Department of Energy

Energy Conservation
at
Federal Facilities Report

May 30, 2001

Contents

Executive Summary

The central steam-heating distribution system at DOE's Grand Junction Project Office was replaced with individual water boilers resulting in a 37% reduction in annual gas costs.

The Department of Energy (DOE) has led other Federal agencies in the reduction of energy use since 1985. During this time, DOE has reduced its energy use in buildings by 38 percent, already achieving the Executive Order 13123 (EO) goal of a 35 percent reduction by 2010. This energy reduction was primarily achieved through energy retrofit projects and is saving DOE over $100 million annually in its facilities.

In FY 2001, in accordance with the Presidential Directive of May 3, 2001, "Energy Conservation at Federal Facilities," DOE will review existing operating and administrative processes and conservation programs and identify and implement ways to further reduce energy use. To initiate many of these activities, we will finalize a new performance based DOE Order "Departmental Energy and Utilities Management" during FY 2001, and will negotiate performance agreements with the DOE Field Offices and sites. These Energy and Utility Management Performance Agreements will be negotiated by Headquarters with the DOE Field Offices. The DOE Field Offices will then have the lead in negotiating energy conservation performance objectives, measures and annual expectations with their Management and Operating Contractors who operate many of the DOE sites.

Through the DOE Order and existing budget authority DOE will accomplish the following objectives in accordance with the Presidential Directive:

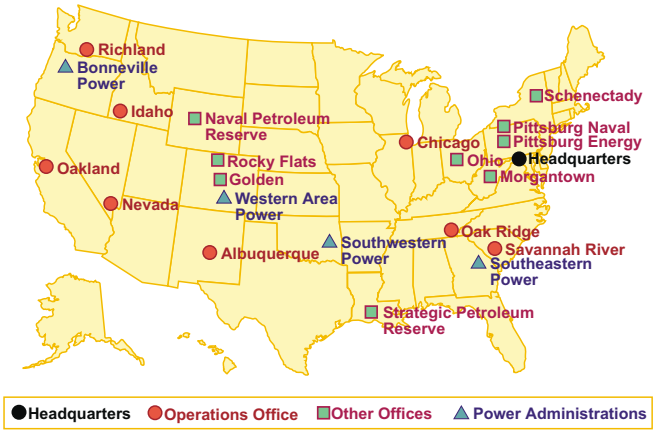
- ⊙ **Perform Energy and Water Audits at 3 sites.**
- ⊙ **Review or finalize proposals for Energy Savings Performance Contracts (ESPCs) at seven sites, with a total investment of over $20 million.**
- ⊙ **Establish Utility Energy Services Contracts (UESCs) at two sites at an investment cost of $20 million.**
- ⊙ **Emphasize a new approach for one DOE site for the procurement of Energy Star and other energy-efficient products.**
- ⊙ **Evaluate DOE office buildings with metered data for Energy Star labels, and develop metering plans for 10 additional DOE office buildings.**
- ⊙ **Obtain the Energy Star Buildings label for at least one office building.**
- ⊙ **Emphasize sustainable building design practices at five DOE sites.**
- ⊙ **Encourage energy efficiency provisions in building leases.**
- ⊙ **Invite Energy Service Companies (ESCOs) and Utilities to propose efficiency improvements for industrial processes at two DOE sites.**
- ⊙ **Encourage two DOE sites using ESPC to bundle renewable energy technologies with other energy conservation technologies.**
- ⊙ **Require all sites to develop Water Management plans and to use Best Management Practices.**
- ⊙ **Re-commission buildings on at least two DOE sites and identify the energy-saving projects.**
- ⊙ **Fund 18 energy management retrofit projects.**
- ⊙ **Accomplish energy savings in two DOE surplus facilities.**
- ⊙ **Update existing curtailment plans for electricity load reduction in accordance with the Federal Directive Plan of Action.**
- ⊙ **Have two DOE sites in California participate in the Assessment of Load and Energy Reduction Techniques (ALERT) teams' identification of additional demand reduction measures.**
- ⊙ **Have all of DOE's major sites participate in the California Energy Commission's Emergency Load Reduction Test.**

Background

DOE Facilities

DOE owns or leases over 12,000 buildings at over 50 sites throughout the United States. Currently occupied buildings comprise 96.2 million gross square feet, which is divided into laboratory space (23%), production space (34%), office space (14%) and other activities (29%). The buildings are under the stewardship of major DOE Operations and Field Offices (Figure1). In 1999, in the buildings category, DOE facilities used approximately 280,000 Btu per gross square foot, compared to approximately 450,000 Btu per gross square foot in 1985. Energy costs in the buildings category in 1999 were $190 million. Total energy costs for 1999 were over $270 million. DOE exempts only 14% of its industrial laboratory, research, and other energy-intensive facilities from energy reduction goals.

Figure 1: Major DOE Field Offices



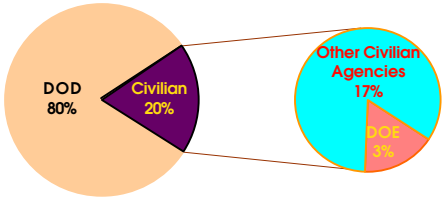
About 2,000 (17%) of DOE's buildings were originally designed and constructed to support Cold War objectives and are no longer needed. These excess buildings constitute 17.1 million gross square feet and use about 6.7 trillion Btu annually, at a cost of about $52 million. DOE is currently pursuing the use of Energy Savings Performance Contracts as a method of funding the decommissioning and deactivation of surplus buildings.

The U.S. Department of Energy has accomplished an ESPC for its lighting systems at its headquarters building in Washington, DC, and is exploring other cost effecive improvements.

DOE Progress toward Energy Reduction Goals

DOE has the second largest energy consumption of all civilian agencies (Figure 2), but through a proactive utility management program, has the lowest average unit cost for electricity in the Federal government. The Department of Energy has led other Federal agencies in the efficient use of energy, significantly reducing DOE energy consumption and accounting for over $100 million in annual avoided costs.

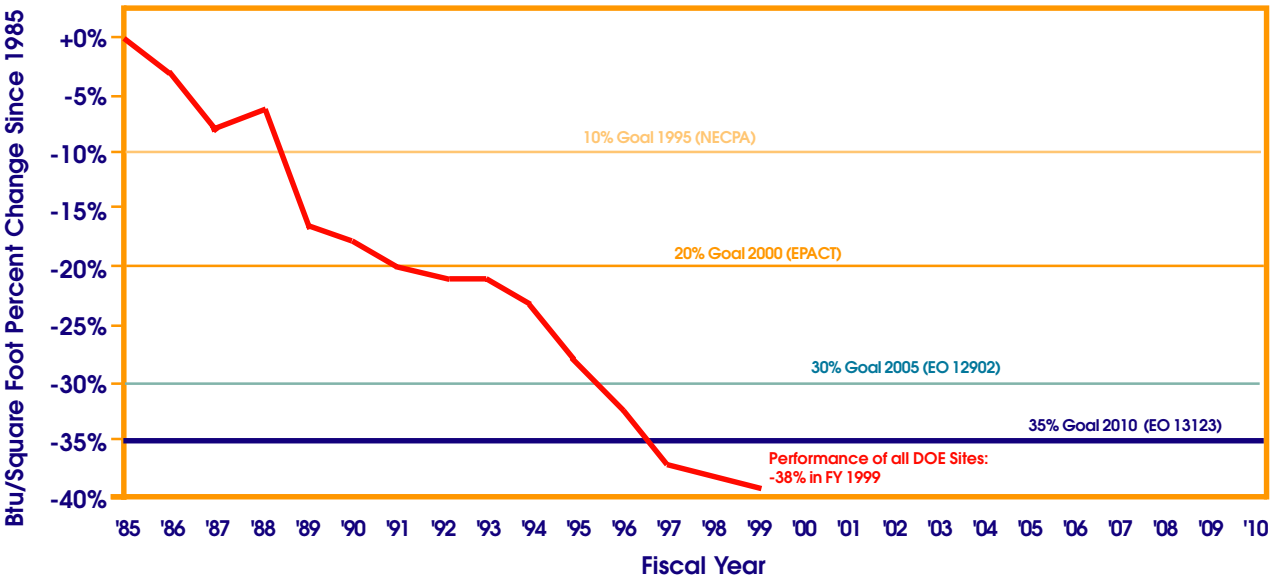
Figure 2: DOE Share of Federal Government Energy Consumption



In FY 1999, DOE exceeded all Federal energy reduction requirements by reducing energy consumption in its buildings by more than 38 percent in Btu per gross square foot compared to FY 1985 (Figure 3). DOE achieved a 2.2 percent reduction in energy use per square foot in buildings in FY 1999 over the previous year, and a savings in utility costs for all facilities of approximately $20 million. These energy management activities reduced emissions of greenhouse gases by 22.4 percent from FY 1990 levels, or 1.3 million tons - equivalent to removing over 900,000 cars from the road.

In addition to efficiency measures, emissions reductions were accomplished by switching from fuel oil and coal to less green-house gas intensive fuels. Coal and fuel oil use from FY 1990 levels was reduced 70 percent and 56 percent, respectively. The savings to the taxpayers in fuel oil and coal costs alone during FY 1999 as compared to FY 1990 was almost $7 million.

Figure 3: DOE Performance Toward Energy Reduction Goals for Buildings



Federal Facilities Report

Energy Management Infrastructure

The Senior Official

The Assistant Secretary for Energy Efficiency and Renewable Energy, Mr. David Garman, is the Senior Agency Official responsible for advocating policy, programs, and new initiatives to take appropriate actions to conserve energy at DOE facilities to the maximum extent consistent with the effective discharge of public responsibilities. The head of this organization is ideally suited to the role of the Senior Agency Official, since the organization is responsible for conducting research in energy conservation and renewable energy technologies and for accomplishing energy conservation actions at DOE facilities through the Federal Energy Management Program. The Director of the Federal Energy Management Program (FEMP), Ms. Beth Shearer, will be the Agency Official responsible for implementing the policies, programs, and new initiatives of the Assistant Secretary at DOE facilities for accomplishing the requirements of the Presidential Directive of May 3, 2001, "Energy Conservation at Federal Facilities."

The Agency Energy Team

The Agency Energy Team at headquarters is The Energy Management Steering Committee (EMSC) which is comprised of senior level representatives from each of the major DOE programs responsible for implementation of DOE's mission at the sites. The EMSC is chaired and reports its progress through Beth Shearer, Director of FEMP. The EMSC reviews proposed implementation policy and plans to ensure compatibility with mission requirements and to facilitate implementation within their programs and at the sites. The major DOE program offices and their program representatives are:

National Nuclear Security Administration – Roger E. Snyder;
Office of Environmental Management – Susan Weber;
Office of Science – Arnold Edelman;
Office of Energy Efficiency and Renewable Energy – Marv Gorelick;
Office of Fossil Energy – Craig Zamuda;
Office of Nuclear Energy, Science, and Technology – Rajendra Sharma;
Office of Environment, Safety, and Health – Ted Koss;
Office of Management and Administration – Doug Bielan and Thomas Brown;
Office of General Counsel – Lawrence Oliver and Francine Pinto;
Office of Chief Financial Officer – Joann Luczak and James Cayce.

This 160kW hydrid (PV and propane) system at Lake Powell, UT. is an example of a renewable energy system replacing an existing fossil-energy-fired generating plant. System performance was measured by DOE's Sandia Lab.

In addition to the energy team at headquarters, DOE also has a team of energy management professionals from headquarters, DOE Field Offices and sites called the Energy Efficiency Working Group (EEWG) which is sponsored by FEMP. This group has a goal of promoting excellence in energy management through the active exchange of timely management and technical information. Working meetings are conducted 2-3 times a year. The chair is Mike Holda of Lawrence Berkeley National Laboratory.

The Departmental Utilities and Energy Management Team

The Departmental Utilities and Energy Management Team is the expert staff within the Federal Energy Management Program who advocate energy efficiency and the cost effective acquisition of energy supplies and services for DOE facilities. The team provides support to the EMSC, EEWG, and Senior Agency Official by drafting plans and policy, budgets, and reports for DOE's energy and utility management efforts. They also draft the Energy and Utilities Management Performance Agreements which are negotiated with the DOE Operations and Field Offices.

DOE Energy Coordinators and Utility Coordinators

The DOE Energy Coordinators and Utility Coordinators are designated persons at DOE Operation Offices and Field Offices responsible for acquiring utility services and for coordinating energy conservation actions and other energy initiatives at the sites. Implementation is carried out primarily through Management and Operating Contractors since the majority of DOE sites are managed and operated by the private sector or not-for-profit divisions of universities.

Site Energy Coordinators

Site energy coordinators are individuals designated by their site management as responsible for advocating energy efficiency at the site. These individuals prepare plans and reports, often initiating projects and support activities and other DOE energy management projects at their sites.

Awards

DOE uses employee incentive programs to recognize outstanding contributions toward energy and dollar savings at DOE facilities and field organizations. Each year, DOE holds its Annual Departmental Energy Management Awards ceremony, which was established in 1979. The awards are held at DOE's Washington, DC headquarters in October to coincide with Energy Awareness Month.

DOE's Solar Energy Research Facility uses state-of-the-art solar and renewable energy technologies.

During FY 2001, DOE will honor DOE and contractor employees for implementing projects that have contributed significantly toward achieving energy management goals.

Performance Evaluations

Facility managers and energy managers will be judged on their performance and progress toward meeting the goals of Executive Order 13123. Evaluations for these staff members will consist partly of self-assessments based on the Performance Objectives agreed to in the prior year Performance Agreements. In addition, the Departmental Utilities and Energy Management Team will conduct field-office level evaluations based on the same Performance Objectives.

A comparison then will be made between the self-assessments and the annual reports provided by the sites and field elements. Discrepancies will be reconciled. The evaluations will be provided to the appropriate Program Office and the Senior Energy Official for review, with potential recommendations for improvement.

Training and Education

During FY 2001, DOE is expecting to provide formal energy management training to over 300 DOE employees. DOE will continue to offer training to energy and utility coordinators in the areas of life-cycle costing, basic energy management, acquisition of energy supplies, and acquisition of energy- efficient products. DOE Energy Coordinators along with other Federal participants will receive training at the Energy 2001 Conference. In addition, at least one new energy coordinator at a DOE field office will receive one-on-one training by a member of DOE's Energy and Utilities Management Team.

Showcase Facilities

Several high-profile DOE areas and buildings have received the Federal Energy Saver Showcase label. In FY 2001, the Fermi National Accelerator Laboratory will receive a designation from FEMP as a Federal Energy Saver Showcase facility. Showcase facilities represent some of the best examples of energy efficiency and renewable energy technologies in the Federal sector.

In FY 2001, in accordance with the Presidential Directive of May 3, 2001, "Energy Conservation at Federal Facilities," DOE will review its existing operating and administrative processes and conservation programs and identify and implement ways to reduce energy use through the following strategies:

1. Expanding the use or initiating new energy savings performance contracts (ESPCs) and utility energy service contracts (UESCs);
2. Auditing of DOE facilities to identify future energy retrofit projects and to accelerate the replacement of inefficient equipment;
3. Auditing DOE facilities for water savings opportunities or implementing FEMP's best management water practices;
4. Evaluating DOE office buildings with metered energy use data for Energy Star labels, developing metering plans for evaluating buildings that do not currently have metered data or improving the energy efficiency of buildings that do not qualify for Energy Star labels;
5. Evaluating methods for reducing energy consumption in surplus facilities;
6. Evaluating high efficiency energy systems including combined cooling, heat, and power systems, bioenergy systems, and geothermal systems, when life-cycle cost-effective;
7. Assisting in the design of sustainable buildings with emphasis on acquiring Leadership in Energy and Environmental Design Building Certification through the U.S. Green Building Council;
8. Reducing greenhouse gas emissions by evaluating life-cycle cost-effective measures for reducing petroleum use by switching to natural gas or renewable energy sources, or other effective means;
9. Evaluating energy efficiency and best practice opportunities in industrial facilities for steam systems, boiler operations, motor and pump systems, air compressor systems, industrial processes, and fuel switching;
10. Evaluating energy efficiency and best practice opportunities in laboratory facilities for clean rooms, computer facilities, and other energy intensive operations;
11. Evaluating the use of off-grid generation systems (i.e. fuel cells, microturbines, wind energy systems, photovoltaic systems, etc.) where such systems are life-cycle cost effective and offer benefits including energy efficiency, pollution prevention, and source energy reductions;
12. Evaluating the replacement of chillers that use Class I ozone depleting substances with chillers that are more efficient and are integrated with other energy conservation measures to allow downsizing of the system;
13. Developing a model program for the procurement of Energy Star products or other energy efficient products that are in the upper 25 percent of energy efficiency;
14. Developing building commissioning or re-commissioning programs to identify and correct operational inefficiencies, verify energy use and improve design and construction practices; and
15. Transferring information from model programs that have already been developed to other sites, so that these programs can be replicated.

The primary DOE tools for implementing these high priority strategies are through the Congressional funding that DOE receives under the Departmental Energy Management Program, and through finalizing a new performance based DOE order "Departmental Energy and Utilities Management." Performance agreements will be negotiated with DOE Field Offices and sites under this Order. These Energy and Utility Management Performance Agreements will be negotiated by Headquarters with the DOE Field Offices. The DOE Field Offices will then have the lead in negotiating energy conservation performance objectives, measures and annual expectations with their Management and Operating Contractors who operate many of the DOE sites.

Life-Cycle Cost Analysis

DOE has always based investment decisions regarding energy efficiency and renewable projects on life-cycle cost effectiveness and will continue to do so. When funds are appropriated specifically for energy management projects, DOE ranks projects according to their savings to investment ratio (SIR). The funds are then allocated, until exhausted, to projects with the highest SIRs. DOE expects to fund approximately $3 million in energy retrofit projects in FY 2001, and expects to cost share some of these projects between FEMP, the DOE site and/or the DOE Program Office.

Relamping of DOE's Headquarters Building using ESPC financing was based on findings of facility energy audit

Facility Energy Audits

DOE has completed comprehensive audits for many sites. At sites where major energy efficiency improvements have been installed, DOE does not anticipate repeating audits for five years. DOE is concentrating its auditing efforts at locations that have not received comprehensive audits or at locations where audits would lead to installation of specific technologies based on unique local circumstances. Funding priority of comprehensive audits are ranked according to their potential for success in achieving energy conservation. Factors for ranking include energy unit cost, total energy consumed at the facility, and energy consumed per gross square foot. During FY 2001, DOE has set-aside a minimum of $75,000 in funding for energy and water efficiency audits at DOE sites. The first priority for these funds is to collect information and establish baselines for ESPCs and UESCs.

DOE will continue to emphasize the use of ESPCs and UESCs to accomplish energy efficiency projects. The second priority of audits is to support other specific strategies such as establishing benchmarks to qualify office buildings for the Energy Star Building label. The third priority is to perform comprehensive audits of 10 percent of facilities each year.

New energy conservation activities that are being initiated in FY 2001 and are being identified for this Presidential report include:

The Fermi National Laboratory (FERMI) will be identifying cost effective energy efficiency lighting systems, and heating, ventilating and air-conditioning (HVAC) systems and their control systems. In addition, FERMI will be investigating upgrading their Supervisory Control and Data Acquisition (SCADA) System Upgrade to allow for better control of electricity once it reaches the laboratory. FERMI will also initiate a Site-wide Computerized Management Program to replace the labor intensive activities used to control energy using systems.

The Idaho National Engineering and Environmental Laboratory (INEEL) will initiate facility audits to identify energy efficiency retrofit projects to reduce the cost of their energy purchases. Energy rates at the INEEL increased 53 percent on May 1, 2001, in part due to increased demand for electricity from California. Low water levels in hydroelectric dams due to prolonged drought conditions also contributed significantly to the rate increase.

Financing Mechanisms

In FY 2001, DOE received $2 million under the Departmental Energy Management Program budget request. This funding will be leveraged with additional funding from the DOE sites to support both energy retrofit projects and to implement strategies to accomplish the requirements of the new Presidential Directive "Energy Conservation at Federal Facilities."

The review board meets to provide The review

This rooftop gas-fired desiccant unit is one example of a system that will eliminate the need for CFC-chillers to dehumidify ventilation air.

The new energy retrofit projects that DOE expects to fund and are being identified for this Presidential report include:

⊙ **Klystron Energy Reduction through the use of Variable Voltage Cathode power Supply LED Modulating Anode Project** at the Thomas Jefferson National Accelerator Facility (TJNAF) costing $323,600. TJNAF will retrofit 43 klystron power supplies to allow adjustment of the input AC voltage. Klystron power supplies convert the incoming electricity to microwaves. The project will save 8,600,000 kilowatt-hours (kWh) and $270,000 annually when completed.

⊙ **Install Variable Frequency Drives with Direct Digital Control Project** at the Princeton Plasma Physics Laboratory (PPPL) costing $55,000. This project will allow for more efficient energy use through better matching of power needs with the loads on the fans through direct digital control of fan speed. The project will save 203,000 kWh and 2,400 million British thermal units (MBtu) of natural gas and $18,000 annually when completed.

⊙ **Upgrade of the Energy Management System and Lighting Systems Project** of the Engineering Research Office Building at the Idaho National Engineering and Environmental Laboratory (INEEL) costing $23,600 in anticipation of applying for the Energy Star Building label. INEEL will install occupancy sensors and light sensors to automatically turn off lights that are not needed. The project will save 80,000 kWh and $5,000 annually when completed.

⊙ **LED Replacement for Safety Locator Lighting Project** at the Brookhaven National Laboratory (BNL) costing $46,000. BNL will replace existing incandescent lamps and fluorescent lamps with a lifetime light emitting diode (LED) bulb, resulting in both energy and maintenance savings. The project will save 63,860 kWh and $7,000 annually when completed.

⊙ **VendingMiser Retrofits Project** at the Lawrence Livermore National Laboratory (LLNL) costing $26,400. LLNL will install VendingMiser® controllers on selected vending machines to reduce their power requirements when not in use. The project will save 110,460 kWh and $4,000 annually when completed.

⊙ **Lighting Control - Building 041, Second Floor Project** at the Stanford Linear Accelerator Center (SLAC) costing $23,400. SLAC will install light switches and occupancy sensors. The project will save 89,000 kWh and $3,500 when completed.

⊙ **Upgrade Chiller Plant and Lighting Project** at the Argonne National Laboratory (ANL) costing $275,500. ANL will install a new correct sized chiller and energy efficient lighting in this cost shared project. When completed, the project will save 761,000 kWh, 5,540 MBtu gas and $55,100 annually. The project will replace a 300 ton chlorofluorocarbon (CFC) chiller with a non-CFC high efficiency chiller..

⊙ **Micro-turbine Demonstration Project** at the Brookhaven National Laboratory (BNL) costing $112,000. KeySpan Energy, the local natural gas supplier will cost-share the project and will install the micro-turbine. BNL expects the project to save 185,000 kWh and 1,230 MBtu of oil and $6,300 per year. The micro-turbine will require 2,520 MBtu of natural gas per year to operate.

⊙ **Install Ultra Low Flow Toilets, Urinals and Automatic Faucets Project** at the PPPL costing $115,000. This project will save 150,000 kWh of

Example of a Trombe Wall designed to utilize passive solar energy in new DOE laboratory

electricity and 8 million gallons of water annually with total annual cost savings of $36,000.

⊙ **Energy Management and Control System (EMCS) Optimization - Phase II Project** at the BNL costing $289,000. The project will optimize operation of heating, ventilating and air-conditioning (HVAC) systems, saving 1.5 million kWh of electricity and 7,100 million British thermal units (MBtu) of fuel oil with total annual cost savings of $112,000.

⊙ **Install Four High Seasonal Energy Efficiency Ratio HVAC Units Project** at the PPPL costing $65,000. These more efficient, non-ozone depleting units, will save 53,000 kWh of electricity and 128 MBtu of natural gas annually with total annual cost savings of $21,000.

⊙ **B241 HVAC Direct Digital Control (DDC) System Retrofit Project** at the LLNL costing $221,000. The controls will provide efficient operation of HVAC systems, saving 1 million kWh of electricity and 9,700 MBtu of natural gas annually, with total annual cost savings of $38,000.

⊙ **Elimination of Once-Through Cooling in 902 Project** at the BNL costing $369,000. BNL will install an air cooled electric chiller to replace one pass water used for cooling. The project will save 43 million gallons of potable water and $72,000 annually.

⊙ **Install Closed Loop Dry Cooler for Air Compressor C-701Project** at the PPPL costing $38,000. This project will replace a one pass cooling water system with a closed loop system, saving 4 million gallons of water and $10,000 annually.

⊙ **CPP-630 Heat Recovery System Project** at the INEEL costing $294,000. The INEEL will install a heat recovery system to preheat makeup air, saving 17,000 kWh of electricity and 5,500 MBtu of fuel oil annually with total annual cost savings of $51,000.

⊙ **Lighting Retrofits for 318, 320, and 350 Project** at the Pacific Northwest National Laboratory (PNNL) costing $227,000. PNNL will retrofit 1,500 fluorescent fixtures with more efficient electronic ballasts and lamps, saving 550,000 kWh and $42,000 annually.

When completed, these direct funded projects will annually save 13,362,300 kWh of electricity, 31,600 MBtus of oil or natural gas and 55 million gallons of water. The energy and water savings will also represent approximately $750,900 in utility cost savings to the Government.

Although these direct funded projects provide significant energy savings, they will not account for the majority of energy savings that will be achieved at DOE sites. Private sector financing will continue to be the primary method for funding energy conservation projects and achieving reductions in energy consumption. DOE will institute guidelines for the ESPC Review Board that will include representatives from the appropriate offices to facilitate the use of Energy Savings Performance Contracts. The review board meets to provide recommendations for improvement of initial proposals from Energy Services Companies regarding DOE sites. The review board will also meet to provide final concurrence for negotiated contracts.

During FY 2001, DOE expects to receive initial proposals or final proposals for ESPCs at the following seven sites: Pantex Plant, Argonne

National Laboratory-East, Y-12 Plant, Idaho National Engineering/Environmental Laboratory, Headquarters (Forrestal and Germantown), National Energy Technology Laboratory, and North Las Vegas. The total investment is expected to be over $20 million.

Energy Star™ compliant lamps are available for virtually all DOE lighting applications

New energy conservation activities through ESPC that are being initiated in FY 2001 and are being identified for this Presidential report include:

At the Hanford Site, DOE's Richland Operation Office will investigate the feasibility of using energy savings performance contract (ESPC) delivery order under the SuperESPC, or a utility contract to accomplish energy conservation opportunities in facilities designated as surplus (excess). There are many facilities at Hanford designated as excess that continue to use energy (primarily electricity) to support fire protection and environmental surveillance systems. Reducing energy consumption in surplus facilities can provide significant cost savings since the Bonneville Power Authority has already provided notice to the Richland Operations Office of an impending rate increase on October 1, 2001. The magnitude of the increase has not been definitively set, however the Richland Operations Office is planning for an increase of $2,000,000 in next year's utility bills. The increased demand for electricity for California and western drought conditions are cited as the reason for the increase.

New DOE Laboratory incorporates daylighting

The Idaho National Engineering and Environmental Laboratory (INEEL) is also evaluating ESPC for energy efficiency retrofit projects to reduce the cost of maintaining excess facilities. Energy rates at the INEEL increased 53 percent on May 1, 2001, in part due to increased demand for electricity from California. Low water in hydroelectric dams due to prolonged drought conditions also contributed significantly to the rate increase.

DOE's Savannah River Site (SRS) will investigate the technical, financial and contractual support for their third task order under their ESPC. Previous task orders included replacing inefficient lighting and air-conditioning equipment that directly contributed to high summer peak electricity demand at SRS. The third task order will investigate additional opportunities to reduce demand.
DOE is also pursuing UESCs. These contracts depend on local conditions with deregulation and competition for customers being the primary drivers. During FY 2001, DOE expects to have at least two UESCs in place at its Chicago sites at an investment cost of over $20 million. New energy conservation activities through UESCs that are being initiated in FY 2001 and are being identified for this Presidential report include:

The Fermi National Accelerator Laboratory (FERMI) will be identifying energy conservation opportunities in partnership with its electricity and natural gas suppliers. FERMI has already identified millions of dollars of investment opportunities and fully expects to identify even more opportunities.

The Idaho National Engineering and Environmental Laboratory (INEEL) will be issuing guidance for the use of UESC at the site. In addition the INEEL will be initiating discussion with its utility providers to explore investment opportunities to accomplish energy conservation projects.

Energy Star™ and Other Energy-Efficient Products

DOE issued an acquisition letter to all of its contracting officers alerting them to purchase DOE/EPA Energy Star products and other energy-efficient products. DOE has included purchases of energy-efficient goods as a priority Performance Objective in all Performance Agreements over the last several years. Most sites have already incorporated energy-efficient goods in their purchasing systems and will continue to purchase these goods when they are life-cycle cost effective and compatible with mission requirements. The National Renewable Energy Laboratory (NREL) will be developing an Energy Star procurement program as an example

of new energy conservation activities being initiated in FY 2001 that are being identified for this Presidential report.

Energy Star™ Buildings

All DOE sites with office buildings and metered data are evaluating their buildings for Energy Star labels. Sites with buildings that do not currently qualify are encouraged to establish a goal for obtaining Energy Star Buildings labels. To date, two office buildings at the Nevada Operations Office, one at the Oak Ridge National Laboratory and one at the Oakland Operations Office have acquired Energy Star labels.

Testing of wind turbine aerodynamics at DOE's National Renewable Energy Laboratory.

Completed surveys suggest that DOE does not have many buildings that fit the EPA Energy Star profile. Most DOE buildings are not used purely as office buildings, but are mixed use and include laboratory, intense computing space, and control rooms. Other DOE buildings designated as office space are actually of modular construction and considered temporary.

Where office buildings that are considered good candidates fall short of the benchmark test, they will be audited for life-cycle cost-effective energy efficiency retrofits. If retrofit projects can be undertaken, DOE will encourage ESCOs to propose such projects and apply for the label.

New energy conservation activities are being initiated in FY 2001 in conjunction with obtaining the Energy Star Building label and identified for this Presidential report include:

The Oak Ridge National Laboratory (ORNL) has identified 11 office buildings that would be good candidates for the Energy Star label. ORNL will begin metering those buildings so that it can apply for the label.

The Idaho National Engineering and Environmental Laboratory (INEEL) will identify facilities that would benefit from accurate meters and develop plans to meter all cost effective significant applications. INEEL will also identify facilities applicable to the Energy Star buildings program; install meters and collect meter data for at least two of the best candidates for the Energy Star; and apply for the Energy Star label.

Also as shown earlier under the Financing section, the INEEL has been provided with funding to upgrade the energy management system and lighting systems of its Engineering Research Office Building in anticipation of applying for the Energy Star Building label.

Sustainable Building Design

During FY 2001, DOE will emphasize sustainable building design practices at five DOE sites. To help introduce sustainable design as a standard operating practice, DOE is encouraging several of its sites to become partners in the DOE/EPA Labs for the 21st Century initiative. DOE expects at least one of its laboratories to become a partner in FY 2001. The partner receives design assistance and preferential project funding consideration as a benefit.

New energy conservation activities being initiated in FY 2001 in conjunction with sustainable design and being identified for this Presidential report include:

The Sandia National Laboratory – New Mexico (SNL-NM) is reviewing and revising its standard construction specifications and Design Manual to incorporate sustainable design. SNL-NM is also training its design professionals and will be providing lessons learned to other DOE sites.

The Idaho National Engineering and Environmental Laboratory (INEEL) will be providing sustainable design recommendations for the conceptual design of the Subsurface Geosciences Laboratory. As part of that effort the INEEL is preparing a life cycle cost assessment showing the building design is cost effective to construct and will evaluate the design using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) software analysis package.

The Pacific Northwest National Laboratory (PNNL) will implement working standards for sustainable design of its capital and expense facility projects. The PNNL effort will include the development of working standards and

economic calculations for use by other DOE sites. PNNL will post recommendations and calculations on the Internet.

The National Renewable Energy Laboratory (NREL) will be working to accredit LEED evaluators and certifying their planned Science and Technology Facility. NREL will also be expanding its sustainable website.

The Oak Ridge National Laboratory (ORNL) will incorporate sustainable design principles into three new buildings. ORNL will also develop criteria for selecting private sector building developers, and transfer lessons learned to DOE's Laboratory Facility Revitalization Initiative.

Energy Efficiency in Lease Provisions

Most DOE space is federally owned and energy intensive. In spaces leased by DOE , energy efficiency has been a matter of policy for years. For example, DOE's Oakland Operations Office has occupied leased space in an Energy Star Building since 1998. However, most DOE facilities are in remote locations, where much of the leased space is in the form of modular offices and trailers that are considered temporary structures. When leased space in a certified Energy Star building becomes available and lease space is needed, then DOE gives such space priority consideration. Leased space in Energy Star Buildings is selected when it is the most life-cycle cost-effective alternative and meets mission requirements. In FY 2001, DOE will encourage energy efficiency provisions in new building leases.

Industrial Facility Efficiency Improvements

Reliability of the energy supply is an important issue in energy-intensive facilities. Thus, DOE is targeting these facilities as opportunities for distributed energy resources. Some of the technologies that may be investigated include cogeneration facilities, micro-turbines and fuel cells that will increase electricity reliability. In FY 2001, Energy Services Companies and Utilities will be invited to propose efficiency improvements for industrial processes in at least two DOE sites.

New energy conservation activities being initiated in FY 2001 in conjunction with industrial facility efficiency improvements and being identified for this Presidential report include:

The Thomas Jefferson National Accelerator Facility (TJNAF) will evaluate new klystron designs for energy efficiency and develop engineering and economic parameters for the final design of a new klystron. Klystrons are the devices that convert dc power into microwave

The Material and Molecular Research Lab at Lawrence Berkeley National Laboratory was the first DOE project that used private sector financing through a shared energy savings contract to improve its energy efficiency, resulting in a $60,000 a year reduction in the utility bill

power which energizes the accelerator used for high energy physics research. The goal is to increase the efficiency of the conversion process from 35 percent to over 60 percent.

The Fermi National Accelerator Laboratory (FERMI) will evaluate and identify cost effective solutions to improve humidity control in the fixed target areas of its accelerator. FERMI has identified excessive energy costs, as well excessive maintenance costs and environmental disposal costs in these areas.

In addition, as listed within the Financing section, TJNAF, has received funding to improve the energy efficiency of its existing klystron systems. The Idaho National Engineering and Environmental Laboratory (INEEL) will be receiving funding for a heat recovery system for a building within its Chemical Processing Plant.

Highly Efficient Systems

In FY 2001, DOE will audit its facilities to determine if more highly efficient systems can be installed cost effectively. A private firm is working with DOE to investigate the feasibility

NREL's 10,000 square foot Thermal Test Facility cuts energy cost by two-thirds at no extra upfront cost.

of installing wind turbines at the Nevada Test Site. Use of biomass is problematic for DOE. Many sites are located in remote areas, such as deserts, where there is little biomass available and transportation costs are prohibitive. Where forests exist, such as at the Savannah River site, they are often the only pristine habitat in the region and are treasured as environmental study areas. In FY 2001, DOE will also target geothermal technologies for inclusion into new building designs as part of the sustainable design process.

Off-Grid Generation

DOE is actively promoting the use of solar and renewable energy. Off-grid generation systems are encouraged when they are life-cycle cost effective and offer benefits such as energy efficiency, pollution prevention, source energy reductions, avoided infrastructure costs, or expedited service.

For FY 2001, DOE will be funding two solar energy projects for special applications. DOE will also encourage ESCOs to bundle renewable energy technologies with other more cost effective energy efficiency technologies in order to increase the installation of renewable energy technologies.

In addition to the solar and renewable projects, DOE has funded micro-turbine projects at its Brookhaven National Laboratory and Sandia National Laboratory.

Water Conservation

DOE recognizes a tremendous potential to save money and precious natural resources through water conservation. Water conservation is a high priority objective in the DOE Order "Departmental Energy and Utilities Management." In FY 2001, DOE Field Offices and sites will be developing Water Management Plans for inclusion in their energy and facility management plans. DOE Field Offices/sites will be implementing Best Management Practices (BMPs) for efficient water use, and prioritizing funding for projects based on life-cycle cost effectiveness.

New energy conservation activities being initiated in FY 2001 in conjunction with water conservation and being identified for this Presidential report include:

The Idaho National Engineering and Environmental Laboratory (INEEL) is preparing a comprehensive Water Management Plan that includes pumps, distribution piping and fixtures inside the buildings. INEEL will audit at least 10 percent of its water using facilities using the Federal Energy Management Programs' Best Management Practices as a guide.

The Fermi National Accelerator Laboratory (FERMI) is evaluating modifications to its site-wide low conductivity water (LCW) system to improve the performance. FERMI will be evaluating the pumps and the speed at which the LCW is flowing through the system in support of experimental high energy physics equipment. In addition as listed in the Financing section, the Princeton Plasma Physic Laboratory will be installing automatic ultra low flow toilets, urinals and automatic faucets.

Natural gas-fired microturbine cogenerators, such as these, can be used by DOE labs to reduce peak electricity grid loads.

Acquisition of Green Power

DOE has established targets of 3 percent of purchases from non-hydro-renewable power by FY 2005 and 7.5 percent of power purchases by 2010. During FY 2001, DOE will issue guidelines for acquiring Green Power and will form a task force to implement purchases of green power for DOE sites, either directly or through a green tags program. In FY 2001, DOE expects to purchase at least 1 megawatt of power either from non-hydro renewable power or from hydro-power that has been certified as environmentally friendly.

Reduction of Ozone-Depleting Substances

In FY 2001, DOE expects to replace chillers that are currently using ozone depleting substances with more efficient chillers using environmentally friendly refrigerants. The retrofit project that will be accomplished at Argonne National Laboratory will replace a 300 ton CFC chiller with a 150 ton non-CFC high efficiency chiller.

Energy-Efficient Operation and Maintenance of Buildings

Even with modern control systems, the energy systems of buildings gain inefficiencies over time due to sensor "drift" and aging of equipment. In FY 2001, DOE will re-commission buildings in at least one site and identify the resultant energy efficiency opportunities.

New energy conservation activities being initiated in FY 2001 in conjunction with energy efficient operation and maintenance being identified for this Presidential report include:

The Pacific Northwest National Laboratory (PNNL) will audit one of its major laboratories. In addition, PNNL will improve measurement and verification tools for recommissioning, and develop a recommissioning checklist and economic calculations for use by other DOE sites. PNNL will post the results of the audit, tools and reports on the Internet.

An example of on-site Diesel engine-driven electricity generators that can be used to shift electrical load off the grid during peak demand periods.

Electrical Load Reduction Activity at California Sites

Peak demand at DOE's major energy using sites in California has been reduced significantly through implementation of energy conservation measures. These measures, which include the upgrading of lighting, central chiller and pumping systems, have not only reduced annual energy consumption but also peak electrical load demand. All of DOE's major energy using sites in California will participate in the California Energy Commission's Emergency Load Reduction Test to demonstrate their peak load reduction capabilities. The largest DOE energy-using site in California, the Lawrence Livermore National Laboratory (LLNL), has reduced energy use by 27% from its 1990 baseline.

As of April 3, 2001, the California Public Utilities Commission ordered electricity service providers to include transmission-level customers, such as all the DOE sites in California, to participate in the rotating outage process. All sites have therefore developed electricity usage curtailment plans that address the actions required at each of the 3 electrical emergency stages. The major sites affected by the rotating outages are Lawrence Berkeley National Laboratory (LBNL), Lawrence Livermore National Laboratory (LLNL), Stanford Linear Accelerator Center (SLAC) and Sandia National Laboratory-California Site (SNL-CA), all of which receive power from and are notified of impending electrical emergency alerts from the Western Area Power Administration (WAPA). Stage 1 alert is declared when predicted load versus generating capacity margin is less than 7%, Stage 2 and Stage 3 alerts are declared when the margins are less than 5% and less than 1.5% respectively.

⊙ LBNL's Response to Electrical Emergency Alerts:

LBNL notifies all staff of alerts by e-mail within 10 minutes of receiving notification from WAPA. At the Stage 1 level, staff turn off all non-essential experimental equipment, lights, computer monitors and other office equipment.

At the Stage 2 level, staff turn off all non-critical experimental equipment and the same lights and equipment turned off during a Stage 1 alert. At the Stage 3 level, staff turn off all non-critical equipment and all office air conditioning. LBNL has also developed preliminary plans to address 5, 10 and 15% power curtailments.

LBNL estimates that rotating outages could cost the lab over $21 million over the next 2 years if subjected to the predicted 15 outages per year. Installation of a power generator on-site to meet the power shortage (during curtailments) is estimated to cost $1.5 million and appears to be an attractive option.

LBNL will participate with the Assessment of Load and Energy Reduction Techniques (ALERT) teams' identification of additional demand reduction measures.

Power transmission lines in California.

⊙ LLNL's Response to Electrical Emergency Alerts:
LLNL notifies all staff of alerts by e-mail through its Public Relations Department. Staff actions in response to each alert level are similar to those described for LBNL above.

LLNL will participate with the ALERT teams' identification of additional demand reduction measures at its site.

⊙ SLAC's Response to Electrical Emergency Alerts:
Since SLAC has an interruptible rate contract with WAPA, it is required upon request by WAPA to reduce its load from 50-65 MW down to no greater than 21 MW during a power shortage. SLAC has identified accelerator subsystems that can be curtailed, while still maintaining the capacity to resume full operations quickly following the restoration of power. During Stage 3 alerts, and at other times requested by WAPA dispatchers, SLAC has reduced its electrical load by deferring activities that involve the development and testing of klystrons. SLAC has conducted a preliminary review of the possible impacts of a catastrophic failure. To mitigate the impact of such a failure SLAC installed a new emergency backup generator at its Main Control Center and has initiated a project to provide emergency backup for its critical computer and communications systems.

⊙ Sandia-CA's Response to Electrical Emergency Alerts:
Sandia-CA will be releasing a site-wide bulletin explaining the Presidential Directive with an appeal to continue conservation efforts. In addition to implementing their established load curtailment plan, Sandia-CA will implement e-mail notifications to employees during Stage 2 and Stage 3 alerts to conserve further. During the alerts, maintenance staff will be stepping up conservation activities such as re-setting thermostats and setting back chillers. During previous alerts in February 2001, electrical consumption decreased by 6 percent.

DOE-Wide Emergency Electrical Load Reduction

DOE's major energy-using sites are required to have emergency conservation plans for 10, 15 and 20 percent reductions from the previous fiscal year in gasoline, other oil-based fuels, natural gas, or electricity, for periods up to 12 months. These plans are designed to achieve the desired level of energy use reductions with the least impact on the site's mission and operating costs. While other energy sources are addressed in these plans, the need for emergency electrical load reduction plans has been underscored by recent events in California.

West side of DOE's low-energy design Solar Energy Research Facility in Golden, CO. showing placement of photovoltaic modules

Most major DOE sites have emergency electric load reduction plans in place, which include many actions listed in the *Appendix B - Plan of Action, Energy Conservation at Federal Facilities*.

Notable accomplishments include:

⊙The DOE headquarters facilities participate in Potomac Electric Power Company's (PEPCO's) load curtailment program by operating diesel generators at the Germantown complex, shutting down escalators and selected elevators at the Forrestal building, and alerting employees to reduce electric loads under their control (lights, personal computers, and appliances). Peak demand has been reduced by about 20 percent since 1990 through energy efficiency improvements in these facilities.

⊙The Argonne National Laboratory has participated in Commonwealth Edison's load reduction program since 1992. In response to requests from the utility the lab reduces end use electrical load, combined with operation of emergency generators, saving over $850,000 through 2000.

⊙The Brookhaven National Laboratory meets regularly with their utility to discuss electric loads and future requirements and set monthly demand targets. Past demand reduction programs have saved over $1.5 million. The lab has pledged demand reductions of 12 megawatts (MW) for summer 2001, the largest reduction in the utility's service area.

⊙The Princeton Plasma Physics Laboratory reduces electric loads by up to 4.5 megawatts, with 30 minutes notice from the utility, saving $11 million since 1986.

⊙The Los Alamos National Laboratory load shedding plan reduces electric demand in four stages up to 50 percent of total load.

⊙The Rocky Flats Environmental Technology Site power curtailment plan reduces electric demand in three phases by 35 percent of total load.

⊙The Savannah River Site initiated its "Peak Alert" program in 1992, to achieve reductions in site electric demand. "Peak Alerts" are issued in response to requests from the utility to reduce electric demand, as well as to control electric demand (and hence cost).

Appendix A

Presidential Directive of May 3, 2001: Energy Conservation at Federal Facilities

MEMORANDUM FOR HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

SUBJECT: **Energy Conservation at Federal Facilities**

A key component of my Administration's overall commitment to make the most economical use of public dollars and to protect the environment is to improve energy conservation at Federal facilities. Further, with possible electricity shortages in California and in the Northeast and Northwest this summer, the Federal Government should set a good example of conservation by reducing its own energy use, particularly in regions where electricity shortages may occur and during periods of peak electricity demand. Such conservation would save public money, protect the environment, and help to minimize shortages.

Therefore, I hereby direct the heads of executive departments and agencies to take appropriate actions to conserve energy use at their facilities to the maximum extent consistent with the effective discharge of public responsibilities. Agencies located in regions where electricity shortages are possible should conserve especially during periods of peak demand.

In addition, agencies should review their existing operating and administrative processes and conservation programs and identify and implement ways to reduce such use. Agencies should report to me, through the Secretary of Energy, within 30 days from the date of this memorandum on the conservation actions taken. The agencies shall take these and other appropriate energy conservations actions using existing budget authority.

Appendix B

Plan of Action: Energy Conservation at Federal Facilities

Background

A key component of this Administration's overall commitment to make the most economical use of public dollars and to protect the environment is to improve energy conservation at Federal facilities. Further, with possible electricity shortages in California, and in the Northeast and Northwest this summer, the Federal Government should set a good example of conservation by reducing its own energy use, particularly in regions where electricity shortages may occur and during periods of peak electricity demand. Such conservation would save public money, protect the environment, and help to minimize shortages. The Federal government is in a position to reduce loads and make a sizable contribution in the effort to avoid Electrical Emergencies.

On May 3, 2001 President Bush issued a directive to the heads of executive departments and agencies ("agencies") to take appropriate actions to conserve energy use at their facilities to the maximum extent consistent with the effective discharge of public responsibilities. Agencies located in regions where electricity shortages are possible should conserve use especially during periods of peak demand.

The Department of Energy will be dispatching special DOE ALERT Teams to the top 25 largest energy-using federal facilities in California. These *Assessment of Load and Energy Reduction Technique* Teams will identify key short-term measures at federal sites in the State in order for them to reduce their own peak load. DOE will hold a workshop in the next few weeks to pass on the "lessons learned" to all federal facilities.

Many federal facilities already realize the financial benefits of planning for electrical load reductions, and have excellent plans in place. The Federal government as a whole has reduced its energy consumption in buildings by 20% and is on track to achieve a 35% by 2010. While these gains in efficiency have been measured in terms of efficiency there is a corresponding reduction in demand on the electrical system. The experience gained by these facilities forms the basis of this Federal-wide plan to be implemented by all Federal facilities in support of local electrical use reduction efforts. Individual facility plans should be customized to site specific conditions. The requirement for emergency conservation plans is contained in Title 10, Code of Federal Regulations, Part 436, Subpart F, Paragraph 436.105.

Reporting of Conservation Actions to the President

Agencies should review their existing operating and administrative processes and conservation programs and identify and implement additional ways to conserve such use. All agencies are required to report back to the President, through the Secretary of Energy, by ~~b~~June ~~y July~~ 3rd on the conservation actions taken. The agencies shall take these and other appropriate energy conservation actions using existing budget authority. The required format for the report will be provided by the Department of Energy's Federal Energy Management Program.

General

1. Establish/enhance communications with the local utility company. Understand their needs for load reductions. Work with the local utility to develop the individual facility plan. An example is the Potomac Electric Power Company's (PEPCO's) Curtailable Load Program. During the summer of 1999, participating Federal agencies in the Washington, DC area provided an estimated eight megawatts of peak load reduction on five occasions when requested by PEPCO, assisting PEPCO, and enhancing grid reliability.

2. Identify load reduction measures appropriate for the facility. Investigate separating loads into: (1) Life, health and safety driven; (2) Mission critical; and, (3) Non-critical. If not separately switchable, investigate modifying systems to allow terminating or reducing non-critical loads.

3. Agencies should immediately update their facility's "Plan of Action for Emergency Electricity Reductions".

4. Federal facilities in California are encouraged to participate in the state's May 24th Emergency Load Reduction Test. The California Energy Commission is sponsoring the test, with federal participation coordinated by DOE. The test will include actual energy conservation measures taken by federal, state, local and private sector facilities. The California Independent System Operator will monitor the load reductions.

5. During Stage 2 or 3 alerts in California federal facilities should take steps to rapidly reduce their electricity loads, even if these actions would require some sacrifices in employee comfort or convenience. These actions should include: raising indoor temperatures to 78 degrees; shutting down non-essential space cooling up to one hour before the normal close of each workday; turning off nonessential lighting and building systems such as escalators; a portion of all elevators, chilled water for fountains); and, reducing corridor lighting. DOE facility managers are required to take these steps.

6. Establish a system to alert employees of expected high demand days including, but not limited to E-mail, voice mail, or public address announcement to all employees. Communicate early to allow employees to take load reduction measures at home and to dress appropriately.

7. Monitor total facility demand and demands for individual major loads (if separate metering is available). Monitor weather forecasts to predict high demand days and be proactive in communicating with the local utility to assess need to reduce load.

8. Initiate load reduction measures. Employees can take steps to reduce lighting, personal computers and appliances electricity use. While energy efficiency should be encouraged on a daily basis, stress the need for increased diligence to alleviate the emergency. Air conditioning operating changes and other system-wide measures should be accomplished by facilities management. Federal facilities that have energy management and control systems are well suited for this task. Facilities should also consider additional measures appropriate for site specific circumstances.

9. Encourage employees to reduce electrical loads in their homes, to reduce demand on the utility system. If no one is at home during the workday, unneeded appliances and lights should be turned off, and air conditioning thermostats should be set higher before departing for the day. Also, some utilities offer cost incentives to residential customers who allow the utility to remotely cycle off power to air conditioning and electric water heating systems. Periods without power are limited, so that comfort is not sacrificed. Encourage employees to participate in these programs, to assist the local utility, while reducing their electricity bill.

10. Enhance employee awareness of energy efficiency through training and less formal methods. Provide mandatory and voluntary training opportunities on smart energy practices so that employees can practice energy efficiency during emergency periods and year-round. In addition to training, run public service announcements about energy efficiency on televisions in cafeterias and other public use areas; send periodic e-mail messages about turning off lights and computers and implementing other efficiency practices; post signs or billboards near light switches or communal printers; and consider holding annual energy fairs prior to seasonal emergency periods to provide additional information for employees about how to manage energy use in the work place and in their homes.

Lighting Measures

1. Turn off fluorescent lights when leaving an area for more than 1 minute. (During non-emergencies, 5 minutes is recommended, to keep from excessively reducing lamp life). Turn off incandescent lights when leaving areas for any period of time.

2. In areas with sufficient daylighting, turn off lights. Adjust blinds, if available, to reduce glare.

3. Use task lighting and turn off general

lighting, where it is feasible to maintain sufficient lighting levels for safety and productivity.

4. Turn off display and decorative lighting.

Personal Computers and Appliance Measures

1. Turn off printers when not in use.

2. Turn off monitors when not in use.

3. Ensure ENERGY STAR power down features are activated.

4. If computers do not have ENERGY STAR features available, turn them off when leaving the office for more than 30 minutes.

5. Ensure personal appliances, such as coffee pots and radios are turned off.

Air Conditioning Measures

1. Pre-cool building(s) below normal temperature settings prior to onset of peak demand period. Make sure to tell employees about this practice, so that they will not operate space heaters. During peak demand period, allow space temperatures to drift back up to normal settings (or as much as 5 degrees Fahrenheit (F) above normal settings).

2. Allow casual attire, to make higher temperatures more acceptable.

3. Where systems allow, lower chilled water temperatures several degrees below normal settings prior to peak periods, and allow to drift above normal settings during peak periods.

4. Duty cycle air handling units off. Ensure adequate outside air flow rates to maintain indoor air quality.

5. Ensure that ventilation grilles and fan coil units are not blocked by books, flowers, debris, or other obstructions. This will improve air conditioning system efficiency and improve comfort.

Other

1. Operate emergency generators (many agencies have negotiated financial incentives from their local utility for operating generators). Ensure that generators have ample fuel for emergency operation and have been tested routinely. Turn off shore power to ships in dock and operate ship power systems. Make mobile utility system electrical generating equipment available to the local utility.

2. Shut off selected elevators and escalators. Ensure accessibility needs are met.

3. Where feasible, schedule high electrical energy use processes during off peak periods.

4. Encourage employees to not use copiers during peak demand period. Turn off selected copiers. Ensure power saver switch on copiers is enabled.

5. Turn off unnecessary loads such as fountain pumps.

Long Term Solutions

1. Consider purchasing interruptible power for selected loads with high electrical demand, and which will not suffer adverse consequences in the event of the utility turning off power. The cost savings from the lower rate may far outweigh the inconvenience of power being turned off within the interruption limitations agreed to in the utility contract.

2. Consider installing sub-metering to identify high intensity loads to be shed during emergencies.

3. Investigate thermal storage systems or alternative energy sources for air conditioning.

4. Install motion sensors and separate lighting circuits to allow turning off unneeded lights. (Some agencies have installed switching to separate public areas from agency work spaces).

5. Install an Energy Management and Control System to allow shedding and monitoring loads from one central location. If non-critical loads are not separately switchable, modify systems to allow terminating. Local utilities or energy services companies (ESCOs) can assist with this effort.

6. Consider adding on-site generation using micro-turbines, fuel cells, combined heat and power, renewable, or other appropriate technology.

Glossary

ALERT ..... Assessment of Load and Energy Reduction Techniques
ANL ..... Argonne National Laboratory
BMP ..... Best Management Practice
BPA ..... Bonneville Power Administration
Btu ..... British Thermal Unit
CFC..... Chlorofluorocarbons
DOE ..... The Department of Energy
EEWG..... Energy Efficiency Working Group
EMS ..... Energy Management System
EO ..... Executive Order 13123
EMSC ..... Energy Management Steering Committee
ESCO ..... Energy Services Company
ESPC ..... Energy Savings Performance Contract
FEMP ..... Federal Energy Management Program
FY ..... Fiscal Year
INEEL..... Idaho National Environmental Engoneering Laboratory
LBNL..... Lawrence Berkeley National Laboratory
LLNL..... Lawrence Livermore National Laboratory
M&O ..... Management and Operating (Contractor)
NREL..... National Renewable Energy Laboratory
PA ..... Energy and Utility Management Performance Agreement
PPPL..... Princeton Plasma Physics Laboratory
SCADA..... Supervisory Control and Data Acquisition System
SIR ..... Savings to Investment Ratio
SLAC..... Stanford Linear Accelerator Center
SNL..... Sandia National Laboratory
SRS..... Savannah River Site
TJNAF..... Thomas Jefferson National Accelerator Facility
UESC ..... Utility Energy Services Contract

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