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ANNUAL REPORT

ON

U.S. ENVIRONMENTAL PROTECTION AGENCY'S

ENERGY MANAGEMENT AND CONSERVATION PROGRAMS

U.S. Environmental Protection Agency
Office of Administration and Resources Management
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EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA) is committed to living its mission to protect human health and the natural environment, through a coordinated strategy to reduce energy use and promote environmentally sustainable practices in its facilities. In Fiscal Year (FY) 2001, EPA continued its ongoing efforts to make its facilities models of energy efficiency and sustainability by creating a new branch—the Sustainable Facilities Practices Branch (SFPB). Under this branch, which is part of EPA's Facilities Management Services Division, EPA is focused on improving the sustainability of all of its facilities, through improved energy management, green building design and operation, waste reduction and recycling, and environmentally preferable purchasing, including renewable power. Through a combination of energy audits, efficiency measures, creative financing, and renewable power purchases, SFPB is helping EPA demonstrate that federal agencies can be more sustainable through aggressive energy management.

Results

Because nearly all of EPA's major facilities are laboratories, which require intensive energy consumption, the Agency faces a particular challenge in reducing its energy use. For all 19 of its laboratory complexes (and a 20th opened October, 2001), the Agency collects energy consumption data and compiles it on a quarterly basis. EPA's energy consumption database shows that the Agency's facilities consumed the following energy in FY 2001:

- 138 million kilowatt hours (kWh) of electricity
- 4.8 million hundred cubic feet (ccf) of natural gas
- 812,591 gallons (gal) of fuel oil
- 6,686 gal of propane
- 36.3 million pounds (lbs) of purchased steam

The Energy Policy Act of 1992 (EPACT) was the first legislation that directed federal agencies to reduce energy use. Under EPACT, FY 1985 energy data provided the baseline from which reductions were measured. While laboratories were specifically exempted from these provisions, EPA moved forward to improve energy performance in its laboratories. Pursuant to these initial efforts, EPA reduced

energy consumption in its laboratories from 399,992 Btus per gross square foot per year in 1985 to 354,429 Btus per gross square foot per year in 2001 – a reduction of 11.4 percent[1]. Executive Order 13123, issued in June 1999, specifically included laboratories in federal energy reduction efforts and changed the baseline year to FY1990; since then EPA has separately calculated its Btus per gross square foot per year for the facilities that existed during that baseline year. The 12 facilities that existed in 1990 reduced energy consumption from 357,334 Btus per gross square foot per year in 1990 to 348,235 Btus per gross square foot per year in 2001—a reduction of 2.5 percent. Energy use at all 19 EPA laboratory complexes decreased by approximately 1 percent from 357,334 Btus per gross square foot per year in 1990 to 354,429 Btus per gross square foot per year in 2001[1].

While our energy use data is not normalized for variations in weather or laboratory work load, two factors which could have contributed to energy performance, we believe the erratic energy markets in FY 2001 and associated fuel switching was the single most important factor which hurt our performance this year. Extremely high natural gas prices necessitated a switch to fuel oil at EPA's second and fourth largest laboratory complexes this past winter. Although fuel oil use resulted in significant cost savings at these labs, oil generally burns less efficiently in boilers engineered primarily for natural gas consumption, so this slowed EPA's progress in reducing energy use.

To further improve its energy performance, EPA is purchasing "green power" to reduce the emissions created from its energy use. Green power is electricity produced from renewable sources such as wind, small hydro, or landfill gas. By the end of FY 2001, the Agency was using green power for 100 percent of the electricity in two of its facilities (see page 3), or 2.6 percent of the electricity used in its 19 reporting laboratories, and had agreements in place to purchase 100 percent green power at three additional facilities. *In FY 2002, with the return to more natural gas fired utility operations and EPA's Green power purchases, we expect energy use to decline 9.2 percent from FY1990 at our reporting laboratories.*

In FY2001, EPA also proposed a $2.6 million Energy Efficiency funding initiative, to be used primarily for laboratory mechanical system upgrades, for FY2003. If appropriated, this investment will improve the momentum of EPA's energy conservation progress.

[1] Green Power netted out per E.O.13123 implementation guidelines

Making Assessments

In addition to collecting and compiling energy consumption data, in FY 2001 SFPB made a concerted effort to examine as many EPA facilities as possible to determine what could make them more energy efficient. Working in cooperation with the EPA Safety, Health, and Environmental Management Division's (SHEMD) Health, Safety, and Environmental Compliance audit process, SFPB now conducts a energy assessment for each of the audited facilities on a triennial basis to determine opportunities for better energy management and facility upgrades. SFPB participated in nine audits in FY 2001 and identified short- and long-term solutions for better energy management. In addition to these audits, SFPB conducted three in-depth assessments of laboratories to identify opportunities for strategic improvements in the energy systems.

Strategic Investments

When energy assessments reveal major opportunities to overhaul mechanical systems in order to achieve energy savings, simple adjustments and individual upgrades may not be enough. Congress established a legal mechanism that enables EPA to finance complete facility energy upgrades and achieve major energy reductions through the use of Energy Savings Performance Contracts (ESPCs). EPA's first ESPC, at the National Vehicle Fuel Emissions Laboratory in Ann Arbor, Michigan, was completed in April 2001 and is now realizing energy reductions of approximately 56 percent. Under this ESPC, the Ann Arbor lab installed new boilers, chillers, rooftop air handling units, double enthalpy recovery, and a natural gas fuel cell—all contributing factors to the energy reduction effort provided by this innovative financing mechanism.

The Ann Arbor laboratory is just one example of a successful energy efficiency measure undertaken using an ESPC in FY 2001. Because of the success of the Ann Arbor project, EPA proceeded with a series of ESPC upgrades to its Ada, Oklahoma, laboratory this year and began working on ESPC-like projects at its labs in Las Vegas, Nevada, and Richmond, California.

Motivating Managers

In FY 2001, SFPB began electronic distribution of the Agency energy consumption statistics it collects to all EPA's laboratory energy managers and program managers with laboratory operations. This simple and graphic PowerPoint email compares energy use at each facility—including reductions over the last five years—and shows the energy reductions associated with a facility's ESPC or green power purchase. SFPB hopes sharing each facility's progress will motivate actions to increase energy efficiency and purchase renewable power.

Renewable Efforts

Beyond monitoring the Agency's energy use, EPA is concerned about the environmental impacts associated with the use of conventional energy sources throughout its laboratory system. To further its environmental mission and demonstrate ways the federal government can continue increasing its green power purchases, the Agency in FY 2001 focused on finding ways to buy more renewable energy for its facilities. With the signing of two contracts this year to purchase 100 percent renewable energy, EPA now has a total of five locations buying green power for *all* their electricity needs. This effort earned the Agency the distinction of becoming a Founding Partner in EPA's own Green Power Partnership, a voluntary program that was launched in FY 2001 to recognize and encourage the use of renewable energy.

The Agency's most recent 100 percent renewable energy contract was signed in May 2001 to power three different EPA facilities in Cincinnati, Ohio, with wind and landfill gas. Other EPA facilities using 100 percent renewable energy include Richmond, California; Manchester, Washington; Golden, Colorado; and a new lab that was built in FY 2001 in Chelmsford, Massachusetts. EPA also initiated a green power purchase procurement at its laboratory in Houston, Texas. According to the latest U.S. Department of Energy (DOE) figures available (FY2000), this makes EPA's purchases the highest *percentage* of green power purchases of any federal agency. With our significant new green power deliveries in FY2001, EPA expects to continue as the leading federal agency in green power procurements. In addition to facilities powered entirely by renewable energy, EPA supports a variety of renewable and off-grid power generation through solar arrays, photovoltaics, geothermal heat pumps, and other technologies.

Laboratories for the 21st Century

Laboratories for the 21st Century (Labs21) is a voluntary program sponsored by EPA and DOE dedicated to improving the environmental performance of U.S. laboratories. The goal of Labs21 is to promote sustainable, high-performance, and low-energy laboratories by improving energy and water efficiency, encouraging the use of renewable energy sources, and promoting environmental stewardship.

In FY 2001, EPA and DOE developed partnership agreements with a diverse group of Labs21 Pilot Partners in an effort to demonstrate the opportunities for improved laboratory performance. These laboratories are spread throughout the public and private sector in the fields of pharmaceuticals, health care, university research, and industry. Working with Labs21, each Pilot Partner will define a specific pilot project, set voluntary energy reduction goals, and measure and report the success of their efforts. Labs21 will, in turn, provide a range of technical support to help Pilot Partners achieve their goals. The Pilot Partners will also be recognized by Labs21 for their efforts at the annual Labs21 conference and through detailed case studies. The list of Labs21 Pilot Partners includes the following:

Private Sector Partners

Wyeth-Ayerst Pharmaceuticals
Bristol-Myers Squibb
Raytheon
Duke University Medical Center
Carnegie Mellon University
University of California (Merced)
University of North Carolina (Asheville)
New York City School Construction Authority

Federal Sector Partners

Sandia National Laboratories
National Oceanic and Atmospheric Administration
National Renewable Energy Laboratory
Lawrence Berkeley National Laboratory

These are just a few of the efforts that EPA has undertaken in FY 2001 and over the past several years to make the Agency a model of sustainable energy management. To realize its energy reduction goals, EPA recognizes that it must continue to aggressively audit facilities, identify opportunities, and implement strategies for better energy management.

SECTION I

MANAGEMENT AND ADMINISTRATION

EPA recognizes that efficient energy and water management must involve all facility management employees as well as senior EPA management. This section describes EPA's energy management infrastructure and the management tools it uses to implement Executive Order 13123, *Greening the Government Through Efficient Energy Management.*

ENERGY MANAGEMENT INFRASTRUCTURE

E.O. 13123 requires each federal agency to assemble a technical support team to encourage the use of appropriated funds and ESPCs to meet the energy-efficiency goals and requirements of the order. In November 2000, EPA consolidated these activities in a newly formed Sustainable Facilities Practices Branch (SFPB). The SFPB gives full-time attention to sustainable practices, policies, and project implementation, which reflects the importance that EPA places on this issue. Key staff in the SFPB's energy team include the branch chief/team manager, national energy coordinator, an energy audit manager, two mechanical engineers, an architect, and support staff.

Senior Agency Official and Energy Team

EPA has designated the Assistant Administrator for Administration and Resources Management as the Agency Energy and Environmental Executive. He is supported by a national energy team and a national energy coordinator, located in the Sustainable Facilities Practices Branch. SFPB's energy team is supplemented by architects and engineers from EPA's Architecture, Engineering, and Real Estate Branch and by DOE's National Renewable Energy Laboratory on a project-specific basis. Site energy managers for each of the Agency's 19[1] facilities are listed in Appendix D.

[1]EPA is required to report to DOE and OMB the energy use at facilities for which the Agency pays utility bills (19 total). Although EPA occupies other facilities, these utilities are paid by GSA.

MANAGEMENT TOOLS

EPA realizes that the commitment of its employees to improve energy efficiency is vital to achieving the Agency goal to reduce energy and water consumption. EPA's energy management team uses awards, incentives, and performance evaluations, as well as continuing education and training programs, to support individual and team efforts in energy efficiency.

Awards (Employee Incentive Programs)

The DOE-sponsored "You Have the Power" campaign was initiated to increase awareness of energy efficiency throughout the federal government. EPA is an active participant and has recognized 20 employees as energy champions. Criteria for selection is based on an individual's effort and success in striving to conserve energy through building design and operation, real estate transactions, and overall promotion of energy-efficiency awareness. Energy champion posters highlighted the selected EPA individuals and their achievements. For more information on this campaign, visit the Web site at <www.eren.doe.gov/femp/yhtp/epa.html>.

EPA has an Agency-wide awards program. These awards are not specifically for energy management performance, but are more inclusive, addressing sustainable design and resource conservation. In 1999, for example, the Fort Meade (Maryland) Environmental Science Center Construction Team received the Gold Medal for Exceptional Service by creating the Agency's first official Federal Energy Saver Showcase facility pursuant to EO 12902, *Energy Efficiency and Water Conservation at Federal Facilities*. The gold medal is EPA's highest honor award and is given on a highly selective basis for distinguished service of major significance to environmental improvement and to public service.

In FY 2001, 13 individuals in the Facilities Management and Services Division received the highly prestigious James W Craig Pollution Prevention Leadership Award for their work on energy conserving and sustainable facilities.

In addition, EPA is working to established a Silver Medal for Superior Service in Energy and Water Conservation for individuals or groups that have exhibited superior energy and water management.

Performance Evaluations

Employees who have energy management responsibilities are evaluated annually against criteria based on the Agency's energy management principles.

Training and Education

EPA uses several education and training programs to ensure that employees are aware of the latest technologies and opportunities to increase energy efficiency:

- *Laboratories for the 21st Century*: The "Laboratories for the 21st Century" program, which grew out of a 1997 federal laboratories conference sponsored by EPA in cooperation with the Lawrence Berkeley National Laboratory and the National Renewable Energy Laboratory, provides information on energy-efficient technology alternatives for laboratory applications and creates a forum for laboratory designers, owners, and operators to obtain up-to-date information and support for implementing energy-efficiency programs.

  During 2001, Labs21 sponsored a series of one-day workshops on energy-efficient laboratory design and operations. The Labs21 Team designed the course to provide a comprehensive understanding of the opportunities to optimize energy performance of new and existing laboratories. Course topics included: design programming; diversity and right sizing; air supply and exhaust systems; distribution systems; air filtration; lighting; commissioning; and resources and tools. Additional information about the courses is posted on the Labs21 Web site at <www.epa.gov/labs21century/training/index.htm>.

  The Labs21 conference has become an annual event and includes plenary and panel sessions to discuss ways in which successful strategies and technologies are being implemented to improve the energy efficiency and environmental performance of laboratories. Breakout sessions following the presentations provide opportunities to explore specific issues in greater detail. The conference features speakers from EPA, DOE, Lawrence Berkeley National Laboratory, National Renewable Energy Laboratory (NREL), academia, and the private sector who present views and technical information on subjects as varied as utility deregulation, passive solar design, and laboratory design, construction, and operation issues. Informal sessions enable attendees to highlight current issues and projects and exchange views and experiences with their peers.

  This year's "Laboratories for the 21st Century" conference, scheduled to take place October 2 to 4, 2001, in Washington, DC, was delayed until January 8 to 10, 2002, following the events of September 11. Hundreds of laboratory energy managers, policy-makers, and technical experts attended the conference, which is open to both federal and non-federal participants and to representatives from other countries including Canada, Germany, and Australia. During the conference, EPA officially recognized the Labs21 Pilot Partners (listed on page 5). The conference agenda, presentations, and speaker biographies are posted on the conference Web site at <www.epa.gov/labs21century>.

- *Buildings and Facilities Conference*: EPA also conducted its annual three-day Buildings and Facilities conference, which all EPA facility managers attend. This year's conference was held in Dallas, Texas, in January, 2001. Conference attendees include facility managers from EPA-operated laboratories and General Services Administration (GSA)-operated regional offices and headquarters. One day was spent on issues related to energy-efficient design and management, including renewable energy purchases, ESPCs, and energy-efficient retrofits.

- *Credit Card Purchasing Guidelines*: Credit card purchasing guidelines on EPA's Environmentally Preferable Purchasing Program's Web site provide easy access for credit card holders to ensure their purchases comply with environmental laws and EPA policies. The guidelines identify specific environmental attributes to look for when selecting products, including the ENERGY STAR® label or other energy-efficiency designations. They also recommend the purchase of products with recycled content, reduced packaging, and those containing minimal hazardous materials or toxic chemicals. In addition, the guidelines provide information on the procurement process, including specific EPA requirements, sources for obtaining the products (e.g., through GSA's Environmental Products Guide or office supply catalogs), and other information and guidance.

- *"Energizing EPA" Newsletter*: *Energizing EPA* is distributed to all EPA facility managers and other federal agencies interested in renewable energy and energy- and water-efficiency activities in EPA facilities. Topics of recent *Energizing EPA* articles include: FY 2001 energy consumption data, green power purchases at EPA facilities, hybrid vehicles and solar energy at regional offices, and updates on EPA's Lab21 Century initiative.

- *Earth Day House Exhibit*: EPA has created a 50-foot-by-8-foot model of a "green" home and an accompanying 50-foot time line tracing the 30-year history of environmental improvements since EPA's founding. This display highlights EPA's commitment to energy efficiency and its role in educating the public about the important relationship between energy efficiency and environmental performance. Every feature in the house, from the construction materials to the furnishings, highlights specific environmental benefits that are explained with more than 100 interpretive signs. Almost one-quarter of the items feature energy-efficiency strategies, including the use of ENERGY STAR®-labeled windows, light fixtures, bulbs, appliances, and computers. The time line also prominently displays the ENERGY STAR® Program's successful efforts to improve energy efficiency and reduce greenhouse gas emissions. EPA estimates that more than 400,000 people have visited the house on the Mall during Public Service Recognition Week, Earth Day, and other events. Other federal agencies, such as the Department of Interior, plan to display the house in their sustainable outreach efforts.

- *Office of Administration Web Site*: EPA's Office of Administration Web site was reorganized to provide more information more efficiently. The site contains square footage, energy and water data, facility manager contact information, and "green" building highlights for each facility EPA manages.

Showcase Facilities

EPA did not designate any showcase facilities in FY 2001. Past designees include Ann Arbor, Michigan; Ada, Oklahoma; and Fort Meade, Maryland. The Agency designated its Ann Arbor, Michigan, facility a showcase for the energy and water efficient measures undertaken as part of an ESPC and the Ada, Oklahoma, facility for the measures planned in its ESPC; Fort Meade is the future home of EPA's first solid oxide fuel cell. EPA hopes to designate more laboratories as showcase facilities in the future. EPA currently has a new laboratory under construction in Region 7, Kansas City, Kansas, which was the result of a design competition that included energy efficiency and resource conservation as award criteria. Extensive energy modeling and design modifications were also made after award to improve the facility design further. This lab will be completed in FY 2003.

SECTION II

ENERGY EFFICIENCY PERFORMANCE

This section highlights the data reported on the accompanying A-11 Data Report and Energy Scorecard (see Appendices A and B). In addition to a narrative of energy and water consumption in FY 2001, this section also discusses EPA's green power purchases, on-site renewable energy generation, and contributions to the Million Solar Roofs initiative.

ENERGY REDUCTION PERFORMANCE

Standard Facilities

EPA has been reporting its energy and water consumption data since 1993. Under the Energy Policy Act of 1992 (EPACT), EPA was not required to report this data because all of its owned facilities are laboratories, which were exempt from EPACT requirements. In 1993, EPA decided to meet the 30 percent and 35 percent energy reduction goals, even though they were set for less energy-intensive nonindustrial facilities. Since 1993, the Agency has measured and reported laboratory energy and water consumption using EPACT's standard facility 1985 baseline and reduction requirements.

In the spring of 1999, EO 13123 broadened the requirements to include industrial and laboratory facilities in energy reduction goals. FY 2000 was the first full reporting year under that executive order. Therefore, EPA is no longer reporting its laboratory energy and water consumption under the standard facility designation as it had prior to last year. Instead, the Agency is now using the more appropriate industrial designation under the executive order.

Industrial and Laboratory Facilities

All of EPA's facilities that require reporting are laboratories and are identified in Appendix D[2].

[2] EPA is required to report to DOE and OMB the energy use at facilities for which the Agency pays utilities bills (19 total). Although EPA occupies other facilities, the utilities are paid by GSA.

EPA compiled its energy and water consumption data using a quarterly report form that is completed by the site energy manager for each facility. The quarterly report includes consumption and cost information for all forms of energy, including electricity, natural gas, propane, fuel oil, and purchased steam, as well as square footage information. Total energy consumption is converted to British thermal units (Btu's) and report as BTU's per gross square foot.

EPA's energy consumption database shows that the Agency's facilities consumed the following energy in FY 2001:

- 138 million kilowatt hours (kWh) of electricity
- 4.8 million hundred cubic feet (ccf) of natural gas
- 812,591 gallons (gal) of fuel oil
- 6,686 gal of propane
- 36.3 million pounds (lbs) of purchased steam

The Energy Policy Act of 1992 (EPACT) was the first legislation that directed federal agencies to reduce energy use. Under EPACT, FY 1985 energy data provided the baseline from which reductions were measured. While laboratories were specifically exempted from these provisions, EPA moved forward to improve energy performance in its laboratories. Pursuant to these initial efforts, EPA reduced energy consumption in its laboratories from 399,992 Btus per gross square foot per year in 1985 to 354,429 Btus per gross square foot per year in 2001 – a reduction of 11.4 percent[3]. Executive Order 13123, issued in June 1999, specifically included laboratories in federal energy reduction efforts and changed the baseline year to FY1990; since then EPA has separately calculated its Btus per gross square foot per year for the facilities that existed during that baseline year. The 12 facilities that existed in 1990 reduced energy consumption from 357,334 Btus per gross square foot per year in 1990 to 348,235 Btus per gross square foot per year in 2001—a reduction of 2.5 percent. Energy use at all 19 EPA laboratory complexes decreased by approximately 1 percent from 357,334 Btus per gross square foot per year in 1990 to 354,429 Btus per gross square foot per year in 2001[3].

While our energy use data is not normalized for variations in weather or laboratory work load, two factors which could have contributed to energy performance, we believe the erratic energy markets

[3] Green Power netted out per E.O.13123 implementation guidelines

in FY 2001 and associated fuel switching was the single most important factor which hurt our performance this year. Extremely high natural gas prices necessitated a switch to fuel oil at EPA's second and fourth largest laboratory complexes this past winter. Although fuel oil use resulted in significant cost savings at these labs, oil generally burns less efficiently in boilers engineered primarily for natural gas consumption, so this slowed EPA's progress in reducing energy use.

To further improve its energy performance, EPA is purchasing "green power" to reduce the emissions created from its energy use. Green power is electricity produced from renewable sources such as wind, small hydro, or landfill gas. By the end of FY 2001, the Agency was using green power for 100 percent of the electricity in two of its facilities (see page 3), or 2.6 percent of the electricity used in its 19 reporting laboratories, and had agreements in place to purchase 100 percent green power at three additional facilities. *In FY 2002, with the return to more natural gas fired utility operations and EPA's Green power purchases, we expect energy use to decline 9.2 percent from FY1990 at our reporting laboratories.*

In FY2001, EPA also proposed a $2.6 million Energy Efficiency funding initiative, to be used primarily for laboratory mechanical system upgrades, for FY2003. If appropriated, this investment will improve the momentum of EPA's energy conservation progress.

Exempt Facilities

EPA has not exempted any facilities from its annual energy reporting.

Tactical Vehicle and Equipment Fuel Use

EPA's Compliance Strategic Plan for the Reduction of Petroleum-based fuels in Tactical Vehicles and Other Equipment has been developed to meet the provisions of EO 13123 and provides a precise approach for achieving the fuel reduction goal. The approach requires:

- Reducing the current number of tactical vehicles and other equipment provided as Government Furnished Equipment to Agency contractors.
- Acquiring better fuel-efficient equipment, which would decrease fuel usage.

- Re-evaluating mission requirements and eliminating equipment where possible.
- Creating incentives for EPA employees and managers to reduce fuel consumption.

Alternatively-Fueled Vehicles

Although most of the vehicles the Agency uses are not considered tactical vehicles, EPA is pursuing alternatively-fueled vehicles where possible. EPA's Region 5 Office in Chicago, Illinois, and Region 6 Office in Dallas, Texas, are each leasing a Toyota Prius, a gas/electric hybrid vehicle. The Region 10 Office in Seattle, Washington, uses Compressed Natural Gas (CNG) vehicles in all applications where a sedan will serve and where fueling infrastructure exists. In FY2001, EPA also has ordered CNG buses for use in the Washington, DC, area to transport employees between Agency buildings. These buses were expected to arrive in January 2002.

A number of EPA offices encourage employees to use public transit by participating in rate programs (i.e., Metrochecks) and, where possible, locating the office near public transit centers. The increase in monthly transit subsidy benefits from $65 to $100 should bring more users into the system.

RENEWABLE ENERGY

EPA is committed to buying green power whenever possible. Recent deregulation of electric utilities makes it difficult for renewable energy production generators to compete with cheaper electricity generation sources such as coal and natural gas, which may have more environmental impacts. EPA can play an important role in assisting the federal government to accelerate the growth of renewable energy sources by requiring the purchase of green power for a percentage of its overall energy requirements.

In 1998, the Restructuring Subcommittee of the Interagency Energy Management Task Force developed a draft Renewable Power Action Plan that included provisions for federal government pilot purchases of renewable power. In the summer of 1999, with assistance from GSA and DOE, the EPA laboratory in Richmond, California became the first federal building to receive 100% of its electricity from renewable sources. EPA signed a three-year contract with the Sacramento Municipal Utility District (SMUD) to purchase electricity generated from an existing geothermal plant and a new landfill gas plant.

Through a combination of procurement methods, the EPA is intensifying the Federal government's demand for green power, or energy derived from renewable sources. Since its first green power purchase, EPA has added electricity from 100 percent renewable sources at four more labs, which brings its total use of green power to 21.8 million kWh per year, or approximately 16 percent of the electricity used by its reporting laboratories. These purchases enabled EPA to be a Founding Partner in EPA's Green Power Partnership, a voluntary program which was launched in FY 2001 to recognize and encourage the use of renewable energy. Recent green power procurement efforts at other EPA laboratories include:

- *Golden, Colorado:* The facility is purchasing 100 percent green power. The lab consumes approximately 2 million kWh of electricity annually and purchases 1,685 "blocks" of 100 kWh of wind power from the Xcel WindSource green pricing program. Because Colorado is a fully regulated market, EPA procured the green power through a GSA area-wide contract. Xcel charges a premium for wind power. EPA makes up a portion of the cost of this premium through a reduced cost natural gas supply contract with GSA. EPA also plans to install a transpired solar collector on the south wall of the facility's hazardous materials building, which conserves energy through a renewable technology.

- *Manchester, Washington*: The Manchester lab's green power purchase is unique because Washington has not deregulated its utility supply industry. This means that the lab is required to purchase electricity from Puget Sound Energy, which currently supplies only a small amount of renewable power generated from hydroelectric dams. Based on current market prices, the lab determined that purchasing green power from Puget Sound Energy would cost approximately 2.2 cents more per kilowatt hour, representing an additional $50,000 annually. Last summer, EPA procured 100 percent renewable wind power through a 10-year demonstration grant agreement with the Bonneville Environmental Foundation (BEF). BEF, working with the Bonneville Power Administration (BPA), is developing a 700-kilowatt wind turbine. The turbine, expected to be completed by the end of CY 2001, will produce approximately 2.1 million kWh of electricity annually. That is enough energy to power the Manchester lab and to produce additional power to the regional electric grid. Washington has not deregulated its electric utility industry, so the electricity from the wind turbine will be sold into the power grid as "generic" electricity and will be available to everyone at the going rate on the regional electric grid. BEF, an independent nonprofit organization promoting renewable energy, will purchase "green tags" from BPA. These tags, which represent the environmental benefits of the wind power over traditional energy sources, are also known as renewable energy credits.

- *Chelmsford, Massachusetts*: EPA has signed a renewable energy credit contract to meet the new facility's estimated 2.2 million kWh annual electric consumption need with 100 percent wind power. The wind will come from Green Mountain Utility's Searsburg wind farm in Vermont and new wind power from New York.

- *Cincinnati, Ohio*: EPA signed a green power contract on May 18, 2001, for 100 percent of the electricity needs at the three main facilities in Cincinnati, Ohio, with Community Energy, Inc., a

renewable energy marketing company. The EPA facilities have committed to purchasing more than 15 million kWh of renewable energy annually for three years, with a three-year option to renew. Community Energy will supply 778,000 kWh per year of wind power from a wind farm in Pennsylvania. Com Ed, a subsidiary of Exelon Corporation, in partnership with Environmental Resources Trust, will supply the remainder of the renewable energy contract with landfill gas from Illinois.

- *Richmond, California*: Since July 1999 EPA has been purchasing 100 percent green power from the SMUD for its laboratory in Richmond, California. The laboratory uses 1.9 million kWh of electricity annually, enough to power 181 households. To ensure the power for this major purchase was truly from renewable sources, EPA required SMUD to obtain "Green-e" certification. Initially, SMUD provided 40 percent of the energy from landfill gas and 60 percent from geothermal sources, but since fall 1999, 100 percent has come from landfill gas.

Self-Generated Renewable Energy

EPA has undertaken a variety of activities across the country to take advantage of self-generating sources of renewable energy, from solar arrays to a geothermal heat pump:

- *Roof-top Solar Array*: In Research Triangle Park, North Carolina, EPA is installing a photovoltaic (PV) roof, one of the two largest on the East Coast, on top of its National Computer Center, which will be complete by April 2002. The 100-kilowatt, integrated roof power system will convert the sun's light into energy, feeding it directly to the building and supplementing the main power utility. PV technology for the computer center is produced by Solarex Corporation, and financial assistance was provided in part by DOE's Renewable Energy Project Demonstration Program. The system incorporates PV cells backed with insulating polystyrene foam, turning solar energy into usable power while increasing the building's thermal insulation. The RTP Computer Center gives EPA the opportunity to demonstrate the effectiveness and marketability of an alternative technology, while serving as a powerful example of the Agency's commitment to sustainable energy principles. In addition, the PV system supports the Million Solar Roofs initiative. RTP also installed solar street lights in parking lots and along facility roadways. Based on information from NREL, EPA understands this is the largest solar road lighting project in the United States.

  Working with GSA and DOE, the EPA Region 5 office last year completed the installation of a solar array on the roof of the Metcalfe Building; that array now provides 10 kW of power to the office building.

- *Net Metering:* Since the end of 2000, EPA's wet laboratory in Manchester, Washington—one of the facility's multiple laboratory buildings—has become the first commercial, solar-powered "net metering" project in the Northwest. Under net metering, any excess electricity produced by the lab's 28 new solar panels will flow directly into the local utility power grid, offsetting the lab's energy costs. The new solar panels are installed and fully operational, generating approximately 2 kW of electricity.

EPA undertook the project to demonstrate the benefits of net metering and solar technology. Although net metering is now an option for consumers and businesses in 27 states, it is still an emerging practice. EPA hopes to demonstrate how net metering can offer a simple, inexpensive, and easily administered way to capture the full value of solar energy production. Under net metering, the laboratory will be credited for any electricity it produces but does not use. This is especially important during weekends or holidays, when the facility is not in use but the solar cells produce power.

- *Geothermal Heat Pump:* EPA's Ada, Oklahoma, laboratory is installing a geothermal heat pump (GHP) as part of its ESPC upgrade. The GHP will eliminate the use of natural gas and significantly lower energy consumption in the Ada laboratory. Energy savings in excess of 50 percent are anticipated from this project, with completion scheduled for early 2002. The ground source heat pump well field installation has been completed, and major work is beginning inside the lab. In addition to the environmental benefits, geothermal systems require lower maintenance than conventional systems, which will reduce Agency expenditures. EPA estimates the energy costs for operating the laboratory with the GHP will be less than $1 per square foot, compared to the current cost of $2.72 per square foot.

  The GHP also will be used to provide domestic hot water, eliminating the need for a boiler or cooling tower. The current cooling tower consumes more than 51,000 gallons of domestic potable water per year as an HVAC heat transfer medium. By eliminating the need for a cooling tower, the geothermal system will reduce the lab's water consumption by more than 80 percent. This reduction in water usage will save more than 938,000 gallons of cooling tower water over the estimated life of the system.

- *Solar Water Heaters:* EPA initiated a project to install a solar hot water heater in San Francisco in July, 2001, to provide hot water for the fitness center and the child care center at the regional office. EPA's Edison, New Jersey, lab has three solar energy water heating systems that are now the primary source of hot water in their respective facility areas. All three solar heating systems consist of a preheat tank (between 66 and 120 gallons) and various numbers of roof-mounted, single-glazed, liquid-evacuated tube collectors. Because the building relies on the electrical systems only for auxiliary heating, the solar heaters allow the facility to conserve electricity and fossil fuel.

- *Photovoltaic Lighting:* Since 1998, EPA has used a photovoltaic system to generate on-site electricity to light two of its Gulf Breeze, Florida, facility's four piers. The photovoltaic project was recommended in a renewable energy assessment performed by the National Renewable Energy Lab. The 600-watt photovoltaic system saves the facility 900 kWh of electricity.

Purchased Renewable Energy

In FY 2001, the Richmond, California; Golden, Colorado; and Manchester, Washington, facilities purchased 100 percent green power (the Cincinnati, Ohio, and Chelmsford, Massachusetts, labs had contracts in place in FY 2001, but did not begin purchasing the power until FY 2002). Combined, these facilities purchased 22.3 kWh hours of renewable energy. This represented 15.7 percent of EPA's electricity purchases for reporting labs. EPA has already surpassed DOE's voluntary goal of 5 percent green power usage in federal agencies.

Based on these green power purchases, the Agency in 2001 qualified as a Founding Partner in EPA's Green Power Partnership. EPA joins Fortune 500 companies, cities, universities, and other partners in helping to boost the market for green power in order to reduce the environmental and health risks associated with conventional power generation. The program recognizes organizations committed to purchasing an amount of renewable energy proportional to their annual electricity use. Partners have access to a network of providers and Partners, technical information, and public recognition.

Million Solar Roofs

EPA has installed solar panels at its laboratories in Athens, Georgia (Environmental Service Division); Manchester, Washington; and Edison, New Jersey. This represents 21 percent of the facilities the Agency manages. This year, the new consolidated facility at Research Triangle Park, North Carolina, will begin using its solar panels to generate electricity. The New England Regional Laboratory in Chelmsford, Massachusetts, completed in September 2001, also includes unique solar sunshade panels in its design. Although not on the roof, a solar wall is under construction at EPA's lab in Golden, Colorado. In addition, EPA has funded solar panels in facilities it occupies but does not manage, including its Waterside Mall facility in Washington, DC, and the Region 5 headquarters building in Chicago, Illinois.

PETROLEUM

In FY 2001, EPA used fuel oil in eight of its laboratories (Narragansett, Rhode Island; Edison, New Jersey; Fort Meade, Maryland; Research Triangle Park, North Carolina; Duluth, Minnesota; Cincinnati, Ohio; Golden, Colorado; and Manchester, Washington). Two of those facilities (Edison and

Manchester) also used propane. Combined, these facilities used 812,591 gallons of fuel oil and 6,686 gallons of propane in FY 2001. The fuel number is significantly higher than in past years, because both the Cincinnati and Fort Meade facilities used a significantly higher percentage of oil in FY 2001, due to the fact that natural gas prices spiked to historically high levels in FY 2001. In FY 1990, for example, the Narragansett, Manchester, and Cincinnati facilities combined used a total of only 41,749 gallons of fuel oil. Using oil instead of natural gas in FY 2001 resulted in significant avoided costs. However, oil is generally burned less efficiently in boilers engineered primarily for natural gas consumption, so although purchasing costs went down significantly, Btu consumption was slightly up, therefore contributing to a rise in EPA's overall Btu per gross square foot figure.

WATER CONSERVATION

In FY 2001, EPA used 190,121,569 gallons of water in its 19 reporting laboratories. EPA expects water consumption to decrease in its facilities as ESPC improvements begin to take effect (see Section III, Water Conservation).

SECTION III

IMPLEMENTATION STRATEGIES

EPA is committed to using a variety of strategies to reduce energy consumption and improve energy efficiency in its facilities, including life cycle cost analysis, energy audits, third-party financing through ESPCs, use of energy-efficient products, sustainable building design, green lease riders, green power purchases, renewable energy technologies, and water conservation measures.

LIFE-CYCLE COST ANALYSIS

When designing, constructing, and maintaining its facilities, EPA uses natural resources conservatively and seeks to incorporate innovative technologies that are cost-effective and environmentally sound throughout their life cycles.

EPA is pursuing ESPCs and ESPC-like arrangements to achieve its energy and water reduction goals. ESPCs are effective avenues for addressing life-cycle cost analysis (LCCA) decisions because energy-efficiency projects can be clustered and bundled together. This clustering method allows the Agency to benefit from overall life cycle cost savings. If certain projects within an ESPC are not the most cost-effective option, but provide a much higher level of energy efficiency, bundling allows the ESPC package of projects to achieve the highest efficiency possible, while still ensuring cost-effectiveness. In its Ann Arbor, Michigan, lab, for example, the ESPC project team evaluated a list of possible energy conservation measures (ECMs), weighed the merits of certain combinations of ECMs, calculated the effect of any relevant rebate programs or more favorable rate structures, and determined the optimal energy conservation system. This process allowed EPA to identify significant energy-efficient upgrades and life-cycle savings that would have gone unnoticed under the traditional process, which emphasized initial cost.

EPA also expanded the time frame it uses to examine life cycle cost savings. While many LCCA models examine savings over a five- to 10-year time frame, EPA is investigating project savings over a 15- or 20-year time frame, since laboratories are such long-term investments. In contrast to ESPCs, these projects involve greater project-by-project decision-making and trade-offs when performing a

LCCA. Some renewable technologies have payback periods of 15 to 20 years. In Fort Meade, Maryland, for example, the payback period for the solid oxide fuel cell is approximately 25 years. EPA considers the reasonable life of these products and the potential for decreased energy consumption, as well as the cost of product, when making investment decisions about which projects to pursue.

FACILITY ENERGY AUDITS

To help identify opportunities for energy system improvements, EPA's office and laboratory facilities are regularly reviewed for their energy efficiency as part of the safety, health, and environmental management audit process. The contracted audit involves the facility manager, an SFPB representative, the auditing firm, and occasionally the DOE's Federal Energy Management Program. Each facility fills out a questionnaire prior to the audit. The auditing firm helps identify opportunities for energy and water conservation measures, and the findings are presented in an on-site exit briefing and compiled in the safety, health, and environmental management audit report. The contracted energy audit report, however, does not address the implementation of the projects.

In 2001, the following EPA facilities and offices have been audited: NVFEL Laboratory, Ann Arbor, Michigan; Oregon Operations Office, Portland, Oregon; Environmental Science Center, Fort Meade, Maryland; Foley Square Office Building, New York, New York; Large Lakes Research Station, Grosse Ile, Michigan; EPA's laboratory/office complex in Cincinnati, Ohio; the Region 5 laboratory in Duluth, Minnesota; EPA's headquarters in the Ariel Rios South Building in Washington, DC; and several lab/office facilities in Athens, Georgia. In addition to these assessments conducted during EPA's safety, health, and environmental management audits, SFPB conducted more in-depth audits of several facilities (Golden, Colorado, and Houston, Texas) in FY 2001 to identify specific energy-efficient opportunities to implement.

EPA also incorporates an audit report process into the overall ESPC project evaluation process for the facilities considering energy savings performance contracts. A single firm, known as an Energy Services Company (ESCo), evaluates the federal facility for energy-saving opportunities, and develops an implementation plan. The ESCo is responsible for purchasing, installing, and maintaining any new equipment. Audits performed through an ESPC tend to be more aggressive and thorough, and often result in energy projects because the ESCo's payment is generated from the savings in the facility's

energy costs. Since 1995, the following facilities, representing 63 percent of all EPA-owned facilities, have been audited:

- Ann Arbor, Michigan
- Athens, Georgia (Office of Research and Development)
- Cincinnati, Ohio
- Corvallis, Oregon
- Duluth, Minnesota
- Edison, New Jersey
- Fort Meade, Maryland
- Houston, Texas
- Manchester, Washington
- Narragansett, Rhode Island
- Newport, Oregon
- Richmond, California

FINANCING MECHANISMS

EPA is pursuing ESPCs and ESPC-like arrangements to finance the initial cost of comprehensive energy upgrades. ESPCs are a form of third-party financing that fund energy-saving upgrades using future utility cost savings. ESPCs enable agencies to obtain energy-efficient technologies, reducing energy use and costs, through private investments.

An ESPC is an agreement between a federal facility and an Energy Services Company (ESCo). The ESCo evaluates a facility for energy and water conservation opportunities, and then designs a project to increase the facility's energy and water efficiency. The ESCo purchases and installs the necessary equipment, such as new energy-efficient windows, automated controls, and updated heating, ventilation, and air conditioning (HVAC) equipment. In exchange for not having to pay the up-front costs of the equipment, the federal agency promises to pay the ESCo a share of the savings resulting from the energy-efficiency improvements. The ESCo is responsible for maintaining the equipment, as well as measuring the energy consumption and savings.

In FY 2001, work continued on an ESPC worth more than $4 million that EPA awarded at its laboratory in Ada, Oklahoma. EPA expects to achieve a greater than 50 percent reduction from current energy consumption levels for each facility undergoing a comprehensive upgrade paid through an ESPC.

In FY 2001, EPA initiated work to amend its leases at its facilities in Las Vegas, Nevada, and Richmond, California. An ESPC-like upgrade is planned for the Richmond facility and will include replacing a single, oversized boiler with two smaller boilers—improving boiler operating efficiency–installing a natural gas co-generator unit to provide electricity and hot water for laboratory operations, and upgrading HVAC control systems. Construction is scheduled to start in the third quarter of FY 2002. Using different financing techniques, the lessor will finance each of the energy-efficiency projects. The Agency will finance these improvements by converting the utility savings into lease payments.

Designs for an ESPC-like upgrade are also planned for the Las Vegas, Nevada, facility as well. EPA leases buildings located on and adjacent to the University of Nevada, Las Vegas, campus. Preliminary testing of the facilities has identified opportunities for energy-efficiency improvements, including converting the air handlers to variable air volume systems, retrofitting the fume hood controls, and installing new direct digital control systems.

ENERGY STAR® AND OTHER ENERGY-EFFICIENT PRODUCTS

EPA actively promotes the purchase of energy-efficient products that carry the ENERGY STAR® label, including photocopier equipment. The Agency reviews and updates its purchasing specifications regularly.

EPA encourages its employees to become involved and responsible participants in the Agency's energy management activities. The Environmentally Preferable Purchasing program helps train government purchase card users on buying energy-efficient and sustainable products. The Agency also distributes product guides that explain in greater detail the environmental attributes of available products, such as light bulbs, light fixtures, and air conditioning equipment.

Several EPA newsletters promote the use of energy-efficient products and provide resources to EPA purchasers, including the Environmentally Preferable Purchasing (EPP) Program's *EPP Update* and the Office of Administration and Resources Management's *Energizing EPA.* Articles on specific product categories and purchasing procedures help EPA spread the word about energy efficiency. In addition,

EPA's model "green" home helps citizens and other federal agencies understand how they can make their own homes and facilities more energy-efficient.

ENERGY STAR® BUILDINGS

EPA approaches facility upgrades from a systemic perspective and incorporates holistic design principles in its construction projects. Currently, the ENERGY STAR® Buildings program does not encompass energy-intensive facilities such as laboratories; therefore, EPA cannot designate its 19[2] laboratory facilities as ENERGY STAR buildings. The Agency is working with GSA, however, to achieve the ENERGY STAR Buildings label in its leased office facilities. Currently, three EPA office buildings, the regional office buildings in New York, Chicago, and Denver, which are either owned or leased by GSA, have been awarded the ENERGY STAR label. The Region 2 Office building in New York was constructed to be very energy efficient, employing steam turbine chillers, a variable volume air distribution system, and variable speed drives for supply fans. In addition, the building has won several awards, including an Illuminating Engineering Society (IES) lighting award, and a Con Edison energy-efficiency award. The lease for the Denver Region 8 Office expires in 2004. The procurement documents for the new office building lease carry an ENERGY STAR requirement as well as other sustainable requirements. Two other regional office buildings in Dallas and Seattle are working towards achieving the label. The Region 10 Office in Seattle anticipates award of the ENERGY STAR Building label by June 2002.

SUSTAINABLE BUILDING DESIGN

To promote a healthy, efficient, and productive working environment, EPA incorporates sustainable design principles into the siting, design, and construction of new facilities, as well as the renovation and maintenance of existing facilities. The Agency developed a Green Buildings Vision and Policy Statement that serves as a guide for a holistic, systems approach to building design.

Several EPA facilities are applying the green building principles outlined in the policy statement:

[2]EPA is required to report to DOE and OMB the energy use at facilities for which the Agency pays utility bills (19 total). Although EPA occupies other facilities, the utilities are paid by GSA.

- *Boston, Massachusetts* (Region 1 Office): EPA is scheduled to move into the old McCormick Post Office and Federal Court House in 2005. In preparation, EPA Region 1, SFPB and AEREB are working with GSA on selecting an architecture and engineering firm for the renovation of the building's mechanical systems and interiors. By ensuring that the design firm is cognizant of energy efficiency concerns and sustainable building practices, EPA hopes to create a healthy and safe working environment.

- *Fort Meade, Maryland*: The new Environmental Science Center features many green building technologies, including energy-saving lighting, use of natural light, an environmentally sound climate control system, a variable air volume system, direct digital controls, environmentally preferable building materials, natural landscaping, and water conservation. The facility is also pursuing certification of its environmental management system (EMS) under the international ISO 14001 standard.

- *Research Triangle Park, North Carolina (new consolidated facility)*: EPA began accepting major portions of a new, consolidated facility from its building contractor in FY 2001, though moves into the facility will not be complete until August 2002. During construction, the facility received GSA's Demolition Derby Award for successful construction waste management disposal—recycling more than 80 percent of its construction debris. On-site cement production reduced by nearly 75,000 miles the amount of cement mixer truck trips, conserving fossil fuels and avoiding air pollution. The facility incorporates low volatile organic compound (VOC) paints, sealants, and adhesives to improve indoor air quality; direct digital controls and high efficiency boilers and chillers to ensure peak energy performance; and recycled carpet and other recycled building materials to conserve virgin materials and divert waste from landfills. Fume hoods are serviced by a centralized air flow system and customized sashes that save energy by avoiding the loss of heated or cooled air and by reducing the need for numerous energy-consuming fans. Outside the building, EPA minimized ground clearing to preserve forests, streams, and wetlands, and a plant rescue saved thousands of native plants. Additionally, the campus will be designated and maintained as a Corporate Wildlife Habitat.

- *Kansas City, Kansas* (Region 7 Office): The new Region 7 Headquarters, which opened in 1999, is a "green" office building incorporating significant environmental features. EPA worked with GSA, which leased the building for EPA, and the building developer to increase the building's environmental performance. Environmental components at the new office building include energy-efficient and passive solar design (using natural light, motion sensors, T-8 fluorescent bulbs, low-E windows), an advanced water management system, erosion control, landscaping and use of indigenous plants, recycled materials, and indoor air quality. In June 2001, the facility hosted a tour of the building in connection with the Energy 2001 Federal Energy Managers Conference in Kansas City. A series of energy upgrades, scheduled for completion in December 2001, includes the installation of a "pony" chiller to provide more efficient cooling of the Region's computer operations by avoiding use of larger units when the building is unoccupied.

- *Kansas City, Kansas* (S&T Center): The 20-year lease for this build-to-suit facility was awarded in August 2000. The Solicitation For Offers (SFO) for this facility requires a LEED (Leadership in Energy and Environmental Design) Certification. LEED is a green building rating system developed by the U.S. Green Building Council. The initial preparation of the site is complete, and the design review is in process. Extensive energy modeling has been performed on the design drawings and recommendations for economical energy conservation measures/design

changes were made. These changes include zoned carbon dioxide sensors, building-integrated photovoltaics, plate-frame heat exchange recovery, and a variable-frequency-drive chiller. Current modeling predicts the lab will use 300,000 Btu's per square foot per year. Completion is expected by the end of 2003.

- *Seattle, Washington* (Region 10 Office): In April 2001, 123 motion sensors were installed in conference rooms and all private spaces. Estimated reduction in consumption in those rooms is 40-80 percent, depending upon frequency of occupation. In June 2001, 115 low-flow aerators were installed in all coffee bars, restrooms, and showers, reducing water consumption on each faucet from 3 g.p.m. to ½ g.p.m. Building management installed green lights in the early 1990s and completely upgraded lighting systems to ENERGY STAR standards in 1999. All tenant improvements employ extensive reuse of doors, insulation, carpeting, VCT, and case goods in order to save resources.

ENERGY EFFICIENCY IN LEASE PROVISIONS

EPA does not own most of the buildings it uses. They are leased by the Agency directly from the building owners or are owned by GSA. As part of its mission to protect and improve the environment, however, EPA decided to exert some control over the energy and water management of its office buildings and recently began requiring "green riders" as part of its leases for newly constructed leased buildings. The green rider, which includes environmentally preferable criteria such as energy- and water-efficiency measures, is an amendment to the Agency's solicitation for offers (SFO) for constructing or retrofitting EPA facilities. EPA used green riders for its new Region 3, Region 7, and Region 10 office buildings, the new Region 1 laboratory and the Region 7 laboratory currently under construction. As part of the lease for its Region 8 Office in Denver, Colorado, EPA has completed a preliminary green rider. When potential contractors submit bids to build a new facility for EPA's use, they are required to address the green rider as part of the proposal process.

At the Region 3 office in Philadelphia, the Agency included environmental criteria in its solicitation for remodeled office space in an existing building. The green rider requirements included reusing materials; recycling of construction and demolition debris; and using low environmental impact materials. The Agency also required that the building be located in Philadelphia's central business district to promote the use of public transportation by staff.

The green rider for the Region 7 office building provided environmentally preferable specifications and guidelines for the HVAC systems to improve the facility's energy efficiency. The

rider enabled the Agency to create an educational document for the contractor, providing access to information on environmentally preferable and recycled-content products and guidelines. A copy of Region 7's green rider is available at <www.epa.gov/region7>.

At the Region 10 office in Seattle, Washington, the "Green Futures Team" developed detailed interior remodeling specifications for the 14th floor of its office building. The remodeling incorporated environmental attributes, including minimizing use of toxic and harmful substances and release of toxics during manufacturing, as well as using recycled-content products and only those with no impact on rare or endangered natural resources.

The Region 1 laboratory in Chelmsford, Massachusetts, which EPA accepted for occupancy in September 2001, incorporates numerous environmental attributes in its design and construction. The laboratory was designed to be eligible for a silver rating from the U.S. Green Building Council's LEED program. A silver rating is rare for a laboratory because the LEED criteria were developed for office buildings, which have significantly lower energy and air flow requirements than laboratories. The lab is using 100 percent green power to meet its electricity needs.

The Region 7 laboratory in Kansas City, Kansas, has green language in its SFO to ensure that the facility and all its construction features promote energy efficiency and environmentally preferable materials and design. The SFO encourages contractors to address energy and water conservation and other environmental factors. The Region 7 lab also is striving to achieve a LEED silver rating.

The lease for the Region 8 Office in Denver, Colorado, expires in 2004. The procurement documents for the new office building lease will carry an ENERGY STAR requirement as well as other sustainable requirements.

INDUSTRIAL FACILITY EFFICIENCY IMPROVEMENTS

EPA is continuing to maximize the energy and water efficiency and environmental performance of its facilities through a variety of innovative projects and commonsense initiatives. The following efficiency improvement opportunities are either underway or being considered for EPA facilities:

- *Ada, Oklahoma*: As part of the recently awarded ESPC, an HVAC system renovation/upgrade will install a ground source heat pump, variable air volume fume hoods and air supply, new and upgraded fan motors, and an integrated direct digital control system for HVAC, energy, fire, and security management.

- *Ann Arbor, Michigan*: As part of the lab's ESPC renovations, a new energy and HVAC infrastructure was installed. As of April 2001, all new air handling units, a new cooling tower, a 200-kW fuel cell, and a new direct digital control system were in place. The new chilled water plant consists of 900 tons of high-efficiency, double-effect chiller/heaters, which do not use CFC or HCFC refrigerants and are equipped with units to recover waste heat from the condensers in the cooling cycle. The chiller/heaters recover up to 25 percent of the input energy from the condenser water stream. A natural gas fuel cell was installed in 2001 to provide both base load power and emergency backup for the facility.

- *Athens, Georgia*: The Environmental Services Division facility is a variable air volume laboratory. At the Athens Office of Research and Development's (ORD) Lifespan Childcare Center a solar hot water heater has contributed to a 17 percent decrease in energy consumption. EPA is examining the feasibility of using bioenergy for both facilities due to the large quantities of biofuels available.

- *Chelmsford, Massachusetts*: The lab, which opened in October 2001, features variable air volume HVAC and fume hoods, extensive recycled material content, and extensive daylighting. EPA has also signed a renewable energy credit contract for 100 percent wind power.

- *Cincinnati, Ohio*: The facility has retrofitted boiler controls and installed a closed-loop glycol cooling tower, energy-efficient elevator motors, two new centrifugal chillers, a revolving door to help maintain temperature and building pressure, a new HVAC system, improved windows and insulation, a new energy-efficient boiler, a summer boiler, and enthalpy recovery from boiler exhaust, as well as adopted the Green Lights program. EPA signed a green power contract in May 2001 for 100 percent green power—5 percent wind and 95 percent landfill gas. The facility also entered into a "Power Share" agreement with the local utility for the summer of 2001. Future projects include testing a magnetic water treatment system, and investigating options for heat recovery in the exhaust stacks. The Center Hill facility installed new energy-efficient HVAC units, replacement windows, and exterior insulation. The testing and evaluation facility replaced an old boiler with a new, more efficient oil/gas boiler, and installed a new rooftop air handling unit and a summer boiler.

- *Corvallis, Oregon*: The facility has installed energy-efficient chillers and boilers and replaced all CFCs used by the facility. The facility also completed a Green Lights upgrade.

- *Duluth, Minnesota*: The facility's energy and environmental management system works to minimize energy waste through improved equipment controls. This system has helped the facility decrease its energy consumption by 18 percent since FY 1997. EPA replaced two large boilers and added a small "pony boiler" to improve the heating system's efficiency. In addition, the facility will be installing a new gas-fired chiller in FY 2002. A new wing is under construction at the facility.

- *Edison, New Jersey*: The facility installed three solar energy water-heating systems that are now the primary source of hot water in their respective facility areas.

- *Fort Meade, Maryland*: Direct digital controls (DDCs) monitor the status of mechanical systems throughout the building to maintain efficiency. Variable air volume fume hoods for lab spaces minimize heating and cooling costs while maintaining a safe working environment. The facility is designed to maximize natural light and uses energy-efficient electrical lighting when needed. The facility is working with DOE and others to demonstrate the world's first megawatt-class solid oxide fuel cell power generation system and is planning to install a small "pony boiler." The programing and operation of large variable air volume laboratories is quite complex. Extensive work has been performed throughout FY 2001 to make the operations of the laboratory more energy efficient through a "re-commissioning" of the lab. Team members from Region 3, SFPB, AEREB, and SHEMD have worked to correct system programming errors, appropriately reduce exhaust velocities on exhaust stacks, improve the operation of bypass dampers, and identify other energy saving opportunities.

- *Golden, Colorado*: The facility installed a DDC system to monitor operating conditions of the HVAC unit. The lab's ventilation system conserves energy after work hours by cutting the system back to 25 percent of its maximum volume. The system is divided into seven zones to enable air exchange in selected areas when employees work late. The facility incorporates daylighting along with Green Lights and uses T-8 fluorescent bulbs and motion sensors. The building is fitted with 1-inch thick, double-paned, thermal windows with solar flexing film. The building's roof has been insulated to an R value of R-30. A transpired solar collector, planned for the south wall of a hazardous materials building, will augment the heating and cooling system. In June 2001, an energy audit and operations evaluation was performed on this variable air volume lab as part of the FMSD effort to monitor and improve the performance of these labs. The facility is purchasing 100 percent green power.

- *Gulf Breeze, Florida.* The facility installed timers on approximately 20 electric water heaters and is installing nodal DDCs to minimize energy waste and monitor building security, fire protection, and indoor environmental quality. In October 1996, a Dinh-style heat pipe dehumidification system was installed in the air handling system. A 1998 EPA study showed that the heat pipe saved 153,775 kWh in annual energy consumption (about 10 percent of the total) and $7,700 in annual energy costs. In FY 1998, EPA installed a PV system to generate on-site electricity to light two of the facility's four piers. The 600-watt PV system saves the facility 900 kWh of electricity per year.

- *Houston, Texas*: The facility conducted air system modifications and upgraded an existing DDC system. It incorporated a cooling tower condensate return system to reduce water consumption and operating costs and enhance environmental conditions. Without this system, large volumes

of water would have to be supplied by the local water utility. EPA is incorporating the use of a night setback system to control exhaust fans, laboratory fume hoods, and supply air. In addition, EPA is evaluating technology and operational options to reduce the levels of cooling and reheating required to reach temperature set-points. Houston's hot and humid climate, requiring extensive cooling, contributes to the facility having the highest Btu/gsf of any EPA laboratory. An extensive energy audit was completed for this facility in September 2001.

- *Las Vegas, Nevada*: This leased laboratory facility is being reviewed for an energy-efficiency upgrade through a third-party financing agreement with the owner, University of Nevada Las Vegas, to replace constant volume HVAC and fume hoods with variable air volume systems.

- *Manchester, Washington*: The Manchester laboratory has contracted for 100 percent renewable power from wind farms. In June 1999, the laboratory installed three photovoltaic (PV) arrays. The laboratory also has adjusted its temperature setbacks and is investigating other efficiency improvements.

- *Montgomery, Alabama*: EPA relocated and installed a 150-ton chiller from its Ann Arbor, Michigan, lab to Montgomery. This move and installation saved money for purchase of a new chiller to condition furnace hood wake-up air.

- *Narragansett, Rhode Island*: The facility is replacing the old HVAC controls, the fume hood fans and controls, and the existing 25-year-old windows and doors. Upgrades are also planned for the wet lab monitoring and control system, which heats and chills lab seawater, as well as the sea water delivery system. The facility also is installing a new seawater chiller. The lab is studying projects to replace a failing air-handling unit as well as old lab doors to improve energy efficiency. In addition, EPA is investigating other opportunities, including night setbacks, variable frequency drive motors, enthalpy recovery from heated seawater, cogeneration and the purchase of green power.

- *Research Triangle Park, North Carolina (new consolidated facility).* EPA installed a Building Automation System that enables operations staff to monitor and control energy-consuming aspects of the building, including temperature, pressures, humidity, electrical systems, refrigeration and boiler equipment, maintenance indicators and alarms, lighting, security, and communications. Fume hoods are serviced by a centralized air flow system and customized sashes that save energy by avoiding the loss of heated or cooled air and by reducing the need for numerous energy-consuming fans. In addition, a 100-kW, integrated roof power system is being installed and will be operational by April 2002.

- *Richmond, California.* The facility will continue purchasing 100 percent green power from landfill gas from the Sacramento Municipal Utility District. An ESPC-like upgrade is planned for this facility.

In addition to the energy-efficiency efforts that EPA has undertaken at each of its major facilities, the Agency is taking an in-depth look at its variable air volume (VAV) labs to understand how they could perform better in terms of energy consumption. In 2001, EPA conducted in-depth assessments of its labs in Houston, Golden, Colorado, and Athens, Georgia (Environmental Services

Division) and continued a close examination of its Fort Meade, Maryland, facility. Furthermore, EPA is paying close attention to the following:

- *Better Controls in New and Existing VAV Labs.* EPA is concerned that its specifications for lab control systems in VAV labs may not be adequate to manage and report on these complex systems. The control systems should be able to run HVAC systems in an energy-efficient manner and correlate with actual facility operating needs (i.e., the ability to set back at night). To address these and other issues, SFPB is planning to hold a conference on designs, controls, commissioning, and operation for its five VAV labs.

- *Nationwide Reporting of Energy Results.* EPA already collects and compiles quarterly energy consumption statistics for all of its labs. SFPB is working on ways to share this information with its facility managers to provide better data and ideas for improving energy efficiency. SFPB sent its first email containing energy reporting data to facility energy managers in September 2001.

- *Move Utility Bills to Regions.* Regions currently have no incentive to cut energy use because they do not pay the bill. Moving utility bills to the regions could increase motivation from all regions to operate efficiently. The new Kansas City lab will be handled in this manner in FY 2002, when it is completed. This assumes the regions know how utilities are funded via the Regional Support Account.

HIGHLY EFFICIENT SYSTEMS

EPA is using the ESPC process to further its installation of combined cooling, heating, and power systems and locally available renewable energy sources. In addition to the geothermal heat pump being installed in Ada, Oklahoma, as part of the ESPC upgrade there, a natural gas fuel cell was installed in the Ann Arbor, Michigan, lab to provide both base load power and emergency backup power for the facility. The fuel cell generates 200 kW of power and provides heating water for the reheat water loop serving the air handling units. By integrating the heating and cooling plant, EPA will recover significant amounts of energy that would have otherwise been wasted in cooling towers or radiators.

Results of a bioenergy feasibility study sponsored by EPA for the EPA and U.S. Department of Agriculture (USDA) co-located laboratories in Athens, Georgia, indicate that large quantities of biofuels are available locally. Though biofuel technology was not incorporated into the design of the EPA facilities, consideration of biomass technologies are being included in the USDA laboratory renovation and new construction programs. A strong partnership between EPA, DOE, USDA, and state agencies provides the foundation for making biomass an energy technology option.

OFF-GRID GENERATION

EPA facilities are using renewable energy technologies to supplement or replace a large portion of their energy requirements. EPA recognizes that incorporating renewable energy sources and technologies combined with increased energy efficiency is the most environmentally beneficial method. In all ESPCs, EPA requires the installation of renewable technologies as part of the overall upgrade. The following facilities incorporate renewable energy technologies (details about each of these projects have been provided in previous sections of this report):

- *Ada, Oklahoma*: The laboratory has installed a geothermal heat pump (GHP) as part of its ESPC.
- *Ann Arbor, Michigan*: A 200-kW natural gas fuel cell was installed as part of its ESPC upgrade.
- *Athens, Georgia*: The ORD facility has a solar hot water heater at the onsite day-care center.
- *Edison, New Jersey*: The facility's three solar energy water-heating systems are now the primary source of hot water in their respective facility areas.
- *Fort Meade, Maryland*: EPA is working with the DOE, Siemens-Westinghouse Power Corporation to demonstrate a solid oxide fuel cell (SOFC) power generation system. The hybrid power system will demonstrate the highest electrical efficiency (60 percent) and lowest emissions of any power plant fueled by natural gas. SOFC technology has the potential to virtually eliminate NO_x and SO_x emissions and drastically reduce greenhouse gases.
- *Golden, Colorado*: EPA has purchased and is planning to build a transpired solar collector panel for the south wall of the facility's hazardous materials building. The solar panel will save energy by preheating ventilated air when heating is required.
- *Gulf Breeze, Florida*: The laboratory employs a photovoltaic system to generate on-site electricity to light two of the facility's four piers.
- *Manchester, Washington*: EPA's wet laboratory in Manchester, Washington, has become the first commercial solar-powered "net metering" project in the Northwest.
- *Research Triangle Park, North Carolina (new consolidated facility)*: A 100-kW, integrated roof power system is being installed on the National Computer Center and 70 solar street lights were installed along the facility's mile of roadway, making this the largest solar road lighting project in the United States.
- *Chicago, Illinois*: A 10-kW solar array on the roof of the Metcalfe Building, completed in FY 2001, helps power EPA's Region 5 Office. EPA is also working with GSA and DOE on the installation of a small fuel cell in the Metcalfe Building.

- *San Francisco, California*: A project to install a solar hot water heater was initiated in July, 2001, to provide hot water for the fitness center and the child care center.

ELECTRICAL LOAD REDUCTION MEASURES

Following President Bush's May 3, 2001, memo on Energy Conservation at Federal Facilities, EPA buildings are working with local utilities to reduce electricity load during power emergencies.

- *Cincinnati, Ohio*. The facility signed a "Power Share" agreement with the local utility this summer. In the event of a power emergency, the facility will voluntarily reduce the electrical consumption by going into night mode on the HVAC system, reducing demand by nearly half.

- *Seattle, Washington.* The Region 10 office has contingency plans for power emergencies. In January 2001, building management reduced maximum temperature set point from 72 to 68 degrees and raised the lowest cooling set point from 73 to 75 degrees. Recent energy conservation measures implemented in the building are estimated to produce yearly savings of $140,000. Utility bills have been reduced by 35 percent, including rate increases. In April 2001, 123 motion sensors were installed in conference rooms and all private spaces. Estimated reduction in consumption in those rooms is 40 to 80 percent, depending upon frequency of occupation. Building management also removed one (or both) fluorescent tube(s) from each two-tube fixture in designated areas and with occupants' permission, reducing energy consumption by 35 to 40 percent per fixture. They also removed one tube from each two-tube fixture designated in common area spaces and in the designated areas in the stairwells. Savings of 172,000 watts per day in the common areas and 90,000 watts per day in the stairwells are estimated.

- *San Francisco, California*. The Region 9 office has a policy of turning off unused machines, such as coffee pots, unnecessary elevators, and personal printers. More than half of the computers are programmed to go into "sleep mode" after 30 minutes of non-use, resulting in a savings of 78 watts per monitor. Region 9 initiated a "Green Lights" project in 1995; the resulting average monthly energy savings is 35,000 kWh. The office also recently set it HVAC thermostats to 72 degrees and planned to set them a few degrees higher in the summer months if the power supply was tentative. In the fall and winter, thermostats are set at 68 to 70 degrees.

- *Richmond, California.* The Region 9 laboratory assessed opportunities and changed temperature set points for cooling and heating to reduce energy use.

WATER CONSERVATION

EPA will continue to require its facilities to monitor and report water consumption and costs and energy consumption data on a quarterly basis. Since 1994, EPA has required the use of water conserving equipment in all newly leased and built facilities. Assessments of water efficiency opportunities are part of EPA's auditing process and ESPC upgrades and have led to operational and management measures that have reduced water consumption. EPA plans to significantly reduce water consumption at the following facilities.

- *Ada, Oklahoma*: As part of the ESPC, EPA expects water consumption at the Ada facility to decrease by 50 percent when the upgrade is completed.
- *Ann Arbor, Michigan*: As a result of the improvements made under the ESPC, EPA expects the Ann Arbor facility's water consumption to decrease by 50 percent.
- *Fort Meade, Maryland*: The facility uses native plants and other natural landscaping techniques to reduce irrigation requirements.
- *Houston, Texas*: The facility incorporated a cooling tower condensate return system to reduce water consumption and operating costs and enhance environmental conditions. Without this system, large volumes of water would have to be supplied by the local water utility.
- *Manchester, Washington*: Since the lab replaced its 4-inch PVC water lines with 6-inch ductile iron water lines, the bigger, stronger lines reduce the frequency of leaks and the lab's overall water consumption rate. The lab also replaced a 20-year-old water cooling tower with a new, more efficient tower, which reduced the water volume needed to run the cooling system. These upgrades have dropped the facility's average water bill from $596 to $203 per month, and reduced water consumption 66 percent, from 204,000 to 70,000 gallons per month.
- *Research Triangle Park, North Carolina (new consolidated facility)*: EPA uses water-efficient fixtures throughout the facility, including flow-restricting nozzles, automated shutoff, and hot and cold water delivery with automatic temperature controls. The lavatories have sensor-operated metered faucets that regulate the amount of water flow, which will save water and the energy needed to heat it.
- *Kansas City, Kansas*. The Region 7 Science and Technology Center, currently under construction will capture rainwater from the roof, filter it, and use it to flush the toilets. This rainwater captures system will cut domestic water use (but not lab process water use) by 40% and significantly reduce stormwater runoff from the site.

SECTION IV

DATA TABLES AND INVENTORIES

Appendix A: OMB CIRCULAR A-11, EXHIBIT 55

Appendix B: ENERGY SCORECARD FOR FY 2001

Appendix C: NOT REQUIRED

Appendix D: INDUSTRIAL AND LABORATORY FACILITIES INVENTORY

Appendix E: EXEMPT FACILITIES

(Note: EPA does not exempt any of its facilities.)

Appendix F: DATA TABLES

APPENDIX A - OMB CIRCULAR A-11, EXHIBIT 55 FY2001

See following pages.

FY 2001 ENERGY MANAGEMENT DATA REPORT

Agency: U.S. Environmental Protection Agency
Prepared by: Bucky Green
Date: 18-Dec-01
Phone: 202 564-6371

PART 1: ENERGY CONSUMPTION AND COST DATA

1-1. Standard Buildings/Facilities

NOTE: EPA does not manage and is not responsible for utility costs in standard facilities.

	Consumption Units	FY 2001		FY 2002		FY 2003	
		Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)
Electricity	MWH						
Fuel Oil	Thou. Gal.						
Natural Gas	Thou. Cu. Ft.						
LPG/Propane	Thou. Gal.						
Coal	S. Ton						
Purch. Steam	BBtu						
Other	BBtu						
		Total Costs	-		-		-

Standard Buildings/Facilities
(Thous. Gross Square Feet)

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

NOTE: FY01 electricity is estimated for Ann Arbor, Richmond, and Manchester due to billing problems.
See last page for FY2002 and FY2003 assumptions.

Cost Increase:
3 percent/year

	Consumption Units	FY 2001		FY 2002		FY 2003	
		Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)
Electricity	MWH	138,007.7	7,623.4	142,075.4	7,992.3	140,347.9	8,130.7
Fuel Oil	Thou. Gal.	812.6	743.6	762.3	715.1	762.3	736.5
Natural Gas	Thou. Cu. Ft.	482,824.9	3,736.1	474,178.7	3,773.5	466,146.5	3,869.4
LPG/Propane	Thou. Gal.	6.7	11.3	6.7	11.7	6.7	12.0
Coal	S. Ton	-	-	-	-	-	-
Purch. Steam	BBtu	36.3	564.1	36.3	581.0	36.3	598.4
Other	BBtu	-	-	-	-		
		Total Costs	12,678.5		13,073.5		13,347.0

Energy-Intensive Facilities
(Thous. Gross Square Feet) 3,119.8 3,167.6 3,167.6

1-3. Exempt Facilities NOTE: EPA has no exempt facilities

	Consumption Units	FY 2001		FY 2002		FY 2003	
		Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)
Electricity	MWH						
Fuel Oil	Thou. Gal.						
Natural Gas	Thou. Cu. Ft.						
LPG/Propane	Thou. Gal.						
coal	S. Ton						
Purch. Steam	BBtu						
Other	BBtu						
		Total Costs	-		-		-

Exempt Facilities
(Thous. Gross Square Feet) _____ _____ _____

1-4. Tactical Vehicles and Other Equipment

	Consumption Units	FY 2001		FY 2002		FY 2003	
		Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)
Auto Gasoline	(Thou. Gal.)	49.0	59.0	51.0	61.0	54.0	64.0
Diesel-Distillate	(Thou. Gal.)	110.0	97.0	114.0	99.0	120.0	103.0
LPG/Propane	(Thou. Gal.)	-	-	-	-	-	-
Aviation Gasoline	(Thou. Gal.)	-	-	-	-	-	-
Jet Fuel	(Thou. Gal.)	-	-	-	-	-	-
Navy Special	(Thou. Gal.)	-	-	-	-	-	-
Other	(Billion Btu)	-	-	-	-	-	-
		Total Costs	156.0		160.0		167.0

1-5. WATER CONSUMPTION AND COST DATA

Cost Increase:
3 percent/year

	Consumption Units	FY 2001		FY 2002		FY 2003	
		Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)
Water	Million Gal.	190.1	817.4	186.2	815.9	181.8	832.5

2-2. ENERGY SAVINGS PERFORMANCE CONTRACTS (ESPC)

	FY 2001		FY 2002		FY 2003	
	Annual savings (MMBTU)	(number/Thou. $)	Annual savings (MMBTU)	(number/Thou. $)	Annual savings (MMBTU)	(number/Thou. $)
Number of ESP contracts awarded in fiscal year & annual energy (MMBTU) savings	N/A	NONE	N/A	NONE	1,046	1/$65
Total value of ESP contracts awarded in fiscal year		N/A				$750
Estimated life-cycle cost savings of ESPCs awarded in fiscal year (Contractor share)		N/A				$749
Estimated life-cycle cost savings of ESPCs awarded in fiscal year (Government share)		N/A				$1
Total ***annual*** payments made to all ESP contractors		1/$1,088		2/$1,341		2/$1,421

2-3. UTILITY ENERGY SERVICES CONTRACTS (UESC) Note: FY02 Includes Las Vegas and Richmond Lease-Amended ESPCs

	FY 2001		FY 2002		FY 2003	
	Annual savings (MMBTU)	(number/Thou. $)	Annual savings (MMBTU)	(number/Thou. $)	Annual savings (MMBTU)	(number/Thou. $)
Number of utility energy services contracts awarded in fiscal year	N/A	NONE	13,959	2	N/A	NONE
Total value of utility energy services contracts awarded in fiscal year		N/A		$2,860		N/A
Estimated life-cycle cost savings of UESCs awarded in fiscal year (Contractor share)		N/A		$2,859		N/A
Estimated life-cycle cost savings of UESCs awarded in fiscal year (Government share)				$1		N/A
Total ***annual*** payments made to all UES contractors		$0		$0		$248

1-6. RENEWABLE GREEN ENERGY PURCHASES

NOTE: Richmond, and Golden (2001); plus Manchester (9 mo.), Cincinnati, and Chelmsford (2002); plus Houston (2003) *anticipated and Manchester full year

Cost Increase: 3 percent/year

	Consumption Units	FY 2001		FY 2002		FY 2003	
		Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)	Annual Consumption	Annual Cost (Thou. $)
Electricity from Renewables	MWH	3,672	$299	21,790	$1,604	25,709	$1,941
Natural Gas from Landfill/Biomass	Thou. cubic ft.						
Renewable Thermal Energy	MMBtu						
Average annual savings/costs anticipated from expenditures (show costs as negative)			-$60		-$180		-$226

PART 2: ENERGY EFFICIENCY IMPROVEMENTS

2-1. DIRECT AGENCY OBLIGATIONS

	FY 2001		FY 2002		FY 2003	
	Annual Savings		Annual Savings		Annual Savings	
	(MMBTU)	(Thou. $)	(MMBTU)	(Thou. $)	(MMBTU)	(Thou. $)
Average annual savings anticipated from obligations	14,018	$140	21,480	$215	37,476	$375
Direct obligations for facility energy efficiency improvements, including facility surveys/audits		$1,963		$3,008		$5,248

2-4. UTILITY INCENTIVES (REBATES)

	FY 2001		FY 2002		FY 2003	
	Annual savings (MMBTU)	(number/Thou. $)	Annual savings (MMBTU)	(number/Thou. $)	Annual savings (MMBTU)	(number/Thou. $)
Incentives received and estimated energy savings	N/A	N/A	N/A	N/A	N/A	N/A
Funds spent in order to receive incentives		N/A		N/A		N/A

2-5. TRAINING

	FY 2001		FY 2002		FY 2003	
	(number)	(Thou. $)	(number)	Thous. $	(number)	Thous. $
Number of personnel trained/Expenditure	20	$25	20	$26	20	$27

2-6. IDENTIFICATION OF FUNDS for Budget Year 2002

	Amount (thou. $)	Account	Program	Line Item	Page in Budget Request
ESPC or utility service contracts negotiation/management	$100				
Direct spending on efficiency	$2,908				
Direct spending on training	$26				
Energy Star building design/ construction incrementatl costs	$131				
"Green Power" purchases	$1,941/$226				
On-site generation and renewable energy	$1,710				

Table 1-2 Assumptions:

In FY02, Chelmsford, MA, lab is added;estimates based on Golden's data. Ann Arbor - 50 percent reduction from average energy use in FY97 and FY98; Ada - 22.5 percent reduction from energy use in FY00; Ft. Meade - 7.5 percent reduction from average energy use in FY00 and FY01.

In FY03, assumptions are the same, except Ann Arbor's reduction is 60 percent and Ada's reduction is 55 percent.

APPENDIX B - ENERGY SCORECARD FOR FY 2001

See following pages.

FY 2001 Federal Agency Energy Scorecard 3/10/02

Department/Agency Name	Contact Name and Phone
U.S. Environmental Protection Agency	Bucky Green 202 564-6371
Name of Senior Energy Official	**Signature of Senior Energy Official**
Morris Winn, Assistant Administrator for Administration and Resources Management	*Signed Arpil 18, 2002*

Did your agency . . .	Yes	No	Anticipated Submittal Date
Submit its FY 2001 energy report to OMB and DOE (Sec. 303)?			Attached
Submit a FY 2002 Implementation Plan (Sec. 302)?			Attached
Did your agency . . .	**Yes**	**No**	**Comments**
Implement renewable energy projects at Federal installations or facilitate the siting of renewable generation on Federal land in FY 2001 (Sec. 204)?	X		If yes, how many projects and how much energy generated? Solar 2 <1 MWH Wind ___ ___MWH Geothermal ___ ___MWH Biomass ___ ___MWH Other RE ___ ___MWH
Purchase energy generated from new renewable energy sources in FY 2001 (Sec. 204)?[1]	X		If yes, how much: 3,672 MWH
Invest direct FY 2001 appropriations in projects contributing to the goals of the Order (Sec. 301)?	X		If yes, how much: $ 1,963,000
Specifically request funding necessary to achieve the goals of the Order in its FY 2003 budget request to OMB (Sec. 301)?	X		If yes, how much: $ 2,600,000
Perform energy audits of 10% of its facility space during the fiscal year (Sec. 402)?	X		What percentage of facility space was audited during the fiscal year? 47 % How much facility space has been audited since 1992? 63 %
Issue to private-sector energy service companies (ESCOs) any energy savings performance contract (ESPC) task orders (Sec. 403(a))?		X	How many? NONE Total const value: $ Est. life-cycle cost savings: ESCO share $ Gov't share $
Issue any utility energy services contract (UESC) task orders (Sec. 403(a))?		X	How many? NONE Total construction value: $ Est. life-cycle cost savings: Utility share $ Gov't share $
Incorporate energy efficiency requirements into relevant acquisitions (Sec. 403(b)(3))?	X		

1 "New" renewable energy means sources developed after 1990.

Did your agency . . .	Yes	No	Comments
Adopt and apply the sustainable design principles (e.g., Whole Building Design Guide, Leadership in Energy and Environmental Design) to the siting, design, and construction of new facilities or major renovations begun in FY 2001(Sec. 403(d))?	X		Number of new building design/construction projects in FY 2001 2 Number of these projects that incorporated sustainable design principles 2
Provide training to appropriate personnel[2] on energy management (Sec. 406(d))?	X		Number of appropriate personnel trained 20 Total number of appropriate personnel 20
Implement any additional management tools (Sec. 406)?	X		Check all that apply: Awards X Performance Evaluations X Showcase Facilities Number of Showcase Facilities 0
Establish Water Management Plans for its facilities and implement at least four water conservation Best Management Practices?	X		Number of facilities with Water Management Plans 7

NOTE: Provide additional information if a "no" reply is used for any of the questions above.
ESCOs have been done in the past and ESCO-like projects are planned for leased facilities in the future, but none was issued in 2001.

Please enter data from annual energy report pertinent to performance toward the goals of Executive Order 13123	Base Year	Previous Year (2000)	Current Year (2001)	% Change (Current vs. Base)
Site Energy Efficiency Improvement Goals (Sec. 202). 1985 Base Year*	NA Btu/ Ft^2/Yr	N/A Btu/Ft^2	NA Btu/Ft^2/Yr	NA %
Source Energy Use (Sec. 206). 1985 Base Year	N/A BBtu	N/A BBtu	N/A BBtu	N/A %
Industrial/Energy Intensive Facilities Goals (Sec. 203). 1990 Base Year **	357,334 Btu/gsf	361,933 Btu/gsf	347,306 Btu/gsf	-2.8 %
Water Conservation Goal (Sec. 207). 2000 Base Year	187.3 MGal	187.3 MGal	190.1 MGal	1.5 %
Renewable Energy (Sec. 204). Energy used from self-generation and RE power purchases***	N/A	13.3 BBtu	12.5 BBtu	N/A

Abbreviation Key: Btu/Ft^2 = 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
BBtu = Billion British Thermal Units
RE = Renewable energy
N/A = Not applicable
*EPA does not report utility costs for its office buildings, which are reported by GSA
**12 labs in existence in 1990
***Energy use at Richmond and Golden decreased, so use of renewable energy power purchases decreased slightly

2 Appropriate personnel include 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.

APPENDIX C - NOT REQUIRED

APPENDIX D - INDUSTRIAL AND LABORATORY FACILITIES INVENTORY[3]

Robert S. Kerr Environmental Research Lab
Ada, Oklahoma
Site Energy Manager: Frank Price

National Vehicle and Fuel Emissions Laboratory
Ann Arbor, Michigan
Site Energy Manager: Steven Dorer

National Exposure Research Laboratory
Athens, Georgia
Site Energy Manager: Alan Tasker

Science and Ecosystem Support Division
Athens, Georgia
Site Energy Manager: Betty Kinney

Andrew W. Breidenbach Environmental Research Center
Cincinnati, Ohio
Site Energy Manager: Robert Bateman

National Health and Environmental Effects Research Laboratory - Western Ecology Division
Corvallis, Oregon
Site Energy Manager: Jay Gile

National Health and Environmental Effects Research Laboratory - Mid-Continent Ecology Division
Duluth, Minnesota
Site Energy Manager: Rod Booth

[3]EPA is required to report to DOE and OMB the energy use at facilities for which the Agency pays utility bills (19). Although EPA occupies other facilities, the utilities are paid by GSA.

Region 2 Laboratory
Edison, New Jersey
Site Energy Manager: Joseph Pernice

Environmental Science Center
Fort Meade, Maryland
Site Energy Manager: Rick Dreisch

Region 8 Laboratory
Golden, Colorado
Site Energy Manager: Sue Datson

National Health and Environmental Effects Research Laboratory - Gulf Ecology Division
Gulf Breeze, Florida
Site Energy Manager: Clay Peacher

Environmental Laboratory
Houston, Texas
Site Energy Manager: Larry Streck

University of Nevada, Las Vegas - On Campus EPA Facilities
Las Vegas, Nevada
Site Energy Manager: May Fong

Region 10 Laboratory
Manchester, Washington
Site Energy Manager: Cathy Reese

National Air and Radiation Environmental Laboratory
Montgomery, Alabama
Site Energy Manager: Herb Reed

National Health and Environmental Effects Research Laboratory - Atlantic Ecology Division
Narragansett, Rhode Island
Site Energy Manager: Russ Ahlgren

National Health and Environmental Effects Research Laboratory - Western Ecology Division
Newport, Oregon
Site Energy Manager: Reene Watt

Central Regional Laboratory
Richmond, California
Site Energy Manager: Jennifer Mann

Research Triangle Park
Research Triangle Park, North Carolina
Site Energy Manager: E.B. Roberts

Appendix E Exempt Facilities

EPA does not exempt any facilities

Appendix F Data Tables

U.S. EPA Consumption Totals FY2001 and FY2002 (projected) compared to the FY1985 baseline (estimated as of 12/20/01)

EPA TOTAL	FY85 Btu/sq.ft.	Btus	FY01 Btu/sq.ft.	Btus	Difference FY85-01 Btu/sq.ft.		FY02 *** Btu/sq.ft.	Btus	Difference FY85-02 Btu/sq.ft.		FY03 **** Btu/sq.ft.	Btus	Difference FY85-03 Btu/sq.ft.	
19 Reporting Labs	399,992	772,474,901,621	358,445	1,118,287,464,350	**-10.39**		347,995	1,102,317,946,373	**-13.00**		343,519	1,088,142,551,514	**-14.12**	
12 Original Labs	399,992	772,474,901,621	348,235	1,086,434,000,050	**-12.94**		337,863	904,393,272,236	**-15.53**		332,568	890,216,877,377	**-16.86**	
19 Reporting Labs * (GrnPwr netted out)	399,992	772,474,901,621	354,429	1,105,758,227,070	**-11.39**		324,523	1,027,968,842,754	**-18.87**		315,827	1,000,421,615,175	**-21.04**	
12 Original Labs ** (GrnPwr netted out)	399,992	772,474,901,621	N/A/	N/A	**N/A**		317,039	848,648,787,064	**-20.74**		311,055	832,631,389,885	**-22.23**	

U.S. EPA Consumption Totals FY2001 and FY2002 (projected) compared to the FY1990 baseline (estimated as of 12/20/01)

EPA TOTAL	FY90 Btu/sq.ft.	Btus	FY01 Btu/sq.ft.	Btus	Difference FY90-01 Btu/sq.ft.		FY02 *** Btu/sq.ft.	Btus	Difference FY90-02 Btu/sq.ft.		FY03 **** Btu/sq.ft.	Btus	Difference FY90-03 Btu/sq.ft.	
19 Reporting Labs	357,334	746,971,756,162	358,445	1,118,287,464,350	**0.31**		347,995	1,102,317,946,373	**-2.61**		343,519	1,088,142,551,514	**-3.87**	
12 Original Labs	357,334	746,971,756,162	348,235	1,086,434,000,050	**-2.55**		337,863	904,393,272,236	**-5.45**		332,568	890,216,877,377	**-6.93**	
19 Reporting Labs * (GrnPwr netted out)	357,334	746,971,756,162	354,429	1,105,758,227,070	**-0.81**		324,523	1,027,968,842,754	**-9.18**		315,827	1,000,421,615,175	**-11.62**	
12 Original Labs ** (GrnPwr netted out)	357,334	746,971,756,162	N/A/	N/A	**N/A**		317,039	848,648,787,064	**-11.28**		311,055	832,631,389,885	**-12.95**	

* Green Power purchased: FY01 - Richmond, CA, and Golden, CO; FY02 - also Manchester, WA, (9 mo.), Cincinnati, OH, and Chelmsford, MA;
FY03 - also Houston, TX, and full year in Manchester, WA.

** Richmond, Golden, and Houston are not among the original 12 labs, so there is no change when green power is netted out.

*** Assumptions for FY02: Ann Arbor, MI - 50 percent reduction from average energy use in FY97 nad FY98; Ada, OK - 22.5 percent reduction in energy use in FY00;
Ft. Meade, MD - 7.5 percent reduction from average energy use in FY00 and FY01; Chelmsford, MA - energy use equivalent to Golden, CO.

**** Assumptions for FY03: Ann Arbor, MI - 60 percent reduction from average energy use in FY97 and FY98; Ada, OK - 55 percent reduction from energy use in FY00;
Ft. Meade, MD - 7.5 percent reduction from average energy use in FY00 and FY01; Chelmsford, MA - energy use equivalent to Golden, CO.

NOTE: FY01 electricity is estimated for Ann Arbor, Richmond, and Manchester due to billing problems.

U.S. Environmental Protection Agency

FY 2002 Implementation Plan

March 10, 2002

For information call: Sustainable Facilities Practices Branch, 202 564-6371

2002 IMPLEMENTATION PLAN

SECTION I
MANAGEMENT AND ADMINISTRATION

EPA recognizes that efficient energy and water management must involve all facility management employees as well as senior EPA management. This section describes EPA's energy management infrastructure and the management tools it will continue using to implement Executive Order 13123, *Greening the Government Through Efficient Energy Management.*

ENERGY MANAGEMENT INFRASTRUCTURE

E.O. 13123 requires each federal agency to assemble a technical support team to encourage the use of appropriated funds and Energy Savings Performance Contracts (ESPCs) to meet the energy-efficiency goals and requirements of the order. In November 2000, EPA consolidated these activities in a newly formed Sustainable Facilities Practices Branch (SFPB). The SFPB will give full-time attention to sustainable practices, policies and project implementation, which reflects the importance that EPA places on this issue. Full staffing of the SFPB should be completed in FY 2002.

Senior Agency Official and Energy Team

EPA has designated the Assistant Administrator for Administration and Resources Management as the Agency Energy and Environmental Executive. He is supported by the SFPB staff, which includes the national energy team and a national energy coordinator. The energy team is supplemented by architects and engineers from EPA's Architecture, Engineering, and Real Estate Branch and by the U.S. Department of Energy's (DOE) National Renewable Energy Laboratory on a project-specific basis. Site energy managers for each of the Agency's 19 facilities are listed in Appendix D of the annual report.

MANAGEMENT TOOLS

EPA will encourage its employees' commitment to improving energy efficiency. EPA's energy management team will continue to use awards, incentives, and performance evaluations, as well as continuing education and training programs, to support individual and team efforts in energy efficiency.

Awards (Employee Incentive Programs)

EPA will continue to use the DOE-sponsored "You Have the Power" campaign to increase awareness of energy efficiency throughout the Agency. EPA is an active participant and has recognized 20 employees as energy champions. EPA will continue encouraging and recognizing its employees for their achievements in conserving energy and in overall promotion of energy-efficiency awareness. For more information on this campaign, visit the Web site at <www.eren.doe.gov/femp/yhtp/epa.html>.

EPA has an Agency-wide awards program. At present, these awards are not specifically for energy management performance, but are more inclusive, addressing sustainable design, resource conservation, and overall environmental improvement. EPA is currently working to establish a high level Agency award specifically for energy and resource conservation at EPA facilities, to supplement more general existing awards.

Performance Evaluations

Employees who have energy management responsibilities will continue to be evaluated annually against criteria based on the Agency's energy management principles.

Training and Education

Continuing to use several education and training programs, EPA will ensure that employees are aware of the latest technologies and opportunities to increase energy efficiency.

Laboratories for the 21st Century

In 1997, EPA, in cooperation with the Lawrence Berkeley Laboratory and the National Renewable Energy Laboratory, instituted an annual conference for federal laboratory managers interested in energy upgrades for their facilities. The "Laboratories for the 21st Century" initiative, which grew out of that conference, provides information on energy-efficient technology alternatives for laboratory applications and creates a forum for laboratory designers, owners, and operators to obtain up-to-date information and support for implementing energy-efficiency programs.

This year's conference, originally scheduled for October 2001, in Washington, DC, was postponed in the aftermath of September 11th. The conference was rescheduled and held in January 2002.

Next year's conference will be held in Research Triangle Park, North Carolina, in October 2002. Details on registration, the annual call for papers, and other details are available on the conference Web site at <www.epa.gov/labs21century>.

The Labs21 conference has become an annual event and includes plenary and panel sessions to discuss ways in which successful strategies and technologies are being implemented to improve the energy efficiency and environmental performance of laboratories. Breakout sessions following the presentations provide opportunities to explore specific issues in greater detail. The conference features speakers from EPA, DOE, Lawrence Berkeley National Laboratory, National Renewable Energy Laboratory, academia, and the private sector who present views and technical information on subjects as varied as utility deregulation, passive solar design, and laboratory design, construction, and operation. Informal sessions enable attendees to highlight current issues and projects and exchange views and experiences with their peers. Approximately 33 EPA employees attended the January 2002 conference.

Buildings and Facilities Conference

A Buildings and Facilities conference is held annually; all EPA facility managers must attend. The three-day FY 2002 conference was held in Research Triangle Park, North Carolina, February 5-7, 2002. Conference attendees included facility managers from EPA-operated laboratories and GSA-operated regional offices and headquarters. One day was spent on issues related to energy-efficient design and management, including renewable energy purchases, ESPCs, and energy-efficient retrofits.

Credit Card Purchasing Guidelines

EPA plans to continue assisting its employees when making purchasing decisions. Credit card purchasing guidelines on EPA's Environmentally Preferable Purchasing Program's Web site provide easy access for credit card holders to ensure their purchases comply with environmental laws and EPA policies. The guidelines identify specific environmental attributes to look for when selecting products, including the ENERGY STAR® label or other energy-efficiency designations. They also recommend the purchase of products with recycled content, reduced packaging, and those containing minimal hazardous materials or toxic chemicals. In addition, the guidelines provide information on the procurement process, including specific EPA requirements, sources for obtaining the products (e.g., through GSA's Environmental Products Guide or office supply catalogs), and other information and guidance.

Energizing EPA Newsletter

EPA keeps its employees up-to-date on resource conservation technologies, energy-efficiency accomplishments at EPA facilities, and other issues concerning the environmental improvement of EPA's facilities through *Energizing EPA*. The newsletter is distributed to all EPA facility managers and others interested in renewable energy and energy- and water-efficiency activities in EPA facilities. Topics of recent *Energizing EPA* articles include: the use of ESPCs to increase energy efficiency, protect the environment, and save money; renewable energy projects at EPA facilities, including photovoltaic and geothermal heat pump technologies; EPA green power purchases; and updates on EPA's Labs21 initiative.

Earth Day House Exhibit

For Earth Day 2000, EPA created a 50-foot by 8-foot model of a "green" home and an accompanying 50-foot time line tracing the 30-year history of environmental improvements since EPA's founding. Every feature in the house–from the construction materials to the furnishings–was selected to highlight specific environmental benefits that were explained with more than 100 interpretive signs. EPA plans to display the "green" home at several future events. This display highlights EPA's commitment to energy efficiency and its role in educating the public about the important relationship between energy efficiency and environmental performance.

Office of Administration Web Site

EPA's Office of Administration's new Web site was reorganized to provide more information more efficiently and meet the Agency's new formatting requirements. This updated site was posted in February, 2002. Additions to the Web site in FY 2002 will update energy and water performance at each facility, highlight new energy-efficiency projects, and provide access to all issues of *Energizing EPA*. EPA also hopes to establish an online reporting system enabling facilities to submit their energy and water consumption data.

Showcase Facilities

EPA completed construction of its Region 1 laboratory in Chelmsford, Massachusetts, in FY 2001. EPA currently has a new laboratory under construction in Region 7, Kansas City, Kansas, which was the result of a design competition that included energy efficiency and resource conservation as award criteria. Extensive energy modeling and design modifications were also made after award to improve the facility design further. This lab will be completed in FY 2003. EPA also will finish improvements and upgrades at a number of its other facilities. EPA hopes to designate its improved laboratories as showcase facilities.

SECTION II
IMPLEMENTATION STRATEGIES

With Executive Order 13123, the federal government is poised to become a leader in sustainable energy management. EPA is committed to continuing to use a variety of strategies to reduce energy consumption and improve energy efficiency in its facilities, including lifecycle cost analysis, energy audits, third party financing through ESPCs, use of energy-efficient products, sustainable building design, green lease riders, green power purchases, renewable energy technologies, and water conservation measures.

LIFE-CYCLE COST ANALYSIS

When designing, constructing, and maintaining its facilities, EPA will use natural resources conservatively and seek to incorporate innovative technologies that are cost-effective and environmentally sound throughout their life cycles.

EPA will continue to focus on ESPCs to achieve its energy- and water-reduction goals. ESPCs are effective avenues for addressing life-cycle cost analysis (LCCA) decisions, because energy-efficiency projects can be clustered and bundled together. This clustering method allows the Agency to benefit from overall lifecycle cost savings. EPA also will consider expanding the time frame it uses to examine lifecycle cost savings. While many LCCA models only examine savings over a 5- to 10-year time frame, EPA is investigating project savings over a 15- or 20-year time frame.

FACILITY ENERGY AUDITS

In accordance with EPACT and E.O. 13123, and to help identify opportunities for energy system improvements, EPA's facilities will continue to be audited regularly for energy and water efficiency. Facilities participate either through a contracted audit process or as part of the ESPC evaluation process. In FY 2002, EPA has scheduled energy assessments at nine Agency labs, and at two major Regional Offices. EPA's new Consolidated facility in Research Triangle Park, North Carolina, is currently being occupied; moves into the facility are expected to be completed by September 2002. While it will take

some time for the moves to be completed and mechanical system operations to stabilize, EPA will start in-depth monitoring of energy use in FY 2002 to pinpoint suboptimal operation of this facility.

FINANCING MECHANISMS

EPA will continue pursuing ESPCs to finance the initial cost of comprehensive energy upgrades. ESPCs are a form of third-party financing that fund energy-saving upgrades using future utility cost savings. ESPCs enable agencies to obtain energy-efficient technologies, thus reducing energy use and costs, through private investments.

In FY 2002, EPA's laboratory in Ada, Oklahoma, will complete an ESPC project worth more than $4 million. EPA expects to achieve a greater than 50 percent reduction from current energy consumption levels for this facility undergoing through this ESPC.

In FY 2002, EPA will amend its leases at its Las Vegas, Nevada, and Richmond, California, facilities. Using different financing techniques, the lessor will finance the energy-efficiency project. The Agency will amend the lease by transferring the utility expenses into lease payments.

ENERGY STAR® AND OTHER ENERGY-EFFICIENT PRODUCTS

EPA will continue promoting the purchase of energy-efficient products that carry the ENERGY STAR® label, including photocopier equipment. The Agency plans to review and update its purchasing specifications as necessary.

EPA will keep encouraging its employees to become involved and responsible participants in the Agency's energy management activities. The Environmentally Preferable Purchasing program will help train government purchase card users on buying energy-efficient and sustainable products. The Agency also will distribute product guides that explain in greater detail the environmental attributes of available products.

Several EPA newsletters promote the use of energy-efficient products and provide resources to EPA purchasers. The Environmentally Preferable Purchasing (EPP) Program's *EPP Update* and the

Office of Administration and Resources Management's *Energizing EPA* include articles on specific product categories and purchasing procedures to help EPA spread the word about energy efficiency.

ENERGY STAR® BUILDINGS

EPA will continue to approach facility upgrades from a systemic perspective and incorporate holistic design principles in its construction projects. Currently, the ENERGY STAR® Buildings program does not encompass energy-intensive facilities such as laboratories; therefore EPA cannot designate its 20 laboratory facilities as ENERGY STAR® buildings. The Agency's Regional Offices in Denver, Chicago, and New York City, are, however, ENERGY STAR Buildings and the Agency expects to achieve ENERGY STAR Certification at its Seattle Regional Office in FY 2002. EPA has completed mechanical system upgrades in the Kansas City Regional Office that should allow ENERGY STAR Certification in FY 2003 and has initiated a cooperative agreement with GSA to obtain ENERGY STAR Certification for the Ariel Rios South building in Washington, DC, by FY 2004. The Agency works with GSA to achieve the ENERGY STAR Buildings label in newly leased office facilities.

SUSTAINABLE BUILDING DESIGN

To promote a healthy, efficient, and productive working environment, EPA will incorporate sustainable design principles into the siting, design, and construction of new facilities, as well as the renovation and maintenance of existing facilities. The Agency will continue to implement the principles outlined in its *Green Buildings Vision and Policy Statement*, which serves as a guide for a holistic, systems approach to building design.

Currently under construction, EPA's new Region 7 laboratory in Kansas City, Kansas, is actively applying the green building principles outlined in the policy statement. The new laboratory's features will cover energy efficiency, indoor air quality, water efficiency, site and building planning, and recycling and use of recycled-content materials.

In FY 2002, EPA will initiate a process to update its facilities guidelines and construction specifications and improve standard provisions for energy efficiency, standby capacity, mechanical

system sizing, facility commissioning, and water conservation to improve its facility design and operations. These guidelines will be applicable to both EPA's owned and leased facilities.

ENERGY EFFICIENCY IN LEASE PROVISIONS

The majority of EPA-occupied facilities are not owned by EPA; they are either leased directly by the Agency from the building owners or are owned or leased by GSA and assigned to EPA. As part of its mission to protect and improve the environment, however, EPA will continue requiring "green riders" as part of its leases for newly constructed leased buildings. The green rider, which includes environmentally preferable criteria such as energy- and water-efficiency measures, is an amendment to the Agency's solicitation for offers (SFO) for constructing or retrofitting EPA facilities. When potential contractors submit bids to build a new facility for EPA's use, they are required to address the green rider as part of the proposal process. Currently EPA is working closely with GSA on its Boston Regional Office and Denver Regional Office leases to ensure energy efficient facilities result from these lease awards. EPA is also working closely with GSA's National Capital Region in Washington, DC, to achieve energy efficiency in a planned HVAC upgrade at the GSA-owned, EPA-occupied Ariel Rios South Building in the Federal Triangle.

As mentioned above, EPA will initiate a process to update its facilities guidelines and construction specifications and improve our standard provisions for energy efficiency, standby capacity, mechanical system sizing, facility commissioning, and water conservation in leased facilities.

INDUSTRIAL FACILITY EFFICIENCY IMPROVEMENTS

EPA will continue to maximize the energy and water efficiency and environmental performance of its facilities through a variety of innovative projects and commonsense initiatives. The following efficiency improvement opportunities are being considered for EPA facilities:

- *Ada, Oklahoma*. As part of the recently awarded ESPC, an HVAC system renovation/upgrade will include: a ground source heat pump; variable air volume fume hoods and air supply; new and upgraded fan motors; and an integrated direct digital control system for HVAC, energy, fire, and security management. Construction will be completed in FY 2002. The facility also is pursuing a 40-kW photovoltaic system to power the ground source heat pump.

- *Ann Arbor, Michigan*. As part of ESPC renovations, the laboratory will continue to realize energy, water, and cost savings. New chiller/heaters recover up to 25 percent of the input energy from the condenser water stream. A natural gas fuel cell provides both base load power and emergency backup for the facility. Construction was completed in FY 2001.

- *Athens, Georgia (Office of Research and Development)*. The facility examined the feasibility of using bioenergy (see page 12 for results).

- *Cincinnati, Ohio*. EPA began receiving green power for this facility October 1, 2002. This is EPA's largest green power purchase and will provide environmentally preferable electricity to the three major research locations in Cincinnati.

- *Duluth, Minnesota*. In FY 2002, EPA will begin design of an engine-driven chiller to replace an aging electric chiller currently in use. This should reduce the lab's high electric demand charges, which are set at the summer peak.

- *Edison, New Jersey*. EPA will continue to pursue 100 percent green power for this facility.

- *Fort Meade, Maryland*. The facility is working with DOE and others to demonstrate a solid oxide fuel cell power generation system.

- *Gulf Breeze, Florida*. The lab is having an HVAC upgrade designed in Building 49 that will include heat exchange and a possible dessicant dehumidification system.

- *Golden, Colorado*. EPA will install a solar panel for the south wall of the facility to augment the heating and cooling system. The lab is also purchasing 100 percent green power through the Colorado Public Service Company, which is supplying the facility with wind power through Windsource.

- *Houston, Texas*. EPA has initiated a procurement for green power at this regional lab and expects to award a contract in FY 2002. In addition, EPA will complete an energy audit of this facility in FY 2002, which should lead to a lease modification and significant mechanical system upgrades at this lab in FY 2003.

- *Las Vegas, Nevada*. This leased laboratory facility is being reviewed for an energy-efficiency upgrade through a third-party financing agreement with the owner, University of Nevada of Las Vegas, to replace constant volume HVAC and fume hoods with variable air volume systems. A contract should be signed in FY 2002 for these changes.

- *Manchester, Washington*. Deliveries of green power were scheduled to start at this laboratory by January 1, 2002. The power will be generated from wind farms, a renewable source of energy.

- *Montgomery, Alabama*. EPA is initiating a study in this lab to investigate the possibility of doing an ESPC.

- *Narragansett, Rhode Island*. EPA has initiated a procurement for green power at this regional lab and expects to award a contract in FY 2002.

- *Research Triangle Park, North Carolina*. A 100-kilowatt integrated roof power system is being installed and will be operational by April 2002.

- *Richmond, California*. The facility will continue purchasing 100 percent green power from the Sacramento Municipal Utility District (SMUD), which is generating power from landfill gas.

EPA continues to evaluate its newest laboratories (Ft. Meade, Maryland; Golden, Colorado; and Athens, Georgia, Environmental Services Division lab) to improve their environmental performance and reduce their energy consumption. In addition, the following activities are being proposed to help ensure EPA's reduction in energy consumption.

- *Review New Variable Air Volume (VAV) Labs*. After a significant year-long effort, EPA has improved the performance of the Fort Meade lab. Computer control of the buildings systems has been significantly improved, with about half the lab now operating in a more energy efficient mode. EPA expects to complete the bulk of the remaining control system adjustments and testing in FY 2003 and dramatically improve what once was the Agency's highest energy-using lab. Lessons learned from this lab will be included in EPA's updated facility specifications.

- *Better Transition from Construction to Operation*. The lessons learned from intense efforts at the Fort Meade lab are currently being summarized to be included in new commissioning requirements and re-commissioning requirements for all EPA laboratories. The control systems in new laboratory facilities are increasingly complex. FMSD will continue to strengthen its program to transition facilities from headquarters to the region or program operators. This could include:

  –Providing more thorough commissioning specifications to require more thorough commissioning of the facilities; reviewing installation; operating control systems; and checking facility operations after occupancy.

  –Specific training for one or more facility operators at each new location regarding energy conservation, systems operations, systems controls; production of a basic facility operating manual; and making these items applicable to both EPA-owned facilities and the GSA-leased facilities where the building owner runs the building but EPA pays utility bills.

  –General facilities training nationwide to insure a pool of competent facility managers.

- *Better Controls in New and Existing Labs*. EPA's research in FY 2001 indicated that specifications for lab control systems in labs are not sufficiently detailed to guarantee that the systems can manage and report in a way that is useful to facility managers and maximizes energy efficiency. The control systems should be able to run HVAC systems in an energy-efficient manner and correlate with actual facility operating needs (e.g., the ability to set back at night.)

FMSD will complete a "best practice" guide for the newly installed direct digital control (DDC) systems.

- *Nationwide Reporting of Energy Results*. Walt Disney World e-mails quarterly energy use information, rankings, and increases and decreases in consumption to each major facility operator and each operations chief with profit responsibility over the facility. The information is also posted on a Web page available to all Disney personnel. This identifies to each operating area whether their peers are outperforming them and the profit impact of poor operations. Following this example, EPA delivered its first electronic energy consumption report in FY 2001 and will continue to do so on a quarterly basis. In addition, EPA will include reporting information on its 38 largest facilities, including regional offices, in its report, even if EPA is not required to report this information to DOE. Better information should increase EPA's ability to manage our energy, motivate facility managers, and educate the public about energy conservation.

- *Move Utility Bills to Regions*. Regions currently have no incentive to cut energy use because they do not pay the bill. Moving utility bills to the regions could increase pressure from all regions to operate efficiently. The New Kansas City lab will be handled in this manner in FY 2002, when it is completed. EPA is currently working to get the FY 2004 budget process set up to complete the transition of energy bill funding to occupying organizations.

- *Monitor the New Research Triangle Park, North Carolina, Laboratory*. RTP is EPA's largest research complex and the largest single energy user in the facility inventory. In FY2002, RTP used approximately 40 percent of the energy EPA must report to DOE. Special emphasis will be given as the year-long move-in process begins at this facility, and as mechanical system operations stabilize, to ensure optimal operation of this facility.

HIGHLY EFFICIENT SYSTEMS

EPA will continue using the ESPC process to further its installation of combined cooling, heating, and power systems and locally available renewable energy sources.

- *Ada, Oklahoma*. The Ada, Oklahoma, laboratory installed a geothermal heat pump (GHP) as part of an ESPC upgrade, which should be completely operational in FY 2002.

- *Ann Arbor, Michigan*. A natural gas fuel cell was installed to provide both base load power and emergency backup power for the facility in FY2001. The fuel cell generates 200 kW of power and will provide heating water for the reheat water loop serving the air handling units. By integrating the heating and cooling plant, EPA will recover a significant amount of energy that would have otherwise been wasted in cooling towers or radiators.

- *Athens, Georgia (Office of Research and Development lab)*. EPA sponsored a bioenergy feasibility study for this lab and a U.S. Department of Agriculture lab (USDA) also located in Athens. Results indicated that large quantities of biofuels are available locally. Though biofuel technology was not incorporated into the design of the EPA facilities, consideration of biomass technologies will be included in the USDA laboratory renovation and new construction programs. A strong partnership between EPA, DOE, USDA, and state agencies will provide the foundation for making biomass an energy technology option.

OFF-GRID GENERATION

To promote environmentally-sensitive energy generation, EPA facilities will use renewable energy technologies to supplement or replace a large portion of their energy requirements. EPA recognizes that incorporating renewable energy sources and technologies combined with increased energy efficiency is the most environmentally beneficial method to reduce greenhouse gas emissions. In all ESPCs, EPA requires the installation of renewable technologies as part of the overall upgrade. The following facilities will incorporate new renewable energy technologies:

- *Ada, Oklahoma*. As mentioned above, the geothermal heat pump should be completely operational in FY 2002.

- *Ann Arbor, Michigan*. A 200 kW natural gas fuel cell was installed in FY 2001.

- *Fort Meade, Maryland*. EPA will continue working with DOE and several other partners to demonstrate a solid oxide fuel cell (SOFC) power generation system. The hybrid power system will demonstrate electrical efficiency and lower emissions. SOFC technology has the potential to virtually eliminate NO_x and SO_x emissions and drastically reduce greenhouse gases. EPA expects funding of this effort to be finalized in FY2002.

- *Golden, Colorado*. EPA plans to build a transpired solar collector panel for the south wall of the facility's hazardous materials building. The solar panel will save energy by preheating ventilated air when heating is required.

- *Research Triangle Park, North Carolina*. A 100-kilowatt, integrated roof power system will be installed and operational by April 2002.

WATER CONSERVATION

EPA will continue to require its facilities to monitor and report water consumption and costs and energy consumption data on a quarterly basis. Since 1994, EPA has required the use of water conserving equipment in all newly leased and built facilities. Assessments of water efficiency opportunities are part of EPA's facility site visit program and have led to operational and management measures that have reduced water consumption. EPA plans to significantly reduce water consumption at the following facilities.

- *Ada, Oklahoma*. As part of the recently awarded ESPC, EPA expects water consumption at the Ada facility to decrease by 80 percent when the upgrade is completed in FY 2002.

- *Ann Arbor, Michigan*. As a result of the improvements made under the ESPC in FY2001, EPA expects the Ann Arbor facility's water consumption to decrease by 80 percent.

- *Kansas City, Kansas*. The new Science and Technology Center, currently under construction, will capture rainwater from the roof and use it to flush toilets. A 40 percent reduction in domestic water use is anticipated when this facility is completed in FY 2003.

April 18, 2002

Mr. Richard Klimkos, Program Manager
U.S. Department of Energy
Federal Energy Management Program
1000 Independence Avenue, SW (EE-90)
Washington, DC 20585-0121

Dear Mr. Klimkos:

Enclosed is the Environmental Protection Agency's *Fiscal Year 2001 Annual Report on Energy Management and Conservation Programs*. Our FY2001 Energy Scorecard and our FY2002 Implementation Plan are also enclosed herein. If you have any questions, please contact Bucky Green of our Sustainable Facilities Practices Branch at 202 564-6371.

Sincerely,

Rich Lemley

Rich Lemley, Director
Facilities Management and Services Division

Enclosures

cc: Mr. Robert Sandoli, Program Examiner
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