

Chapter Ten

Short-Term Action Plan



Chapter Ten: Short-Term Action Plan

The short-term action plan identifies specific actions to meet TVA's customer needs from 1996-2002. The short-term action plan is derived from the portfolio of options presented in the long-term plan, which was discussed in the preceding chapter.

The short-term action plan relies heavily on flexible supply-side and demand-side resources. These resources meet Energy Vision 2020 criteria and manage risk by providing flexibility in the face of uncertain load growth and other factors.

Because the future usually does not turn out as expected, the short-term action plan will need revisions as TVA learns more about the future. The long-term plan provides the guidance and flexibility to do this.

This Chapter Includes:

- Development of the Plan
- Description of the Plan
- Implementation of Resource Options
- Investigation/Research and Development (R & D)
- TVA's Compliance with Environmental Regulations
Will Provide a Safety Net

Short-Term Action Plan

Development of the Plan

TVA has developed a short-term action plan from the long-term plan described in the last chapter. The short-term action plan incorporates actions TVA will take over the next three years to meet customer needs from 1996-2002. For customer needs after 2002, TVA has the time and the opportunity to choose among many of the resource options in the long-term plan. Thus, no short-term actions are necessary at this time to meet the needs after 2002.

The actions recommended for implementation in the short-term action plan (Figure 10-1) are derived from the portfolio (see Chapter 9). The short-term action plan relies heavily on the flexible strategies.

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 Chapter 9, Figures 9-4 through 9-10, many strategies were considered in trying to create a balance among all the evaluation criteria. The long-term and short-term resource plans achieve this balance.

The short-term strategy is based on the implementation of flexible resource options due to the large uncertainty in future load growth. There were concerns expressed in the planning process about whether the load forecast is too high and about the large uncertainty in future load growth. By implementing flexible resource options, if load growth is low (no growth) then these options will not be purchased, but if load growth is higher, these resource options can be implemented.

The customer service options in the short-term action plan are based on new and expanded demand-side management programs including energy efficiency, load management, and beneficial electrification.

TVA has identified customer service options in the short-term action plan for immediate full scale implementation or for implementation as flexible demand-side management options. 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. 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 and trade allies to deliver large scale demand-side management programs as needed. Full-scale and flexible programs implemented in the short-

The short-term action plan incorporates resource options from several strategies and identifies specific TVA actions to meet customer needs from 1996-2002.

FIGURE 10-1. Short-Term Action Plan

Short-Term Actions—Supply-Side	Milestones
Purchase Call Options	
<ul style="list-style-type: none"> • Base-Load Coverage - 2001 – 2002 • Winter and Summer Peaking Coverage - 1998 – 2002 	Implement up to 3,000 MW
Hydro Modernization Projects	
<ul style="list-style-type: none"> • Invest in hydro modernization projects between 1996 – 2007 	Achieve 150 MW
Bellefonte Nuclear Plant Conversion to Combined Cycle Plant	
<ul style="list-style-type: none"> • Converting the Bellefonte Nuclear Plant to a combined cycle plant utilizing natural gas or gasified coal as the primary fuel has been identified as one of the most viable alternatives. Such an alternative provides the opportunity to utilize a substantial portion of the Bellefonte non-nuclear plant equipment. However, there is a degree of uncertainty and market risk associated with this alternative which requires further in-depth engineering and financial examination. Accordingly, TVA will use an outside, independent team of technical and financial experts to assess and develop the Bellefonte conversion strategy more fully over the next 18 to 24 months. During the course of the study, TVA will also pursue the evaluation and development of a demonstration gasification plant with the Department of Energy. In the meantime, the Bellefonte plant and Watts Bar Nuclear Plant Unit 2 will continue in a deferred status. TVA will continue to be receptive should outside entities propose an acceptable financial arrangement to complete these units as nuclear facilities in partnership with TVA. • Browns Ferry Nuclear Plant Unit 1 will continue in its inoperative status. 	18 – 24 month study
Renewables	
<ul style="list-style-type: none"> • Implement cost-effective biomass cofiring <ul style="list-style-type: none"> - Cofiring precommercial demonstration runs at existing TVA coal-fired plants - Initiate first commercial wood waste cofiring project operation • Investigate biomass energy facilities • Implement a flexible wind project • Determine coalbed methane resources feasibility • Inventory sites suitable for landfill methane • Initiate 25-kW landfill methane fuel cells pilot 	1996 1997 1996–97 1996–97 1996–97 1996 1997–98
Additional Capacity Development	
<ul style="list-style-type: none"> • Acquire three sites and develop preliminary engineering modules suitable for coproduction, combined cycle, combustion turbines, cascaded humidified advanced turbines, and compressed air energy storage • Investigate cogeneration and other unique energy supply arrangements 	1996–1998 1996
Implement a Flexible Phase II Acid Rain Strategy	
<ul style="list-style-type: none"> • Strategy/Plan Definition • Initiate early implementation options 	1996 1996–97

term action plan will provide the foundation of programs that can be relatively quickly scaled up or down as conditions warrant.

TVA has included all of the demand-side activities in the low price block (Block 1) in the short-term action plan. In addition, TVA included options from Blocks 2 and 3 in the short-term action plan to address lost opportunities (energy-efficient new homes) and to promote market transformation (heat pump water heater, manufactured housing, home self-audit, and student self-audit). Equity among customers is addressed through a flexible program to improve the energy efficiency of low income housing.

FIGURE 10-1. Short-Term Action Plan CONTINUED

Short-Term Actions—Customer Services	Milestones
DEMAND-SIDE SAVINGS	Up to 650 MW - 2002, Up to 2,200 MW - 2010
Residential	
<i>Full Scale Programs</i>	Revisions in Place
• Heat Pump Leasing / Financing	1996–97
• Ground Source Heat Pump Leasing	1996–97
• New Homes Program	1996–97
• Manufactured Housing - New Construction	1996–97
• Residential Self-Audit	Launch 1996–97
• Load Management	Revisions in Place
- Air Conditioners	1996–97
- Water Heaters	1996–97
<i>Flexible Residential Demand-Side Programs for Selected Market Segments</i>	Launch Phase 1
• Efficiency Products Catalog - Mail Order	1997
• Lighting Products Retail Component	1997
• Low Income Program - Site Visit	1997
• Student Self-Audit - Schools Environmental	1997
• Heat Pump Water Heater Initiative	1997
Commercial and Industrial	
<i>Full Scale Programs</i>	Launch 1996–97
• Commercial and Industrial Energy Services	1996–97
- Comprehensive Measures Financing	1996–97
- Commercial New Construction	1996–97
- Commercial Lighting	1996–97
- Commercial Appliances	1996–97
- Industrial Process Energy Efficiency	1996–97
- Industrial High Efficiency Motors	1996–97
• Commercial Cool Storage	1996–97
<i>Flexible Commercial and Industrial Programs</i>	Launch Phase 1
• Commercial Group Load Curtailment	1997
• Commercial Rooftop Cool Storage Program	1997
BENEFICIAL ELECTRIFICATION	
Residential	
• HVAC and Water Heating applications to improve consumer value	1996–97
• Initiate Flexible Security Lighting and Lawn Mower Programs	Launch 1997
Commercial and Industrial	
• Commercial Space Conditioning and Water Heating	Launch 1996–97
• Commercial Cooking and Security Lighting	Launch 1996–97
• Industrial Electrification Programs for Processing Heating, Food Processing, and Environmental Technologies	Launch 1996–97
• Flexible Industrial Electrification Options for Curing & Drying applications and Textile processes	Launch Phase 1 - 1997
General Research and Development	
• Develop telecommunication supported demand-side management programs	Launch 1996
• End-use renewables, market transformation, load management new technologies, targeted distributed generation, photovoltaics, electric vehicles	Launch 1996–97

The beneficial electrification options are designed to increase customer value, enhance economic development, and improve the environment. Such activities include industrial electrotechnologies and electric transportation.

In the longer term, the short-term action plan emphasizes research and development of renewable resource options in addition to clean coal technologies. Renewables research will include evaluation of biomass cofiring, wind resource investigations, investigation of landfill and coalbed methane potential, end-use photovoltaics, and distributed generation technologies including fuels cells and targeted demand-side management. Of course, in the long term, after 2002, there is sufficient time and flexibility to make any decisions, and no commitments are being made for resources after 2002 in the short-term action plan.

Description of the Plan

The short-term action plan is organized into two areas:

- Implementation of Resource Options
- Investigation/Research and Development (R&D).

Supply-side and customer service options are identified for each area. The short-term action plan is illustrated in *Figure 10-1*.

Implementation of Resource Options

To supply power, the short-term action plan identifies the following actions:

- Buying call options, including base load in 2001–2002 and peaking for winter and summer in 1998–2002.
- Converting the Bellefonte Nuclear Plant to a combined cycle plant utilizing natural gas or gasified coal as the primary fuel has been identified as one of the most viable alternatives. Such an alternative provides the opportunity to utilize a substantial portion of the Bellefonte non-nuclear plant equipment. However, there is a degree of uncertainty and market risk associated with such an alternative which requires further in-depth engineering and financial examination. Accordingly, TVA will use an outside, independent team of technical and financial experts to assess and develop the Bellefonte conversion strategy more fully over the next 18 to 24 months. During the course of the study, TVA will also pursue the evaluation and development of a demonstration gasification plant developed with the Department of Energy. In the meantime, the Bellefonte plant and Watts Bar Nuclear Plant Unit 2 will continue in a deferred status. TVA will continue to be receptive should outside entities propose an acceptable financial arrangement to complete these units as nuclear facilities in partnership with TVA.
- Browns Ferry Nuclear Plant Unit 1 will continue in its inoperative status.
- Investing in siting and pre-engineering for a coproduction facility, a com-

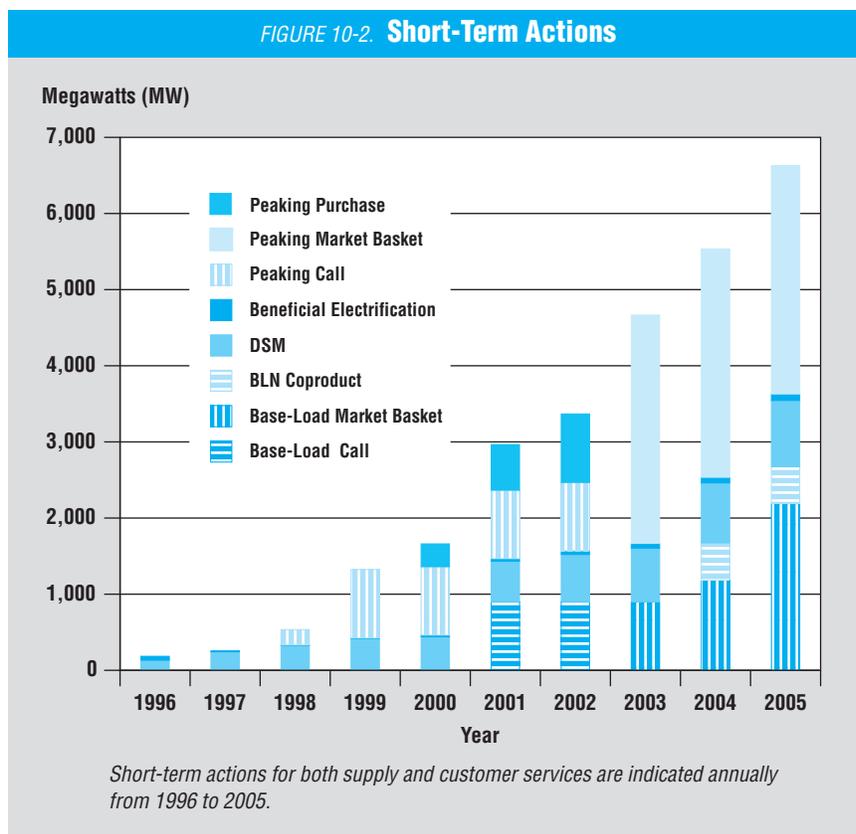
bined cycle facility, combustion turbines, cascaded humidified advanced turbines and compressed air energy storage systems. Three sites, in the western part of the TVA system, will be developed for this generation.

- Modernizing TVA’s hydro plants.
- Perform cost-effective biomass cofiring.
- Implement a flexible plan for Phase II acid rain compliance.

A summary of the annual resource additions that meet customer needs from 1996-2005 are shown in *Figure 10-2*.

In the short-term action plan, TVA will implement three types of customer service options—demand-side management, beneficial electrification, and off-system sales. The demand-side management options to be implemented immediately are:

- A Heat Pump/Ground Source Heat Pump program that promotes quality installations of higher efficiency heat pumps by offering customers financing or leasing options and maintenance contracts.
- A Residential New Construction program that promotes higher efficiency standards and quality construction in new homes through incentives for homebuilders.
- A Manufactured Housing program that transforms the market by promoting installation of efficient heating, ventilation, air conditioning, and water heating equipment, proper duct design, and improved duct insulation by manufacturers during construction.
- A Residential Self-Audit program that provides homeowners a method to conduct their own home survey and receive a detailed computerized analysis identifying energy efficiency opportunities.
- A Residential Air Conditioner and Water Heater Load Management program that uses a radio control system to cycle water heaters and air conditioning load to reduce power system demand during times of peak electrical usage.
- A Commercial Cool Storage program that promotes thermal energy storage technologies to shift energy use from on-peak periods to off-peak periods.
- The Comprehensive Measures Financing option was expanded to over twice its original level to form the Commercial and Industrial Energy Services option. This option



provides project management services, technical assistance, and financing. The original option was targeted to building retrofits. The expanded option combines parts of the technology replacement options (Lighting, Appliances, High-Efficiency Motors), the Commercial New Construction option, and the Industrial Process Energy Efficiency options in a financing program. This allows TVA to capture much of the commercial and industrial energy efficiency potential in Block 2. This program includes targeted incentives directed to lost opportunity projects such as new construction or chiller replacements. The program will promote market transformation by providing trade ally incentives for architects and engineers to design energy-efficient buildings and to equipment dealers (e.g., motor dealers) to stock and sell high-efficiency equipment.

The plan calls for eight flexible customer service programs: six demand-side management programs and two beneficial electrification programs. The demand-side management programs include:

- A Residential Heat Pump Water Heating program that offsets the up-front cost of high-efficiency water heating technologies by offering residential customers financing or leasing options.
- A Residential Student Audit program that presents the self-audit package to students to conduct a home audit and to create greater understanding of the benefits of energy efficiency.
- A Low Income program that works with government agencies and community action agencies to directly install low-cost efficiency measures for participants in their homes.
- A Catalog and Retail Sales program that is designed to transform the market for high-efficiency lighting products, security lighting, and other efficient electric appliances through a catalog and in cooperation with participating retail outlets.
- A Commercial Rooftop Cool Storage program that promotes an emerging thermal storage technology that reduces customer equipment costs and shifts energy use from on-peak periods to off-peak periods. Initially, the program will focus on the development and commercialization of the rooftop cool storage technology. TVA is currently demonstrating this technology within the Valley.
- A Commercial Group Load Curtailment program that provides bill credits to commercial customers, or groups of customers, who are able to reduce demand for electricity by 100 kilowatts or more during peak demand hours.

In the short term, the demand-side management activities were grouped into four areas:

- Expansion of existing programs (Heat Pump/Ground Source Heat Pump program)
- Peak clipping or reduction (Residential Air Conditioner and Water Heater Load Management and Commercial Cool Storage programs)
- Energy efficiency improvements for lost opportunities (Residential New

Construction, and Commercial and Industrial Comprehensive Financing programs)

- Market transformation opportunities (Manufactured Housing program, Residential Self-Audit program, and the Commercial and Industrial Comprehensive Financing program)

A primary objective common to all programs is to increase public awareness of the benefits of energy efficiency and to provide consumers and trade allies with information on energy-efficient building equipment and practices. All programs will include promotional activities and educational components which support this important objective.

The long-term plan contains demand-side management options largely from demand-side management Blocks 1 and 2. The short-term plan contains almost all of the demand-side management programs identified in Blocks 1 and 2 with two options identified in Block 3. The specific programs included in the short-term plan compared to the demand-side management blocks are shown in *Figure 10-3*.

FIGURE 10-3. Demand-Side Management in Short-Term Action Plan

	OPTIONS CONSIDERED	SHORT-TERM ACTION PLAN	
	MW in 2010	MW in 2010	Recommended Action
Block 1			
Commercial Cool Storage	120	120	Flexible DSM
Rooftop Cool Storage	93	93	Flexible DSM
Commercial Group Load Curtailment	242	242	Flexible DSM
Residential Load Management - Air Conditioning	53	53	Immediate Implementation
Residential Existing Load Management - Air Conditioning	0	0	Immediate Implementation
Residential Existing Load Management - Water Heating	0	0	Immediate Implementation
Residential Heat Pump Leasing Program	518	518	Immediate Implementation
Residential Efficiency Products Catalog	107	107	Flexible DSM
Industrial Technology - High Efficiency Motors	14	14	Implemented w/C&I Energy Services
Residential Lighting Products - Retail Component	103	103	Flexible DSM
Comprehensive Measure Financing	170	170	Implemented w/C&I Energy Services
Residential Ground Source Heat Pump Leasing	62	62	Immediate Implementation
Total MW - Block 1	1,482		
Block 2			
Residential Self-Audit	19	19	Immediate Implementation
Residential New Homes	184	184	Immediate Implementation
Commercial Technology Rebates - Lighting	511	75	Implemented w/C&I Energy Services
Residential Low Income Program	75	75	Flexible DSM
Residential Load Management - Water Heaters	84	84	Immediate Implementation
Commercial New Construction	188	40	Implemented w/C&I Energy Services
Commercial Technology Rebates - Appliances	69	22	Implemented w/C&I Energy Services
Refrigerator Turn-In	13		
Residential Student Self-Audit	23	23	Flexible DSM
Small Commercial Retrofit	98		
Total MW - Block 2	1,264		

FIGURE 10-3. Demand-Side Management in Short-Term Action Plan *CONTINUED*

	OPTIONS CONSIDERED	SHORT-TERM ACTION PLAN	
	MW in 2010	MW in 2010	Recommended Action
Block 3			
Residential Load Management - SCADA	0		
Comprehensive Measure Rebates	311		
Industrial Energy Efficiency - Distributor Served	190	20	Implemented w/C&I Energy Services
Industrial Energy Efficiency - Direct Served	169	20	Implemented w/C&I Energy Services
Industrial Technology Rebates - Adj. Speed Drives	6		
Energy Efficient Pricing (opt-out)	56		
Residential Heat Pump Water Heating Leasing	103	103	Flexible DSM
Residential Direct Install	386		
Commercial Technology Rebates - HVAC	223		
Residential Manufactured Housing Program	53	53	Immediate Implementation
Total MW - Block 3	1,497		
Block 4			
Residential Load Management - New Technology	0		
Commercial HVAC Maintenance Program	26		
Residential Heat Pump Loans	469		
Residential Efficient Air Conditioning	133		
Residential Heat Pump Rebates	527		
Residential Load Management - Storage Water Heaters	39		
Industrial Technology Rebates - Comp. Air Eff.	4		
Residential Appliance Rebates Program	41		
Residential Low Income Weatherization Program	6		
Residential Solar Water Heater Program	4		
Commercial New Construction - Renewables	40		
Total MW - Block 4	1,289		
Total DSM Impact - 2010	5,532	2,200	

The demand-side management programs included in the short-term plan are of two types: First, those that are to be immediately implemented or are expansions of existing programs. These programs will result in a demand savings of 600 megawatts by 2002 and 1,450 megawatts by 2010. Second, 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 second phase would be full implementation and would occur if the first phase proves cost-effective and there is a need for the demand savings on the power system. The flexible demand-side management programs would add 50 megawatts by 2002 and potentially 750 megawatts by 2010. In the short-term action plan the total demand savings is expected to be 650 megawatts by 2002 and 2,200 megawatts by 2010 if all flexible demand-side management programs are implemented.

Beneficial electrification options are included in the short-term action plan to encourage energy efficiency and reduce peak demands on the power system, but at the same time minimize the impact on electric rates.

The four beneficial electrification options to be implemented immediately are:

- A Residential Heating and Air Conditioning program that promotes high-efficiency heat pumps as an alternative to equipment using other fuels.
- An Industrial Electrotechnologies program that promotes selected electrotechnologies to industrial customers to enhance competitiveness and address environmental concerns. This program will target the food process industry and will also promote electrotechnologies to improve process heating and to provide environmental solutions.
- A Commercial Heating and Air Conditioning program that promotes high-efficiency electric heating, ventilation, and air conditioning equipment as an alternative to equipment using other fuels.
- A Commercial Cooking program that promotes high-efficiency electric cooking equipment to commercial customers in cooperation with trade allies and equipment dealers.

The flexible beneficial electrification programs include:

- An Industrial Electrotechnologies program that promotes selected electrotechnologies to industrial customers to enhance competitiveness and address environmental concerns. This option will assess the applicability of electrotechnologies for the textile and chemical/metal industries and for industrial curing and drying.
- A Residential Security Lighting program that promotes security lighting products through a catalog and in participating retail outlets.

The beneficial electrification options are designed to increase consumer value, as are the demand-side management programs.

Off-system sales will better utilize existing assets from 1996-2002.

Investigation/Research and Development (R&D)

The short-term action plan calls for research and development programs covering supply-side and customer service options. TVA will pursue research or demonstration projects in the following supply-side areas:

1. Investigate cogeneration and other unique energy supply arrangements.
2. Developing new capacity using such technologies as cascaded humidified advanced turbines, distributed generation, and fuel cells. An explanation of these technologies is given below.
 - A cascaded humidified advanced turbine is a gas turbine with a unique configuration that allows the unit to have efficiencies similar to a conventional combined cycle plant (a type of plant that generates electricity first from

the heat produced by burning gas and then again from heat extracted from-exhaust steam), but without the addition of a steam turbine and associated equipment. The cascaded humidified advanced turbine should have a capital cost somewhat less than for a combined cycle installation of similar generating capacity.

- Distributed generation refers to the location of smaller-scale power generating units near the power consumer. Examples would be gas turbines or diesel generators located in power transmission substations or installed adjacent to large industrial or commercial power consumers. The close proximity of the power generator to the power user significantly reduces the losses associated with the transmission of power.
 - Fuel cells are devices similar to batteries, except they are capable of generating power rather than simply storing power. A fuel and a form of air or oxygen are consumed in the cell by a chemical reaction that creates electricity.
3. Developing renewable energy options to include investigations and research into the possibility of using wind resources, landfill methane, coalbed methane, end-use photovoltaics to produce power, and biomass energy projects.
- Large wind turbines (windmills) have the potential to be a viable generation source, subject to the availability of wind at volumes and speeds capable of supporting this type of generating equipment. 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.
 - Methane (gas) from sanitary landfills offers another possible option as an innovative fuel source. Landfills are filled with organic waste material and sealed (covered) in such a way that air cannot gain admittance to the material. As the material decomposes, methane is produced. The methane can be collected by a series of wells drilled into the waste layers. Once collected, the methane can be used as a fuel by conventional power generation equipment such as internal combustion engines, gas turbines, or fuel cells.
 - Coalbed methane is produced in the same way as methane from a landfill. As the organic material in the coalbed decomposes to form coal, methane is produced as a byproduct. The methane can be collected from the coalbed prior to opening the coal seam for mining by a series of wells drilled into the seam. Like landfill methane, this gas can be used as a fuel in conventional power generation equipment.
 - Photovoltaics is a technology that converts solar energy into electricity. TVA will investigate the use of photovoltaics for end-use applications at remote sites where electricity is not readily available.
 - Investigate a biorefinery that uses refuse-derived fuel (garbage), wood waste, and energy crops to produce chemicals and boiler fuel.
 - Investigate a refuse-derived fuel/biomass energy facility that uses compost and biomass waste as a fuel.

Customer service research and development efforts during the short term for new demand-side management communications technologies and end-use renewables include:

- A market transformation research and development project that will explore alternative strategies for increasing the supply and demand for energy-efficient buildings and equipment. The project will be conducted in conjunction with distributors, trade allies, and state and local code officials.
- A communication technology research and development project that is proposed to demonstrate two-way communication technologies with a distributor of TVA power to enable TVA, distributors, and end-use customers to better manage electric load.
- An energy management/remote data acquisition project that is proposed to use two-way communication technologies for remote control of building energy management systems, and to allow TVA and distributors to collect customer energy use data remotely.
- Research on targeted applications of demand-side management, distributed renewable and non-renewable generation, and storage technologies to achieve transmission and distribution system benefits.
- An end-use photovoltaics research and development project that will examine how photovoltaics technologies can be used to reduce customers' energy costs and how these can be used in specific locations to reduce system generation, transmission, and distribution costs. The project will include TVA's membership in the Utility Photovoltaic Group (UPVG).
- Research and development activities for electric transportation that will focus on the development and demonstration of solutions to electric transportation limitations. TVA activities will concentrate on five areas of focus: vehicle evaluations, business impacts, stakeholder partnerships, awareness and education, and infrastructure development.

TVA compared the short-term action plan with seven previously identified long-term strategies across key evaluation criteria. Long-term actions identified in Strategy Q (see Chapter 9) were combined with the recommended short-term supply-side and customer service options to make an eighth strategy. The trade-off graphs illustrated in Figures 10-4, 10-5, 10-6, and 10-7 show how the short-term action plan, identified as (X), compares with the other long-term strategies. The

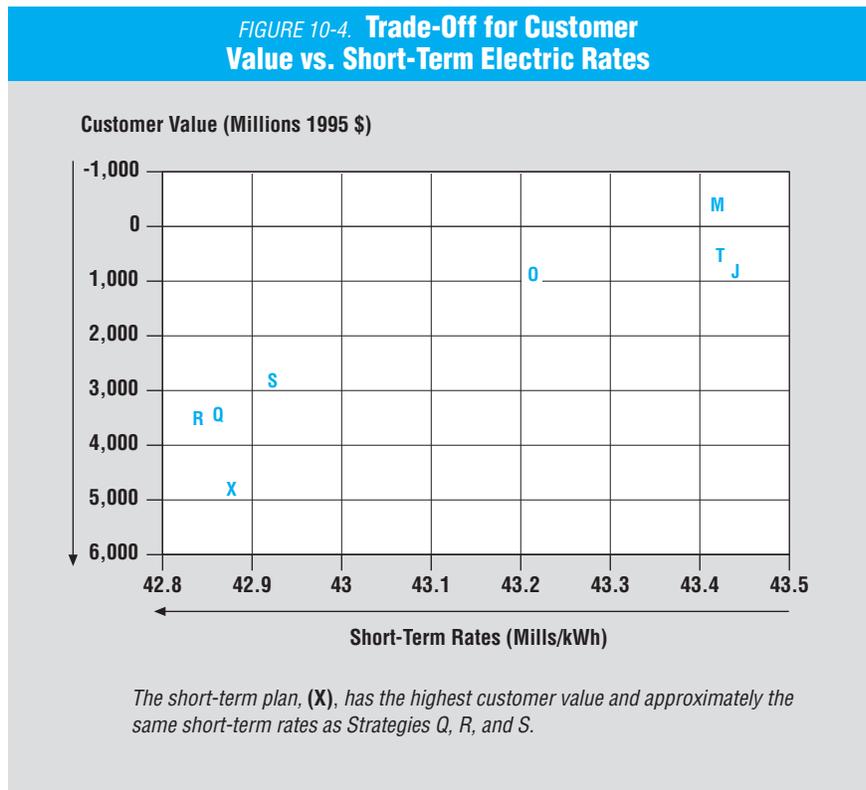


FIGURE 10-5. Trade-Off for Short-Term Rates vs. Total Resource Costs (TRC)

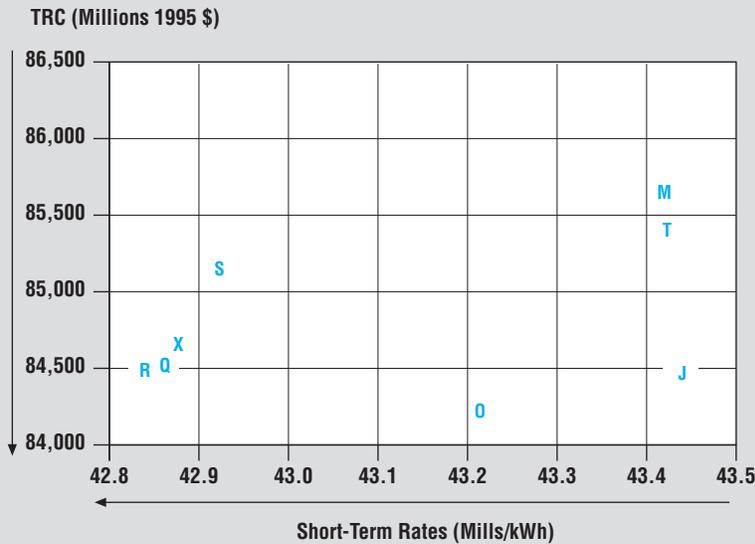
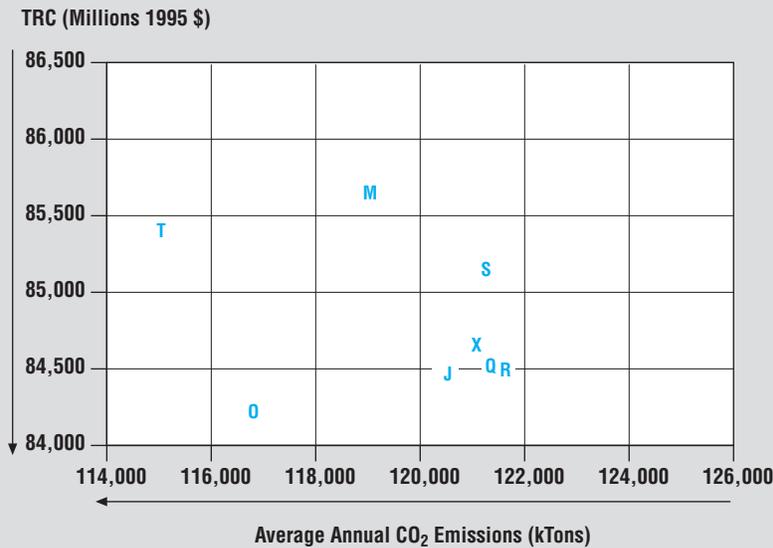


FIGURE 10-6. Trade-Off for Carbon Dioxide Emissions vs. Total Resource Costs (TRC)



trade-off graphs that show the short-term action plan are not designed to identify additional trade-offs between the short-term action plan (X) and the other strategies. The trade-off graphs are included to show that the short-term action plan is consistent with the seven best strategies, particularly Strategy Q.

The short-term strategy increases customer value and increases short-term rates slightly, compared to Strategy Q. Debt remains at the same level, total resource cost is slightly higher, and carbon dioxide emissions are reduced.

The short-term action plan, just as the long-term plan, provides for low cost, low debt, low electric rates, improved environmental emissions, high customer value, a high impact on economic development, and risk management.

Throughout Energy Vision 2020, three key concerns have been competitively priced electricity for customers, TVA's debt, and concern for the environment.

The projected electric rates, debt, and carbon dioxide emissions resulting from the short-term action plan for the period 1996-2005 are shown in Figures 10-8, 10-9, and 10-10, respectively.

As indicated in Figure 10-8, electric rates adjusted for inflation decline from 1996 to 2005. As indicated in Figure 10-7, total debt in 2001 remains below the \$30 billion statutory limit. In Figure 10-9 the ratio of total debt to total assets declines from 0.85 to 0.73. This decline reflects less reliance on debt to finance capital expenditures. As shown in Figure 10-10, carbon dioxide emissions remain below 110 million tons per year from 1996-2000

and below 120 million tons per year from 2001-2005.

As previously explained, the recommended short-term action plan is derived from the portfolio of options presented in the long-term plan. Although the short-term action plan provides flexibility, even the near-term future usually does not turn out as expected. The plan, therefore, will be reviewed on an ongoing basis and revised as necessary. The long-term plan provides TVA with guidance on making changes to the short-term action plan.

TVA's Compliance with Environmental Regulations Will Provide a Safety Net

A number of environmental consultation, review, and permit requirements would apply to energy resource options that are put in place. The nature of these requirements varies depending on the kind of option. More extensive requirements would apply to those actions having more substantial environmental impacts.

These reviews or requirements include:

- National Environmental Policy Act (NEPA): Actual implementation of options identified in the plan would be “tiered” off the Energy Vision 2020 Integrated Resource Plan/ Environmental Impact Statement, and as appropriate, will be preceded by more specific NEPA reviews.
- Reviews, laws, or permits governing air pollution, wastewater discharge, solid and hazardous waste management, protection of wetlands and floodplains, endangered species, cultural resources, and farmland protection. The

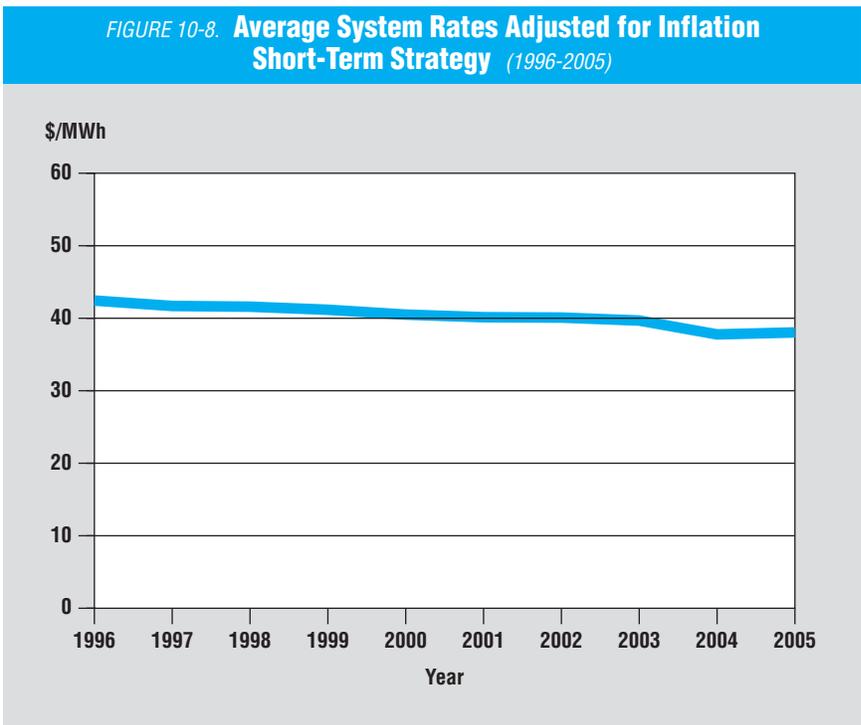
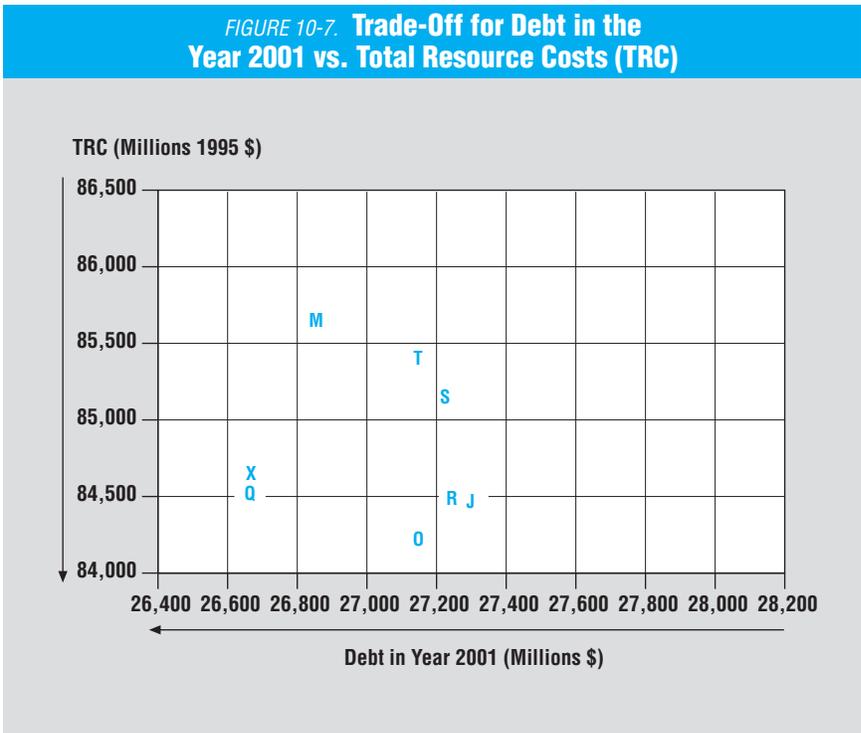


FIGURE 10-9. Ratio of Total Debt to Total Assets
Short-Term Strategy (1996-2005)

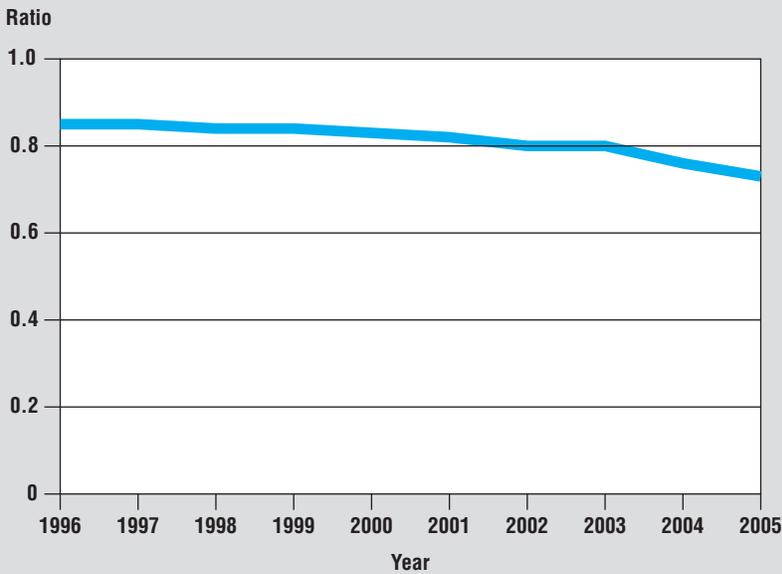
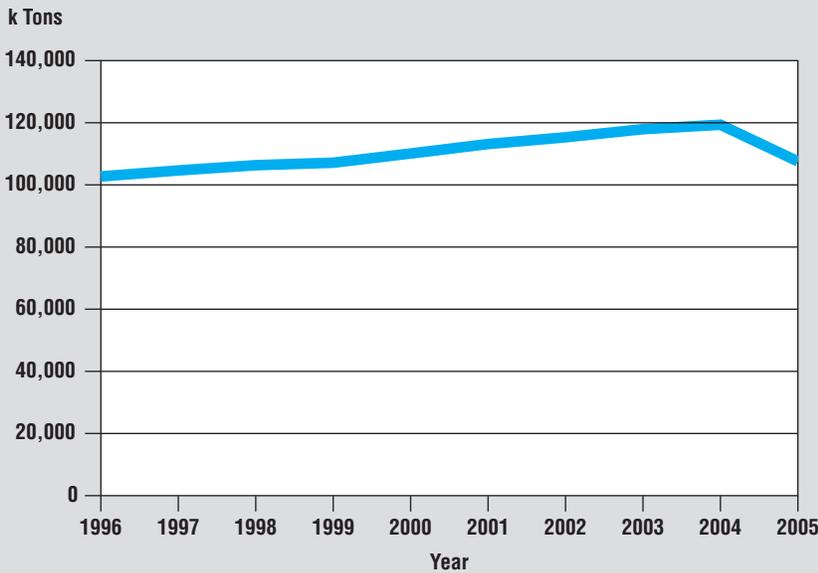


FIGURE 10-10. Annual Carbon Dioxide Emissions
Short-Term Strategy (1996-2005)



Clean Air Act, the Clean Water Act, the Endangered Species Act, the Surface Mining Reclamation and Control Act, and the Resource Conservation and Recovery Act are just a few of the major laws in this country that are formulated to prevent or lessen various kinds of environmental impacts.

No major energy resource can be put in place without complying with a substantial number of federal, state, and local environmental requirements. These regulatory processes typically have multiple opportunities for public comment and participation. Most federal environmental laws allow citizens to bring suit to enforce compliance with requirements. Also, various federal, state, and local environmental regulatory agencies exist to police compliance.

Although these environmental laws and their implementing regulations do not eliminate all risk of environmental impacts, they substantially reduce those risks, especially the risk of significant impacts. Consequently, the risk of significant impacts associated with the implementation of any of the final strategies identified in Energy Vision 2020 is substantially lessened because of TVA's mindfulness of environmental regulations as each alternative was studied. Moreover, such impacts will be identified in the subsequent environmental reviews that TVA will conduct before it decides to put specific options in place.