CHAPTER 1

1.0 PURPOSE OF AND NEED FOR ACTION

The Tennessee Valley Authority (TVA) operates the largest public power system in the country. From 1990 to 2008, demand for electricity in the TVA power service area grew at an average rate of 2.3 percent. The 2008-2009 economic recession has slowed load growth in the short term and adds uncertainty to the forecast of power needs; however, economic recovery is expected and future power needs are expected to grow at a rate that requires additional generating capacity. TVA's medium forecast analysis of future demands for electricity from its power system has identified the need for at approximately 7,500 megawatts (MW) of additional capacity in the 2018-2020 time frame (see Section 1.4).

TVA proposes to complete or construct and operate a single 1,100- to 1,260-MW nuclear generating unit at the Bellefonte Nuclear Plant (BLN) site located in Jackson County, Alabama. As part of its proposal, TVA is seeking to assure future power supplies; maximize the use of existing assets and avoid larger capital outlays by using those existing assets; and to avoid the environmental impacts of siting and constructing new power generating facilities elsewhere. Completing or constructing a single nuclear unit at the BLN site would meet a substantial portion of TVA's future generating needs and provide a low carbon-emitting power source at a significantly lower cost per installed kilowatt than other generation options.

Currently, there are two partially constructed Babcock and Wilcox pressurized light water reactors (B&W) with an expected rated capacity of 1,260 MW each at the BLN site. TVA may choose to complete and operate either one of these partially constructed units (Alternative B) or construct and operate a new Westinghouse AP1000 advanced passive pressurized light water reactor (AP1000) using some of the existing infrastructure (Alternative C). TVA will also consider taking no action at the Bellefonte site (Alternative A). Under any of the proposed construction alternatives, TVA would use licensing processes that are already underway. TVA currently holds construction permits for the two B&W units (BLN 1&2) and has applied for combined (construction and operating) licenses for two AP1000 units (BLN 3&4). TVA's current proposal is to complete only one nuclear generating unit. The considerable work that has been accomplished toward licensing the B&W and AP1000 technology will reduce the time and cost of bringing a single nuclear generating unit at BLN on line.

The purpose of this final supplemental environmental impact statement (FSEIS) is to inform decision makers, agencies, and the public about the potential for environmental impacts that would result from a decision to complete or construct and operate a single nuclear generating unit at the BLN site. This document supplements the original *Final Environmental Statement, Bellefonte Nuclear Plant Units 1 and 2* (1974 final environmental statement [FES]; TVA 1974a) for the BLN project and updates pertinent information discussed and evaluated in related environmental documents identified in Section 1.7, including the 2008 environmental report (ER) for the construction and operation of two AP1000 units at the BLN site (TVA 2008a). In doing so, TVA has updated the power needs analysis and information on environmental, cultural, recreation, and socioeconomic resources. TVA will use this information, along with input from reviewing agencies and the public, to make an informed decision about locating a single nuclear generating unit at the BLN site. This supplemental environmental impact statement (SEIS) tiers from TVA's *Energy Vision 2020 Integrated Resource Plan* (TVA 1995), a comprehensive environmental

review of alternative means of meeting demand for power in the TVA system. Energy Vision 2020 is described further in Section 1.7. In June 2009, TVA announced the preparation of a new Integrated Resource Plan (IRP) to replace *Energy Vision 2020.* The new IRP is scheduled to be completed in early 2011. Given the long lead time for bringing a nuclear plant on line, completing the SEIS for BLN while simultaneously developing the new IRP will help ensure that a new generating unit could be built in time to meet the projected demand for base load energy.

Chapter 1 includes a historic overview of TVA's activities related to the BLN site; a brief description of the TVA power system; a need for power analysis, a description of the *National Environmental Policy Act* (NEPA) process and public involvement; a listing of past documents related to the BLN site; and a list of permits, licenses and approvals.

In response to comments on the draft supplemental environmental impact statement (DSEIS), information was added to Chapter 1 to describe the evaluation processes that will inform TVA's decision makers regarding addition of a single nuclear unit at the BLN site and some information was updated including the Need for Power section.

1.1. Decision to be Made

TVA will decide whether to approve and fund the completion or construction and operation of a single nuclear unit at the BLN site and upgrade its transmission system to support electric generation load from the BLN site.

Over the past few years, TVA has conducted various activities that have led to the development of two potential nuclear generation options for the Bellefonte site. These activities have included licensing interactions with the U.S. Nuclear Regulatory Commission (NRC), financial assessments, engineering evaluations, need for power analyses, and risk evaluations. All of these evaluations will be used in the decision-making process.

1.2. Background

1.2.1. The Bellefonte Site

The BLN site is located on a 1,600-acre peninsula on the western shore of Guntersville Reservoir at Tennessee River Mile (TRM) 392, near the town of Hollywood and the city of Scottsboro in Jackson County in northeast Alabama (Figure 1-1). Scottsboro, Alabama, located 7 miles southwest of the site is the largest city within a 10-mile radius of the site. The three largest population centers (defined as having more than 25,000 residents) in the region are Huntsville, Alabama; Chattanooga, Tennessee; and Gadsden, Alabama. The BLN site is located 38 miles east of downtown Huntsville, Alabama; 44 miles southwest of downtown Chattanooga, Tennessee; and 48 miles north of downtown Gadsden, Alabama. Guntersville Reservoir is an impoundment of the Tennessee River and is operated by TVA as part of its integrated management of the Tennessee River system.

1.2.2. Historical Overview of Bellefonte Nuclear Plant Units 1 and 2

TVA submitted an application to construct and operate two B&W reactors at its BLN site on May 14, 1973. The design of the BLN 1&2 reactors is an evolution of the earlier B&W 177 model, with seven units currently operating in the United States. The 205 fuel assembly model at BLN is larger and includes many other safety and operational improvements over the earlier designs. Although larger, the basic design, operation, and maintenance

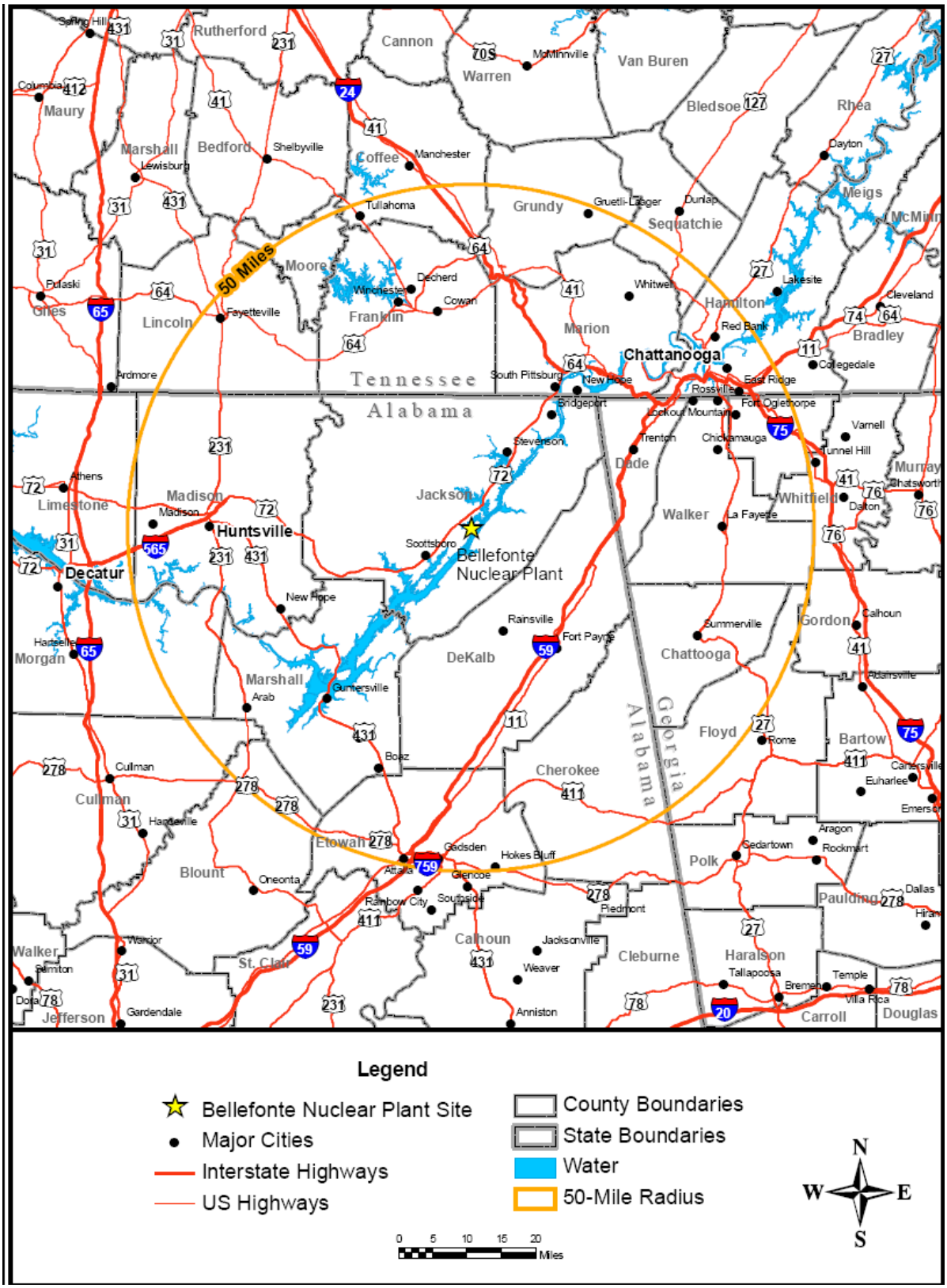

Figure 1-1. Bellefonte Locator Map

philosophy is the same as the current fleet of pressurized light water reactors (PWRs) operating in the United States. TVA issued an FES addressing the construction and operation of BLN 1&2 in May 1974 (TVA 1974a), and the U.S. Atomic Energy Commission (AEC) (now called the U.S. Nuclear Regulatory Commission or NRC) issued its FES in June 1974 (AEC 1974). NRC issued construction permits for both units on December 24, 1974.

On February 1, 1978, TVA filed an application for operating licenses for BLN 1&2, which included an *Operating License Final Safety Analysis Report* (FSAR) (TVA 1978a) and an *Operating License ER (TVA 1976)*. NRC docketed TVA's Operating License Application on June 6, 1978, and published a Notice of Hearing Opportunity on TVA's Operating License Application on July 17, 1978 (43 *Federal Register* 30628). There were no requests for a hearing or petitions to intervene filed in response. Construction of BLN 1&2 continued until the mid-1980s when forecasted load growth began to decrease and TVA halted work on the two units in 1988. When TVA requested deferred status for the two units in 1988, Unit 1 was approximately 90 percent complete, and Unit 2 was approximately 58 percent complete.

In 1993, when TVA considered resuming construction on the B&W units, a white paper was prepared to review the 1974 FES and to update information on existing environmental conditions (TVA 1993a). TVA determined that neither the plant design nor environmental conditions had changed in a manner that materially altered the environmental impacts described in the FES. At the same time, TVA stated it would continue to monitor the situation and if changes occurred that materially affected impact projections in the FES, a supplement would be prepared.

The 1997 final EIS for the Bellefonte Conversion Project (TVA 1997) considered construction and operation of five optional types of fossil fuel generation, four of which involved plants with total electricity production capacity equivalent to BLN 1&2 (approximately 2,400 MW). The Conversion EIS substantially updated the description of the affected environment at BLN and the potential for environmental impacts from new construction. The proposed combustion turbine plant was not constructed.

TVA maintained the plant in deferred status and, in 2003, NRC extended the construction permits for BLN 1&2 to the year 2011 and 2014, respectively. Subsequently, TVA's Board of Directors approved the cancellation of BLN 1&2 in November 2005 in order to facilitate consideration of the BLN site for other possible uses. By letter dated April 6, 2006, TVA submitted a site redress plan (TVA 2006) to the NRC along with a request for withdrawal of the construction permits. Subsequently, NRC withdrew the BLN 1&2 construction permits on September 14, 2006. Under the redress plan, TVA maintained environmental permits and equipment associated with ongoing activities at BLN, including a training center and an electrical substation. Some equipment or structures not identified as necessary for these ongoing activities were sold for reuse or abandoned in place as part of an investment recovery program. The construction activities that will be necessary to complete the units are largely refurbishment, replacement, analysis, and testing activities. The existing structural plant footprint is not expected to change.

In August 2008, in response to changes in power generation economics since 2005 and the possible effects of constraints on the availability of the worldwide supply of components needed for new generation development, TVA requested reinstatement of the construction permits for BLN 1&2. Reinstatement would allow TVA to resume preservation and maintenance activities. The NRC reinstated TVA's construction permits for BLN 1&2 in

terminated plant status in March 2009 pending reestablishment of the quality assurance (QA) programs, physical conditions, and records quality necessary to move the license back to deferred status.

Following reinstatement, TVA (1) revised its Nuclear Quality Assurance Plan (NQAP) to acknowledge the new plant status; (2) established the necessary programs, policies, and procedures to warrant BLN 1&2 being placed in deferred status; and (3) resumed preservation and maintenance activities aimed at protecting selected plant assets, including building repairs to eliminate leaks, and preservation of site documents. TVA has also instituted asset preservation activities to maintain the intake and discharge facilities, cooling towers, wastewater system, and transmission switchyards. In accordance with the NQAP, the lapse in QA oversight that occurred in the period from withdrawal of the construction permits through March 2009 was entered into the Corrective Action Program. In addition, TVA implemented work process controls to prevent construction-related activities from being conducted until NRC approval is given to reactivate construction.

By letter dated August 10, 2009, TVA requested that the NRC authorize placement of BLN 1&2 in deferred plant status in accordance with NRC's order reinstating the construction permits (see Appendix A). NRC conducted a BLN site inspection for deferred status the week of October 19, 2009. NRC issued Inspection Reports 05000438/2009601 and 05000439/2009601 on December 2, 2009. The NRC concluded that TVA has established the necessary programs to support transition to deferred status, consistent with the Commission Policy Statement for Deferred Plants. The inspection reports are included as Appendix B.

By letter dated January 14, 2010, the NRC authorized placement of BLN Units 1 and 2, into "deferred plant" status (see Appendix A). With this authorization, TVA has placed the plant into "deferred plant" status.

1.2.3. Combined License Application for Bellefonte Nuclear Plant Units 3 and 4

In 2006, TVA formally joined NuStart Energy Development LLC, a consortium consisting of nine member utility companies and two reactor vendors. The purpose of this consortium is to demonstrate the new 10 Code of Federal Regulations (CFR) Part 52 licensing process for completing a combined license application (COLA) and to complete the design engineering for two selected reactor technologies, one of which is the AP1000 reactor. In choosing the BLN site as the AP1000 COLA site, TVA and NuStart recognized that a substantial portion of the existing BLN 1&2 equipment and ancillary structures (e.g., cooling towers, intake structure, transmission switchyards) could be used to support a new facility and that their use could reduce the cost of new construction. A COLA was submitted to the NRC in October 2007 with TVA as the applicant of record. The COLA described the siting of two AP1000 reactors, BLN 3&4, with an estimated reactor power level of 3,400 megawatts thermal (MWt) and an expected net output each of 1,100 megawatts electric (MWe) at the BLN site. The BLN COLA included an FSAR and an ER. In October 2008, TVA submitted Revision 1 of the COLA ER (TVA 2008a), and in January 2009, Revision 1 of the COLA FSAR (TVA 2009a). Although TVA was the applicant of record for the demonstration, TVA had not proposed to construct these advanced reactors at the BLN site or elsewhere.

In April 2009, NuStart transferred the initial licensing efforts and reference plant designation for the AP1000 from BLN 3&4 to Southern Company's Plant Vogtle. The transfer of the reference designation will help the NRC complete the reference plant licensing process

sooner and help move the industry closer to new plant construction and commercial operation of the AP1000 technology. Notwithstanding the transfer of the reference plant designation to Plant Vogtle, TVA is continuing to pursue a combined license (COL) for BLN 3&4 to preserve future base load generation options. Since July 2009, as part of their review process, NRC has issued Safety Evaluation Reports with Open Items on all FSAR chapters except Chapter 6 and Sections 2.4, 3.7, and 3.8.

Reinstatement of the construction permits for BLN 1&2 and efforts to return the units to deferred plant status do not affect TVA's current plans to pursue a COL for BLN 3&4, and the license information submitted to the NRC for the purpose of supporting the COLA remains valid. Should TVA decide to restart construction on a B&W unit, TVA would address the resulting impacts on the BLN COLA. Likewise, should TVA choose to construct an AP1000 unit, TVA would address the resulting impacts on its construction permits for BLN 1&2.

1.3. TVA Power System

TVA is an agency and instrumentality of the United States, established by an act of Congress in 1933, to foster the social and economic welfare of the people of the Tennessee Valley region and to promote the proper use and conservation of the region's natural resources. One component of this mission is the generation, transmission, and sale of reliable and affordable electric energy.

TVA operates the nation's largest public power system, producing 4 percent of all electricity in the nation. The agency serves an 80,000-square-mile region encompassing most of Tennessee and parts of Virginia, North Carolina, Georgia, Alabama, Mississippi, and Kentucky. The major load centers are the cities of Memphis, Nashville, Chattanooga, and Knoxville, Tennessee; and Huntsville, Alabama. The population of the service territory in 2008 was estimated to be 9 million people. TVA delivers electricity to 155 local power distributors and 58 directly served large industries and federal facilities. The total number of businesses and residential customers served in 2008 was 4,571,600. TVA supplies almost all electricity needs in Tennessee, 31 percent in Mississippi, 24 percent in Alabama, and 26 percent in Kentucky. Its contribution to the electricity needs in Virginia, North Carolina, and Georgia is 3 percent or less. The *TVA Act* requires that the TVA power system be self-supporting and operated on a nonprofit basis, and the *TVA Act* directs TVA to sell power at rates as low as are feasible.

Dependable capacity on the TVA power system is about 37,000 MW. TVA generates most of this power with three nuclear plants, 11 coal-fired plants, nine combustion-turbine plants, a combined-cycle plant, 29 hydroelectric dams, a pumped-storage facility, a wind farm, a methane-gas cofiring facility, and several small renewable generating facilities. A portion of delivered power is obtained through long-term power purchase and lease agreements. About 60 percent of TVA's annual generation is from fossil fuels, predominantly coal; 30 percent is from nuclear; and the remainder is from hydroelectric and other renewable energy resources. TVA transmits electricity from these facilities over almost 16,000 miles of transmission lines. Like other utility systems, TVA has power interchange agreements with utilities surrounding the Tennessee Valley region and purchases and sells power on an economic basis almost daily.

1.4. Need for Power

Electricity is a just-in-time commodity. The resources needed to produce the amount of electricity demanded from a system must be available when the demand is made. If the

demand cannot be met or reduced through managed demand response programs, forced reductions and curtailments in service (i.e., brownouts or blackouts) result. One of TVA's most important responsibilities is ensuring that it is able to meet the demand for electricity placed on its power system. Thousands of businesses, industries and public facilities, and millions of people depend on TVA every day to supply their power needs reliably.

To meet this responsibility, TVA forecasts the future demand and the need for additional generating resources in the region it serves. A need for additional power exists when future demand exceeds the capabilities of currently available and future planned generating resources. Because planning, permitting, and construction of new generating capacity and transmission requires a long lead time, TVA must make decisions to build new generating capacity well in advance of the actual need.

This section updates the need for power analysis in the original BLN 1974 FES and subsequent pertinent publications (see Section 1.7). It shows the circumstances when demand exceeds supply, given the current forecasts and assumptions. TVA's method of forecasting demand and its analysis of a large number of supply- and demand-side management resources (options) that could meet forecasted demand are addressed in *Energy Vision 2020* (TVA 1995).

Terms used in this section have the following meanings:

1. Demand, also called load, is used to describe the amount of energy required in a specific time period and is typically measured in MW.

2. Peak demand is the maximum load during a specific time period, which could be annually, seasonal, or monthly.

3. Capacity is used to describe the output rating of a generator and is measured in MW.

4. Generation is used to describe how much energy or electricity is produced over a specified time frame, and it is typically measured in gigawatt-hours (GWh).

1.4.1. Power Demand

The primary factor affecting the demand for power is economic growth. A large portion of the economic growth in the TVA region is dependent on the manufacturing sector, and the region benefits from its favorable location at the center of the southern U.S. automotive industry. Even as job growth in the manufacturing sector is declining, job opportunities still exist, and continued migration into the TVA region supports strong population growth. While some of this population growth stems from jobs in retail businesses serving the existing population, a growing part is "export" services that are sold to areas outside the TVA region. Notable examples include corporate headquarters such as Nissan in Nashville and Service Master in Memphis as well as industries in the still-growing music business centered in Nashville. In addition, the TVA region has become attractive to retirees looking for a moderate climate in an affordable area, which has led to additional population growth to support service industries.

Nevertheless, future growth is expected to be lower than historical averages as a result of a number of factors including the impacts of the 2008-2009 recession and subsequent recovery, the trend of declining U.S. manufacturing, and the projected loss of some TVA customer load. Increased financial market regulation, tighter credit conditions, as well as large federal budget deficits may all work toward restraining growth to a level lower than

what was previously predicted. Although the TVA region is expected to retain its comparative advantage in the automotive industry, as exemplified by the new Volkswagen auto plant under construction in Chattanooga, Tennessee, reduced long-term prospects for the U.S. automotive industry will also have an impact on the regional industry. These changes in the economic outlook could persist in the long term with overall gross domestic product growth for both the TVA region and the nation being slightly below previous expectations.

No matter what the economic environment holds, TVA is committed to providing reliable, low-cost power to meet the needs of all residential, directly served industrial customers and distributor-served commercial and industrial customers (local utilities delivering power to other customers). In order to fulfill this mission, TVA strives to predict future demand for electricity accurately by using historical sales and announced plans of large industrial customers to use electric power, combined with state-of-the-art load-forecasting techniques, such as advanced econometric models, that calculate the demand for electricity based on (1) the level of economic activity, (2) the price of electricity, (3) the prices of available alternative fuels, and (4) increased efficiencies from new conservation and technology. To address the uncertainty inherent in single-point forecasts, inputs such as inflation rates, electricity prices, and the price of fuel are evaluated across probable ranges to develop high, medium, and low future scenarios. TVA also utilizes advanced analytical techniques such as Monte Carlo simulation of select key random variables like load, fuel prices, and weather to help it assess the overall robustness of its long-term plans.

Figure 1-2 shows TVA's actual and forecast net system requirements, which consists of sales to all distributor-served and directly served customers, plus distribution and transmission losses. The three load forecast scenarios are based on economic drivers and other assumptions updated in August 2009 and are described in detail below.

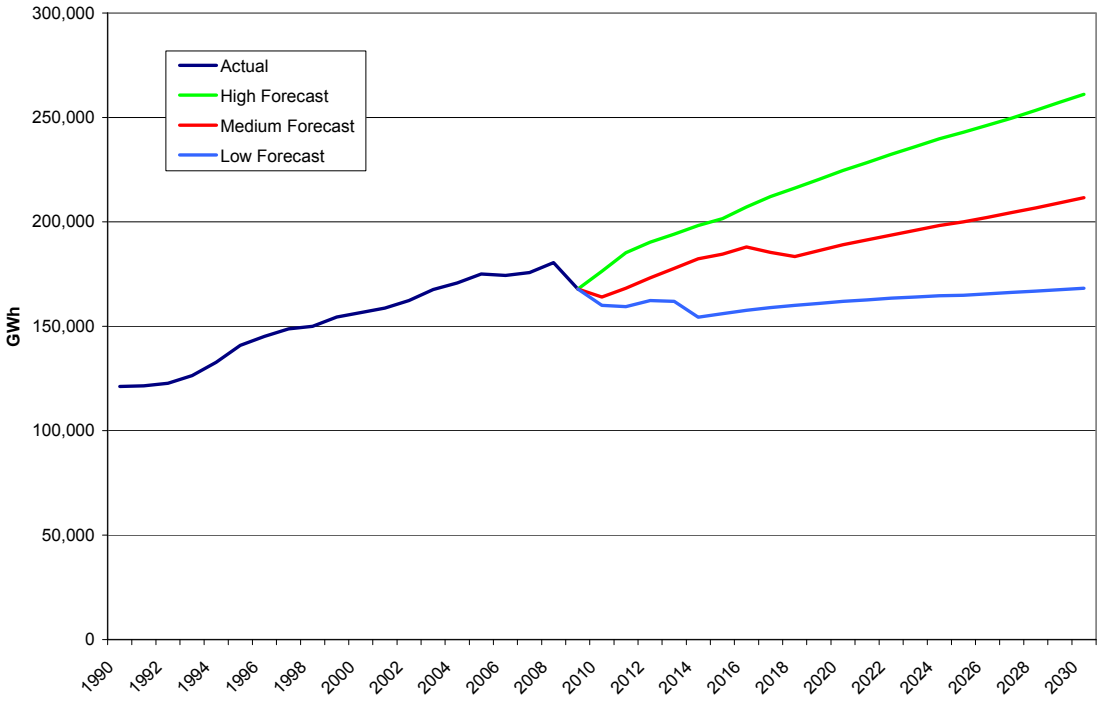

Figure 1-2. Actual and Forecast Net System Requirements by Fiscal Year

Historically, net system requirements grew at an average rate of 2.3 percent (1990-2008) before the recent economic downturn. The medium-load forecast, which shows a reduction in demand through 2010 and 1.3 percent average annual growth from 2010 through 2030, is used to provide a projection of future power needs with the high and low forecasts being used to help make more informed power supply decisions by considering the uncertainty associated with a future outside of normal expectations. Further details on the three alternative scenarios are as follows:

- **Medium.** The medium-load forecast reflects TVA's "expected" inputs and outcomes and assumes demand and energy grow at a rate similar to that expected for overall economic growth. Distributor and direct-served customers who have not already given notice of departing[1] (i.e., receiving their electrical power from a non-TVA source) are assumed to renew their power supply contracts continually through the planning period. In addition, TVA considers changes in demand based on input from its direct-served customers and distributors. TVA sales outside its service territory continue to be guided by the "fence" provisions of the *TVA Act*.[2]

- **High.** The high forecast assumes higher demand and energy usage are driven by a combination of favorable economic conditions and retail electricity and gas price assumptions. It also assumes additional industrial growth in the directly served sector. Net system requirements are projected to grow at a rate of 2.0 percent for the 2010-2030 time period in the high load forecast. It would be highly unlikely that the actual load would exceed the high forecast given the range of possible outcomes used in the forecast.

- **Low.** The low forecast assumes lower demand and energy usage are driven by a combination of unfavorable conditions, including assumptions for economic growth and retail electricity and gas prices. There is an assumed industrial load reduction in the directly served sector. Net system requirements are projected to grow at a rate of 0.3 percent for the 2010-2030 time period in the low load forecast. It would be highly unlikely that the actual load would fall below the low forecast given the range of possible outcomes used in the forecast.

1.4.2. Power Supply

TVA is a dual-peaking system with high demand occurring in both the summer and winter months. For example, the annual peak demand in 2008 occurred in August, while in 2009, the annual peak occurred in January. Winter peaks are expected to continue for the next couple of years; thereafter, the forecasted peak load or the highest demand placed on the TVA system is projected to be in the summer months. To ensure that enough capacity is available to meet peak demand in most circumstances, including unforeseen contingency, additional generating capacity beyond that which is needed just to meet peak demand, is necessary. This additional generating capacity, known as "reserve capacity" or "total reserves", must be large enough to cover the loss of the largest single operating unit (contingency reserves), be able to respond to moment by moment changes in system load (regulating reserves) and replace contingency resources should they fail (replacement

[1] Distributors who have recently departed are Paducah (December 2009) and Princeton (January 2010). No further notices of departure have been filed.

[2] TVA is limited in the sale and delivery of power outside the area for which it was the primary source of power supply on July 1, 1957.

reserves). Total reserves must also be sufficient to cover unplanned unit outages, load forecasting error including abnormal weather, and undelivered purchased capacity, among other uncertainties. As typical for the utility industry, TVA plans for total reserves of between 12 and 20 percent of total system load, depending on the age of current resources, as required by North American Electric Reliability Corporation reliability standards. TVA optimizes its mix of generating assets and purchases to meet these standards.

TVA's generating supply consists of a combination of existing TVA-owned resources, budgeted and approved projects (such as new plant additions and uprates to existing assets), and power purchase agreements. This supply includes a diverse portfolio of coal, nuclear, hydroelectric, natural gas and oil, market purchases, and renewable resources designed to provide reliable, low-cost power while reducing the risk of disproportionate reliance on any one type of resource. Each type of generation can be categorized, based on its degree of utilization, into base load, intermediate, or peaking generation.

Base load generators[3] are primarily used to meet continuous energy needs, because they have lower operating costs and are expected to be available and operate continuously throughout the day. However, they typically have higher capital costs. This type of generation typically comes from larger coal plants and nuclear plants that can provide continuous, reliable power over a period of uniform demand. Some energy providers may consider combined-cycle plants for incremental base load generation needs; however, historically, natural gas prices, when compared to coal and nuclear fuel prices, make combined cycle an expensive option for larger continuous generation needs.

Intermediate resources are primarily used to fill the gap in generation between base load and peaking needs. These units are required to cycle with more or less output as the energy demand increases and decreases over time (usually during the course of a day). Intermediate units are more costly to operate than base load units, but cheaper than peaking units. This type of generation typically comes from natural gas-fired combined-cycle plants and smaller coal plants. Renewable resources (such as wind and solar), which are intermittent in nature and have capacity factors typically well below 50 percent, are increasingly being used as a source of intermediate generation. Energy storage technologies can be integrated into a solar or wind project to increase the availability of the generated energy, as discussed in Section 2.4.

Peaking units, conversely, are only expected to operate during shorter duration high-demand periods and are essential for maintaining system reliability requirements, as they can ramp up quickly to meet sudden capacity changes. Typical peaking resources include natural gas-fired combustion turbines and hydroelectric generation (which is also used to help regulate the system, but could be limited due to water supply) and renewable resources.

Once a load forecast has been developed, TVA determines if the combination of existing and planned resources is sufficient to meet the projected demand. If a capacity need is identified, TVA conducts expansion-planning studies to select the combination of resources

[3] Base load capacity consists of all resources with expected capacity factors greater than or equal to 85 percent. Base load demand is that portion of forecasted net system requirements occurring at loads equal to or less than average load (U.S. Nuclear Regulatory Commission, Environmental Standard Review Plan, NUREG 1555, October 1999).

that provides the lowest-cost combinations of options while not subjecting customers to excessive levels of risk. The options considered range from resources that do not require the construction of new generation, such as power purchases, repowering existing units, and energy conservation, as well as installation of new generating capacity. Section 2.4 discusses the range of options considered. Section 1.4.3 presents the mix of resources currently projected to meet future demand.

1.4.3. Resource Plan

TVA employs a variety of analytical tools and models to develop its long-term resource plans, including production cost models that consider many variables including fuel costs, variable operating and maintenance expenses, and the type of generating unit in order to simulate future demands for each unit in the TVA portfolio. To ensure that future demand needs are accurately identified, the most current approved assumptions and forecasts available are used as inputs to the modeling.

Since the publication of the DSEIS, a number of changes in planning assumptions have been made as part of the normal business planning cycle. These include adjustments in reserve requirements, forecasted hydropower production (due to the end of the 2005-2009 Southeast U.S. drought), fuel and emissions allowance prices, and an updated load forecast, as presented in Subsection 1.4.1. In addition, TVA entered into certain long-term power purchase agreements (PPAs) in late 2009 and early 2010 for wind energy as a result of its December 2008 Request for Proposals for Renewable Energy and/or Clean Energy Sources. These PPAs are now part of the long-term resource plan.

TVA also further refined its plans for reducing emissions from its coal-fired power plants beyond current levels. As part of its response to changing regulatory environment, TVA is increasingly utilizing emission-control equipment, such as scrubbers and selective catalytic reduction systems, and moving away from reliance on cap-and-trade programs for nitrogen oxide (NO_x), sulfur dioxide (SO_2), and mercury. For example, changes in National Ambient Air Quality Standards (NAAQS) for ozone and fine particles and technology requirements for controlling mercury emissions influence the approach toward emission control. The response to these anticipated emissions-reduction requirements have also resulted in plans to place certain fossil assets in long-term lay-up and/or expedite existing plans for placing fossil assets in long-term lay-up. These changes have been incorporated into the long-term resource plan used as the base case for the need for power analysis, resulting in a foreseeable capacity reduction of 1,000 to 2,000 MW by 2015.

The base case for this SEIS includes an Energy Efficiency and Demand Response (EEDR) program that is predicted to reduce energy needs by about 5,200 GWhs in the 2018-2020 time period. An Enhanced EEDR program, which almost doubles the reduction in energy use of the base case EEDR program in the long run, has also been developed. Section 2.4.1 provides a more detailed discussion of both programs. This need for power analysis includes a sensitivity study to show the impact of the Enhanced EEDR program on the long-term resource plan with the proposed nuclear unit.

The analysis performed for this SEIS and discussed in Subsection 1.4.4 below shows that additional capacity and energy is needed by the 2018-2020 time frame. Overall needs increase approximately 7,500 MW in capacity and 22,000 GWh of energy from 2010 to 2019 in the medium-load case. For the high-load case, an additional 12,700 MW in capacity is needed over the same period. Furthermore, the low-load case shows the need for 1,800 MW of additional capacity.

Capacity

TVA's existing capacity in 2010 and projected capacity in 2019 in its current business plan consists of a mix of coal, nuclear, natural gas, and renewable resources, market purchases, and EEDR programs, as shown in Figures 1-3 and 1-4, respectively. Market purchases are almost always derived from gas-fired resources and therefore are classified as "Gas and Oil" in Figures 1-3 and 1-4. The required capacity to meet the annual peak load increases from 35,876 MW in 2010 to 43,092 MW in 2019.

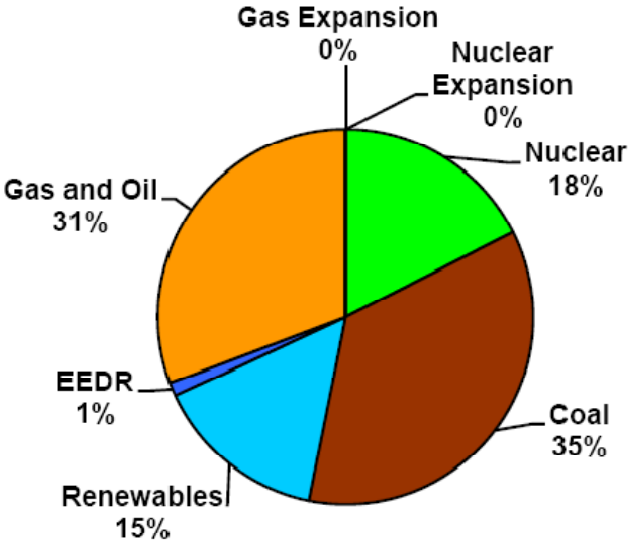

Figure 1-3. 2010 Estimated Capacity by Fuel Type, Based on 35,900 MW

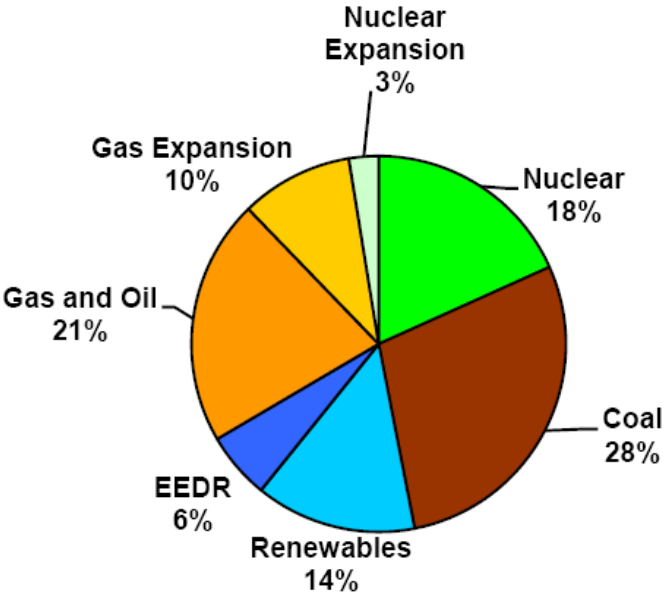

Figure 1-4. 2019 Estimated Capacity by Fuel Type Based on 43,100 MW

Currently, renewable resources consist primarily of generation from TVA hydro plants and power purchases from the Southeastern Power Administration (SEPA) for generation from

U.S. Army Corps of Engineers (USACE) hydro plants. The amount of renewable resources in the TVA portfolio is projected to increase in 2019 relative to 2010 due to the addition of long-term contracts for the purchase of renewable wind energy from outside the TVA region, as announced late 2009 and early 2010. The renewable resources as a percentage of TVA's total capacity decreases slightly (from 15 percent in 2010 to 14 percent in 2019) because the forecasted peak load also grows. TVA anticipates acquiring additional renewable resources beyond these recent announcements.

The EEDR portion of the base case capacity mix increases from 1 percent in 2010 to 6 percent in 2019. While the specific programs and mix of EEDR continue to evolve, they are currently designed in the base case to achieve approximately 1,400 MW summer peak demand reduction by 2012, reaching 2,700 MW by 2019. This corresponds to energy reductions of approximately 1,800 GWh by 2012 and 5,200 GWh by 2019.

The projected decrease in coal capacity from 35 percent in 2010 to 28 percent in 2019 is the result of lower capacity on units where air pollution control equipment has been installed[4] and the long-term lay-up of 1,000 to 2,000 MW of existing coal units, as discussed previously.

The increase in nuclear capacity from 18 percent in 2010 to 21 percent in 2019, comprised of both existing and planned nuclear capacity expansion, includes already approved additions such as the startup of TVA's Watts Bar Nuclear Unit 2 and the uprate of Browns Ferry Nuclear Unit 1. The proposed completion of one nuclear unit at the BLN site is included in the nuclear expansion portion of the 2019 capacity mix.

The portion of the capacity mix using gas and oil is 31 percent in both 2010 and 2019. This includes an increase from the natural gas combined-cycle plant that is proposed to be located at John Sevier Fossil Plant. Gas-fired capacity expansion and market purchases based on natural gas are included by 2019 to assure that TVA has adequate reserves to meet growing peak load requirements.

Generation

The generation profile differs from the capacity profile because the actual output from the installed capacity (how much is generated from a unit) depends on a number of different variables including fuel costs, variable operating and maintenance expenses, and the type of demand being met (e.g., base load, intermediate, or peaking). Capacity factor is the total energy a plant produces during a period of time divided by the energy the plant would have produced at full capacity during that same period of time. TVA's nuclear capacity factor is 90 percent or higher, which reflects a higher contribution of nuclear generation than a coal plant with a 70 to 80 percent capacity factor, or a combined-cycle capacity factor of 20 to 70 percent, or a simple-cycle combustion turbine at 5 percent or less.

TVA's current and future expected energy mix in the base case consists of coal, nuclear, natural gas, renewable resources, market purchases (which are mostly natural gas-fired), and EEDR programs, as shown in Figure 1-5 for the period from 2010 to 2028. Existing resources consist of generating units currently owned by TVA, approved capacity addition projects, and power purchase agreements. Planned resources are those selected in expansion planning studies as the combination of resources that provides the lowest-cost long-term resource plan and mitigates fuel, technology, or other supply-side risk.

[4] The operation of air pollution control equipment on coal-fired plants reduces the generating capability of the units.

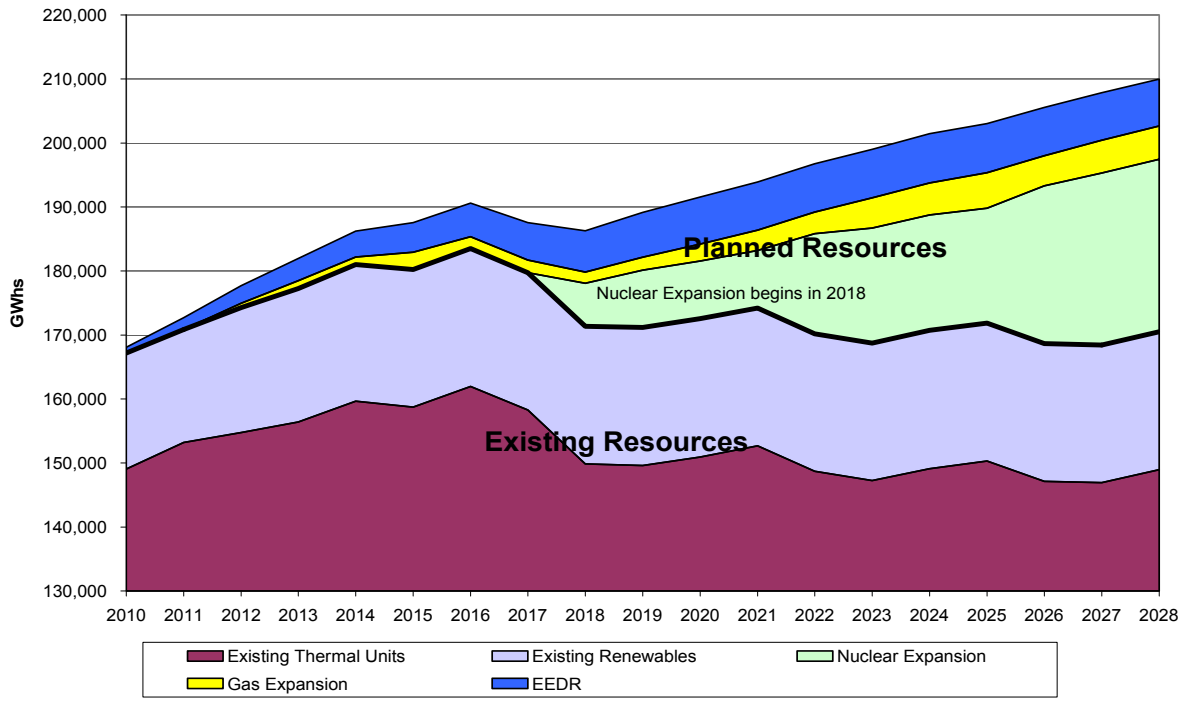

Figure 1-5. 2010 Base Case – Generation (GWh)

As shown in Figure 1-5, the majority of TVA's generation from existing resources comes from thermal (coal, gas, and nuclear) units and PPAs, with the remainder from renewable resources. The generation from existing thermal units declines after 2016 due to reductions in coal unit capacity and planned long-term lay-up of units. Renewable resources increase from 2010 to 2014 due to the recently purchased wind generation.

The projected resources consist of EEDR and natural gas-fired generation through 2017 supplemented by nuclear expansion beginning in 2018. The nuclear expansion consists of the completion of nuclear units at the Bellefonte site although that has yet to be proposed and would depend on a number of factors including future events. TVA anticipates acquiring additional renewable resources to meet future capacity needs through PPAs, but planning has not progressed to the point where they can be included in the base case.

By relying less on carbon-emitting sources, there are significant reductions in emissions from TVA's coal- and gas-fired generation. The projected changes in emissions from the TVA system in the long-term resource plan between 2010 and 2019 are shown in Table 1-1. Emissions of SO_2, NO_x, and mercury are cut by over half from 2010 levels. Carbon dioxide (CO_2) emissions are reduced by 1.3 percent.

Table 1-1. Changes in TVA Emissions From 2010 to 2019 by Pollutant Type

Change in Emissions (percent)			
Sulfur Dioxide	Nitrogen Oxide	Carbon Dioxide	Mercury
-68	-52	-1.3	-60

1.4.4. Effect of Alternatives on Long-Term Resource Plan

Three generation alternatives to the base case long-term resource plan have been evaluated:

- Alternative A – No Action
- Alternative B – Completion and Operation of a B&W Pressurized Light Water Reactor at Bellefonte
- Alternative C – Construction and Operation of an AP1000 Advanced Passive Pressurized Light Water Reactor at Bellefonte

The expected energy mix for the No Action Alternative (Alternative A) is shown in Figure 1-6 for the period from 2010 to 2028. The long-term supply needs of the TVA region are met only by EEDR resources and natural gas expansion in the No Action Alternative. There are no nuclear expansions beginning in 2018, as there is in the base case. There is more generation from TVA's existing coal and gas resources because the incremental cost of running the existing units is less expensive than adding new gas units. Consequently, the No Action Alternative results in higher emissions in 2019 than the base case. Therefore, there is less reduction in SO_2, NO_x, and mercury emissions from 2010 levels in the No Action Alternative—1 percent less for SO_2 and 2 percent less for NO_x and mercury. CO_2 emissions in 2019 increase by 5.6 percent from 2010 levels in the No Action Alternative instead of decreasing by 1.3 percent as in the base case.

The expected energy mix for Alternative B is shown in Figure 1-7 for the period from 2010 to 2028. Alternative B has a very similar energy mix to base case. The portion of the generation from nuclear expansion attributable to the Bellefonte B&W alternative is shown as the darker green. Emissions reductions for Alternative B are virtually the same as Table 1-1.

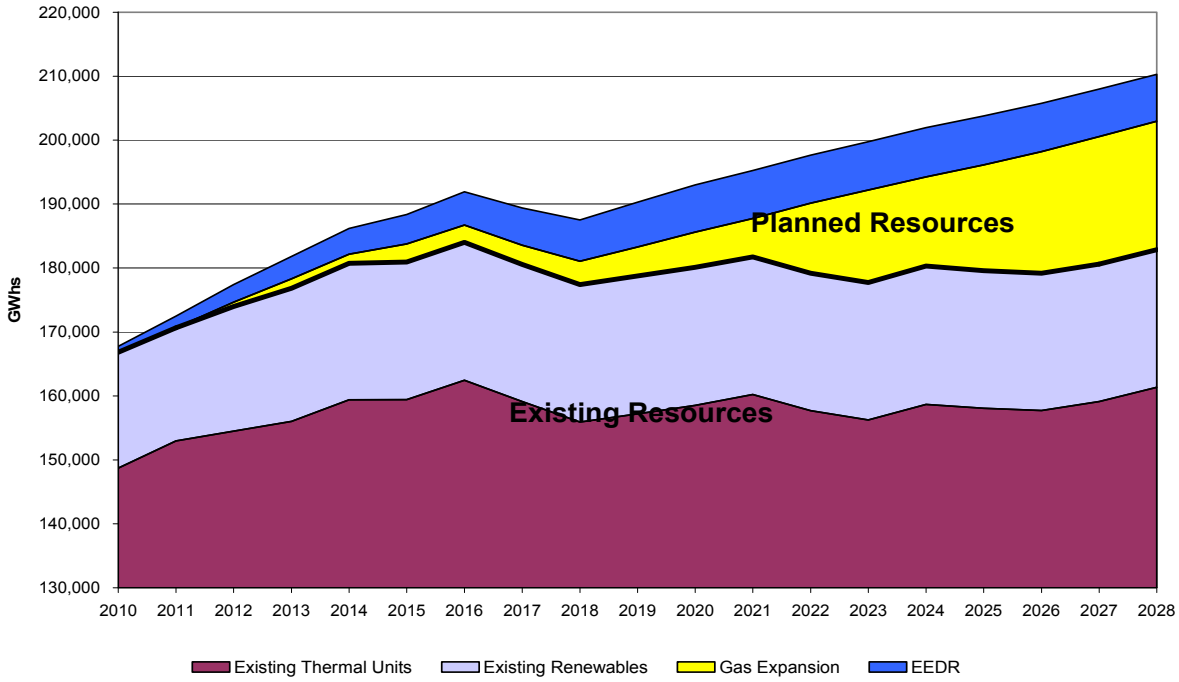

Figure 1-6. Alternative A – No Action With No Nuclear Expansion

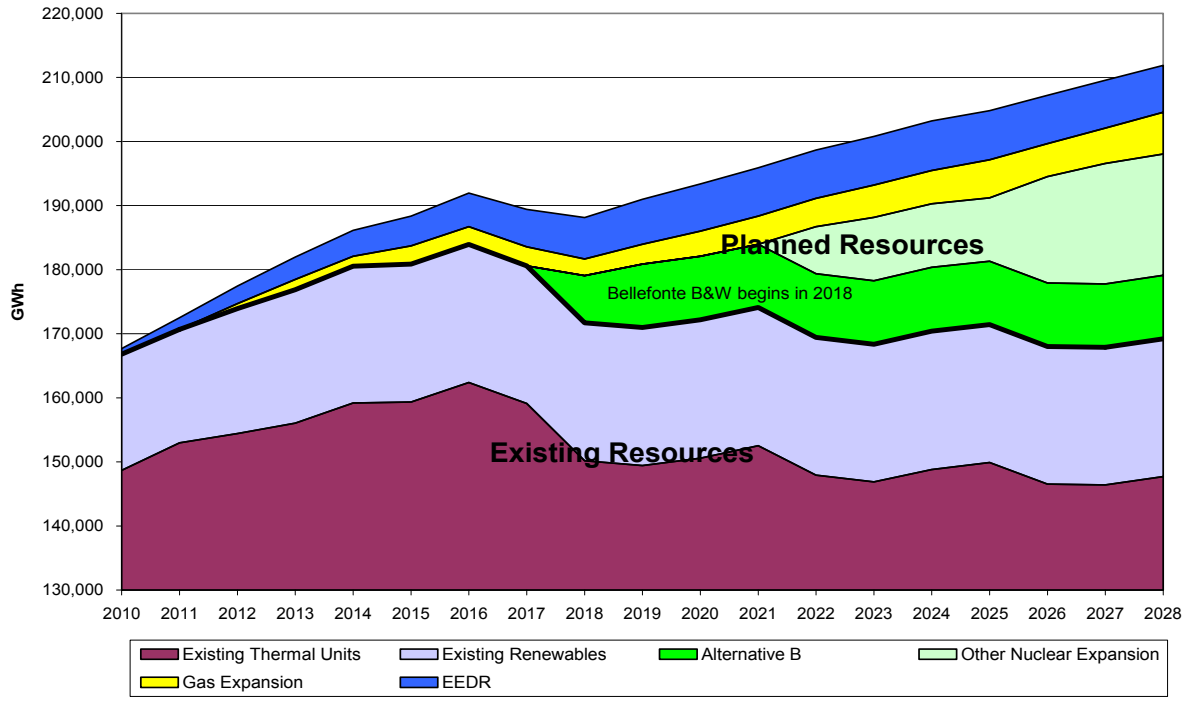

Figure 1-7. Alternative B – Bellefonte B&W

The expected energy mix for Alternative C has very similar impacts to the generation profile as Alternative B and is therefore not represented graphically. Emissions reductions for Alternative C are virtually the same at Table 1-1.

TVA conducted a sensitivity study to analyze the effect of the Enhanced EEDR program discussed in Subsection 2.4.1 on the expected energy mix for Alternative B and is shown in Figure 1.8. The Enhanced EEDR program leads to reductions in 3,500 MW of capacity and approximately 10,500 GWh in electric generation by 2019. Figure 1-8 shows that increasing EEDR resources results in less gas expansion and market purchases based on gas and less generation by existing TVA coal and gas resources. Existing and planned nuclear generation is unaffected, meaning nuclear generation is the same with an Enhanced EEDR program as in the base case. Adding more EEDR resources results in an additional 0.5-1.0 percent reduction in 2019 SO_2, NO_x, and Mercury emissions relative to 2010, as compared to the base case (Table 1-1). CO_2 emissions are reduced by 3.4 percent instead of 1.3 percent.

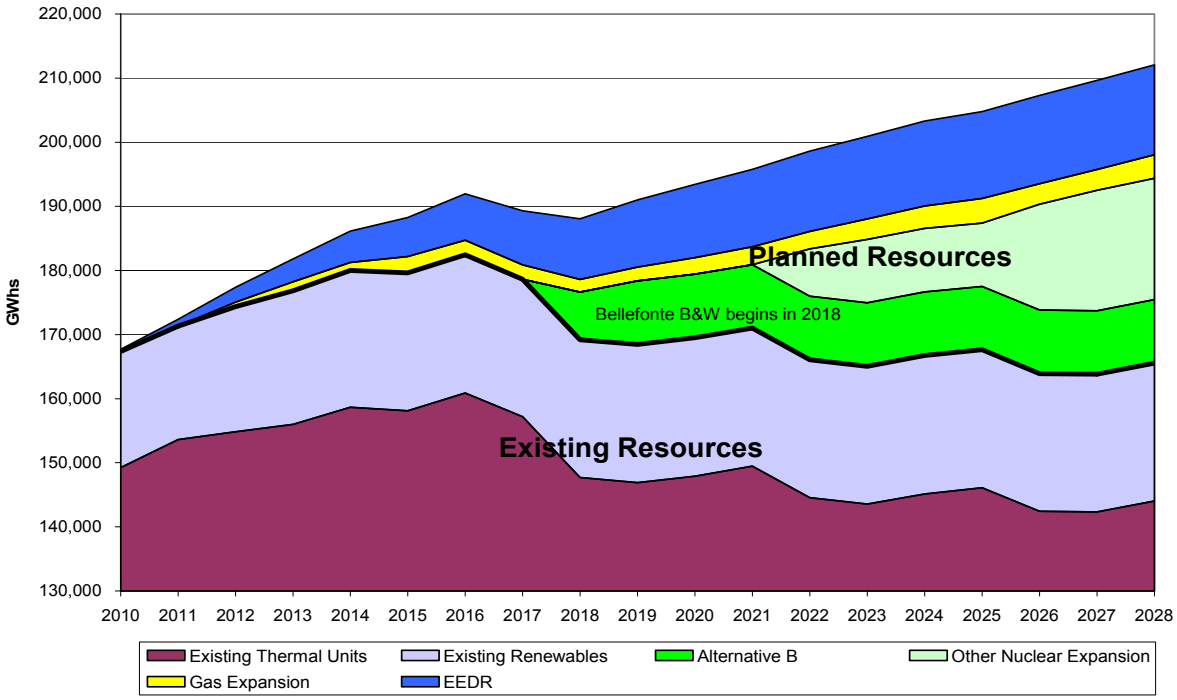

Figure 1-8. Estimated Generation by Fuel Type With Modified Assumptions

Future development and improvement of the EEDR portfolio will be influenced by many things including program measurement and verification results, the economic performance of current programs, and technology advancement and penetration in the marketplace. If EEDR programs are proven successful, TVA could further reduce reliance on its carbon-emitting generation sources.

1.4.5. Average Cost of Power

The annual cost of power in 2018-2024 for the base case and all alternatives is shown in Table 1-2. The annual cost of power does not include the payments in lieu of taxes, fuel cost adjustment, and other minor costs, but is otherwise consistent with the delivered cost of power shown in the DSEIS. Differences between alternatives and the base case using the annual cost of power have the same trends as differences using the delivered cost of power indicator.

Table 1-2. Effect of One BLN Nuclear Unit on TVA's Annual Cost of Power

Scenario	cents/kWh						
	2018	2019	2020	2021	2022	2023	2024
Base Case	6.7	6.9	7.2	7.5	7.8	8.1	8.3
Alternative A - No Action with No Nuclear Expansion	6.5	6.8	7.1	7.4	7.8	8.2	8.4
Alternative B - Bellefonte B&W	6.6	6.8	7	7.3	7.6	7.9	8.1
Alternative C - Bellefonte AP1000	6.6	6.8	7.1	7.4	7.8	8.1	8.3
Change from Revised Base Case							
Alternative A - No Action with No Nuclear Expansion	(0.18)	(0.13)	(0.08)	(0.07)	(0.08)	0.04	0.05
Alternative B - Bellefonte B&W	(0.11)	(0.13)	(0.11)	(0.11)	(0.21)	(0.23)	(0.22)
Alternative C - Bellefonte AP1000	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)	(0.00)	(0.01)

The annual cost of power for all three alternatives is lower than the cost of power in the base case. The cost of power for the No Action Alternative loses its cost advantage compared to the base case over time and becomes more costly than the base case by 2023 because it relies only on natural gas expansion and EEDR to provide for future energy needs. A B&W unit would be less costly than the base case and would increase its cost advantage over time relative to the base case because of the lower operating cost and lower capital cost of the B&W unit. The annual cost of an AP1000 unit would not be significantly less expensive than the base case. Operation of a B&W unit would be the least costly alternative for providing additional generation by 2020 and overall the most cost-effective alternative for providing base load energy.

1.4.6. Summary

The Need for Power analysis shows that the demand for capacity and energy in the TVA region exceeds what TVA's existing resources can provide. Required reductions in emissions from TVA coal-fired units have resulted in plans to add emissions controls and long-term lay-up of existing coal units. Consequently, the generation from existing TVA resources is projected to decrease in the future.

TVA anticipates using a mix of resources, including EEDR programs, renewable resources, natural gas-fired generation, and nuclear generation to provide the additional future needs. Given the magnitude of the capacity and energy need, and to avoid the risk of relying on only one fuel or technology, no single resource can meet all of the future energy and capacity requirements.

The decision anticipated in this SEIS is the choice of the next capacity addition to the TVA portfolio. Given the future capacity and generation needs and analyzing a number of different resource mixes, TVA has determined that adding a nuclear unit at the BLN site is the most cost-effective alternative to meet a portion of these future needs. A nuclear unit at the BLN site would (1) supply reliable, low-cost power from a proven high-energy-producing resource; (2) afford increased operating flexibility in the face of increasing environmental constraints; and (3) provide TVA's customers with additional fuel cost stability to reduce risk from volatile fuel prices.

1.5. National Environmental Policy Act (NEPA) Process

The NEPA process, 42 U.S.C. §§ 4321 et seq., requires federal agencies to consider the impact of their proposed actions on the environment before making decisions. If an action is expected to have a significant impact on the environment, the agency proposing the action must develop a study for public and agency review. This study, called an EIS, is an analysis of the potential impacts to the natural and human environment from the proposed action, as well as from a range of reasonable alternatives. The Council on Environmental Quality (CEQ) regulations (40 CFR §1505.1) require federal agencies to make environmental review documents, comments, and responses a part of each agency's administrative record. When an agency proposes substantial changes to a previously reviewed action and/or significant new circumstances or information are present, agencies are directed to prepare supplements to previously prepared EISs (40 CFR §1502.9). TVA is preparing this SEIS to update information in the BLN 1974 FES and other pertinent reviews relative to its proposed action to complete or construct and operate a single nuclear unit at the BLN site.

In compliance with 40 CFR §1501.7, TVA prepared and issued a notice of intent (NOI) to prepare this SEIS. The NOI was published on August 10, 2009 (74 *Federal Register*

40000). This NOI briefly described the proposed action, reasonable alternatives, and probable environmental issues to be addressed in the SEIS. Because of the number of environmental reviews, including public involvement, that have been developed related to the BLN project over the last 35 years, TVA did not solicit public scoping comments as part of the NOI consistent with 40 CFR §1502.9(c)(4).

At the close of the DSEIS public comment period, TVA responded to the comments received and incorporated any required changes into the FSEIS. TVA has completed consultation with the U.S. Fish and Wildlife Service (USFWS) and the appropriate State Historic Preservation Officers (SHPOs). The completed FSEIS will be sent to those who received the DSEIS or submitted comments on the DSEIS. It will also be transmitted to the U.S. Environmental Protection Agency (EPA) who will publish a notice of its availability in the *Federal Register*.

TVA will make a decision on the proposed action no sooner than 30 days after the notice of availability (NOA) of the FSEIS has been published in the *Federal Register*. This decision will be based on the project purpose and need, anticipated environmental impacts as documented in the FSEIS, along with cost, schedule, technological, and other considerations. To document the decision, TVA will issue a record of decision (ROD). The ROD normally includes (1) what the decision was; (2) the rationale for the decision; (3) what alternatives were considered; (4) which alternative was considered environmentally preferable; and (5) any associated mitigation measures and monitoring, and enforcement requirements.

1.6. Public Review Process

1.6.1. Scoping

NEPA regulations require an early and open process, known as the scope of the evaluation, for deciding what should be discussed in an environmental review. However, additional public scoping is not required for an SEIS per 40 CFR §1502.9(c)(4).

As described below, the BLN site and the B&W and AP1000 technologies have received extensive environmental review, including public comments, over the last 35 years. Extensive internal scoping, including compilation and review of the documents listed in Table 1-3 and review of the COLA ER (TVA 2008a) and NRC public scoping related to the COLA, was conducted by a TVA interdisciplinary team. In addition, TVA has considered records related to public review of the SEIS for *Completion and Operation of Watts Bar Nuclear Plant Unit 2* (TVA 2007a) completed in connection with the Watts Bar Unit 2 operating license application.

Based on these reviews and an assessment of the proposed action, TVA has determined that the scope of the FSEIS should include the following topics:

- Surface Water and Groundwater Resources
- Floodplains and Flood Risk
- Wetlands
- Aquatic and Terrestrial Ecology
- Endangered and Threatened Species
- Natural Areas
- Recreation
- Archaeological Resources and Historic Structures

- Visual Resources
- Noise
- Socioeconomics, including environmental justice
- Solid and Hazardous Waste
- Seismology (i.e., earthquakes)
- Climatology and Meteorology, Air Quality, and Global Climate Change
- Radiological Effects of Normal Operations
- Uranium Fuel Use Effects (radioactive waste, spent fuel, and transportation)
- Nuclear Plant Safety and Security
- Decommissioning
- Transmission System Improvements

1.6.2. Draft Review and Preparation of FSEIS

The DSEIS for the Single Nuclear Unit at the Bellefonte Plant Site was posted on TVA's Web site on November 4, 2009. Copies of the draft were mailed to state, local, and federal agencies and organizations listed in Section 7.1. EPA published an NOA on November 13, 2009 (74 *Federal Register* 58626). A press release describing opportunities for commenting on the DSEIS, including an information open house, was issued on November 10, 2009 (see Section 7.2). Paid advertisements for the open house (see Section 7.3) were published in seven regional newspapers between December 2 and December 7, 2009 (listed in Section 7.3).

An information open house was held on December 8, 2009, at the Goose Pond Civic Center in Scottsboro, Alabama, from 4:00 to 8:00 p.m. Central Standard Time. Forty-nine people registered. During the open house, comments on the draft could be made orally to a court reporter, on the Internet by computer, or by written comment form. A copy of the open house handout is included in Section 7.4.

TVA accepted comments on the DSEIS from November 13 until December 28, 2009. Comments were received from 35 individuals and four federal and state agencies. Many of the commenters supported nuclear power, while others voiced general concerns about the use of nuclear power. Many comments focused on the age of existing structures, water quality, reactor design, the safety of nuclear power, air quality, spent fuel, radwaste, alternative sources of energy and conservation, and socioeconomic impacts. Some comments raised concerns about the need and cost of power. A listing of all comments received and TVA's responses to these comments are included in Appendix C.

This FSEIS reflects revisions in support of the responses to comments on the DSEIS including an updated need for power analysis, more analysis of transportation effects in Subsection 3.13.10 and an expanded treatment of global climate change in Subsection 3.16.3.

1.7. Other Pertinent Environmental Reviews and Documentation

Past Documents Related to the BLN Site

Several evaluations in the form of environmental reviews, studies, and white papers have been prepared for actions related to the construction and operation of a nuclear plant or alternative power generation source at the BLN site. The following paragraphs describe some of the most pertinent documents. These documents are available on TVA's Web page at http://www.tva.gov/environment/reports/index.htm. As provided in the regulations

(40 CFR §1502) for implementing NEPA, this SEIS updates, tiers from, and incorporates by reference information contained in these documents about the BLN site and about nuclear plant construction and operation.

The environmental consequences of constructing and operating BLN 1&2 were addressed comprehensively in TVA's 1974 FES (TVA 1974a). The FES concluded that the principal ways the plant will interact with the environment are (1) releases of small quantities of radioactivity to the air and water, (2) releases of minor quantities of heat and nonradioactive wastewaters to Guntersville Reservoir and major quantities of heat and water vapor from the plant's cooling towers into the atmosphere, and (3) a change in land use from farming to industrial.

By 1993, when TVA drafted a white paper in support of TVA's 120-day notice to NRC for resumption of plant construction, most of the construction effects had already occurred. The white paper reviewed 10 aspects of TVA's proposal in its 1974 FES that had changed or were likely to change. It concluded that most of the changes involved design modifications or changes in expected operational practices that would improve safety or lessen potential environmental impacts. Because none of the changes were determined to materially affect impact projections in TVA's 1974 FES, TVA concluded that the FES would not have to be supplemented. However, TVA subsequently chose not to resume construction.

Environmental conditions at the BLN site have been comprehensively reviewed three more times since 1993. The 1997 Final EIS for the Bellefonte Conversion Project (TVA 1997) considered construction and operation of five optional types of fossil fuel generation, four of which involved plants with total electricity production capacity equivalent to BLN 1&2 (approximately 2,400 MW). The Conversion EIS substantially updated the description of the affected environment at BLN, and the potential for environmental impacts from new construction. The proposed combustion turbine plant was not constructed.

In the late 1990s, TVA participated as a cooperating agency with the U.S. Department of Energy (DOE) on an environmental review evaluating the production of tritium at one or more commercial light water reactors (CLWR) to ensure safe and reliable tritium supply for U.S. defense needs. The final environmental impact statement (FEIS) for the *Production of Tritium in a Commercial Light Water Reactor* (DOE 1999) addressed the completion and operation of BLN 1&2 and updated the environmental analysis of their operation. TVA adopted this DOE FEIS in May 2000. TVA's current proposal to complete additional generating capacity at the BLN site does not involve the production of tritium. The CLWR FEIS includes pertinent information on spent nuclear fuel management, health and safety, decommissioning, and other topics.

Most recently in 2007, as a part of a COLA process, TVA, as a member of the NuStart Consortium, prepared and submitted to NRC a comprehensive ER for the construction and operation of two AP1000 nuclear units at the BLN site (see Subsection 1.2.3). In addition to updating the description of environmental conditions at the BLN site and some operational aspects of the cooling water system, the COLA ER fully describes the environmental effects of constructing and operating two AP1000 units. The ER also contains a discussion of alternative sites and energy resource options. The ER was revised in response to NRC requests for additional information, and COLA ER Revision 1 (hereafter referred to as the COLA ER) was issued in October 2008 (TVA 2008a).

Other Related Documents

In addition to documents directly related to the BLN site, two other TVA documents are relevant to this SEIS. In December 1995, TVA completed a comprehensive environmental review of alternative means of meeting demand for power on the TVA system through the year 2020, published as *Energy Vision 2020 – Integrated Resource Management Plan and Final Programmatic Environmental Impact Statement* (TVA 1995; hereafter referred to as *Energy Vision 2020*). Deferral and/or completion of BLN 1&2, individually or together, were among the resource options evaluated in that FEIS, but not as the preferred alternative. The alternative adopted by the TVA Board following completion of the *Energy Vision 2020* was a portfolio of various supply- and demand-side energy resources. Completion of BLN Units 1 and/or 2 was not part of this portfolio.

In *Energy Vision 2020*, TVA made conservative assumptions about the expected capacity factor (performance—roughly how much a unit would be able to run) of its nuclear units. This capacity factor was used in conducting the economic analyses of nuclear resource options. TVA nuclear units, consistent with nuclear industry performance in the United States, now routinely exceed this earlier assumed capacity factor, which changes the earlier analyses for BLN 1&2, and the increased capacity factor is used in the current consideration of completing the unit (see Section 1.4, Need for Power).

On June 15, 2009, TVA announced its intent to conduct a new comprehensive study and EIS entitled *Integrated Resource Plan: TVA's Environmental and Energy Future.* This new plan will replace *Energy Vision 2020* and is scheduled to be completed by 2011. In order to meet the anticipated demand for base load power, TVA must make a decision on a single nuclear unit at BLN before the new IRP is completed. The proposal set out in the BLN FSEIS supports TVA's efforts to reduce its carbon footprint and the need to make beneficial use of the existing infrastructure at the BLN site.

In February 2004, TVA issued its *Reservoir Operations Study Final Programmatic Environmental Impact Statement* (ROS FEIS) evaluating the potential environmental impacts of alternative ways of operating the agency's reservoir system to produce overall greater public value for the people of the Tennessee Valley (TVA 2004). The ROS FEIS evaluated, among other things, the adequacy of the water supply necessary for reliable, efficient operation of TVA generating facilities within the operating limits of their National Pollutant Discharge Elimination System (NPDES) permits and other permits. A ROD for the ROS FEIS was subsequently issued in May 2004. Although operation of a single nuclear unit was not included in the ROS FEIS analysis, the reservoir operations described therein are adequately robust and flexible to encompass the operation of a nuclear plant with a closed-cycle cooling system, which uses only a minor amount of the river flow passing the BLN site (see Section 3.1). Furthermore, BLN's location on a mainstream reservoir ensures TVA control of flows. The assumptions for reservoir operations resulting from the ROS FEIS review and the cumulative effects analysis as it pertains to the operation of BLN are incorporated by reference in the present evaluation and used in the hydrothermal analysis (see Subsection 3.1.3).

In addition to the documents mentioned above, Table 1-3 provides a more complete listing of relevant environmental documents pertaining to the construction and operation of a nuclear plant or alternative power generation source at the BLN site.

Table 1-3. Environmental Reviews and Documents Pertinent to the Bellefonte Nuclear Plant Site

Document Type	Title	Date
FES	*Final Environmental Statement, Bellefonte Nuclear Plant Units 1 and 2* (TVA 1974a)	May 24, 1974
FES	*Final Environmental Statement Related to Construction of Bellefonte Nuclear Plant Units 1 and 2*, Tennessee Valley Authority, Docket Nos. 50-438 and 50-439 (AEC 1974)	June 4, 1974
FER [1]	*Bellefonte Nuclear Plant Units 1 and 2 Environmental Report, Operating License Stage*, Volumes 1-4 (TVA 1976)	January 1, 1976
FSAR	*Bellefonte Nuclear Plant Units 1 & 2, Final Safety Analysis Report, Amendment 30* (TVA 1991)	Original as updated through 1991
White Paper	*Environmental Impact Statement Review, Bellefonte Nuclear Plant White Paper* (TVA 1993a)	March 1993
FEIS/ROD	*Energy Vision 2020 - Integrated Resource Plan and Final Programmatic Environmental Impact Statement,* and *Record of Decision* (TVA 1995)	December 1995
FEIS	*Final Environmental Impact Statement for the Bellefonte Conversion Project* (TVA 1997)	October 1997
FEIS	*Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor* (DOE 1999)	March 1999
ROD/ Adoption	*Record of Decision and Adoption of the Department of Energy Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor* (TVA 2000)	May 19, 2000
FEIS	*Guntersville Reservoir Land Management Plan, Jackson and Marshall Counties, Alabama, and Marion County, Tennessee* (TVA 2001)	August 2, 2001
FEIS	*Reservoir Operations Study Final Programmatic Environmental Impact Statement and Record of Decision* (TVA 2004)	May 19, 2004
FEA [2]	*Final Environmental Assessment Bellefonte Nuclear Plant Redress, Jackson County, Alabama* (TVA 2006)	January 2006
ER	*Bellefonte Nuclear Plant Units 3&4, COL Application, Part 3, Environmental Report, Revision 1* (TVA 2008a)	October 2008
FSAR	*Bellefonte Nuclear Plant Units 3&4, COL Application, Part 2, Final Safety Analysis Report, Revision 1* (TVA 2009a)	January 2009
FEA [2]	*Activities at Bellefonte Nuclear Plant Related to Future Site Use, Jackson County Alabama* (TVA 2008b)	July 2008

[1] Final Environmental Report
[2] Final Environmental Assessment

1.8. Permits, Licenses, and Consultation Requirements

Federal and state environmental laws establish standards for radiation exposure in the general environment (areas outside of the NRC-regulated area) and for sources of air pollution, water pollution, and hazardous waste. TVA will obtain applicable permits by submitting construction and operation plans and specifications for review by the appropriate government agencies. Environmental permits contain specific conditions governing construction and operation of a new or modified emission source, describe pollution abatement and prevention methods to reduce pollutants, and contain emission limits for the pollutants that will be emitted from the facility.

TVA has maintained the BLN site in regulatory compliance following the cancellation of the construction permits by NRC in September 2006. Table 1-4 lists permits that have been cancelled since 2006 and those that are still active.

Table 1-5 lists federal, state, and local authorities evaluated for potential applicability to the proposed project.

Table 1-4. Permits Held or Canceled Since Year 2006

Type of Permit/Authorization	Expiration Date	Additional Information
NPDES Permit AL0024635	11/30/2014	Still active
NRC Construction Permit for Unit 1 - CPPR-122	10/01/2011	Cancelled September 2006; Reinstated March 9, 2009, to a “terminated plant” status
NRC Construction Permit for Unit 2 - CPPR-123	10/01/2014	Cancelled September 2006; Reinstated March 9, 2009, to a “terminated plant” status
Air Permit for Synthetic Minor Source Operation Permit #705-0021-X002 (two 115.2 million British thermal units/hour auxiliary boilers (No. 2 diesel oil fuel)	None	Cancelled June 2007; auxiliary boiler building sold and dismantled
Air Permit for Synthetic Minor Source Operating Permit #705-0021-X004 (two 7,000-kilowatt [kW] diesel generators)	None	Still active
Resource Conservation and Recovery Act (RCRA) EPA Identification No. AL5640090002	None	Still active

Table 1-5. Federal, State, and Local Environmental Authorizations

Statute/Agency	Authority	Activity Covered
U.S. Nuclear Regulatory Commission (NRC)	10 CFR Part 50; 10 CFR Part 52	Construction and Operation for Commercial Nuclear Plant.
Endangered Species Act (ESA) USFWS	16 United States Code (U.S.C.) §1531 et seq.	Consultation with USFWS for potential impacts to federally listed threatened or endangered species.
Native American Graves Protection and Repatriation Act	25 U.S.C. §3001 et seq.	Provides for the repatriation of Native American human remains or cultural items that are excavated from or inadvertently discovered on federal lands.
American Indian Religious Freedom Act	42 U.S.C. §1996	Protection and preservation of traditional religions of Native Americans.

Statute/Agency	Authority	Activity Covered
National Historic Preservation Act of 1966 Alabama, Tennessee, and Georgia Historical Commissions; SHPO; Federal Advisory Council on Historic Conservation	16 U.S.C. §§470 et seq.	Consultation with SHPO for potential impacts to historic properties listed in the National Register of Historic Places.
Object Affecting Navigable Space; Federal Aviation Administration (FAA)	Title 49, Subtitle VII; 14 CFR Part 77	Preconstruction letter of notification to FAA results in a written acknowledgment certifying that no hazards would result from constructing and operating the BLN Units 1 and 2. Similar acknowledgment may need to be obtained for the proposed project.
U.S. Coast Guard	14 U.S.C. §§81, 83, 85, 633; 49 U.S.C. §1655(b)	Navigation markers authorization to protect river navigation from hazards connected with construction activities in a river. TVA complies voluntarily.
U.S. Army Corps of Engineers (USACE)	33 U.S.C. §1344; 33 U.S.C. §1341	*Clean Water Act* (CWA) Section 404 permit for the discharge of dredge or fill material into the waters of the United States. Concerned with placement of structures, working in or altering waters, and aquatic resources including wetlands. Alteration of jurisdictional wetlands requires compensatory mitigation if such impacts cannot be avoided. A state Section 401 certification that the action does not violate state water quality standards must be obtained prior to application for a USACE Section 404 permit.
EPA/Alabama Department of Environmental Management (ADEM)	42 U.S.C. §§7661-7661f; Title 22, Alabama Code, Chapter 28	Construction permit and operating permit for emission of air pollutants from the proposed project.
EPA/ADEM	33 U.S.C. §1342; Title 22, Alabama Code, Chapter 22	Existing permit identifies outfalls through which wastewater may be discharged. Permit may need to be modified for the proposed project.
EPA/ADEM	33 U.S.C. §1342; Title 22 Alabama Code, Chapter 22	Storm water runoff control for construction and individual sites
RCRA; *Alabama Hazardous Waste Management and Minimization Act*	42 U.S.C. §6901 et seq.; Title 22, Alabama Code, Chapter 30	Permit for construction of a disposal facility.
RCRA; *Alabama Hazardous Waste Management and Minimization Act*	42 U.S.C. §6901 et seq.; Title 22, Alabama Code, Chapter 30	Permit for disposal of nonhazardous waste.
RCRA; Alabama Hazardous Waste Management and Minimization Act	42 U.S.C. §6901 et seq.; Title 22 Alabama Code, Chapter 30	Transport, treatment, storage, and disposal of hazardous waste.
Executive Order (EO) 11514 (Protection of Enhancement of Environmental Quality)	40 CFR §§1500-1508	Requires federal agencies to protect and enhance the quality of the environment; develop procedures to ensure the fullest practicable provision of timely public information and understanding of federal plans and programs that may have potential environmental impacts so that the views of interested parties can be obtained.
EO 11988 (Floodplain Management)	10 CFR §1022; 18 CFR Part 725	Requires federal agencies to avoid floodplain impacts to the extent practicable.

Statute/Agency	Authority	Activity Covered
EO 11990 (Protection of Wetlands)	10 CFR §1022; 18 CFR Part 725	Requires federal agencies to avoid any short- and long-term adverse impacts on wetlands wherever there is a practicable alternative.