light & Water Department

Ms. Nelda Bishop, Forked Deer Electric Cooperative

Mr. Joe F. Boehms, Okolona Electric Department

Mr. Hollis Bolton, Sand Mountain Electric Cooperative

Mr. Tom Boone, Jr., City of Holly Springs Utility Department

Mr. R. Wayne Bowman, Lexington Electric System

Mr. Lindsay Boyd, Columbia Power System

Mr. Carl Brandt, Rockwood Electric Utility

Mr. Dewel Brasher, City of West Point Electric System

Mr. Jeffrey J. Broughton, City of Oak Ridge

Dr. R. Michael Browder, Bristol Tennessee Electric System

Mr. Howard C. Brown, Erwin Utilities

Mr. Olin W. Bryant, Paducah Power System

Mr. William M. Buchanan, Volunteer Electric Cooperative

Mr. Joe V. Bunch, Arab Electric Cooperative

Mr. John D. Burt, Philadelphia Utilities

Mr. Ralph T. Byars, Aberdeen Electric Department

Mr. David Callis, Tri-County Electric Membership Corporation

Mr. Kenneth D. Carpenter, Appalachian Electric Cooperative

Mr. John Carringer, Town of Murphy Electric Power Board

Mr. Austin B. Carroll, Hopkinsville Electric System

Mr. William M. Carroll, Greeneville Light and Power System

Mr. Glen Choate, Hickman-Fulton Counties Rural Electric Cooperative Corporation

Mr. David R. Clark, Tennessee Valley Electric Cooperative

Mr. Don R. Collette, McMinnville Electric System

Mr. Robert A. Collier, North East Mississippi Electric Power Association

Mr. Lynn D. Compton, Carroll County Electric Department

Dr. Matthew C. Cordaro, Nashville Electric Service

Mr. T. T. Craven, Athens Utilities

Mr. William S. Crawford, Memphis Light, Gas and Water Division

Mr. Eugene D. Crowell, Shelbyville Power System

Mr. John Culpepper, Chickamauga Electric System

Mr. Steve DeFoor, Russellville Electric Board

Mr. K. W. Dennison, Newbern Light and Water Department

Mr. Jack E. Dillard, Lawrenceburg Power System

Mr. Gary E. Dishman, Monticello Electric Plant Board

Mr. William C. Draper, Gallatin Department of Electricity

Mr. James H. Eakes, Hickman Electric System Board

Mr. Johnny Earnest, City of Oxford Electric Department

Mr. Larry E. Elkins, Holston Electric Cooperative

Mr. Hubert Elliott, Monroe County Electric Power Association

Mr. Floyd H. Ellis, Warren Rural Electric Cooperative Corporation

Mr. Larry A. Fleming, Knoxville Utilities Board

Mr. John Fortune, Bolivar Electric Department

Mr. Steven F. Foshee, Cullman Electric Cooperative

Mr. Jack Fox, Southwest Tennessee Electric Membership Corporation

Mr. Harry Fraser, Lenoir City Utilities Board

Mr. Michael C. French, Somerville Light, Gas and Water Department

Mr. Quentis Fuqua, Pennyrile Rural Electric Cooperative Corporation

Mr. Robert A. Gardner, Springfield Department of Electricity

Mr. George W. Godwin, Jr., Decatur Utilities

Mr. James R. Gooch, Mayfield Electric and Water Systems

Mr. Robert F. Grisham, Tishomingo County Electric Power Association

Mr. Charles E. Grissom, Duck River Electric Membership Corporation

Mr. Albert M. Guy, Jr., East Mississippi Electric Power Association

Mr. Leslie Gwin, Pickwick Electric Cooperative

Mr. Richard Hall, Harriman Utility Board

Mr. John C. Hall, Natchez Trace Electric Power Association

Mr. William J. Hamby, Caney Fork Electric Cooperative

Mayor Charles R. Hartsell, Tarrant Electric Department

Mr. Sam A. Head, Jr., City of Columbus Light & Water Department

Mr. Charles R. Higgins, Pulaski Electric System

Mr. Wayne D. Hollowell, Northcentral Mississippi Electric Power Association

Mr. Ronald O. Hutchins, North Georgia Electric Membership Corporation

Mr. William R. Jackson, Pontotoc Electric Power Association

Mr. G. E. Johnson, Covington Electric System

Mr. Larry D. Kirk, Murfreesboro Electric Department

Mr. Tommy Lee Kirkpatrick, Louisville Utilities

Mr. James V. Law, Starkville Electric System

Mr. Stan Little, Humboldt Utilities

Mr. Joe N. Loggins, Tullahoma Utilities Board

Mr. Robert R. Long, Fort Loudoun Electric Cooperative

Mr. William W. Long, Tombigbee Electric Power Association

Mr. Paul D. Long, Central Electric Power Association

Mr. Ralph L. Loveless, Meriwether Lewis Electric Cooperative

Mr. Eddie B. Magee, City of Water Valley Electric Department

Mr. Randell Meyers, Powell Valley Electric Cooperative

Mr. Lee Miller, City of Amory Utilities

Mr. C. J. Moore, Weakley County Municipal Electric System

Mr. Prentis Morris, Courtland Electric Department

Mr. David Moss, Fulton Electric System

Mr. Gerald D. Myrick, Florence Electricity Department

Mr. Charles W. Nevins, Bessemer Electric Service

Mr. Joseph A. Peek, Cookeville Electric Department

Mr. James E. Peeler, Dickson Electric Department

Mr. Charles R. Perry, Paris Board of Public Utilities

Mr. Allen L. Phipps, Johnson City Power Board

Mr. Bob Pickering, Sequachee Valley Electric Cooperative

Mr. William C. Pippin, Huntsville Utilities

Mr. Wayne Poole, Cumberland Electric Membership Corporation

Mr. Elbert Powell, Mount Pleasant Power System

Mr. William J. Ray, Glasgow Electric Plant Board

Mr. Lewis W. Roach, Sweetwater Utilities Board

Mr. Wayne Rogers, Sparta Electric System

Mr. E. Gene Rose, Scottsboro Electric Power Board

Mr. Ronny Rowland, Prentiss County Electric Power Association

Mr. Roy G. Satterfield, Jr., Blue Ridge Mountain Electric Membership Corporation

Mr. Steven R. Sax, Fort Payne Improvement Authority

Mr. David Scarbrough, Albertville Municipal Utilities Board

Mr. Richard Schimmel, City of Macon Electric Department

Mr. Gary Scroggins, Guntersville Electric Board

Mr. John Seale, Plateau Electric Cooperative

Mr. George R. Seaton, Sevier County Electric System

Mr. Thomas W. Shackelford, Jr., Tippah Electric Power Association

Mr. John F. Sharpe, Brownsville Utility Department

Mr. James F. Smith, Cullman Power Board

Mr. Grady Smith, Cherokee Electric Cooperative

Mr. Harold G. Smith, New Albany Electric Department

Mr. Robert L. Sosebee, Tri-State Electric Membership Corporation

Mr. Larry Spears, Benton Electric System

Mr. Zack Spivey, Hartselle Utilities

Mr. Kenneth Spradlin, Clarksville Department of Electricity

Mr. Larry Stargel, City of Alcoa Utilities

Mr. James W. Stewart, Marshall-DeKalb Electric Cooperative

Mr. Baron D. Swafford, City of Maryville Utilities

Mr. William G. Swann, Morristown Power System

Mr. Doug Swayne, Etowah Utilities Department

Mr. Walter J. Szelich, Jr., Fayetteville Electric System

Mr. Gerald Taylor, Chickasaw Electric Cooperative

Mr. Rickey Thomas, Muscle Shoals Electric Board

Mr. Tony Thompson, Murray Electric System

Mr. David Thornton, Tuscumbia Electricity Department

Ms. Cheryl L. Tidwell, Jellico Electric System

Mr. Johnny N. Timmons, City of Tupelo Water & Light Department

Mr. Milton Troutt, Benton County Board of Public Utilities

Mr. Richard Turner, Lewisburg Electric System

Mr. Thomas W. Underwood, Jr., Tallahatchie Valley Electric Power Association

Mr. George H. Usry, III, Athens Utilities Board

Mr. Kerry Lee Vincent, Princeton Electric Plant Board
Mr. R. Keaton Webb, III, Milan Department of Public Utilities
Mr. Earl W. Weeks, 4-County Electric Power Association
Mr. Victor F. Welch, City of Dayton Electric Department
Mr. Tom Wheeler, Jr., Cleveland Utilities
Mr. Jim N. White, Gibson Electric Membership Corporation
Mr. Tom Whitehead, Elizabethton Electric System
Mr. Larry S. Wilcutt, Russellville Electric Plant Board
Mr. John W. Williams, Jackson Utility Division
Mr. J. E. Williamson, Jr., Dyersburg Electric System
Mr. Robert D. Woodard, Upper Cumberland Electric Membership Corporation

Direct Served Industries

Mr. Larry Allen, Air Products and Chemicals, Inc.
Mr. Darrell Anderson, General Motors Corporation
Mr. David C. Anderson, Kimberly-Clark Corporation
Mr. Chuck Ard, Amoco Chemical Company
Mr. Phil Bates, Beaulieu of America, Inc.
Dr. David Branham, U.S. Army Missile Command
Mr. Wayne Breaux, Degussa Corporation
Mr. Ed Bredniak, SKW Metals and Alloys, Incorporated
Mr. K. C. Brewer, UCAR Carbon Company, Incorporated
Mr. Ron Brignoli, Memphis Naval Air Station
Major Larry Brittenham, Department of the Air Force
Mr. James R. Brockman, B. F. Goodrich Chemical Company
Mr. Gene Brooks, Champion International Corporation
Mr. Phillip Casey, Florida Steel Corporation
Mr. H. D. Church, Texas Eastern Gas Pipeline Company
Mr. Gerald Clarke, Occidental Chemical Corporation
Mr. Tommy Coleman, Kerr-McGee Chemical Corporation
Mr. Tony Corley, Monsanto Company
Mr. Terry Cowan, Occidental Chemical Corporation
Mr. H. R. Crosby, Eka Nobel Incorporated
Mr. Mike Edenfield, E. I. duPont de Nemours and Company
Mr. Lynn Elder, A. E. Staley Manufacturing Company
Mr. Phil Estes, Bridgestone, Warren Plant
Mr. James E. Fry, Volunteer Army Ammunition Plant
Mr. William M. Giles, LaRoche Industries Incorporated
Mr. Robert Goble, Alumax, Inc.
Mr. Bob Goelz, BASF Corporation
Mr. Danny Gregg, Monsanto Company
Mr. John Hatmaker, Jr., Kerr-McGee Chemical Corporation
Mr. J. C. Hedrick, BIT Manufacturing, Incorporated
Mr. Lance Holland, Fontana Village Resort
Mr. Marion A. Holt, Packaging Corporation of America
Mr. Paul Jethro, Weyerhaeuser Company
Mr. Bob Johnson, Department of Energy
Mr. Howard Johnson, Beaulieu of America, Incorporated
Mr. Ron Jones, The Mead Corporation
Mr. Doug Katt, Applied Industrial Materials Corporation
Mr. Tim Kilboy, Alumax Engineered Metal Processes, Inc.
Dr. Herbert Knahl, SKW Metals and Alloys, Inc.
Mr. W. F. Kraeling, Logan Aluminum, Incorporated
Mr. Rick Longton, Savage Zinc
Mr. Bill Lundberg, North Star Steel
Mr. A. M. Malatzky, Olin Corporation
Mr. W. G. Manuel, Florida Steel Corporation
Lt. Col. McGonigle, Headquarters 101st Airborne Division
Mr. John McIntosh, Olin Corporation
Mr. Richard McIntyre, General Motors Corporation
Mr. Gary L. Metcalf, L.W.D., Incorporated
Mr. David Mills, Air Products & Chemicals, Incorporated
Mr. Herman Moore, Reynolds Metals Company
Mr. Ralph Moore, Elf Atochem North America
Mr. James L. Mottet, Skyline Coal Company
Mr. R. Don Newman, Bowater Incorporated
Mr. Herman Overcash, UCAR Carbon Company, Incorporated
Mr. Kenneth H. Packie, BASF Corporation, Energy and Feedstock
Mr. Bob Pepler, The Carbide/Graphite, Group, Incorporated
Mr. G. John Pizzey, Aluminum Company of America
Mr. Earl Pritchard, The Mead Corporation
Mr. James Reynolds, Saturn Corporation
Mr. Jerry Rich, AIMCOR TAC Alloys
Mr. Mitch Smith, Beaulieu of America, Inc.
Mr. T. G. Soles, Amoco Chemical Company
Mr. J. Dieter Stein, BASF Corporation
Mr. Rick Stewart, AEDC PKP
Mr. Robert Stone, Inland Container Corporation
Mr. Richard Swakla, ISP Chemicals Incorporated
Mr. Richard Taylor, ISP Chemicals
Mr. Stewart Thomas, Newsprint South, Inc.
Mr. Kenneth Towe, E. I. duPont de Nemours and Company, DuPont Sourcing
Mr. Dick Tyler, Weyerhaeuser Company
Mr. J. R. Watt, Jr., Acety-Arc, Incorporated
Mr. Bo Welander, Eka Nobel, Inc.
Mr. Don Westfall, Newsprint South, Incorporated
Mr. Jack C. Woerner, Inland Container Corporation
Mr. James Wolak, United States Enrichment Corporation
Mr. Ken Younger, Reynolds Metals Company

Members of Congress

The Honorable Spencer Bachus, United States House of Representatives

The Honorable Cass Ballenger, United States House of Representatives

The Honorable Bob Barr, United States House of Representatives

The Honorable Tom Bevill, United States House of Representatives

The Honorable Rick Boucher, United States House of Representatives

The Honorable Ed Bryant, United States House of Representatives

The Honorable Bob Clement, United States House of Representatives

The Honorable Thad Cochran, United States Senate

The Honorable Paul Coverdell, United States Senate

The Honorable Robert Cramer, United States House of Representatives

The Honorable Nathan Deal, United States House of Representatives

The Honorable John J. Duncan, Jr., United States House of Representatives

The Honorable D. M. (Lauch) Faircloth, United States Senate

The Honorable Wendell Ford, United States Senate

The Honorable Harold Ford, United States House of Representatives

The Honorable Bill Frist, United States Senate

The Honorable Bart Gordon, United States House of Representatives

The Honorable Howell Heflin, United States Senate

The Honorable Jesse Helms, United States Senate

The Honorable Van Hilleary, United States House of Representatives

The Honorable Earl Hilliard, United States House of Representatives

The Honorable Ron Lewis, United States House of Representatives

The Honorable Trent Lott, United States Senate

The Honorable Mitch McConnell, United States Senate

The Honorable G. V. (Sonny) Montgomery, United States House of Representatives

The Honorable Sam Nunn, United States Senate

The Honorable James Quillen, United States House of Representatives

The Honorable Charles S. Robb, United States Senate

The Honorable Harold Rogers, United States House of Representatives

The Honorable Richard Shelby, United States Senate

The Honorable John Tanner, United States House of Representatives

The Honorable Charles H. Taylor, United States House of Representatives

The Honorable Fred Thompson, United States Senate

The Honorable Bennie Thompson, United States House of Representatives

The Honorable Zach Wamp, United States House of Representatives

The Honorable John Warner, United States Senate

The Honorable Edward Whitfield, United States House of Representatives

The Honorable Roger Wicker, United States House of Representatives

Energy Vision 2020 Review Group

Mr. Darrell Anderson, General Motors Corporation

Dr. R. Michael Browder, Bristol Tennessee Electric System

Ms. Carol B. Crawley, Mid-South Minority Purchasing Council

Mr. R. Allen Cunningham, E. I. duPont de Nemours and Company, DuPont Sourcing

Mr. Mike Dalen, Alabama Sierra Club

Mr. Josh Ellis, Tennessee Association of Business

Dr. Mary English, The University of Tennessee

Ms. Sharon Fidler, League of Women Voters

Mr. Ron Fogel, Associated Valley Industries, Incorporated

Mr. Quentis Fuqua, Pennyrile Rural Electric Cooperative Corporation

Dr. Susan Gawarecki, League of Women Voters

Dr. Eric Hirst, Oak Ridge National Laboratory

Ms. Sheila Holbrook-White, Alabama Sierra Club

Ms. Ann Murray, Tennessee Conservation League

Mr. Jim Navolio, Kentucky Economic Development Cabinet

Ms. Elizabeth Owen, Tennessee Division of Consumer Affairs

Dr. Edward Passerini, Alabama Conservancy

Mr. William C. Pippin, Huntsville Utilities

Mr. Chester Smith, Mississippi Department of Economic and Community Development

Dr. Stephen Smith, Tennessee Valley Energy Reform Coalition

Mr. Jim N. White, Gibson Electric Membership Corporation

Mr. Carter Witt, Tennessee Association of Business

Government Agencies

Mammoth Cave National Park

Mark Twain National Forest

Jefferson National Forest

U.S. Environmental Protection Agency, EIS Filing Section

U.S. Forest Service

Mr. Charles H. Badger, Georgia State Clearinghouse

Mrs. Chyrs Baggett, North Carolina State Clearinghouse

Dr. Lee A. Barclay, U.S. Fish and Wildlife Service

Dr. Andrew Barrass, Division of Natural Heritage

Mr. Timothy C. Boyce, Alabama Forestry Commission

Mr. Louis Buck, Department of Agriculture

Mr. Jimmy Butts, Department of Transportation

Mr. N. E. Christianson, Department of Transportation

Mr. Ronald W. Cook, State Clearinghouse

Mr. Robert Culver, Top of Alabama Regional Council of Governments

Mr. Greg Denton, Division of Water Pollution Control

Mr. Don E. Dills, Department of Environment and Conservation

Mr. Robert E. Freeman, East Tennessee Development District

Mr. Roger D. Fryar, U.S. Forest Service

Mr. Joe Garrison, Tennessee Historical Commission

Ms. Valerie A. Hudson, State Environmental Clearinghouse

Mr. Bob Ikard, Economic and Community Development

Mr. Robert C. Joslin, U.S. Forest Service

Mr. James H. Lee, Office of Environmental Policy and Compliance

Mr. Robert Lunsford, Department of Economic and Community Affairs

Ms. Cathy Mallette, Department of Finance and Administration

Mr. James D. Martin, Department of Conservation and Natural Resources

Mr. Ronald Mathews, North Central Alabama Regional Council of Local Governments

Mr. Mike Mobley, Division of Radiological Health

Mr. Heinz Mueller, U.S. Environmental Protection Agency, Region IV

Lt. Colonel J. David Norwood, Nashville District

Mr. F. Oaks, Alabama Historical Commission

Mr. Randle G. Phillips, U.S. Forest Service

Ms. Jane W. Powell, Department of Environmental Quality

Mr. Tom Puckett, Rural Economic and Community Development

Mr. James W. Pulliam, U.S. Fish and Wildlife Service

Mr. Dan Sherry, Tennessee Wildlife Resources Agency

Mr. John M. Smith, Department of Environmental Management

Mr. Charles Snider, Sr., Alabama Development Office

Mr. Willie R. Taylor, Office of Environmental Policy and Compliance

Mr. Jack Thompson, Department of Agriculture and Industries

Mr. Tom Tiesler, Division of Solid Waste Management

Ms. Karen Wade, U.S. Park Service

Mr. John Walton, Division of Air Pollution Control

Indian Tribes

Choctaw Tribal Council Mississippi

Eastern Band of Cherokee Tribes

Public

Mr. Joe E. Adams, Aluminum Company of America

Ms. Barbara Altizer, Virginia Coal Council

Mr. Paul Amon, Amon Consulting

Mr. William Arney

The Honorable Victor H. Ashe, Mayor of Knoxville, Tennessee

The Honorable Ben Atchley, Tennessee Senate

Mr. Daniel Axelrod

Ms. Susan Bailey

Mr. John Baker

Mr. Alan Ball

Mr. Scott Banbury

Mr. James Barr

Ms. Karah Bates

Mr. Sam Beall

Ms. Nancy Bell

Mr. S. C. Berl

Ms. Magnita Black

Mr. Richard Bond

Mr. David Bordenkircher

Ms. Mary Ellen Bowen

Mr. William Bowker, Kentucky Coal Marketing and Export Council

Mr. David Bowman, Huntsville News

Mr. Bill Boyd, North Mississippi Industrial Development Association

Mr. C. T. Brewster

Mr. Peter Brinson

Mr. Ed Brooks, Tennessee Southern Railroad
Mr. Clark Buchner, Sierra Club, Tennessee Chapter
Mr. Don Buckley
Ms. Hannah Burdine
Mr. Brian Bury
Mr. J. E. Butt
Mr. Patrick Byington, Alabama Environmental Council
Ms. Stephanie Calvert
Mr. Thomas Camp
Mr. Jerry L. Campbell, Tennessee Valley Public Power Association
Mr. Anthony J. Campbell, Tennessee Conservation League
Mr. Hank Cardwell
Ms. Mary Carton
Ms. Michelle Carratu
Mr. Roan Carratu
M. Case
Ms. Linda Cataldo Modica
Mr. James Catlett, South Kentucky Industrial Development Association
Ms. Patricia Chapman
Mr. Robert Chavez
Ms. Jean Cheney
Ms. Dara Chernicky
Ms. Sheilla Cheyenne
Mr. Robert Church, National Rural Electric Cooperative Association
Ms. Linda Church Ciocci, National Hydropower Association
Ms. Jo Anne Clark
Ms. Elizabeth Coleman
Mr. Howard Connell
Mr. Jim Cooper
Ms. Hester Cope, Alabama Environmental Council
Ms. Anna Sue Courtney
Mr. Geoffrey Crandall, MSB Energy Associates
Mr. Richard Crawford, Tennessee Valley Public Power Association
Ms. June Crew
Ms. Claire Cronin
Ms. Katey Culver
Mr. Edwin Curtis
Ms. Deborah Cuva
Mr. Andrew Danzig
Ms. Leslie Davenport
Ms. Mary Byrd Davis, Ygdrasil Institute
Mr. Lynn Deakins
Mr. Edward DeBro
Mr. Bryan Deel
Mr. Whiting Delk
Mr. Sam Denham
Mr. Alexander Dewey
Mr. Jack Dillard
Mr. Hamp Dobbins, Jr.
Ms. Kathy Dowbiggin
Ms. Danielle Droitsch, Global Sustainability Energy Project
Mr. Bill J. Dukes
Ms. Anna Durham Windrow
Ms. Nikki Durkin, WATE-TV 6
Mr. W. H. Dyer
Mr. Mike Eastman
Ms. Sharron Eckert
Ms. Rela Edwards
Ms. Marilyn Elliott, Alabama Department of Environmental Management
Mr. Paul Elliott
Mr. Randy Eminger
Mr. William Emmott
A. B. Evans
Mr. Jack Eversole, Barren River Area Development District
Ms. Linda Ewald
Mr. Harold Falkenberry
The Honorable Jimmy Fannon, Mayor of Columbus, Mississippi
Ms. Stephanie Farley-Bledsloe
Mr. Andy Fazio
Mr. Hollis Fenn
Ms. Gail Ferrell
Ms. Retha Ferrell
Mr. Tom Fitzgerald, Kentucky Resources Council, Inc.
Ms. Sharon Force
Mr. R. G. Ford, Energy Design Corporation
Mr. Dirk Forrister, Department of Energy, Office of the Secretary
Mr. Tom Forsythe
Mr. and Ms. Powell & Sharon Foster
Mr. Carl Fowler, Jr.
Mr. Al Fritsch, Appalachia-Science in the Public Interest
The Honorable Eddie Frost, Mayor of Florence, Alabama
Mr. Lee Gable
Mr. Larry Gage, Pickwick Electric
Mr. Bruce Gant

Ms. Elizabeth Garber
Ms. Becky Garland, Memphis Light, Gas and Water Division
Mr. John Gessell
Mr. Gene Gibson
The Honorable Mike Gillespie, Madison County Commission
Mr. James Gillum, Tennessee River Valley Association
Mr. Stan Gloeckner, Sierra Club
Mr. E. B. Gober, TVA Retirees Association
Mr. Jim Golden
Mr. W. A. Goodwin, Government Energy Board
Mr. William Grant, Sierra Club, Virginia Chapter
Mr. Denny Gray
Mr. Tom Griffin, Commonwealth of Virginia
Mr. Dennis Griffin, Bowling Green/Warren County Chamber of Commerce
Mr. Karl Grotke
Ms. Kim Grube
Mr. Chris Gulick
Mr. Luther Gulick
Ms. Doris Gunn
Mr. Jason Gurley
Mr. Joe Guthrie, Southeast Tennessee Development District
Mr. Dennis Haldeman
The Honorable William L. Hanbery
Mr. L. George Hannye
Mr. Herbert Harper, Tennessee Historical Commission
J. Harper
Ms. Linda Harris
Ms. Ann Harris
Mr. John Harwood
Ms. Susana Harwood
Mr. James A. Haslam, II, Pilot Oil Corporation
Mr. John Hatmaker, Tennessee Valley Industrial Committee
Ms. Kristen Hebestreet, Johnson City Press
Mr. Jimmy Heidel, Mississippi Department of Economic and Community District
Mr. Isahl Hemm
Mr. Dennis Henke
Hermann
Ms. Anna Hess
Mr. Errol Hess
Ms. Sharin Hill
Mr. Larry Hobart, American Public Power Association
Ms. Dottie Hodges
Mr. Henry Hodges, Purchase Area Development District
Mr. Bob Holladay
Mr. Frank Holm
Ms. Ruth S. Holmberg, The Chattanooga Times
Mr. J. Richard Hommrich, Volunteer Barge & Transport, Inc.
Ms. Jeannine Honicker
Mr. Bradley Hoot, Department of the Army
Mr. Charlie Hopkins, GENESCO
Ms. Dolores Howard
The Honorable Donna Hubbard, Bradley County Courthouse
Mr. Rowland Huddleston
Ms. Barbara Hughes
Mr. John Hurgeton
Ms. Jennifer Hurgeton
Mr. Al Hutchison, Walker County Chamber of Commerce
Mr. Tom Irwin
Ms. Debra Jackson
Mr. Ben Jaco, TVA Retirees Association
Mr. Myles Jakubowski, Sunbeam Household Products
Ms. Susan Jata
Mr. Kirk Johnson
Mr. Patrick Johnson
Mr. John Johnson, Earth First
Mr. Terry Johnson
Mr. Mark Johnson
Mr. L. M. Johnson, Sr.
Mr. Alan Jones, Tennessee Environmental Council
Ms. Jan Jones, Tennessee River Valley Association
Ms. Anna Jordan, CSX Transportation
Ms. Maggie Kalen, Tennessee Valley Energy Reform Coalition
Mr. Ron Kapavik
Mr. Michael Karp, Northwest Conservation Act Coalition
Mr. Will Kidd, Sunsource Unlimited, Inc.
Ms. Regina Dawn Killman
Ms. Carol Kimmons
Mr. Gordon Kinney, Norton Company
Ms. Naomi Furman Kipp, Legal Services Corporation of Alabama
Mr. Bill Kling, Jr., Top of Alabama Regional Council of Governments
Mr. Gerald Knight
Mr. William Kurtz
Ms. Sandra Kurtz
B. J. Lackey

Ms. Linda LaForest, Tennessee Citizens for Wilderness Planning
Ms. Ann Lamb
Ms. Jennifer Lapidus and Hannah Bennett
Ms. Lynn Leach, Alabama Environmental Council
Ms. Tara Lee
Mr. Eric Lewis, Solar Works
Ms. Olivia Lim, Southeast Center for Ecological Awareness
Mr. Richard Lodge, Bass, Berry, & Simms
The Honorable Lynn Long, County Commission
Mr. Thomas Long
Mr. Charles Love, Chattanooga Area Urban League
Ms. Karen Lovell
Ms. Ann Lowe
Ms. Sandy Loyd
R. & G. Ludwig
Mr. Gus Magrini
Mr. Harry Martin, Community Development Foundation
Ms. Betty Martin, Friends of the River
Ms. Molly Martin
Mr. Neil G. McBride, Rural Legal Services of Tennessee, Incorporated
Ms. Sarah McCollum, COAL
Mr. John McCown, Sierra Club, Southern Region
Ms. Kathryn McCoy, Tennessee Energy Education Network
Mr. Frank McDonald, Chattanooga Free Press
Ms. Tanya McDowell
Mr. Sanford McGee, Cumberland Center for Justice and Peace
Ms. Martha McGill
Mr. J. Robert McGuff, Blue Cross Blue Shield of Tennessee
Mr. Eileen McIlvane, Coalition for Jobs and the Environment
Mr. Ellsworth McKee, McKee Foods Corporation
Mr. C. L. McKinney, Creret, Inc.
Mr. Terry McKinney, Association of Tennessee Valley Governments
Mr. Julian McManus, Cherokee Lions Club
Mr. Woody McMillin, Tennessee Valley Industrial Committee
Mr. Duane McQuown
Ms. Miles Mennell, Association of Tennessee Valley Governments
Ms. Monique Mollet
The Honorable Gerry Montgomery, Mayor of Paducah, Kentucky
Mr. Calvin Moore
Mr. Tom Moreland, Middle Tennessee Electric Membership Corporation
Mr. Larry Morris, West Kentucky Economic Development Corporation
Mr. William Moss, Tennessee Municipal Electric Power Association
Mr. Suparan Mullick
Mr. F. W. Munson
Ms. Catherine Murray, State of Franklin Group Sierra Club
Mr. Gary Myers, Tennessee Wildlife Resources Agency
Ms. Leila Nabors
Mr. Robert Nash
Ms. Michelle Neal, Tennessee Valley Energy Reform Coalition
Mr. Allen Neel, Tennessee's Resource Valley
Mr. Gerald Nicely, Metro Development and Housing Agency
Mr. Chad Nichols
Mr. G. C. Nichols
Mr. Henry Nickell, Memphis Light, Gas and Water Division
Mr. John Noel
Ms. Carolyn Novkov
Mr. Bill O'Brien, B. F. Goodrich
Ms. Kathleen O'Donohue
Mr. Kevin O'Hara
Dr. Fred Obear, The University of Tennessee at Chattanooga
Mr. Roger Odom, Lenzinc Fibers Corporation
Ms. Ann Oliver
Ms. Katherine Osborn
Mr. Russell Palk
Mr. Lee Parbery
Mr. Bobby Parrish, TVA Retirees Association
Mr. Frances Parson
Mr. Leith Patton
Mr. Robert Peeples
Ms. Ruth Peeples
Mr. M. Nathan Perry
Mr. Don Perry
Ms. Amy Perry
Mr. Jeff Peterson
Mr. Jeff Pfitzer
Mr. Tom Phillips
Ms. Jamie Pizzirusso
Mr. Scott Pogue
Ms. Vinay Prabhv, Vanderbilt University
Ms. Joan Prewitt
The Honorable Louis E. Price, Mayor of Scottsboro, Alabama
Mr. Kent Price
Mr. Wilson Prichett, Tennessee Valley Energy Management Association

Ms. Kathy Priore
Mr. Tom Purkey, Tennessee Electric Cooperative Association
Mr. Alex Radin, Radin and Associates
Ms. Marjorie Raines
Ms. Katie Rawls, Tennessee Valley Authority
Mr. Jim Reaves
Ms. Anne Redwine
Mr. Chuck Reedy
Mr. Jim Renfro
Mr. Grady Rhoden
Mr. James Riccio, Public Citizens Critical Mass Energy Project
Mr. Mark Richardson
Ms. Stacey Riplett
Mr. Dalton Roberts
The Honorable Gene Roberts, Mayor of Chattanooga, Tennessee
Mr. Pete Rolston
Ms. Joyce Rouse
Mr. Andy Rowlett
Sahara
Salo
Mr. and Ms. Mike & Ann Sanders
Mr. Charles Sanford, Sanford & Associates
Ms. Shirley Schaaf
Mr. Don Scharf, Middle Tennessee Group of the Sierra Club
Mr. Jonathan Scherch
Ms. Kathy Schleagel, Logan County Economic Development Commission, Incorporated
Mr. Robert Schreiber, Common Sense
Ms. Mary Schwarz
Mr. John Schwarz, Jr.
Dr. Martin Schweitzer, Oak Ridge National Laboratory
Mr. Stephen Scott
Mr. Ricky Sebring
Mr. Jim Sells
Ms. Yvonne Seperich
Mr. William Shadden
Ms. Leslie Shankman-Cohn
Mr. Lenny Sharlet
Mr. John Sharp, Jr.
Mr. Ron Sheets, Kentucky Association of Electric Cooperatives, Incorporated
Mr. Floyd Sherrod
Mr. Garry Shores
Mr. George W. Shuff, III, Middle Tennessee Industrial Development Association
Mr. John Sibley, Onyx International, Incorporated
Mr. Richard Simmers
Ms. Suzanne Sims
Ms. Deborah Sliz, APCO Associates
Mr. Edward Smeloff, Sacramento Municipal Utility District
Mr. Matt Smith
Mr. John Smith
Mr. Arthur Smith
Mr. Larry Smith, Mid-South Peace and Justice Center
Mr. Larry J. Smith
Mr. Jim Snell
Ms. Peggy Snow
Ms. Barbara Soliday
Mr. Michael Soroczak, Creative Culinary Systems, Inc.
Ms. Myra Soroczak
Ms. Beth Speltz
Ms. Elaine Stancil
Mr. Don Stansberry, Tennessee Valley Industrial Committee
Mr. John Stapleton, Department of Natural Resources and Environmental Protection, Commonwealth of Kentucky
Mr. and Ms. Walter & Dorothy Stark
Mr. Stephen Stedman
Mr. Walter Stenberg
Mr. David Stephenson, Southeastern Regional Biomass Energy Program
Ms. Beth Stewart
Mr. and Ms. Hugh & Amy Stewart
Mr. Benjamin Stewart, Faith Lutheran Church
Mr. C. Strain
Mr. William Sudderth, River Valley Partners
Mr. Joseph Sweat, Tennessee Municipal League
Mr. Howard Switzer, Sun/Earth Tempered Organic Architecture
Ms. Susan Switzer
Mr. Barry L. Tarter, North Georgia Regional Development Center
Ms. Mary Anne Terry
Mr. and Ms. Philip & Winfred Thomforde
Mr. S. W. Thompson
Mr. Don Threadgill
Ms. Melissa Thurmond
Ms. Robin Tickle
Ms. Mandy Tiesler
Ms. Dee Tison
Tohert

Ms. Sandra Toomey
Mr. Gary Toomey
Mr. Paul Vachon
Mr. John van der Harst
Ms. Monique Van Landingham
Mr. John Van Mol, Tennessee Valley Industrial Committee
K. Varnum
Mr. James G. Vaughan, Jr., Chattanooga Area Chamber of Commerce
Mr. Victor Villa
Ms. Betty Vincent
Mr. Jim Von Bramer
Mr. Eli Walker
Ms. Beth Wallace
Mr. Larry J. Waller, Huntsville/Madison County Chamber of Commerce
Mr. Steven Walsh
Mr. Arthur Webb
Mr. Rodney Webb
Mr. and Ms. Ben & Winn Welch
Mr. Ken Wheeler, Midland Enterprises
Mr. James White
Ms. Betty Whitehouse
Mr. Ed Whitehouse
Mr. N. E. Whitfield
Mr. Dean Whitworth
Mr. Ray Williams
Mr. Ray Williamson, Westinghouse Electric Corp.
Ms. Jenny Willoghby
Mr. Seth Wilson
Ms. Kathryn Wise, Carpet and Rug Institute
Mr. Hal Womble
Mr. John Wood
Mr. Bruce Wood
Mr. Fred Wright
Mr. Forrest Wright, C.I.D., Shoals Industrial Development Authority
Ms. Dianna Young
Ms. Faith Young
Ms. Marion Zachiel
Mr. Stan Zdeb, Nissan Corporation
Mr. Bernard Zellner, TVA Retirees Association
Ms. Beth Zilbert, Greenpeace

Placed for reference at the following libraries:

Public Library, Arley, Alabama
Birmingham-Jefferson County Library, Birmingham, Alabama
Blountsville Public Library, Blountsville, Alabama
Cherokee County Public Library, Centre, Alabama
Cullman County Public Library, Cullman, Alabama
Double Springs Public Library, Double Springs, Alabama
Gadsden-Etowah County Library, Gadsden, Alabama
Haleyville Public Library, Haleyville, Alabama
Lynn Public Library, Lynn, Alabama
Marshall County Cooperative Library, Arab, Alabama
Northwest Regional Library, Winfield, Alabama
Oneonta Public Library, Oneonta, Alabama
Rainsville Public Library, Rainsville, Alabama
Scottsboro Public Library, Scottsboro, Alabama
University of North Florida Library, Jacksonville, Florida
Chattooga County Library, Summerville, Georgia
Allen County Public Library, Scottsville, Kentucky
Barren River Regional Library, Russellville, Kentucky
Cumberland County Public Library, Burkesville, Kentucky
Edmonson County Public Library, Brownsville, Kentucky
Goodnight Memorial Library, Franklin, Kentucky
Graves County Library, Mayfield, Kentucky
Grayson County Public Library, Leitchfield, Kentucky
Lyon County Public Library, Eddyville, Kentucky
Monroe County Public Library, Tompkinsville, Kentucky
Paducah Community College Library, Paducah, Kentucky
Paducah Public Library, Paducah, Kentucky
Coffeeville Public Library, Coffeeville, Mississippi
Dixie Regional Library, Pontotoc, Mississippi
Lee-Itwamba Library System, Tupelo, Mississippi
Marshall County Library, Holly Springs, Mississippi
Neshoba County Public Library, Philadelphia, Mississippi
Northeast Regional Library, Corinth, Mississippi
Noxubee County Library System, Macon, Mississippi
Oktibbeha County Library System, Starkville, Mississippi
Tallahatchie County Library, Charleston, Mississippi
Tombigbee Regional Library, West Point, Mississippi
Union County Library System, New Albany, Mississippi
University Of Mississippi Library, University, Mississippi
Andrews Public Library, Andrews, North Carolina
Avery-Mitchell-Yancey Regional Library, Spruce Pine, North Carolina
Avery-Morrison Public Library, Newland, North Carolina
Black Mountain Public Library, Black Mountain, North Carolina

Henderson County Public Library, Hendersonville, North Carolina
Hudson Library, Highlands, North Carolina
Johannsen Memorial Library, Cashiers, North Carolina
Macon County Public Library, Franklin, North Carolina
Madison County Public Library, Marshall, North Carolina
Mars Hill Memorial Library, Mars Hill, North Carolina
Mitchell County Library, Bakersville, North Carolina
Murphy Public Library, Murphy, North Carolina
Southwestern Technical College Library, Sylva, North Carolina
Transylvania County Library Inc., Brevard, North Carolina
Yancey County Library, Burnsville, North Carolina
Adams Memorial Library, Woodbury, Tennessee
Altamont Public Library, Altamont, Tennessee
Argie Cooper Public Library, Shelbyville, Tennessee
Art Circle Public Library, Crossville, Tennessee
Beene-Pearson Public Library, South Pittsburg, Tennessee
Benton County Library, Camden, Tennessee
Bledsoe County Public Library, Pikeville, Tennessee
Blue Grass Regional Library, Columbia, Tennessee
Bolivar-Hardeman County Public Library, Bolivar, Tennessee
Brentwood Public Library, Brentwood, Tennessee
Briceville Public Library, Briceville, Tennessee
Carroll County Library, Huntingdon, Tennessee
Caryville Public Library, Caryville, Tennessee
Charles Ralph Holland Memorial Library, Gainesboro, Tennessee
Chattanooga Times Library, Chattanooga, Tennessee
Chattanooga/Hamilton Co Bicentennial Library, Chattanooga, Tennessee
Cheatham County Public Library, Ashland City, Tennessee
Claiborne County Public Library, Tazewell, Tennessee
Clay County Public Library, Celina, Tennessee
Cleveland Public Library, Cleveland, Tennessee
Clinton Public Library, Clinton, Tennessee
Copperhill Public Library, Copperhill, Tennessee
Crockett Memorial Library, Alamo, Tennessee
Dickson County Public Library, Dickson, Tennessee
East Ridge City Library, East Ridge, Tennessee
Englewood Public Library, Englewood, Tennessee
Fentress County Public Library, Jamestown, Tennessee
Franklin County Library, Winchester, Tennessee
Fred A. Naught Memorial Library, Hartsville, Tennessee
Gibson County Memorial Library, Trenton, Tennessee
Giles County Public Library, Pulaski, Tennessee
Gorham-Macbane Public Library, Springfield, Tennessee
Grainger County Library, Rutledge, Tennessee
Graysville Public Library, Graysville, Tennessee
Greenfield Public Library, Greenfield, Tennessee
H. B. Stamps Memorial Library, Rogersville, Tennessee
Halls Public Library, Halls, Tennessee
Hancock County Public Library, Sneedville, Tennessee
Hendersonville Public Library, Hendersonville, Tennessee
Hickman County Public Library, Centerville, Tennessee
Highland Rim Regional Library Center, Murfreesboro, Tennessee
Humboldt Public Library, Humboldt, Tennessee
Irving Meek Jr. Public Library, Adamsville, Tennessee
Jack Mcconnico Memorial Library, Selmer, Tennessee
Jackson-Madison County Library, Jackson, Tennessee
Jefferson County Library, Dandridge, Tennessee
Jellico Public Library, Jellico, Tennessee
John W. Finney Memorial Library, Columbia, Tennessee
Johnson City Public Library, Johnson City, Tennessee
Justin Potter Public Library, Smithville, Tennessee
Kingston City Library, Kingston, Tennessee
Lake City Public Library, Lake City, Tennessee
Lavergne Public Library, Lavergne, Tennessee
Lawrence County Public Library, Lawrenceburg, Tennessee
Lebanon-Wilson County Library, Lebanon, Tennessee
Lee Ola Roberts Public Library, Whiteville, Tennessee
Lewis County Public Library, Hohenwald, Tennessee
Lincoln Memorial University Library, Harrogate, Tennessee
Loudon City Library, Loudon, Tennessee
Luttrell Public Library, Luttrell, Tennessee
Macon County Library, Lafayette, Tennessee
Marshall County Memorial Library, Lewisburg, Tennessee
Martin Public Library, Martin, Tennessee
Mciver's Grant Public Library, Dyersburg, Tennessee
Mckenzie Memorial Library, Mckenzie, Tennessee
Mildred G. Fields Library, Milan, Tennessee
Minor Hill Public Library, Minor Hill, Tennessee
Monteagle Public Library, Monteagle, Tennessee
Moore County Public Library, Lynchburg, Tennessee
Newbern City Library, Newbern, Tennessee
Niota Public Library, Niota, Tennessee
Norris Community Library, Norris, Tennessee
Obion County Public Library, Union City, Tennessee
Oliver Springs Public Library, Oliver Springs, Tennessee
Overton County Public Library, Livingston, Tennessee
Palmer Public Library, Palmer, Tennessee

Parrottsville Public Library, Parrottsville, Tennessee
Perry County Public Library, Linden, Tennessee
Pickett County Library, Byrdstown, Tennessee
Portland Public Library, Portland, Tennessee
Putnam County Library, Cookeville, Tennessee
Ridgely Public Library, Ridgely, Tennessee
Rockwood Public Library, Rockwood, Tennessee
Scott County Public Library, Oneida, Tennessee
Shelby State Community College Library, Memphis, Tennessee
Smith County Public Library, Carthage, Tennessee
Smyrna Public Library, Smyrna, Tennessee
Somerville-Fayette County Library, Somerville, Tennessee
Spring Hill Community Library, Spring Hill, Tennessee
Stewart County Public Library, Dover, Tennessee
Stokley Memorial Library, Newport, Tennessee
Sugar Hill-Lauderdale County Library, Ripley, Tennessee
Sunbright Public Library, Sunbright, Tennessee
Sweetwater Public Library, Sweetwater, Tennessee
Thomas Hughes Free Public Library, Rugby, Tennessee
Tipton County Public Library, Covington, Tennessee
Tiptonville Public Library, Tiptonville, Tennessee
Tracy City Public Library, Tracy City, Tennessee
Tusculum College Library, Greeneville, Tennessee
Union County Public Library, Maynardville, Tennessee
Van Buren County Public Library, Spencer, Tennessee
W. G. Rhea Library, Paris, Tennessee
Wartburg Public Library, Wartburg, Tennessee
Wayne County Public Library, Waynesboro, Tennessee
Weakley County Public Library, Dresden, Tennessee
White County Public Library, Sparta, Tennessee
Russell County Public Library, Lebanon, Virginia
Tazewell County Public Library, Tazewell, Virginia
Wythe-Grayson Regional Library, Independence, Virginia
Wytheville Community College Library, Wytheville, Virginia

INDEX

Numbers indicate comment number

T

V

W

Y

Z

Printed on recycled paper.
12/95