

Tennessee Valley Authority Annual Report on Energy Management FY 2003

(Including Department of Energy
Reporting Guidance and Outline)

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OUTLINE AND INSTRUCTIONS FOR THE ANNUAL REPORT

- I. Management and Administration.** This section will describe (1) the agency's establishment of an energy management infrastructure and (2) the agency's use of management tools to implement Executive Order 13123.
- A. Energy Management Infrastructure**

- 1. Senior Agency Official.** Identify the agency's senior energy official and describe the official's role and responsibilities.

LeAnne Stribley is the designated Senior Energy Official and Executive Vice President of Administration.

Stephen L. Brothers manages the TVA Internal Energy Management Program (IEMP) and is Senior Manager of Energy Legislation and Management under Administration.

David R. Zimmerman is the manager of Sustainable Design under Energy Legislation and Management.

- 2. Agency Energy Team.** Identify the members of the team and describe the team's responsibilities.

TVA formed the Agency Energy Management Committee (AEMC) to facilitate compliance with federal statutes, Executive Orders, federal regulations, TVA energy and related environmental management objectives, and obligations under the Environmental Protection Agency's (EPA) Green Lights Program (GL), EPA's Energy Star Buildings Program (ESB) and EPA's Energy Star Program (ESP). The AEMC serves as the agency energy team. This committee is comprised of representatives from each TVA organization responsible for energy management and associated environmental considerations in facility and general operations inside the agency. The AEMC provides an avenue for sharing lessons learned and replicating success. The members are:

- **Stephen L. Brothers, chairperson for the AEMC;**
- **William H. Lehman, Fleet Management;**
- **David R. Zimmerman, Sustainable Design;**
- **David W. Stewart, Fossil;**
- **Aaron B. Nix, Facilities Management Environmental;**
- **William R. McNabb, Facilities Management O&M;**
- **Jay T. Grafton, Nuclear;**
- **Terry L. Rutledge, Nuclear alternate;**
- **Teresa S. Wampler, River System Operations and Environment;**
- **David R. Dinse, Public Power Institute;**
- **Tommy K. McEntyre, River Operations;**
- **Bryan H. Jones, Information Services;**
- **Carolyn B. Marvel, Fossil alternate;**
- **David A. Gordon, Heavy Equipment;**

- **Judy G. Driggans, Chief Financial Officer representative;**
- **Bryan D. Singleton, Chief Financial Officer alternate;**
- **Barry M. Gore, Transmission and Power Supply;**
- **V. Edward Hudson, Demand Side Management Program;**
- **David R. Chamberlain, Customer Service and Marketing;**
- **Tina I. Broyles, Transmission and Power Supply alternate;**
- **Mary H. Moore, General Counsel; and**
- **Sherri R. Collins, General Counsel.**

B. Management Tools

1. **Awards (Employee Incentive Programs).** Describe the agency's use of employee incentive programs to reward exceptional performance in implementing Executive Order 13123.

TVA utilizes pay for performance as one method to reward employees' efforts toward meeting agency goals. One of the benefits to TVA's agency goals is savings attributed to the implementation of cost effective energy and related environmental projects. An example of one pay for performance goal is reduction in cost per square foot for building operation which includes energy consumption.

2. **Performance Evaluations.** Describe agency efforts to include successful implementation of provisions of Executive Order 13123 in the position descriptions and performance evaluations of senior energy officials, members of the agency energy team, heads of field offices, and facility/energy managers.

To the extent to which employees are responsible for activities that are related to the objectives of Executive Order 13123 (E.O. 13123), their job descriptions contain reflective line items and their performance is evaluated in terms of the extent to which they accomplish such goals.

3. **Training and Education.** Describe activities undertaken to ensure that all appropriate personnel receive training for energy management requirements. (Note: The number of employees trained will be reported on the agency's Data Report and Energy Scorecard. Expenditures on training will also be reported on the Data Report). Describe agency outreach programs that include education, training, and promotion of ENERGY STAR[®] and other energy efficient products for Federal purchase card users.

TVA uses various training methods to accomplish objectives of the IEMP. Information updates are provided on current federal requirements and regulations to employees, managers, and TVA customers upon request. Energy management and associated environmental training is provided to managers and employees as needed. Employee awareness activities are used to educate employees on how they impact energy consumption and the environment through their daily activities at work and home. TVA also educates staff on energy and environmental related topics through the TVA University.

4. **Showcase Facilities.** Highlight exemplary new or existing facilities that the agency has designated Showcase Facilities in FY 2003. Describe why the facilities

are considered Showcase Facilities (i.e., discuss the facility design, the improvements made in energy or water efficiency, the use of renewable energy, etc.).

The TVA Chattanooga Office Complex (COC) continued to be TVA's designated Showcase Facility for FY 2003. The COC was completed in 1986 and encloses approximately 1.2 million square feet of floor area, and is made up of five interconnected buildings (Signal Place, Lookout Place, Blue Ridge, Missionary Ridge, and Monteagle Place). It integrates the use of passive energy strategies, energy management practices, and environmental programs and activities. Occupants' daily activities have been recognized as a major component in facility performance. Energy and environmental awareness programs have been established to inform the occupants of the impacts their actions have on this performance. The combinations of original design elements, energy and environmental activities, and aggressive energy reduction operation and maintenance efforts have resulted in the COC becoming a model facility.

During FY 2003 we began to consolidate TVA space to reduce cost. This resulted in an increase in the occupancy density of the COC. To offset the increased energy demand from this increased density we continue to investigate energy efficiency measures and have implemented measures which include:

- Better placement of task lights resulting in reduction of numbers used;
- Use of digital lighting controls which can be operated from the users PCs;
- Orienting offices to better utilize daylighting over mechanical lighting;
- Use of more efficient T5 lighting in place of existing T8 and T12; and
- Use of more efficient flat panel displays in place of conventional cathode ray tube displays.

ENERGY MANAGEMENT AND ASSOCIATED ENVIRONMENTAL EFFORTS

Energy consumption in the COC exceeds TVA's target for facility design and the FY 2010 building energy reduction goal established in E.O. 13123. This low energy consumption rate supports the reduction of CO₂ and other environmental impacts at the source.

Since initial construction, additional energy and environmental improvements have been implemented in the COC. One of these improvements was the design and installation of a chilled and hot water storage system for the COC and Monteagle Place (MP) buildings. The system allows the two buildings, through a symbiotic relationship, to better use site energy and reduce the need for source energy. During FY 2003 we rebuilt one of the MP chillers which improved its overall efficiency.

COC Original Design Features:

- VAV air handlers with full economizer capabilities.
- Energy Management and Control System (HVAC, Lighting, Fire).
- Heat recovery from MP chillers.
- Approximately 30 footcandles of ambient lighting supplemented with daylighting and task lighting.
- Renewable energy attributes such as daylighting.
- Thermal storage through structural and fluid mass.

Additional Improvements:

- Chilled water crossover piping allows the COC and adjacent facility to share chilled water and run the most efficient mix of chillers.
- Water fountains are heated and cooled through heat exchangers to better manage temperature and humidity in the building.
- Motion sensors and timers have been installed in the COC (i.e., conference rooms, restrooms, enclosed offices, closets, etc.).
- LED exit lights have been installed.
- Energy efficient lighting has been added.
- COC storage tanks are used for chilled and hot water storage (3 x 19,000 gallons).
- Heat exchangers and chilled water were used to cool the secondary water loop allowing the abandonment of rooftop evaporative coolers and associated fans, motors, and sump heaters.
- Equipment (i.e., fixtures, motors, ballasts, chillers etc.) was upgraded to energy efficient models as failures occurred.
- Variable Frequency Drives (VFDs) and energy efficient motors have been installed on all large air-handling units.
- The energy management system has been upgraded to be more user friendly.
- Chiller efficiencies have been evaluated so the most energy efficient mix of chillers can be run for operating conditions.
- Upgrading to more energy efficient equipment is evaluated during modifications (fixtures with T-8 lamps and electronic ballasts, etc.).
- Energy efficient motors are installed where applicable.
- During purchase of replacement parts, energy efficient and environmentally friendly materials were ordered and stocked.
- Chillers have been retrofitted to accept non-CFC refrigerant.
- Energy Star equipment was installed where applicable.
- Building entry air locks with automated doors have been installed to reduce the infiltration of outside air.

ENVIRONMENTAL PROGRAMS AND ACTIVITIES

TVA demonstrates a commitment to environmental stewardship through the implementation of its environmental programs and activities at the COC. Examples of these efforts include, but are not limited to, toxic reduction, affirmative procurement, waste minimization, and recycling.

Toxic Reduction:

TVA continues its efforts to reduce the amount of toxic chemicals used in its operation and maintenance activities for the building. The volume of toxic chemicals purchased in corporate office buildings has been reduced by over ninety percent since 1994. The COC is the largest single contributor to this effort.

Affirmative Procurement:

TVA reduces environmental impacts at the COC and other facilities through affirmative procurement of materials with recycled content. In FY 2003, TVA issued a Corporation-wide Affirmative Procurement Policy and revised the Agency's Affirmative Procurement Plan. During FY 2003 TVA purchased \$5.87 million of materials meeting guidelines established under the Resource Conservation and Recovery Act (RCRA) out of \$11.99 million (forty-nine percent), and \$63.40 million of other recycled content materials.

Waste Minimization and Recycling Programs:

TVA is a Federal Charter Partner in the EPA "WasteWise Program." Through this program, TVA has made a commitment to achieve results in three areas:

- 1) Waste prevention;
- 2) Collection of recyclables; and
- 3) Use of recycled materials.

This aligns with TVA's mission of stimulating economic growth by protecting the Tennessee Valley's natural resources and building partnerships for the public good. TVA has established the Solid Waste Leverage Team and a Solid & Hazardous Waste Regulatory Policy Team to support the "WasteWise Program."

During FY 2003 TVA generated 12,637 tons of solid waste which includes corporate facilities such as the COC. TVA partners with a nonprofit organization which trains and develops work skills in mentally and physically challenged clients. These clients, in conjunction with their respective organizations, collect, sort, and market the recycled material from the COC. In addition to the typical office waste recycling, TVA continues its efforts in recycling used batteries, fluorescent light tubes, oil, scrap metals, building materials, wood waste, and ballasts. TVA also utilizes a redeployment program which collects and redeploys used equipment and materials. During FY 2003 TVA donated or sold 20,006 tons of material and equipment through scrap contracts, auctions and sales, and donations.

Sustainable carpet is used throughout the COC. This carpet contains and uses high performance backing made from one hundred percent recycled content. TVA has an agreement with the carpet manufacturer to recycle carpet removed from the COC which has kept used TVA facility carpet out of the landfill while saving an equivalent amount in raw materials.

5. **Other Energy and Related Environmental Initiatives.** Highlight new or existing energy and related environmental initiatives that the agency has accomplished in FY 2003. Provide a brief description of these initiatives.

INDUSTRIAL INITIATIVES

TVA provides an initiative for its direct-served and distributor-served industrial customers, which focuses on providing solutions to energy-related problems in the manufacturing environment. TVA works with clients to help them identify and solve problems related to their use of energy such as manufacturing processes, environmental issues, and plant operations. The targeted segments, such as the textile and food processing industries, are selected because of the large presence of such industries in the TVA service area, high energy usage, or the availability of solutions for their existing problems. The TVA industrial marketing managers mainly rely on in-house expertise, but sometimes bring in consultants to assist these industrial clients.

As a prime example of TVA energy assistance to a major industrial customer, TVA representatives developed and co-chaired an in-house energy conservation team to identify and implement energy cost savings opportunities at the Saturn Spring Hill automobile assembly plant. The team achieved savings in excess of \$1.1 million in FY 2003 and over \$4 million since the beginning of the initiative four years ago. Using a similar approach, TVA identified additional energy savings of over \$500,000 at the Athens, Alabama, Delphi plant in FY 2003 over the \$2.5 million identified previously. During FY 2003, Delphi implemented a TVA recommendation to repair multiple compressed air leaks in the plant, resulting in the replacement of a 1500 HP air compressor with a 700 HP air compressor.

COMMERCIAL INITIATIVES

TVA works with Tennessee Valley commercial and institutional customers to provide solutions to their energy-related problems and to encourage the selection of energy efficient equipment. For example, TVA is working with schools, governments, offices, retail, healthcare, and other commercial segments to provide information on the various energy options available to them. As part of that effort, TVA provides feasibility studies conducted by independent private sector professional engineers, to compare different types of systems on a life-cycle-cost basis. Also, if the customer is interested in closed loop geothermal heat pumps, TVA will provide test bores and thermal conductivity tests at the proposed project site to assist with the design of the ground heat exchanger. Furthermore, TVA sponsors continuing education for Tennessee Valley architects and engineers on the proper design and application of geothermal heat pumps. In the TVA service area, there are approximately 190 geothermal systems installed or in design as the result of TVA's promotion of this energy efficient technology. Demand for TVA assistance to commercial customers on energy-related problems continues to grow.

RESIDENTIAL INITIATIVES

TVA and power distributors have a long history of residential energy-efficiency programs for the Valley. These programs are marketed under the brand name *energy right*[®].

About 150 distributors participate in the various initiatives from the *energy right*[®] Program. These initiatives are described below:

New Homes Plan promotes all-electric, energy-efficient new homes. All homes built *energy right*[®] must meet a minimum rating in overall energy efficiency. Homes built at least fifteen percent better than the minimum rating, qualify as *energy right*[®] Gold, and those built thirty percent better qualify as *energy right*[®] Platinum.

Heat Pump Plan promotes the installation of high efficiency heat pumps in homes and small businesses. Installation, performance, and weatherization standards have been established to ensure the comfort of the customer and the proper operation of the system. A Quality Contractor Network has been established for maintaining high installation standards. Through a third-party lender, TVA provides ten year financing for residential heat pumps with repayment through the consumer's electric bill.

Water Heater Plan promotes the installation of energy-efficient electric water heaters in homes and small businesses.

New Manufactured Homes Plan promotes the installation of electric heat pumps in new manufactured homes.

In Concert With The Environment (in partnership with Nexus Energy Software) is a comprehensive environmental and energy education program directed to middle school and junior high school students. Student participants receive an energy survey to complete for their households. Results from the survey indicate the home's estimated annual and monthly energy usage by appliance and gives a number of energy, environmental and water recommendations for the student and their family to implement.

energy right Home e-valuation[®] (in partnership with Nexus Energy Software) allows residential customers to play an active role in saving energy in their homes. After completing an energy survey, customers receive a personalized report that breaks down the home's annual and monthly energy usage by appliance, and gives a number of energy recommendations as well as information about distributor products and services.

energy right Home e-Valuation Online is a web-based home energy audit for residential customers to complete interactively via the Web. Customers complete the survey and receive a detailed analysis of their energy use based on their answers and average TVA rates.

energy right Small Business e-Valuation is an energy audit for small and medium-sized business customers that is completed online. Customers complete the survey and receive a detailed analysis of their energy use and customized savings. They can also benchmark their facility's use against similar businesses.

More information is available at the *energy right*[®] website (www.energyright.com)

DEMAND SIDE MANAGEMENT

TVA and thirteen of its power distributors are involved in a Direct Load Control program. This program involves power distributors installing radio controlled switches on their customer's air-conditioners and water heaters. During peak demand periods TVA is allowed to curtail the power to this equipment. The power distributors receive a bill credit for each operable switch. The participating power distributors are allowed to determine the type of incentive given to their customers. Currently, TVA can curtail approximately 45 MW of load upon demand.

PUBLIC POWER INSTITUTE

As a national leader in demonstrating the value of public power, TVA created the Public Power Institute (PPI) to develop and implement solutions for energy, environmental, and economic issues through 21st century technologies.

The technology focus areas for PPI are: Biomass and Renewables; Clean and Advanced Energy; Environmental Impacts and Reduction; and Energy Use and Industrial Ecology.

TVA's PPI promotes the value of public power in a competitive marketplace by:

- Using TVA facilities as a living laboratory to test new energy technologies;
- Showcasing technologies that benefit the public; and
- Providing scientific input on regulatory and public policy issues.

The institute serves both as a research laboratory seeking new ways to achieve sustainable power production and as a public policy clearinghouse for energy and environmental issues. PPI represents the vision and ultimate mission of public power: to put the public good first and to emphasize long-term benefits over short-term gains.

PARTNERSHIPS

Recognizing that the PPI's ability to accomplish its mission is largely dependent upon partners, PPI collaborates with others, including federal, state, local, private, not-for-profit, and educational entities. These collaborative efforts allow for the development of technologies for power production, power delivery, and power use. The following are the major partnerships that leverage external expertise and promote cooperation between the public and private sectors.

Utility-Related Organizations:

- **Large Public Power Council**
- **East Kentucky Power Cooperative**
- **Tennessee Valley Public Power Association (TVPPA)**
- **American Public Power Association (APPA)**
- **National Rural Electric Cooperative Association (NRECA)**

Research Organizations and Partnerships:

- **National Farmers Union**
- **Alabama Farm Bureau**
- **Alliance to Save Energy**
- **British Petroleum (BP) Amoco**
- **Corporate Executive Board**
- **Mississippi Alternative Energy Enterprise (MAEE)**
- **Solar Electric Power Association**
- **Coal Utilization Research Council**
- **Electricity Storage Association**
- **Environmental and Energy Study Institute**
- **Electric Power Research Institute (EPRI)**
- **Oak Ridge National Laboratory (ORNL)**
- **U.S. Department of Energy (DOE)**
- **U.S. Department of Agriculture**
- **U.S. Department of Defense**
- **U.S. Environmental Protection Agency (EPA)**
- **Geothermal Heat Pump Consortium**
- **Center for Transportation and the Environment (CTE)**
- **Electric Drive Transportation Association**
- **U.S. Department of Transportation**
- **American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)**
- **American Bioenergy Association**
- **American Wind Energy Association**
- **CEA Technologies, Incorporated**
- **Center for Air Toxics Metals**
- **Consortium For Energy Efficiency**
- **Consortium on Seismic Qualification of Substation Equipment**
- **East Tennessee Clean Fuels Coalition**
- **Gasification Technology Council**

- **Interstate Renewable Energy Council**
- **IRIS Consortium New Uses Council**
- **Power System Electric Research Council**
- **Utility Wind Interstate Group**

Universities:

- **UT Space Institute**
- **Mississippi State University**
- **Tennessee Technological University**
- **Tuskegee University**
- **University of Alabama**
- **University of Kentucky**
- **University of Tennessee at Chattanooga**
- **University of Tennessee at Knoxville**
- **Vanderbilt University**
- **University of Mississippi**
- **Carnegie Mellon**
- **Middle Tennessee State University**
- **University of Akron**

PPI helps TVA fulfill its commitment to provide competitively-priced and reliable power while promoting environmental stewardship and economic development. The PPI is positioned today to help develop, demonstrate, and deploy new energy-related technologies for a better tomorrow.

PPI RECENT HIGHLIGHTS/ACCOMPLISHMENTS

New Technologies Demonstrated – PPI’s Technologies Demonstrated Indicator is a measure of the number of research and development technologies which are demonstrated for the first time at TVA facilities, at customer sites (distributor, directly served, and consumer), and through partnerships and collaborations.

1. **Soybean-Based Electric Distribution Transformer Oil – BioTrans - BioTrans was developed and patented by Waverly Iowa Light & Power as a soybean electric distribution transformer oil with assistance from the American Public Power Association. Nashville Electric Service (NES) is presently implementing a 24-month demonstration project of transformers filled with BioTrans. Three additional distributors of TVA Power, Appalachian Electric Coop., Athens Tennessee Utility Board, and Gibson EMC, have started parallel demonstrations. Additionally, TVA has conducted a retrofill of one of its 700 kw transformers at the Buffalo Mountain Wind Farm with 250 gallons of BioTrans.**
2. **Mini SODAR Technology for Augmenting Wind Tower Measurements – This project involves using a technology originally developed to measure winds with helicopters hovering nearby. The system utilizes a high frequency acoustic signal to track the winds and was adapted to provide detailed information for wind energy systems.**

- 3. Roofing Integrated Photovoltaics with Net-metering Alternative – In a joint partnership with ORNL, DOE, and Habitat for Humanity, three in a series of five state-of-the-art energy-efficient Habitat homes, have been completed in Loudon County, Tennessee. These initial homes introduce the Zero Energy Building (ZEB) concept by featuring utility-interactive PV systems that qualify for TVA’s Green Power Switch® Generation Partners demonstration. Total estimated capacity of each home generation system is 2 kW.**

- 4. TVA-Wide New Technologies Implemented - The TVA–Wide Technology Implementation Indicator is a measure of the number of new technologies which TVA organizations have implemented or applied for the first time (as part of normal operations).**
 - Thermal Conductivity Mapping for Geothermal Heat Pumps - A CD ROM was developed that contains thermal conductivity test data and for 89 sites in the Tennessee Valley overlaid on a geology map. This data was disseminated to the private design professionals in the Valley to aid in designing large commercial geothermal heat pump systems.**

 - eScan – eScan diagnostic technology was developed and implemented to pinpoint ductwork problems and problems in the operation of heating, ventilation, and air conditioning systems. Middle Tennessee Electric Membership Corporation is offering the eScan diagnostic technology to their residential customers**

Other Current Activities:

- Development and commercialization by TVA and ORNL of the frostless heat pump;**
- Partnered with ORNL, DOE and others to develop a revolutionary hybrid solar lighting (HSL) concept that integrates light from both solar and electric sources. Construction started on a demonstration of HSL technology at the TVA Public Power Institute Facility in Muscle Shoals, Alabama;**
- Demonstrating passive treatment of high-acidity and high-iron coal ash leachate at a TVA fossil plant;**
- Involved in multi-organizational public and private partnerships to demonstrate and evaluate alternative fueled vehicle (AVF) options within the Great Smoky Mountain National Park and other national parks;**
- Leading a partnership with NPS/DOE/EPRI to study fine particulate and nitrogen loadings in the Great Smoky Mountains National Park;**
- Participating in flue gas mercury speciation tests as part of the joint EPRI/DOE/EPA test program to determine if SCRs change the state of the mercury to a form that can be removed by wet limestone scrubbers;**
- Completing a 16-year performance evaluation and a survey of passive TVA constructed wetlands technologies for acid drainage treatment;**

- **Characterizing fate and form of ammonia in ash sluice water derived from Selective Catalytic Reduction systems at a fossil plant;**
- **Continued microturbine testing/demonstration program (30 kW Capstone and 60 kW Capstone);**
- **Completed computer simulation phase of novel, low temperature power cycle technology development, then submitted the patent and began engineering design of demonstration pilot plant;**
- **Cooperated with Voith Hydro, Inc. in establishing and operating Hydro Resource Solutions, LLC, a Tennessee limited liability company which develops and markets energy efficiency enhancing hardware and software for the hydro power industry;**
- **Initiated a joint DOE, EPRI, and TVA project, the Carbon Capture and Water Emissions Treatment System (CCWESTRS), which will demonstrate integration of fossil power plant operations with terrestrial carbon sequestration technologies;**
- **Evaluating and demonstrating Demand Side Management (DSM) initiatives to prepare for future changes in the energy and market place. Demonstrations underway include:**
 - **Uptown Memphis Green Buildings;**
 - **Net Zero Energy Building Demonstration; and**
 - **Price Response Load Management demonstration/evaluation;**
- **“Energy Efficiency Education” market transformation initiative with the State of Tennessee;**
- **Efficient technology demonstration for wastewater treatment;**
- **Increased nuclear electrical generation by 11.6 MW by installing more accurate feed water flow instrumentation; and**
- **Began testing and demonstration with EPRI of a Stirling cycle engine. The demonstration will use biogas from the Lenoir City Utility Board sewage treatment plant as a fuel source. Cogeneration opportunities will be investigated as part of the demonstration.**

II. Energy Efficiency Performance. This section will highlight data calculated for reporting on the Data Report and the Energy Scorecard. The purpose of the section is to provide narrative information in support of these data.

A. Energy Reduction Performance

Site-Delivered vs. Source Energy—The factors used for converting the reporting units to Btu have a significant impact on how performance toward the energy efficiency goals and other goals of E.O. 13123 are measured. “Energy use” is defined as the energy that is used at a building or facility and measured in terms of energy delivered to the building or facility. Recognizing this, OMB and DOE will use Btu based on the site conversion factors for both electricity and steam as the primary measure of performance. However, because carbon emissions are generally proportional to source energy use, reductions in source Btu will also be considered more seriously than in the past. The conversion factor for electricity of 3,412 Btu per kilowatt hour, the rate of consumption by the end-user on site, will be used for measuring performance. The difference between the site conversion rate and the estimated source conversion rate of 10,346 Btu per kilowatt hour is attributable to transmission and conversion losses associated with electric generation. The site conversion factor for purchased steam is 1,000 Btu per pound. Generation inefficiencies and distribution losses are included in the source conversion factor of 1,390 Btu per pound. Separate tables showing agency consumption using the source conversion factors for electricity and steam, along with estimated carbon emissions, will be included in DOE’s Annual Report to Congress.

TVA's facility inventory and the type of activities these facilities are used for continues to evolve as the agency faces new challenges. This facility information is updated through the AEMC. The AEMC remains the focal point for disseminating energy and related environmental information to TVA organizations and employees and implementing TVA's Energy Plan (see Attachment 8). The AEMC is also responsible for the development of TVA's Implementation Plan (see Attachment 6). To benchmark success the AEMC utilizes many tools including the Energy Scorecard (see Attachment 2). The AEMC allows representatives to voice problems in meeting regulations and goals and share success stories which can then be applied throughout TVA. To benchmark success the AEMC uses many tools including:

TVA NEW BUILDING DESIGN

TVA is designing new buildings to not only meet energy efficiency standards but also sustainable standards. Technologies such as daylighting, passive solar heating, geothermal heat pumps, advanced controls and non-toxic, recycle-content building materials are being incorporated into new building designs.

TVA FACILITY IMPROVEMENTS

TVA implements various energy efficiency improvements in its facilities. Some examples of typical energy reduction improvements are as follows:

- Laboratory exhaust hoods have been equipped with Variable Speed Drives to reduce exhaust requirements when hoods are not being used;**
- Air handlers have been equipped with variable speed drives to reduce makeup air to laboratory space when the exhaust hoods airflow is at a reduced level;**
- Heating, ventilating, air conditioning, and exhaust hood systems have been added to TVA's Energy Management and Control System;**
- Energy Management Control Systems have been added to control heat pump heating and cooling systems;**
- Variable Frequency Drives have been added to building heating, ventilating, and air conditioning units;**
- New lighting systems using T-8 lamps, electronic ballasts and motion sensors have been installed in many existing buildings;**
- New lighting systems using T-5 lamps, electronic ballasts, and varied control systems have been installed in existing buildings;**
- New high efficiency heat pump systems have been installed in many buildings;**
- Existing air handlers have been rebuilt to improve efficiency; and**
- Existing chillers have been rebuilt to improve efficiency.**

OPERATION AND MAINTENANCE ACTIVITIES FOR BUILDINGS

TVA continues to improve its energy efficiency and environmental stewardship through operation and maintenance activities. The following is a list of operation and maintenance practices and activities for FY 2003:

- **Recycle scrap metals, used oil, substation and communication station service batteries, and storm damaged or deteriorating steel structures;**
- **Recycle expired fluorescent lamps;**
- **Recycle or reuse waste material when feasible;**
- **Educate employees on energy efficiency;**
- **Encourage employees to implement energy efficient ideas and practices;**
- **Turn off equipment when not needed;**
- **Have custodians turn off building equipment after cleaning;**
- **Clean lamps, fixtures, and diffusers;**
- **Use the most efficient lamps available (i.e., screw-in fluorescent, screw-in halogen, screw-in high pressure sodium, energy efficient fluorescent lamps, etc.);**
- **Reduce lighting levels where light output exceeds requirements for the space;**
- **Install motion sensors to control lighting in rooms where economical (offices, restrooms, conference rooms, etc.);**
- **Install light switches or motion sensors in areas not currently controlled;**
- **Disconnect unnecessary lamps and ballasts;**
- **Disconnect unnecessary transformers;**
- **Install energy efficient electronic ballasts;**
- **Perform group relamping;**
- **Install photocell control on outdoor lighting;**
- **Rewire lamps to permit shutoff of unneeded lights;**
- **Minimize the number of ballasts installed (use a four-lamp ballast, for two adjacent two-lamp fixtures);**
- **Revise building operating procedures for efficiency and cost;**
- **Install programmable thermostats and use the night and weekend setback features to reduce energy use during unoccupied periods;**
- **Set thermostats in mechanical rooms and unoccupied areas so the least amount of energy will be used without causing the equipment to deteriorate;**
- **Verify and calibrate all controls periodically, including time clocks;**
- **Keep all outside doors and windows closed when heating or cooling, using vestibules properly;**
- **Keep garage and warehouse doors closed as much as possible while heating or cooling;**
- **Replace broken windows;**
- **Replace missing insulation;**
- **Add caulking where necessary;**
- **Replace worn weather-stripping on windows and doors;**
- **Reduce the amount of infiltration air where possible but always meet fresh air requirements;**
- **Eliminate ventilation during unoccupied hours;**
- **Operate exhaust fans only when required;**
- **Verify that all outside air dampers are operating properly;**
- **Operate HVAC in economizer mode when conditions are favorable;**

- **Eliminate ductwork leaks;**
- **Reduce ductwork and piping resistance where possible;**
- **Avoid heating and cooling at the same time;**
- **Change filters as recommended;**
- **Clean HVAC coils;**
- **Test and balance HVAC systems;**
- **Optimize chiller operation;**
- **Recycle waste heat when feasible;**
- **Lower domestic hot water temperature;**
- **Repair hot, chilled, or domestic water leaks;**
- **Cut off nonessential gas to buildings during the summer;**
- **When replacing motors, use properly sized energy efficient motors;**
- **Balance three-phase loads;**
- **Use cog-type belts for higher efficiency;**
- **Eliminate steam trap leaks; and**
- **Properly insulate hot water and steam lines to reduce energy loss.**

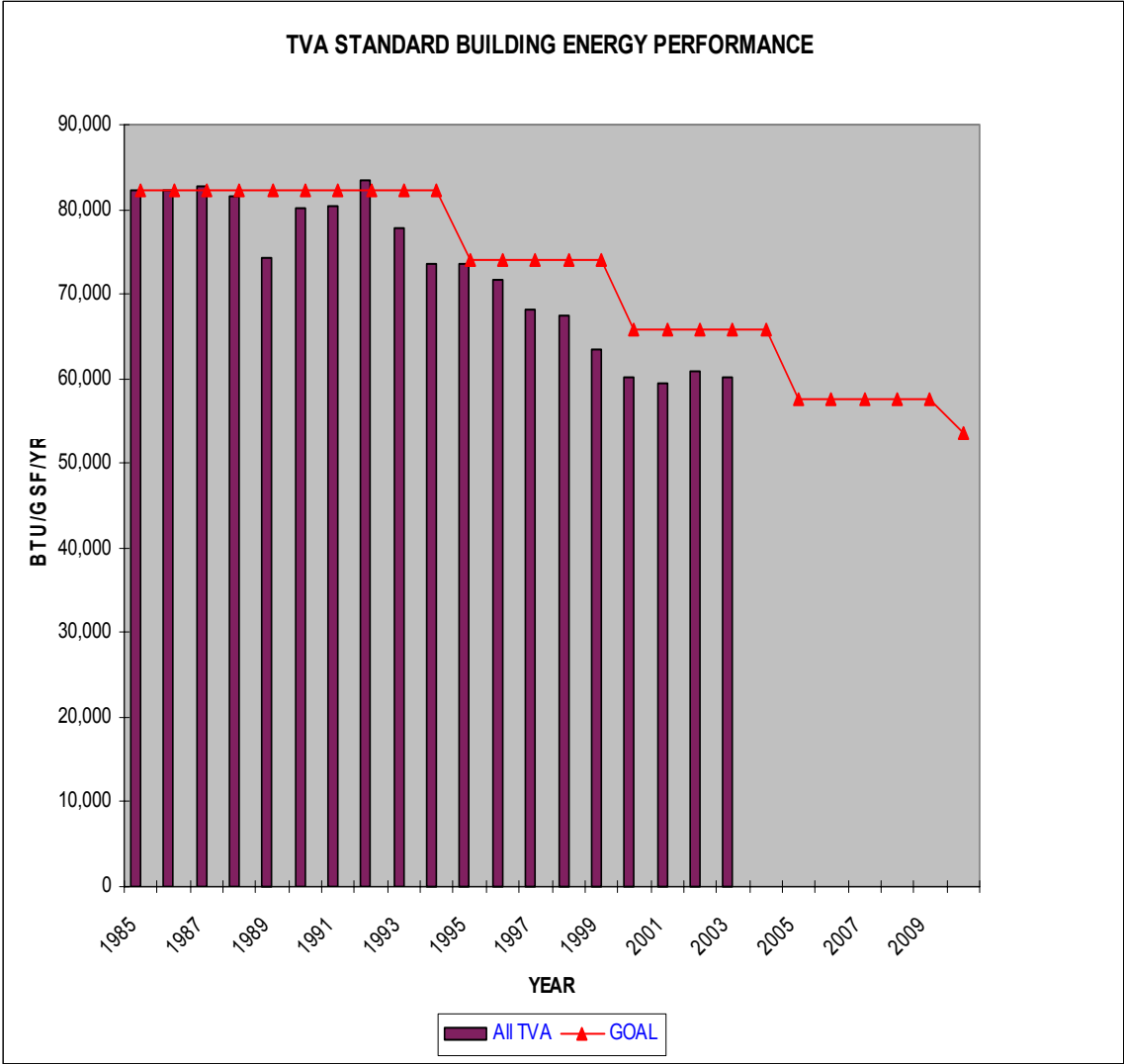
1. **Standard Buildings.** Report energy use for standard buildings in units of Btu-per-gross-square-foot (Btu/GSF) for FY 1985 (the base year) and FY 2003. Report the percent change from FY 1985 and from the FY 2002. (Note: This information will be reported on the agency's Energy Scorecard). Discuss any extenuating factors that may be skewing the accuracy of this performance measure.

Leased Spaced—Each agency that controls its Federally-owned building space or directly pays the utilities in its leased space will report to DOE the agency's aggregate energy consumption for various fuel types (see Data Report instructions). Reporting on leased buildings may pose some difficulty depending on the nature of the lease (partially serviced, fully serviced). In cases where an agency is responsible for paying utility bills for space that is leased, the agency is expected to report energy consumption for the leased space to DOE. If an agency is leasing from the General Services Administration, GSA is responsible for reporting.

Delegated Space—Agencies that have been delegated responsibility by GSA for operation and maintenance of buildings they occupy are required to report, to DOE, energy consumption for these buildings during the years the buildings are under their control. An agency should *not* adjust the FY 1985 baseline to reflect the addition of buildings delegated by GSA if those buildings were not under the agency's control during the base year period. The FY 1985 consumption and square footage of any building delegated after FY 1985 is included in GSA's FY 1985 baseline. To also include this square footage and consumption in the agency's baseline would result in double reporting. The impact of delegation activity on the Btu/GSF rates of most agencies should be minimal. In cases where building delegations account for a large increase in the percentage of an agency's building inventory and its Btu/GSF is greatly impacted, this situation will be documented in the text of DOE's Annual Report to Congress.

Lack of Base Year Data—Comparisons to a FY 1985 base year will not be possible for agencies that had no buildings under their control during the base year. Where comparisons to the FY 1985 base year are not possible, that specific item in the data table will be footnoted as "not applicable" in the report. In order to maintain accurate data and comply with the legislation, FEMP will work with relevant agencies to determine alternative approaches that would minimize double counting, but provide comparative information on Btu/GSF consumption.

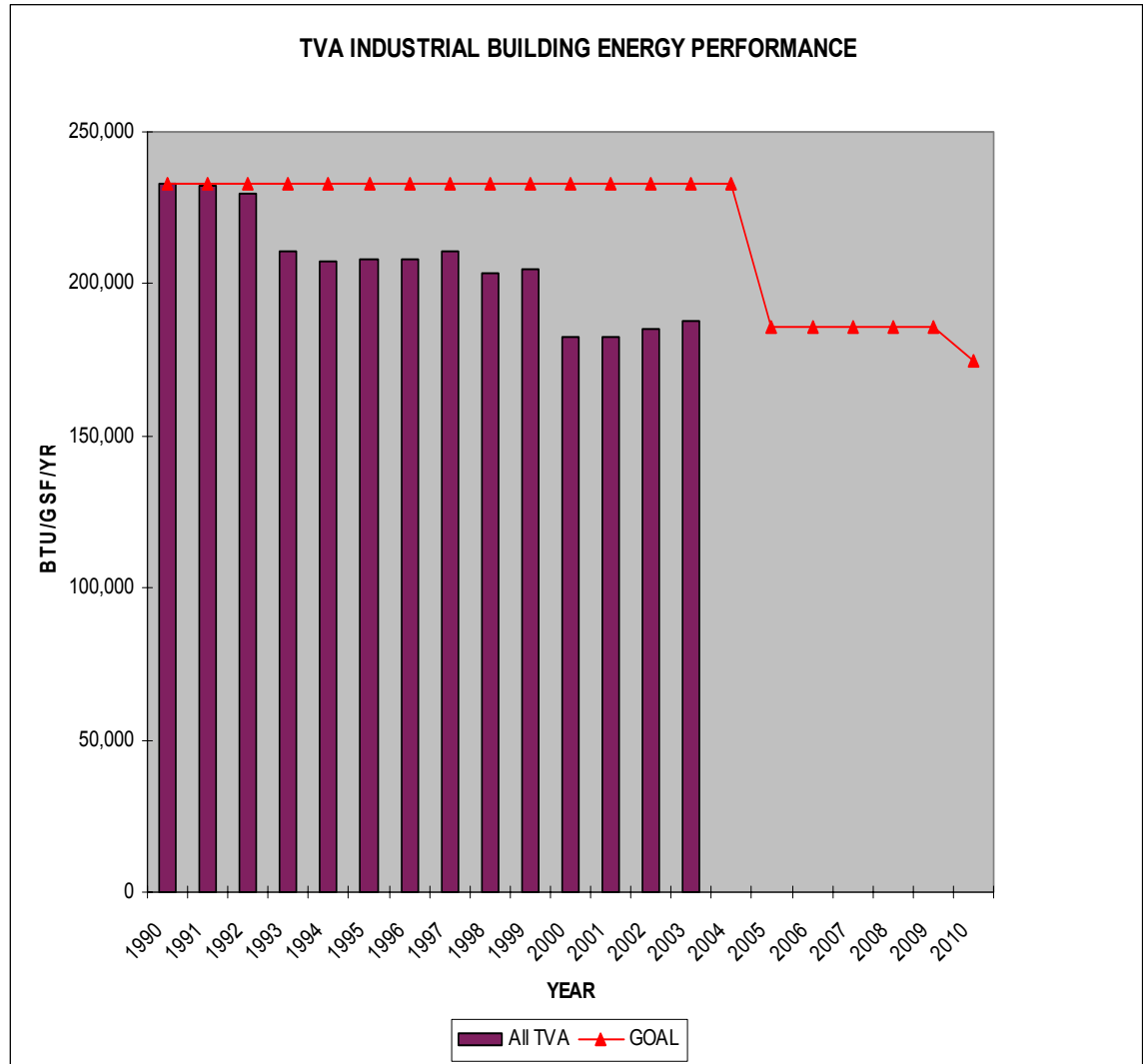
TVA continues to reduce energy use in its facilities through the coordination of energy management efforts. TVA has ended FY 2003 with a Btu/GSF of 60,256 which is a twenty-seven percent reduction from FY 1985.



2. **Industrial and Laboratory Facilities.** Identify the facility inventory subject to this goal, referencing Section IV, Part D that lists the buildings included. Describe the performance measure(s) used (Btu/square foot, Btu/production unit, etc.). (Refer to FEMP web site for the guidance document *Section 203 Performance Goals for Industrial, Laboratory, Research, and Other Energy-Intensive Facilities* www.eren.doe.gov/femp/resources/indust.html).

Report energy use (in the designated performance measure) for industrial and laboratory facilities for FY 1990 (the base year) and FY 2003. Report the percent change from FY 1990 and from the FY 2003. (Note: This information will be reported on the agency's Energy Scorecard). Discuss any extenuating factors that may be skewing the accuracy of this performance measure.

TVA has ended FY 2003 with a Btu/GSF of 187,849 which is a nineteen percent reduction from FY 1990.



3. **Exempt Facilities.** Refer to Section IV E—a list of exempt facilities and an explanation of why they were exempted. (Refer to DOE’s *Criteria for Exempting Facilities from the Goals of Executive Order 13123 and Guidance for Reporting Exemptions* www.eren.doe.gov/femp/resources/criteria.html).

Although buildings found exempt according to the criteria are not subject to the requirements of Sections 202 and 203 of Executive Order 13123, DOE will continue to collect energy consumption data for these buildings under the new reporting category of “Exempt Buildings.” This ensures that accurate reporting on overall Federal energy consumption is maintained.

TVA has a long history of demonstrating stewardship toward energy reduction and will continue to work toward reducing energy use in its generation, transmission and related energy intensive buildings. Energy reduction in these buildings has become increasingly more difficult given the majority of the energy consumption in these buildings is largely attributed to process energy (generation and transmission of electricity). In recognition of the above and the fact that only so much can be done to make these buildings more efficient in a cost effective manner, TVA, in discussion with DOE has decided to exempt these buildings. Attachment 5 contains a list of TVA’s exempt facilities.

The following is a list of projects implemented in FY 2003 or planned for future implementation related to energy/water efficiency and sustainability in these exempt facilities.

TRANSMISSION POWER SUPPLY EFFICIENCY

TVA’s Transmission Power Supply staff considers energy efficiency and environmental impacts for each project and activity. Following is a list of activities which have been completed in FY 2003 or planned for future implementation:

- **Reactive Power:** Optimizing the power factor of electrical supply helps minimize losses associated with the transmission of electricity. TVA has installed new capacitors at Summer Shade, West Cookeville, Crossville, Dickson, and Watts Bar Fossil Plant.
- **Replacement of Conductors:** Rebuilding transmission lines with larger conductors reduces losses. Present worth analyses enable the optimum conductor to be selected that balances the capital cost against losses for the life of the line and the predicted loading. Reconductored lines include Solutia-Ratcliff, Pin Hook-Hurricane Creek, Pin Hook-Murfreesboro Rd, Chickamauga-Hamilton, and Trinity-Morgan (2 lines).
- **Construction of New Lines:** New lines help to ensure that electricity can be delivered reliably for the minimum transmission loss. The environmental impact of new lines is very carefully minimized through careful design and route selection, study of all possible alternatives including new technologies, and realizing the best performance from existing resources, as well as a detailed process for public involvement. New lines were constructed from Eagle Bend-North Knoxville, West Ringgold-Dug Gap-Center Point, Jonesborough-Sullivan 161-kV Line,

Center Point-County Line 230-kV Line, Center Point-Alpha, and East Point-Hanceville.

- **New Substations and Line Loops:** Like new lines, designing a system with sufficient substations and connections to the transmission system enables supply to consumers to be achieved most directly while enhancing reliability and minimizing losses. New construction includes substations at Stateline and Pin Hook. New transmission connections include Colbert-Tupelo, Colbert - West Point, John Sevier-W. Johnson City, and Davidson-Wilson.
- **Replaced 500 kV GIS Switchyard at, Maury, TN 500 kV Substation with more efficient switchgear.**
- **Installed load-break switches on the Elizabethton-Cranberry transmission line at Roan Mountain Tap and Hampton Tap and on the Mayfield-Murray and Marshall-Murray transmission lines for more efficient load distribution.**
- **Replaced obsolete relays with more efficient solid-state relays on the Browns Ferry-Trinity #1, Browns Ferry-Maury, the Browns Ferry Union and the Davidson-Maury transmission lines.**
- **Continued installing steel poles instead of wood reducing the number of trees cut; replacing 1,639 existing wood poles with steel poles**
- **Installed over 2,640 steel cross arms for failing wooden cross arms.**
- **Continued yearly repair or replacement of a significant number of HVAC units as they were determined to no longer provide a high level of reliability. High efficiency electric heat pumps were used exclusively. Each through wall and window heat pump unit and central system heat pumps was required to have a Seasonal Energy Efficiency Rating (SEER) rating of 10 or higher.**
- **Smaller modular switchhouses which are more energy efficient are now being installed instead of the old block switchhouses of the past.**
- **Replaced 45 obsolete compressors for air blast breakers with more efficient units.**

HYDRO EFFICIENCY

The table below lists both completed and on-going projects at TVA hydro plants in FY 2003. These projects are aimed at increasing overall hydro efficiency by reducing energy consumption, maintaining plant availability, lowering maintenance costs, and increasing megawatt capacity. They also support environmental stewardship in that environmental impacts are included as part of the project development process. In addition, by maximizing hydro efficiency, TVA is able to burn less fossil fuel, reducing the amount of carbon released into the atmosphere.

As shown below, TVA's hydro modernization is of particular importance in terms of energy management. This initiative, designed to ensure the availability of reliable hydroelectric generation in the future, has improved the facilities' efficiency by an average of approximately 5 percent since its inception in 1992. When completed around 2015, TVA's modernization program will have increased the hydro system's power output by more than 700 MW. TVA's automation program, another key energy management initiative, also is significantly reducing operating costs and increasing hydro efficiency.

Plant Name	Project Name	Cost (000's)
Blue Ridge	Waterways Replacement	6,396
Blue Ridge	Replace Thrust Runner, Shoes, and Guide Shoes	532
Chickamauga	Replace Generator Neutral Oil Circuit Breakers	200
Douglas	Sluiceway Trash Racks	238
Fontana	Emergency Spillway-Closure Abandonment	558
Hiwassee	Replace Draft Tube Unwatering Pump	141
Hydro System	Coating Program	5,668
Hydro System	Transformer Replacement	3,050
Hydro System	Gate, Guides, Seals & Trash Racks	1,917
Hydro System	Remoting and Automation	13,974
Hydro System	Security Program	903
Hydro System	Tailwater Warning Device	732
Hydro System	Modernization Program	24,956
Hydro System	Unwatering Pump Program	478
Hydro System	Evaluation of Spillway Gates	200
Hydro System	Fire Protection/Detection Program	2,054
Hydro System	Standardized Maintenance Program	357
Hydro System	Navigation Lock Dewatering and Inspection	165
Melton Hill	Unit 1: Replace Generator Leads	182
Melton Hill	Unit 1: Replace Stator Winding	608

Pickwick	Rewind Unit 4 Stator	358
Pickwick	Shaft Replacement	714
Raccoon Mountain	Units 1-4: Capacity Upgrade	15,416
Watts Bar	Hydro Recovery	19,242
Wilson	Unit 20: Purchase & Install Stator Winding	1,004
	Total All Projects	100,043

NUCLEAR EFFICIENCY

TVA Nuclear considers energy efficiency and environmental impacts for each project and activity. Many projects were initiated or completed in FY 2003 to maintain plant availability and increase electrical generation. The following is a list of energy management and related environmental projects at TVA Nuclear plants in FY 2003.

NUCLEAR ENERGY PROJECTS COMPLETED IN FY 2003

Plant Name	Project Name	Cost (000's)
Browns Ferry	Increased Unit 2 electrical generation 4 MW/hr by installing a more efficient power source for the reactor cooling water recirculation pumps.	8,381
Browns Ferry	Installed a more accurate Unit 2 Main Control Room MVAR Meter to better quantify generation losses and improve thermal efficiency. Estimated 0.5 MWe/hr losses per year will be identified and corrected as the project progresses.	277

Sequoyah	Improved heat rate and life of plant by replacing the Unit 1 steam generators. Steam generator replacement in combination with generator high pressure turbine rotor replacement increased Unit 1 electrical output by 21 MW/hr.	175,806
Sequoyah	Improved heat rate by replacing the Unit 1 generator high pressure turbine rotor.	7,364
Sequoyah	Replaced 4 transformers containing PCB with non-PCB transformers.	590
	Total All Projects	192,418

NUCLEAR ENERGY PROJECTS IN PROGRESS IN FY 2003

Plant Name	Project Name	Cost (000's)
Browns Ferry	Increase Unit 3 electrical generation 4 MW/hr by installing a more efficient power source for the reactor cooling water recirculation pumps.	7,250
Browns Ferry	Install a spent reactor fuel dry storage facility.	19,108
Browns Ferry	Remove PCBs from transformers.	3,222
Browns Ferry	Increase Unit 2 and 3 electrical output by 110 MW/hr per Unit.	172,425
Browns Ferry	Restart the Unit 1 reactor, 1280 MWe/hr	1,733,400
Sequoyah	Install a spent reactor fuel storage facility.	26,277
Sequoyah	Remove PCBs from transformers.	4,768
Sequoyah	Increase Unit 2 electrical generation at least 13 MW/hr by replacing the generator high pressure turbine rotor.	10,067
Watts Bar	Improve Unit 1 heat rate by replacing the steam generators	216,662
Watts Bar	Increase annual Watts Bar Dam electrical generation 3 MW/hr by	893

	raising Watts Bar Nuclear Plant design and license basis ultimate heat sink temperature.	
	Total All Projects	2,194,072

FOSSIL EFFICIENCY

Fossil Power Group has made significant improvements in reducing the number of forced outages at its fossil power plants since the implementation of the Failure Prevention Initiative in June 2000 and the Human Performance Initiative in the Spring of 2001. In FY 2003, TVA reduced the number of forced outages at its fossil plants by 20 percent compared to the number in FY 2001. In addition, an overall reduction of 13 percent has been achieved in the total number of outages which includes forced, maintenance, and planned outages. The reduction in number of outages means fewer generating unit startups which improves unit operational efficiency and helps reduce the delivered cost of power.

Many energy management and related environmental projects were completed at TVA Fossil plants during FY 2003. We support these projects which include heat rate improvements, maintaining plant availability, reducing energy consumption, lowering maintenance costs, environmental stewardship, and increasing overall efficiency.

The following is a list of projects for FY 2003:

Plant	Description	Cost (000's)
Paradise	PAF--U3 Replace ILP Turbine Buckets	2,139
Allen	ALF--U2-3 Bio-Gas Fuel Supplement	5,290
Allen	ALF--U3 Replace #8 HP Feedwater Heater	1,663
Allen	ALF--U1 Selective Catalytic Reduction (SCR) Addition	34,206
Allen	ALF--U2 Selective Catalytic Reduction (SCR) Addition	28,906
Allen	ALF--U3 Selective Catalytic Reduction (SCR) Addition	48,832
Allen	ALF--U1-3 Install Water Cannons	2,944
Colbert	COF--U1 Air Preheater	2,132
Colbert	COF--U1 Sootblower Retrofit	1,156
Colbert	COF--U2 Sootblower Retrofit	938
Colbert	COF--U4 Sootblower Retrofit	761
Cumberland	CUF--U2 HP Turbine - Replace Rotor & Inner Cylinder Blades	4,301

Cumberland	CUF--U1 HP Turbine Capacity Increase	7,936
John Sevier	JSF--U1 Replace Long & Rotary Sootblowers	780
John Sevier	JSF--U4 Replace Long & Rotary Sootblowers	1,183
Shawnee	SHF--U5 Upgrade HP Stationaries	733
Shawnee	SHF--U7 Upgrade IP Stationaries	393
Widows Creek	WCF--U6 Refurbish/Replace LPSF&LPDF L-0 Blades	810
	Total All Projects	145,103

Following is a list of ongoing and/or future Projects:

Plant	PROJECT TITLE	Cost (000's)
Allen	ALF--U1 Replace #8 HP Feedwater Heater	2,229
Allen	ALF--U3 Retube #6 HP Feedwater Heater	700
Bull Run	BRF--U1 HP TurbineE - Replace Rotor & Inner Cylinder	11,564
Bull Run	BRF--U1 LP Heaters Replacement	1,289
Colbert	COF--U4 Air Preheater	2,178
Gallatin	GAF--U3 IP Turbine Replace Nozzle Block	449
Gallatin	GAF--U1 IP Nozzle Replacement	913
Gallatin	GAF--U1 HPT Control Stage Upgrade, Nozzle, Blading Replacement	760
Johnsonville	JOF--U3 Condenser Tube Replacement of West Side	506
Kingston	KIF--U5 Replacement of HP Feedwater Heater #3	621
Kingston	KIF - U1 Replace Air Preheaters	310
Kingston	KIF - U2 Replace Air Preheaters	310
Kingston	KIF - U3 Replace Air Preheaters	310
Kingston	KIF - U4 Replace Air Preheaters	310
Kingston	KIF - U5 Replace Air Preheaters	355
Kingston	KIF - U7 Replace Air Preheaters	355
Kingston	KIF - U8 Replace Air Preheaters	355
Paradise	PAF--U1 HP Capacity Increase	6,701
Paradise	PAF--U3 HP Capacity Increase	9,616
	Total All Projects	39,831

- 4. Tactical Vehicle and Equipment Fuel Use.** Refer to the Data Report to identify the fuel use for tactical vehicles and other equipment. Discuss trends in the use of each type of fuel and methods employed to reduce fuel use.

Vehicle Fleet Consumption—To relieve reporting burdens on Federal agencies, GSA's Agency Report of Motor Vehicle Data (Form SF-82) was revised for collecting acquisition, fuel consumption, and fuel cost data for motor vehicles directly from vehicle fleet managers. The use of the SF-82 eliminated the need to report fuel consumption data for non-tactical motor vehicles to DOE. GSA now collects this data, including alternative fuel consumption data reported under Sections 303 and 308 of EPACT, and forwards this information to DOE for inclusion in the Annual Report to Congress. For more information on the SF-82, please contact Ms. Lois Mandell of GSA's Federal Vehicle Policy Division at (202) 501-2824.

FLEET FUEL EFFICIENCY

TVA's fleet strategy is to examine current vehicle use and where possible, when vehicles need replacement, choose those that are most efficient. TVA, as a major provider of electricity will continue to make use of alternative fueled vehicles (AFVs) including those that use electric power and acquire additional vehicles to meet requirements under EPAct92. TVA has recognized the value of hybrid electric vehicle technology in reducing fuel consumption, increasing versatility, and promoting electric propulsion and has included these vehicles in its fleet. TVA created a hybrid-fleet program in FY 2002 which is a partnership effort between TVA's Energy Management and Fleet Management organizations. TVA added two hybrid gas/electric vehicles to its fleet in FY 2002 and eleven in FY 2003.

During FY 2003 TVA increased gasoline fuel use by eleven percent and diesel fuel use by thirty-eight percent compared to FY 2002. The increase in gasoline and diesel use is mostly due to the increased trucking of fuel to the combustion turbine sites, construction at the Browns Ferry Nuclear site and construction of selective catalytic reduction (SCR) scrubbers to meet clean air act requirements at many TVA fossil fuel generation sites.

VEHICLE FUEL EFFICIENCY OUTREACH PROGRAMS

TVA encourages employees to use mass transit systems, vans for group travel, and car pools, when available and feasible. The use of coordinated TVA and vendor delivery, pickup routing schedules, and just-in-time delivery is utilized throughout TVA. This coordinated effort avoids double handling and, multiple trips to the same sites, and reduces deadheading.

The TVA service area covers all of Tennessee and portions of six other states, therefore employees are widely dispersed and often travel significant distances to attend meetings and presentations. TVA continues to install technologies which enable employees to travel less and conduct more meetings from their remote work sites. The reduction of required travel realized through telecommunication improvements has resulted in a savings of fuel and related expenses. Also, saving electrical energy consumption is a conscious decision factor when selecting and purchasing new equipment with energy saving features. Examples include the following:

- **Meeting Place** – This technology enables audio conferencing, real-time online document collaboration, and remote presentations among employees at different locations. Employees can participate in audio conferencing without operator assistance, simultaneously share, view, and edit documents from computers, and conduct and participate in remote presentations without having to travel. On average, over 1,850 such meetings are held monthly using this system.
- **Work From Home** – There are approximately 3,800 employees who have dial-up access capability. These employees have the ability to conduct TVA business from their computer at home or elsewhere off TVA premises, which can result in savings if travel is not required to conduct work.

The capability to work from home also allows IS support staff to resolve virus, security related problems, and other issues from home. Prior to implementing this capability, staff would have to travel to work locations to resolve problems that can now be resolved remotely, therefore saving fuel and related expenses.

- **Video Conference Rooms** – TVA has 46 video conference rooms throughout the Tennessee Valley service area. Approximately 1,240 video conferences were held in FY 2003, eliminating the need for travel to these meetings.
- **PC and Monitor Efficiency** - During the past year TVA replaced approximately 3,000 computers with new units that have the latest energy savings features. It is policy to enable all energy saving features available in new PCs and monitors so the maximum possible energy savings can be realized.
- **Conference Calls** – There were approximately 120 conference calls set up monthly by TVA operations which enabled employees to conduct business without having to travel and meet face-to-face.
- **Streaming Media** – This technology was introduced the last quarter of FY 2003 and is quickly becoming a popular medium of sharing real-time presentations through employee computers. Employees can now view presentation from their office without having to travel to video conference facilities or to the origin of the presentation. Usage data has yet to be captured on this new technology.

HEAVY EQUIPMENT

Utilization of the Total Base Number (TBN - measure of oil's alkaline) value as an oil indicator has resulted in a reduction in TVA's oil consumption due to extended oil drain intervals. Accordingly, the oil change interval in some of the smaller diesel engines has changed to 320 hours or 10,000 miles to protect TVA's equipment. Turbo pre-cleaners are being used on tractor scrapers and dozers to lengthen air filter life and extend oil change intervals. Air filter indicators used on TVA's equipment have reduced filter changes (especially oil bath type), and additionally provide better engine protection. We continued the program of TBN oil values for FY 2003.

TVA uses Fuel Mag with small compressors to kill bacteria and spores that grow in fuel that is stored for long periods of time. It should decrease the amount of contaminated fuel that has to be disposed. These units can also eliminate down time due to filter and fuel injector plugging.

TVA's maintenance shops are using filter crushers to get all possible oil out of filters before disposal. The three maintenance facilities are using oil burners to heat their facilities using TVA's generated used oil.

These projects provide TVA with the benefits of reduced potential of adverse environmental impacts from spillage of waste oil and fuel, increased operational efficiency, increased availability of units, and decreased cost due to reduction in oil consumption.

TVA incorporates EPA emission standards in specifications for both on-road and off-road trucks.

FEDERAL VEHICLE FUEL EFFICIENCY

The following tables show a comparison of TVA's annual mileage and miles per gallon (mpg) performance for sedans and light trucks from FY 1975 through FY 2003.

ANNUAL MILEAGE

FY	Miles Driven		Percent Increase/(Decrease)	
	Sedans	Trucks*	Sedans Base Yr. 75	Trucks* Base Yr.79
75	12,222,850	N/A	0	N/A
76	14,698,600	N/A	20	N/A
77	14,331,650	N/A	17	N/A
78	14,101,300	N/A	15	N/A
79	13,779,900	25,947,000	13	0.0
80	14,788,300	25,989,000	21	0.2
81	14,922,450	27,655,000	22	7
82	24,714,480	24,878,000	4	(4)
83	12,125,848	25,122,699	(1)	(3)
84	11,760,288	24,947,558	(4)	(4)
85	11,958,251	21,237,202	(2)	(18)
86	12,359,000	24,954,488	1	(4)
87	12,905,706	24,064,000	6	(7)
88	12,650,124	24,008,436	3	(7)
89	11,312,417	22,599,061	(7)	(13)
90	15,665,480	23,516,512	28	(9)
91	19,175,027	24,120,233	57	(7)
92	23,264,550	24,318,622	91	(6)
93	25,557,833	25,702,300	109	(1)
94	29,766,173	23,947,797	144	(8)
95	30,096,968	23,996,720	146	(8)
96	28,388,572	24,998,289	132	(4)
97	20,298,902	24,343,292	66	(6)
98	7,124,589	26,623,769	(42)	3
99	7,939,345	21,335,796	(35)	(18)
00	9,723,679	27,701,582	(20)	5
01	9,290,949	25,242,686	(24)	(3)
02	10,793,620	23,520,150	(12)	(9)
03	11,788,288	26,175,474	(4)	1

*Figures for Trucks include both light duty (<8500 lbs GVWR) & medium duty (8501 – 16000 lbs GVWR).

MPG PERFORMANCE

FY	Annual MPG			Percent Increase/(Decrease)		
	Sedans Base Yr. 75	Trucks*		Sedans Base Yr. 75	Trucks*	
		Base Yr. 79	4 x 2		4 x 4	Base Yr. 79
75	15.1	N/A	N/A	0	N/A	N/A
76	15.0	N/A	N/A	(1)	N/A	N/A
77	15.6	N/A	N/A	3	N/A	N/A
78	16.2	N/A	N/A	7	N/A	N/A
79	16.3	11.6	8.2	8	0	0
80	17.9	12.0	8.3	19	3	1
81	19.2	13.2	7.9	27	14	(4)
82	22.7	14.2	8.5	50	22	4
83	26.2	16.0	9.8	74	38	20
84	27.5	16.4	9.5	82	41	16
85	26.9	16.1	10.2	78	39	24
86	27.6	18.2	10.8	83	57	32
87	26.6	17.5	11.4	76	51	39
88	24.6	15.3	11.0	63	32	34
89	28.3	15.9	13.1	87	37	60
90	28.4	15.7	11.6	88	35	41
91	29.6	18.2	15.7	96	57	91
92	27.7	21.2	12.4	84	83	52
93	31.9	17.3	13.6	105	49	66
94	29.8	15.5	12.9	97	34	57
95	31.2	14.5	13.4	107	25	63
96	29.1	13.2	12.7	66	14	44
97	28.3	14.2	12.7	87	22	44
98	26.6	15.4	14.4	76	33	76
99	25.4	12.8	11.9	68	10	45
00	26.3	13.7	12.8	74	18	56
01	26.6	13.9	13.2	76	20	61
02	26.0	14.1	12.9	72	22	57
03	27.4	14.0	12.7	81	21	55

*Figures for Trucks include both light duty (<8500 lbs GVWR) & medium duty (8501 - 16000 lbs GVWR).

PROCUREMENT OF ALTERNATIVE FUELED VEHICLES

As a major supplier of electricity, TVA is particularly interested in supporting the use of electric vehicles (EVs). TVA has incorporated EVs into its fleet operations and supports power distributors and local communities with EV technology demonstrations. TVA is also utilizing electric vehicles at its plant sites to reduce fuel consumption and emissions.

TVA currently has the following EVs:

- **1 U.S. Electricar Prism sedans**
- **4 Solectria Ford sedans**
- **2 Ford Ranger pickup trucks**
- **3 GEM electric cars**
- **5 EZGOs electric vehicles**

- B. Renewable Energy.** Discuss agency's policy and efforts to encourage purchase of electricity generated from renewable energy sources. (Note: The quantitative information related to this section [see below] will be reported on the agency's Data Report and Energy Scorecard. On the Energy Scorecard, self-generated renewable energy use and purchased renewable energy use will be aggregated into a single value).

GREEN POWER SWITCH® (GPS)

TVA and twelve public power companies launched GPS on Earth Day, April 22, 2000. GPS was the first program of its kind offered in the Southeast and provided consumers with an economic opportunity to participate in TVA's development of renewable energy resources. The program originally included supply from wind and solar energy sources. The program was expanded in FY 2001 to include electricity generated from methane gas at a landfill in Murfreesboro, Tennessee, and a waste water treatment plant in Memphis, Tennessee. Future expansion plans include additional wind turbines and solar installations at locations across the Tennessee Valley.

Fifteen solar generating facilities are presently operating in Tennessee, Kentucky, Alabama, Virginia and Mississippi. One additional solar installation is planned to be built in Memphis, Tennessee, during FY 2004. One commercial scale wind power generation site has been operational since November 2000. TVA is in negotiations to purchase power from new wind turbines. These wind turbines will be added to the existing wind site located on Buffalo Mountain in Anderson County, Tennessee, by the end of FY 2004. GPS also benefits from generation produced from a four megawatt waste water treatment methane gas project located at TVA's Allen Fossil plant near Memphis, Tennessee. The GPS program is managed through TVA's Marketing Organization.

Under the GPS program, residential customers can purchase green power blocks of 150 kilowatt hours each, at a cost of \$4.00 per block. These blocks represent approximately, twelve percent of a typical home's monthly energy use. Commercial and industrial customers can sign up for 150 kilowatt hour blocks at a cost of \$4.00 per block based on the amount of energy they use each month. When two blocks of GPS are purchased each month for one year, the associated reduction of atmospheric carbon dioxide is equivalent to planting an acre of trees in the Tennessee Valley. As of September 30, 2003, there were 7,097 residential customers purchasing 12,255 blocks and 358 business customers purchasing 10,361 blocks for a total of 22,616 purchased blocks of green power.

Today there are 65 TVA power distributors and one direct served customer participating in the GPS program throughout the Tennessee Valley. TVA plans to continue expanding the GPS program by offering it to additional power distributors as renewable energy supplies allow.

TVA's GPS program was awarded the "2003 TVA Environmental Excellence Award for Partnership and Public Involvement" and the "2003 Center for Resource Solution National Award for Creative Marketing of Green Power". GPS and the State of Tennessee's Department of Environment & Conservation awarded Lowe's Home Improvement Warehouse for their leadership in purchasing green power for their TVA's service area stores. Lowe's was the largest purchaser of green power in the southeastern U.S. in FY 2003.

TVA launched the Generation Partners Program in support of Green Power Switch. Generation Partners pays customers fifteen cents per kWh for all the generation they produce from solar and wind generation installed on their home or small business. The energy from Generation Partners is used to supply renewable energy for Green Power Switch.

RENEWABLE ENERGY TECHNOLOGY MONITORING

The purpose of the program is to monitor and evaluate new technologies in wind energy, solar photovoltaics (PVs), and biopower. Additionally, advanced wind energy forecasting and storage technologies are being monitored and evaluated.

Renewable energy technologies are becoming more reliable and cost effective. As more utilities offer renewable energy alternatives, manufacturers achieve lower costs through economy of scale. The cost of wind energy, for example, has decreased about ninety percent over the last 20 years. Renewable energy portfolios are mandated in 13 states and may be mandated at the national level in the near future. In anticipation of renewable portfolio mandates and in response to customer needs TVA continues to assess and evaluate new and advanced renewable technologies.

Advanced wind energy forecasting and resource assessment technologies aid in the selection of wind farm sites, resulting in increased efficiencies and lower costs. Hybrid systems, such as combining a renewable resource like wind with energy storage, are also being evaluated. Hybrid systems may alleviate the intermittency problem associated with renewables and result in higher value renewables when the demand is at its greatest. These advancements in technologies will ultimately result in the ability to offer competitively priced renewable energy.

1. **Self-generated renewable energy.** Identify/estimate energy use from electricity self-generated from renewable sources (photovoltaics, wind turbines) and renewable energy thermal projects (solar thermal, biomass, geothermal). Also report energy generated on Federal lands or by projects facilitated by your agency, but which may be sold to other parties. Agencies should report the annual energy generated from all renewable energy systems installed after 1990 and in place during FY 2003.

TVA utilizes photovoltaics, wind, and methane as part of its mix to provide renewable energy to its customers through its GPS program.

2. **Purchased renewable energy.** Identify the renewable (i.e., wind, solar, geothermal, biomass) energy component of power purchases under competitive contract in megawatt-hours. (Note: Guidelines for counting renewable energy projects and purchases of electricity from renewable energy sources toward agency progress in reaching their goals are available on the FEMP web site www.eren.doe.gov/femp/resources/countguide.html. Information on the Federal renewable energy goal is also available on the FEMP Web site at www.eren.doe.gov/femp/resources/renewableguide.html).

TVA purchased 1,170 MWh from the TVA GPS program for use in its Knoxville Office Complex, Chattanooga Office Complex, and Huntsville office.

TVA's current efforts are directed toward large scale solar installations in highly visible locations through its GPS program. The Generation Partners Program allows residential and small commercial customers to install solar/wind generation and sell their excess power to TVA's GPS program.

- C. **Petroleum.** Identify petroleum-based fuels (fuel oil, LPG/propane) used in buildings in FY 1985 and in FY 2003 and the percentage change from FY 1985. (Note: The FY 2003 data will be reported on the Data Report and the Energy Scorecard).

TVA consumed 10,712 gallons of petroleum in building operations in FY 2003 which is a decrease of fifty-one percent from the FY 1985 baseline of 21,920 gallons.

D. Water Conservation. Identify/estimate water consumption and cost by the agency in FY 2003 and outline any agency-specific issues related to collection of water consumption data. (Note: This information will be reported on the Data Report and the Energy Scorecard). Refer to DOE's *Guidance to Federal Agencies for Determining Baseline Water Usage* and *Guidance to Establish Water Efficiency Improvement Goal for Federal Agencies* on the FEMP web site <http://www.eere.energy.gov/femp/resources/water.html> and <http://www.eere.energy.gov/femp/resources/waterguide.html>. Also in this section, highlight activities undertaken to improve water efficiency. Discuss progress in developing Water Management Plans and implementing Best Management Practices for efficient use of water (See the document, *Guidance to Establish Water Efficiency Improvement Goal for Federal Agencies* on FEMP's Web site www.eere.energy.gov/femp/resources/waterguide.html.)

During FY 2003 energy surveys including water were conducted at multiple TVA power plant sites.

TVA consumed 171,700,000 gallons of potable water in FY 2003 with an estimated cost of \$359,700. These numbers exclude the water consumption of the exempt buildings.

TVA considers water management plans as part of its operation and maintenance activities. As part of these activities more than 70 facilities have been covered representing over 3.6 million GSF. This represents over thirty-seven percent of TVA's standard and industrial facilities GSF.

To date TVA has implemented the Best Management Practices (BMPs) in more than eleven percent of its gross square footage.

III. Implementation Strategies. The purpose of this section is to identify and describe the use of strategies to reduce energy consumption and improve energy efficiency. It is not expected that each agency will have employed every strategy; rather, each strategy identified in Executive Order 13123 is listed as a subsection to remind agency officials of the existence of these strategies and to encourage their use where practical and life-cycle cost effective.

In each of the following subsections, present highlights for each of the strategies that were used. If certain strategies were not used, explain why not. Please provide narrative where strategies that were identified as focal points in the previous year's Implementation Plan were successful, where challenges existed in implementing strategies, and how challenges were overcome.

TVA implements many energy management measures through a number of strategies which include the following:

AGENCY ENERGY MANAGEMENT COMMITTEE

TVA Agency Energy Management Committee is a forum for sharing of information and success stories on energy efficiency efforts for application across the agency.

NEW CONSTRUCTION

TVA combines teams of designers to incorporate energy efficiency and sustainability at the start of new building designs.

RENOVATION

TVA takes advantage of renovation activities by incorporating energy efficiency and sustainability into its spaces that are being reconfigured for change.

OPERATIONS & MAINTENANCE

Operation and maintenance (O&M) personnel are the front line, used to identify potential energy and sustainable problems and opportunities on a daily basis. O&M staff take corrective action where needed and seek help from engineering, energy and sustainable staff to resolve technical issues when necessary.

Examples of O&M activities are the efficient operation of building EMCS systems, the placement of controls on lighting and other energy consuming equipment, and replacement of inefficient lighting when actions are determined to be life-cycle cost effective. In addition TVA considers efficiency improvements in its industrial, power plant and transmission operations when life-cycle cost effective.

As part of its operation and maintenance function, TVA has an emergency curtailment procedure which reduces energy use in its buildings during energy emergencies.

VEHICLE FUEL

TVA looks at its overall fleet and business needs on a continuous basis to match the work needs of each individual to the most efficient vehicle. TVA investigates efficient vehicles such as hybrid cars and adds these vehicles to its fleet to meet business needs. TVA also investigates ways to extend the life cycle of vehicles especially special purpose vehicles. TVA's detailed Fleet Strategy is provided as Attachment 9.

A. Life-Cycle Cost Analysis. Outline procedures in place to ensure the use of life-cycle cost analysis in making investment decisions about in products, services, construction, and other projects to lower the Federal Government's costs and to reduce energy and water consumption. Highlight examples where life-cycle cost analysis was used in capital budgeting decisions concerning

energy efficiency. Report on the successes and challenges of implementing life-cycle cost effective projects. (Under EPACT, energy conservation projects that will pay back investment costs within 10 years must be undertaken).

TVA's Energy Plan provides that life-cycle analysis will be used in making investment decisions regarding energy/water efficiency and sustainable measures.

- B. Facility Energy Audits.** Describe the number/percentage of agency facilities audited for energy and water efficiency during FY 2003, and the total percentage of facilities audited to date. (In accordance with EPACT and Executive Order 13123, approximately 10 percent of facilities should be audited each year).

TVA has evaluated building inventory for potential energy conservation measures. These facilities are being re-evaluated in accordance with E.O. 13123 and TVA's Memorandum of Understanding with the EPA. This past summer, TVA completed survey efforts at its fossil facilities to update building inventory information and uncover potential energy/water-saving opportunities.

- C. Financing Mechanisms.** Provide narrative information related to the use of Energy-Savings Performance Contracts (ESPCs) and Utility Energy Services Contracts (UESCs). (Note: Quantitative information related to ESPCs and UESCs will be reported on the Data Report and the Energy Scorecard). Report funding requested and received for FY 2002 and funding requested for FY 2003 for the performance of energy surveys/audits and for applied energy conservation measures (Note: This information will be reported on the Data Report).

Funding procedures for energy management and related environmental projects are reviewed through the IEMP and the AEMC. Recommendations and comments are submitted to the proper organizations for implementation consideration. Projects for facilities are primarily funded through renovation, operation, maintenance, and modernization efforts. Projects covered under general operations are ranked for economic benefit compared to other TVA projects to determine funding availability and implementation status and are funded mainly through the capital budgeting process.

- D. ENERGY STAR[®] and Other Energy-Efficient Products.** Describe steps taken to promote the purchase of ENERGY STAR[®] products and/or products that are in the upper 25 percent of energy efficiency as designated by FEMP. Note whether energy efficient criteria have been incorporated into all guide specifications and product specifications developed for new construction and renovation. Also note whether such criteria have been incorporated into product specification language. (See the ENERGY STAR[®] products and "green" products web sites by GSA [www.fss.gsa.gov/enviro], DOE [www.eere.energy.gov/femp/procurement/], and EPA [www.energystar.gov/products/])

TVA's Energy Plan provides that TVA will strive, where cost-effective, to meet the Energy Star Building criteria for energy performance and indoor environmental quality in eligible facilities to the maximum extent practicable as described by section 403(c) of E.O. 13123. This includes purchasing Energy Star and other energy efficient products when feasible.

TVA continues its efforts to buy materials which have positive environmental qualities including soy ink, rechargeable batteries, low mercury lamps, and non-toxic supplies. TVA also purchases materials which meet sustainable architecture criteria. These are non-toxic building materials which have recycled content, and their creation, use, and disposal does not damage the environment.

- E. **Energy Star® Buildings.** Report the number and percentage of buildings that have met the Energy Star® Building criteria and have officially been designated ENERGY STAR® Buildings. (Buildings must rank in the top 25 percent in energy efficiency relative to comparable commercial and Federal buildings to be eligible for the ENERGY STAR® Buildings designation. See www.energystar.gov).

TVA currently has two facilities that meet the ENERGY STAR® Buildings criteria. These are the Chattanooga Office Complex and the Edney building which represent 11 percent of TVA's overall corporate square footage.

- F. **Sustainable Building Design.** Report whether sustainable building design principles have been incorporated into the siting, design, and construction of new facilities. (See www.wbdg.org for a description of sustainable building design principles).

TVA is incorporating sustainable design criteria into renovation and new construction efforts. A Sustainable Checklist and Design Guideline along with an Energy Process that includes sustainability have been written and are being reviewed by the AEMC and management. All of these efforts are being done as part of an agency sustainable program under TVA's IEMP.

TVA continues to buy materials that have positive environmental qualities and include those that meet RCRA requirements and other recycled content materials. Examples of environmental products purchased include soy ink, rechargeable batteries, low mercury lamps, and non-toxic supplies and movable/reusable wall systems in place of drywall. TVA also purchases materials which meet sustainable architecture criteria. These non-toxic building materials have recycled content, and their creation, use, and disposal minimize environmental impacts.

- G. **Energy Efficiency in Lease Provisions.** Describe how energy and water efficiency are considered when agencies enter into new leases or renegotiate/extend existing leases (e.g., preference for buildings with sustainable design and development, preference for certified ENERGY STAR® Buildings, etc.)

Where applicable, TVA uses model lease provisions based on those recommended by the General Services Administration (GSA) and such provisions will be incorporated into new and renewed leases provided they are cost-effective. The model lease provisions address energy and water efficiency.

- H. Industrial Facility Efficiency Improvements.** Highlight activities undertaken to explore efficiency opportunities in energy-intensive facilities. This may include activity in the following areas: steam systems, boiler operation, air compressor systems, industrial processes, fuel switching, cogeneration, and other efficiency and renewable energy technologies.

TVA continuously looks for opportunities to improve energy efficiency in its industrial facilities. During FY 2003 several projects were implemented in TVA industrial facilities including the replacement of four chilled water pumps with higher efficiency pumps in the TVA Monteagle Place computer center. In Monteagle Place the condensing tube bundles were acid cleaned which should give us a better than 10 percent increase in performance. In some of TVA's lab facilities high-efficiency heat pumps were installed which are connected to TVA's EMC system for more efficient control.

- I. Highly Efficient Systems.** Describe new construction and/or retrofit projects for which combined cooling, heating, and power systems were installed. Report whether local natural resources were surveyed to optimize use of available biomass, geothermal, or other naturally occurring energy sources.

TVA considers the implementation of high efficiency systems as mentioned above when it is life-cycle cost effective.

- J. Off-Grid Generation.** Describe the installation of non-renewable distributed generation technologies such as fuel cells, microturbines, generators (dedicated and peak shaving), and other power generation alternatives. Distributed generation from renewable sources (solar, wind, etc.) should have already been reported in Section II, part B. Some distributed generation projects could be grid connected and should be reported if used by the agency to reduce demand usage from the power grid.

TVA is currently researching, testing, and demonstrating the use of green power technologies.

- K. Electrical Load Reduction Measures.** Describe agency activities undertaken to reduce electricity load during power emergencies. These activities are required under the President's Memorandum of May 3, 2001 on Energy Conservation at Federal Facilities. (See www.eren.doe.gov/femp/resources/presidential_direct.html for information on electrical load reduction measures.)

As part of its operation and maintenance function, TVA has an emergency curtailment procedure which reduces energy use in its buildings during energy emergencies.

IV Data Tables and Inventories. Include the items listed below:

- **FY 2003 Annual Energy Management Data Report.** A blank Data Report form and instructions for completing the form is included as Attachment 1 of this Guidance. Also include a Data Report for any revisions to past years' energy data along with an explanation for the revision.
- **Energy Scorecard for FY 2003.** A blank Scorecard is included as Attachment 2 of this Guidance.
- **Goals of Executive Order 13123 and NECPA/EPACT (optional).** This table was prepared by OMB/DOE and is attached to this guidance document. Agencies may wish to include this table in their Annual Reports for reference (see Attachment 3).
- **Industrial and Laboratory Facilities Inventory.** This should include the following information: building name and building location (city and state) (see Attachment 4).
- **Exempt Facilities Inventory.** This should include the following information: building name, building location (city and state), and justification for exempt status.

V. Attachment. Attach a FY 2004 Implementation Plan to this FY 2003 Annual Report. Consult Attachment 6, *Guidance for Preparing the Federal Agency Implementation Plan for FY 2004*.

- 1) **FY 2003 Annual Energy Management Data Report (electronic file "Attachment 1_DataReport_12-03.xls")**
- 2) **Energy Scorecard for FY 2003 (electronic file "Attachment 2_Scorecard_12-03.doc")**
- 3) **Goals of Executive Order 13123 and NECPA/EPACT (electronic file "Attachment 3_EO_13123_Goals_12-03.doc")**
- 4) **Industrial & Lab Buildings (electronic file "Attachment 4_Industrial_Lab_12-03.xls")**
- 5) **Exempt Facilities Inventory (electronic file "Attachment 5_Exempt Facilities_12-03.xls")**
- 6) **FY 2004 Implementation Plan including Guidance for Preparing the Federal Agency Energy Management Implementation Plan (electronic file "Attachment 6_Implementation_Plan_12-03.doc")**
- 7) **Reporting Units and Conversion Factors for Federal Energy Management Reporting (electronic file "Attachment 7_Conversion_Factors_12-03.doc")**
- 8) **TVA Energy Plan 12-4-03 Final (electronic file "Attachment 8_TVA Energy Plan_12-03.doc")**
- 9) **TVA Fleet Strategy FY 2003 (electronic file "Attachment 9_Fleet Strategy_12-03.doc")**

FY 2003 ENERGY MANAGEMENT DATA REPORTAgency: TVAPrepared by: Steve BrothersDate: 12/23/2003Phone: 423-751-7369**PART 1: ENERGY CONSUMPTION AND COST DATA****1-1. Standard Buildings/Facilities**

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)	Unit Cost (\$)	Site-Delivered Btu (Billion)	Est. Source Btu (Billion)	Est. Carbon Emissions (Metric Tons)	
Electricity	MWH	164,795.4	\$9,887.7	\$0.06 /kWh	562.3	1,705.0	27,231	
Fuel Oil	Thou. Gal.	10.7	\$12.0	\$1.12 /gallon	1.5	1.5	30	
Natural Gas	Thou. Cubic Ft.	2,052.9	\$16.6	\$8.07 /Thou Cu Ft	2.1	2.1	31	
LPG/Propane	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0.0	0	
Coal	S. Ton	0.0	\$0.0	#DIV/0! /S. Ton	0.0	0.0	0	
Purch. Steam	BBtu	0.0	\$0.0	#DIV/0! /MMBtu	0.0	0.0	0	
Other	BBtu	0.0	\$0.0	#DIV/0! /MMBtu	0.0	0.0	0	
		Total Costs:	\$9,916.3		Total:	565.9	1,708.6	27,292
Standard Buildings/Facilities (Thou. Gross Square Feet)		9,391.3			Btu/GSF:	60,256	181,931	

1-2. Industrial, Laboratory, Research, and Other Energy-Intensive Facilities

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)	Unit Cost (\$)	Site-Delivered Btu (Billion)	Est. Source Btu (Billion)	Est. Carbon Emissions (Metric Tons)	
Electricity	MWH	22,293.6	\$1,337.6	\$0.06 /kWh	76.1	230.6	3,684	
Fuel Oil	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0.0	0	
Natural Gas	Thou. Cubic Ft.	0.0	\$0.0	#DIV/0! /Thou Cu Ft	0.0	0.0	0	
LPG/Propane	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0.0	0	
Coal	S. Ton	0.0	\$0.0	#DIV/0! /S. Ton	0.0	0.0	0	
Purch. Steam	BBtu	0.0	\$0.0	#DIV/0! /MMBtu	0.0	0.0	0	
Other	BBtu	0.0	\$0.0	#DIV/0! /MMBtu	0.0	0.0	0	
		Total Costs:	\$1,337.6		Total:	76.1	230.6	3,684
Energy-Intensive Facilities (Thou. Gross Square Feet)		404.9			Btu/GSF:	187,849	569,599	

1-3. Exempt Facilities

* - Energy indicated below does not include generation and transmission power.

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)	Unit Cost (\$)	Site-Delivered Btu (Billion)	Est. Source Btu (Billion)	Est. Carbon Emissions (Metric Tons)	
Electricity	MWH	367,498.7	\$22,049.9	\$0.06 /kWh	1,253.9	3,802.1	60,727	
Fuel Oil	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0.0	0	
Natural Gas	Thou. Cubic Ft.	0.0	\$0.0	#DIV/0! /Thou Cu Ft	0.0	0.0	0	
LPG/Propane	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0.0	0	
Coal	S. Ton	0.0	\$0.0	#DIV/0! /S. Ton	0.0	0.0	0	
Purch. Steam	BBtu	0.0	\$0.0	#DIV/0! /MMBtu	0.0	0.0	0	
Other	BBtu	0.0	\$0.0	#DIV/0! /MMBtu	0.0	0.0		
		Total Costs:	\$22,049.9		Total:	1,253.9	3,802.1	60,727
Exempt Facilities (Thou. Gross Square Feet)		19,167.9			Btu/GSF:	65,417	198,360	

1-4. Tactical Vehicles and Other Equipment

	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)	Unit Cost (\$)	Btu (Billion)	Est. Carbon Emissions (Metric Tons)
Auto Gasoline	Thou. Gal.	2,422.6	\$2,713.3	\$1.12 /gallon	302.8	5,860
Diesel-Distillate	Thou. Gal.	1,204.4	\$1,397.1	\$1.16 /gallon	167.1	3,333
LPG/Propane	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0
Aviation Gasoline	Thou. Gal.	75.3	\$146.9	\$1.95 /gallon	9.4	178
Jet Fuel	Thou. Gal.	71.0	\$170.8	\$2.41 /gallon	9.2	178
Navy Special	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0
Other	Thou. Gal.	0.0	\$0.0	#DIV/0! /MMBtu	0.0	
		Total Costs	\$4,428.1		488.5	9,548

1-5. WATER CONSUMPTION, COST AND EFFICIENCY MEASURES

	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)
Water	Million Gal.	171.7	\$359.7
Best Management Practice Implementation Tracking Data			
Number of facilities* in agency inventory		1,009	
Number of facilities with completed water management plans		70	
Number of facilities with at least four (4) BMPs fully implemented **		2	

*number in the agency inventory, can be buildings, bases, or campuses

** - These two buildings represent 11% of the gsf.

1-6. RENEWABLE GREEN ENERGY PURCHASES

(Only include renewable energy purchases developed or contracted after 1990)

	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)
Electricity from Renewables	MWH	1,170.0	\$31,200.0
Natural Gas from Landfill/Biomass	MMBtu	0.0	\$0.0
Renewable Thermal Energy	MMBtu	0.0	\$0.0
Other Renewable Energy_____*			

*For other renewable energy that does not fit any category, please fill in the type, units used, annual consumption and cost, and include any additional information in your narrative submission. For example, biodiesel used in non-transportation applications. (Renewable fuels used for transportation will be collected through GSA's Fleet Management reporting process.)

1-7. SELF-GENERATED RENEWABLE ENERGY INSTALLED AFTER 1990

	Consumption Units	Total Annual Energy	Energy Used by Agency*
Electricity from Renewables	MWH	30.0	30.0
Natural Gas from Landfill/Biomass	MMBtu	0.0	0.0
Renewable Thermal Energy**	MMBtu	0.0	0.0
Other Renewable EnergyHMOD***		9,602.0	9,602.0

*Energy used by agency equals total annual generation unless a project sells a portion of the energy it produces to another agency or the private sector. It can equal zero in the case of non-Federal energy projects developed on Federal land.

**Examples are geothermal, solar thermal, and geothermal heat pumps, and the thermal portion of combined heat and power projects. Thermal energy from geothermal heat pumps should be based on energy savings compared to conventional alternatives.

***For other renewable energy that does not fit any category, fill in the type, units used, annual consumption and cost, and include any additional information in your narrative submission. For example energy displaced by daylighting technology or passive solar design.

PART 2: ENERGY EFFICIENCY IMPROVEMENTS

2-1. DIRECT AGENCY OBLIGATIONS

	FY 2003		Projected FY 2004	
	(MMBTU)	(Thou. \$)	(MMBTU)	(Thou. \$)
Direct obligations for facility energy efficiency improvements, including facility surveys/audits		\$400.0		\$400.0
Estimated annual savings anticipated from obligations	4,549.5	\$80.0	4,549.5	\$80.0

2-2. ENERGY SAVINGS PERFORMANCE CONTRACTS (ESPC)

(we have no ESPCs to report)

	Annual savings (MMBTU)	(number/Thou. \$)
Number of ESPC Task/Delivery Orders awarded in fiscal year & annual energy (MMBTU) savings.	0.0	0
Investment value of ESPC Task/Delivery Orders awarded in fiscal year.		\$0.0
Amount privately financed under ESPC Task/Delivery Orders awarded in fiscal year.		\$0.0
Cumulative guaranteed cost savings of ESPCs awarded in fiscal year relative to the baseline spending.		\$0.0
Total contract award value of ESPCs awarded in fiscal year (sum of contractor payments for debt repayment, M&V, and other negotiated performance period services).		\$0.0
Total payments made to all ESP contractors in fiscal year.		\$0.0

2-3. UTILITY ENERGY SERVICES CONTRACTS (UESC)**(TVA is a utility)**

	Annual savings (MMBTU)	(number/Thou. \$)
Number of UESC Task/Delivery Orders awarded in fiscal year & annual energy (MMBTU) savings.	0.0	0
Investment value of UESC Task/Delivery Orders awarded in fiscal year.		\$0.0
Amount privately financed under UESC Task/Delivery Orders awarded in fiscal year.		\$0.0
Cumulative cost savings of UESCs awarded in fiscal year relative to the baseline spending.		\$0.0
Total contract award value of UESCs awarded in fiscal year (sum of payments for debt repayment and other negotiated performance period services).		\$0.0
Total payments made to all UESC contractors in fiscal year.		\$0.0

2-4. UTILITY INCENTIVES (REBATES)**(TVA is a utility)**

	Annual savings (MMBTU)	(Thou. \$)
Incentives received and estimated energy savings	0.0	\$0.0
Funds spent in order to receive incentives		\$0.0

2-5. TRAINING

	(number)	(Thou. \$)
Number of personnel trained/Expenditure	250.0	\$18.8

Attachment 2

FY 2003 Federal Agency Energy Scorecard

Department/Agency Name	Contact Name and Phone
Tennessee Valley Authority	Steve Brothers (423) 751-7369
Name of Senior Energy Official	Signature of Senior Energy Official
LeAnne Stribley	

Did your agency . . .	Yes	No	Anticipated Submittal Date
1. Submit its FY 2003 energy report to OMB and DOE by January 1, 2004 (Sec. 303)?	X		12-23-2003
2. Submit a FY 2004 Implementation Plan by January 1, 2004 (Sec. 302)?	X		12-23-2003
Did your agency . . .	Yes	No	Comments
3. Implement or continue to use renewable energy projects at Federal installations or facilitate the siting of renewable generation on Federal land in FY 2003 (Sec. 204)? (Report all self-generated renewable energy from projects installed after 1990; refer to Table 1-7 on the Energy Management Data Report)	X		If yes, how many projects and how much energy generated? (Specify unit: MWH or MMBtu) Solar <u> 1 </u> <u> 30 </u> <u> MWH </u> Wind <u> </u> <u> </u> <u> </u> Thermal ¹ <u> </u> <u> </u> <u> </u> Biomass <u> </u> <u> </u> <u> </u> Other RE(1) <u> 42 </u> <u> 9602 </u> <u> MWH </u>
4. Purchase energy generated from new renewable energy sources in FY 2003 (Sec. 204)? ²	X		If yes, how much: <u> 1,170 </u> MWH or <u> </u> MMBtu
5. Invest direct FY 2003 appropriations in projects contributing to the goals of the Order (Sec. 301)? (2)		X	If yes, how much: \$ <u> </u>
6. Specifically request funding necessary to achieve the goals of the Order in its FY 2005 budget request to OMB (Sec. 301)? (Refer to OMB Circular A-11, Section 25.5, Table 2) (2)		X	If yes, how much: \$ <u> </u>
7. Perform energy audits of 10% of its facility space during the fiscal year (Sec. 402)? (3)	X		What percentage of facility space was audited during the FY? <u> 11 </u> % How much facility space has been audited since 1992? <u> 100 </u> %
8. Issue to private-sector energy service companies (ESCOs) any energy savings performance contract (ESPC) task orders (Sec. 403(a))? (Refer to Table 2-2 on the Energy Management Data Report) (4)		X	How many? <u> </u> Annual savings (MMBtu): <u> </u> Total investment value ³ : \$ <u> </u> Cumulative guaranteed cost savings: \$ <u> </u> Contracts award value: \$ <u> </u>

¹ Examples are geothermal, solar thermal, and geothermal heat pumps. Thermal energy from geothermal heat pumps should be determined as follows: Thermal energy = Total geothermal heat transferred – electrical energy used.

² “New” renewable energy means sources developed after 1990.

³ Investment value includes design, materials, labor, overhead, and profit but excludes contractor’s financing costs and government’s administration costs. Using investment value allows comparison with other traditional execution methods such as appropriated and working capital funded projects.

Did your agency . . .	Yes	No	Comments
9. Issue any utility energy services contract (UESC) task orders (Sec. 403(a))? (Refer to Table 2-3 on the Energy Management Data Report) (5)		X	How many? _____ Annual savings (MMBtu): _____ Total investment value ³ : \$ _____ Cumulative cost savings: \$ _____ Contracts award value: \$ _____
10. Incorporate energy efficiency requirements into relevant acquisitions (Sec. 403(b)(3))? (6)	X		See TVA Energy Plan
11. Adopt and apply the sustainable design principles (e.g., Whole Building Design Guide, Leadership in Energy and Environmental Design (LEED)) to the siting, design, and construction of new facilities or major (budget line item) renovations begun in FY 2003 (Sec. 403(d))? (7)	X		Number of new building design/construction projects in FY 2003: <u>0</u> Number of these projects that can or will be certified under LEED: <u>0</u>
12. Provide training to appropriate personnel ⁴ on energy management (Sec. 406(d))? (8)	X		Number of appropriate personnel trained: <u>250</u> Total number of appropriate personnel: <u>250</u>
13. Implement any additional management tools (Sec. 406)?	X		Check all that apply: Awards: <u>X</u> Performance Evaluations: <u>X</u> Showcase Facilities: <u>X</u> Number of Showcase Facilities designated in fiscal year: <u>1</u>
14. Establish Water Management Plans (WMPs) and implement at least 4 Best Management Practices (BMPs) in at least 10% of agency facilities (Sec. 207,503(f))? (9)	X		Number of facilities with WMPs and 4 BMPs: <u>3</u> Number of facilities in agency inventory: <u>1009</u>

NOTE: Provide additional information if a "No" reply is used for any of the questions above.

Please enter data from annual energy report pertinent to performance toward the goals of Executive Order 13123	Base Year	Previous Year (2002)	Current Year (2003)	% Change (Current vs. Base)
15. Site Energy Efficiency Improvement Goals (Sec. 202). 1985 Base Year	82,357 Btu/Ft ²	60,776 Btu/Ft ²	60,256 Btu/Ft ²	(27) %
16. Source Energy Use (Sec. 206). 1985 Base Year	402.4 BBtu	565.0 BBtu	566.0 BBtu	41 %
17. Industrial/Energy Intensive Facilities Goals (Sec. 203). 1990 Base Year	232,662 Btu/unit	185,536 Btu/unit	187,848 Btu/unit	(15) %
18. Water Conservation Goal (Sec. 207). 2000 Base Year	173.1 MGal	172.6 N/A	171.7 MGal	(1) %
19. Renewable Energy (Sec. 204) Energy used from self-generation and RE purchases (10)	N/A	103.2 BBtu	125.3 BBtu	N/A

Abbreviation Key: Btu/Ft² = British thermal units per gross square foot
 Btu/unit = British thermal units per unit of productivity (or gross square foot when such a unit is inappropriate or unavailable)
 MGal = Million gallons
 MMBtu = Million British Thermal Units

⁴ Appropriate personnel include the agency energy management team as well as Federal employees and on-site contractors who are energy or facility managers, operations and maintenance workers, design personnel, procurement and budget staff, and legal counsel.

BBtu = Billion British Thermal Units
RE = Renewable energy
N/A = Not applicable

- (1) This value represents a very small percentage of renewable power from hydro modernization and is based on projects covering multiple units and the number of effected facilities.
- (2) TVA is self funded through its power operations and does not request appropriations to support its statutory mission; therefore, TVA has not submitted any such requests.
- (3) Since FY 1992, TVA has evaluated 100-percent of its buildings, and plans to reevaluate facilities as needed to implement cost effective energy management objectives and/or update portfolio information.
- (4) TVA considers the use of ESCOs where cost effective and in the best interest of the agency and its customers.
- (5) TVA is a utility.
- (6) TVA incorporates energy efficiency language where appropriate.
- (7) TVA is in the process of developing a sustainable design program.
- (8) This includes employees not specified under sec. 406(d) since all employees play an important part in energy management.
- (9) During FY 2003 TVA developed an agency wide water plan which is currently being reviewed. Prior to FY 2003 TVA had implemented 4+ BMPs in two of its facilities accounting for 11% of TVA's total facility square footage.
- (10) The source conversion factor was used for this value (11600 Btu/kWh).

Attachment 3 Goals of Executive Order 13123 and NECPA/EPACT

Executive Order 13123

Category	Goal	Comments
Greenhouse Gas Emissions	30% reduction by 2010	Base year is 1990. DOE will calculate agencies' progress toward this goal and report it on agencies' annual energy scorecards
Energy Efficiency		
Standard Buildings	<ul style="list-style-type: none"> • 30% improvement by 2005 • 35% improvement by 2010 	Base year is 1985
Industrial and Laboratory Facilities	<ul style="list-style-type: none"> • 20% improvement by 2005 • 25% improvement by 2010 	Base year is 1990
Exempt Facilities	N/A	Despite lack of quantitative goal, agencies should implement strategies to improve energy efficiency at these facilities.
Renewable Energy	<ul style="list-style-type: none"> • Implement renewable energy projects • Purchase electricity from renewable energy sources • Install 2,000 solar energy systems at Federal facilities by 2000 • Install 20,000 solar energy systems at Federal facilities by 2010 	Installation of Federal solar energy systems will help support the Million Solar Roofs initiative
Petroleum	Reduce petroleum use	Switches to alternative energy sources should be life-cycle cost effective
Source Energy	Reduce use of source energy	Accomplish by undertaking projects that are life-cycle cost effective
Water Conservation	Reduce water consumption*	Accomplish via life-cycle cost effective measures, energy-savings performance contracts, or other financing mechanism

NECPA/EPACT

Energy Efficiency	20% improvement by 2000	Base year is 1985
Financing	Undertake all energy efficiency improvement projects that have a simple payback period of 10 years or less by 2005	E.O. 13123 expands this goal by mandating that any energy efficiency project that is life-cycle cost effective be undertaken
Audits	Conduct audits for energy efficiency on 10% of facilities annually	E.O. 13123 includes language supporting this goal

* FEMP has established water efficiency improvement goals as directed by the Executive Order. Agencies must implement Water Management Plans and Best Management Practices according to the following schedule:

05% of facilities by 2002

15% of facilities by 2004

30% of facilities by 2006

50% of facilities by 2008

80% of facilities by 2010

For more detail, see the FEMP guidance document Water Efficiency Improvement Goal for Federal Agencies