



**FISCAL YEAR 2002  
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  
1200 Pennsylvania Avenue, NW (3101A)  
Washington, DC 20460  
January 15, 2003

Cover photo of Research Triangle Park facility in North Carolina. Photo courtesy of Beers Skanska.

**U.S. Environmental Protection Agency  
Energy Management and Conservation Programs  
Fiscal Year 2002 Annual Report**

EPA Office of Administration and Resources Management  
1200 Pennsylvania Avenue NW (3101A)  
Washington, DC 20460

December 30, 2002

**Contents**

<b>SECTION</b>	<b>PAGE</b>
<b>EXECUTIVE SUMMARY</b> .....	3
<b>I. MANAGEMENT AND ADMINISTRATION</b> .....	6
Energy Management Infrastructure .....	6
Senior Agency Official and Energy Team .....	6
Management Tools .....	7
Awards (Employee Incentive Programs) .....	8
Performance Evaluations .....	9
Training and Education .....	9
Showcase Facilities .....	11
<b>II. ENERGY EFFICIENCY PERFORMANCE</b> .....	12
Energy Reduction Performance .....	12
Standard Buildings .....	12
Industrial and Laboratory Facilities .....	12
Exempt Facilities .....	14
Tactical Vehicle and Equipment Fuel Use .....	14
Renewable Energy .....	15
Self-Generated Renewable Energy .....	16
Purchased Renewable Energy .....	18
Million Solar Roofs (MSR) .....	18
Petroleum .....	19
Water Conservation .....	19
<b>III. IMPLEMENTATION STRATEGIES</b> .....	21
Life-Cycle Cost Analysis .....	21
Facility Energy Audits .....	22
Financing Mechanisms .....	23
ENERGY STAR® and Other Energy-Efficient Products .....	24
ENERGY STAR® Buildings .....	25
Sustainable Building Design .....	26
Energy Efficiency in Lease Provisions .....	28
Industrial Facility Efficiency Improvements .....	29
Highly Efficient Systems .....	33
Off-Grid Generation .....	33
Electrical Load Reduction Measures .....	33
Water Conservation .....	34
<b>IV. DATA TABLES AND INVENTORIES</b>	
Appendix A—OMB Circular A-11, Exhibit 55	
Appendix B—Energy Scorecard for FY 2002	
Appendix C—Not Required	
Appendix D—Industrial and Laboratory Facilities Inventory	
<b>V. ATTACHMENTS</b>	
FY 2001 Implementation Plan	

## EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA) is committed to energy and water efficiency in its laboratories and office facilities. In FY 2002, the Agency realized significant reductions in the amount of energy and water used at its reporting laboratories, compared to the 1990 baseline required under Executive Order 13123.

### Results

- *Energy Use Reduction:* Energy use in EPA's 28 reporting laboratories decreased from 357,864 Btus per gross square foot (GSF) in FY1990 to 303,078 Btus per GSF in FY2002, a reduction of 15.31 percent. EPA attributes this reduction to combination of the mild 2002 winter and EPA's ongoing efforts to improve energy efficiency.
- *Green Power Purchases:* In FY 2002, EPA purchased 24.1 million kWh of green power, including 100 percent green power purchases at five of its laboratories. When green power is netted out of EPA's energy use, the Agency used 277,628 Btus per GSF in FY 2002, or a reduction of more than 22.4 percent from the 1990 baseline energy consumption.
- *Water Conservation -* EPA's water use decreased from 187.3 million gallons of water in FY1990 to 186.0 million gallons of water in FY2002, a reduction of 0.68 percent. Because of this performance, EPA has placed a special emphasis on developing and implementing water management plans at its facilities.

### EPA Changes Facility Processes to Improve Energy and Water Performance

With the creation of a Sustainable Facilities Practices Branch (SFPB) within its Office of Administration and Resources Management (OARM) in November 2000, EPA committed to improve its processes for acquiring, operating and maintaining facilities and to consider the energy and water conservation effects of its facilities. In FY 2002, significant progress was made in improving our facility acquisition, operation, and maintenance practices, including:

- *Energy Master Planning:* In FY 2002, EPA initiated efforts to incorporate energy and engineering master planning as part of the architectural master planning process. For the following facilities, the Agency is identifying short, intermediate, and long term opportunities to upgrade or replace mechanical systems to improve energy efficiency:
  - Cincinnati, Ohio, A.W. Breidenbach Environmental Research Center
  - Narragansett, Rhode Island Atlantic Ecology Laboratory
- *Tiered Audit Program:* To prioritize its energy and water conservation efforts among the facilities

it owns and operates, EPA utilizes a tiered system of energy audits. Energy assessments are now part of regularly scheduled safety, health, and environmental management (SHEM) audits the Agency performs at least every three years at each major Agency facility. These audits identify areas to explore for energy savings. More detailed Stage 2 audits are used to develop specific energy conservation solutions and predict the cost and energy savings associated with those solutions. EPA conducted the following audits in FY 2002:

- Chelmsford, Massachusetts, New England Regional Laboratory (SHEM)
- Edison, New Jersey, Laboratory (SHEM)
- Atlanta Regional Office (SHEM)
- Montgomery, Alabama (Stage 2)
- Chicago Regional Laboratory (Stage 2)
- Research Triangle Park, North Carolina, NHEERL (Stage 2)
- Research Triangle Park, North Carolina Chapel Hill Labs (Stage 2)
- Narragansett, Rhode Island (Stage 2)

- *Procurement Planning:* As part of the Agency's overall procurement process for new construction and leased facilities, EPA places a major emphasis on energy efficiency, water conservation, and other sustainable design features. In FY 2002, EPA worked closely with GSA to incorporate sustainable design requirements into the procurement process for two Regional Office buildings with leases about to expire and one new Headquarters facility:

- New England Regional Office, Boston (renovation of historic post office)
- Denver Regional Office (new facility)
- Northern Virginia Satellite Office (new lease)

- *Design Development:* This year, several of EPA's laboratories focused on designing upgrades to heating, ventilation, and air conditioning (HVAC) systems and controls to improve energy performance over the long term:

- Narragansett, Rhode Island, Atlantic Ecology Division
- Richmond, California, Laboratory
- Houston, Texas, Laboratory

- *Construction Projects:* Several construction projects were underway in FY 2002 that will eventually lead to significant energy savings at the following labs:

- Ada, Oklahoma, (energy savings performance contract with several upgrades)
- Fort Meade, Maryland, Environmental Science Center (efficient summer boiler)
- Kansas City, Kansas, Science and Technology Center (a new high-efficiency lab)

- *Occupancy:* This year, EPA moved into two new facilities; both made energy efficiency, water conservation, and sustainable practices top priority in their design and construction. The Agency's newest generation of green facilities began operations in the following:

- Chelmsford, Massachusetts, New England Regional Laboratory
- Research Triangle Park, North Carolina, New Consolidated Facility

- *Re-commissioning:* Energy savings in FY 2002 were also reflected in the re-commissioning of the

Fort Meade, Maryland lab. Through an effort begun in FY 2001 and completed this year, the Agency identified several programming improvements and other energy saving opportunities, resulting in at least a 12 percent decrease in energy used.

- *Water Conservation:* In FY 2002, the Agency launched an initiative to emphasize water conservation in all of its facilities. Water management plans were developed for the following labs:
  - Chelmsford, Massachusetts, New England Regional Laboratory
  - Fort Meade, Maryland, Environmental Science Center
  
- *Green Power Purchases:* In addition to the five labs already purchasing 100 percent green power this year, the Agency initiated green power procurement efforts at laboratories in:
  - Fort Meade, Maryland
  - Narragansett, Rhode Island
  - Houston, Texas
  - Research Triangle Park, North Carolina
  
- *Guidelines and Standards:* In FY 2002, EPA initiated a process to update its facilities guidelines and construction specifications to improve standard provisions for energy efficiency, standby capacity, mechanical system sizing, HVAC controls, facility commissioning, and water conservation in its buildings. These guidelines apply to both owned and leased facilities.
  
- *Outreach and Education:* To provide encouragement and incentives to facility managers, inform other EPA employees, and educate the public on the importance of energy and water conservation at Agency facilities, EPA conducted the following outreach:
  - sent quarterly email updates on energy consumption to its senior, facility, and energy managers
  - developed a new awards program to recognize facility managers and others for energy conservation
  - held a national conference and workshops on Laboratories for the 21<sup>st</sup> Century
  - created a brochure and video presentation on purchasing green power, which was presented to Agency Senior Managers and the Administrator, and posted on our website
  - published a new quarterly newsletter called *Energizing EPA*
  - updated its Office of Administration Web site with energy use, green building, and sustainability information.

In FY 2003, EPA will keep the momentum of the past year's success by broadening its efforts in every aspect of the building procurement, design, construction, operations, and maintenance process.

## **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*, which mandates federal agency energy use reductions of 20 percent by 2005 and 25 percent by 2010, measured from a 1990 baseline.

### **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. EPA's SFPB is dedicated to meeting these requirements. SFPB serves as an advocate, coordination point, and technical advisor on sustainable practices, policies, and project implementation to all of EPA's facility-related organizations and personnel. SFPB reflects the importance that EPA places on these issues. Key staff in the SFPB's energy team include the branch chief, national energy coordinator, energy audit and project manager, two mechanical engineers, an architect, and support staff.

In June 2002, the importance of energy conservation was raised within EPA when OARM formally adopted a new management goal system, which included milestones for energy conservation. Energy conservation efforts and progress are reviewed by the Assistant Administrator for Administration and Resources Management every six months; the system has already helped focus managers on energy conservation and the actions necessary to achieve energy reduction goals.

#### **Senior Agency Official and Energy Team**

EPA has designated the Assistant Administrator for Administration and Resources Management, currently Morris X. Winn, as the Agency Energy and Environmental Executive. The Deputy Assistant Administrator for Prevention, Pesticides, and Toxic Substances is the alternate Agency Environmental Executive; currently Dr. William H. Sanders III serves in this position.



Mr. Winn is supported by a national energy team and a national energy coordinator, located in SFPB. SFPB's energy team works closely with architects and engineers from EPA's Architecture, Engineering, and Real Estate Branch (AEREB) and with ventilation safety experts from EPA's Safety, Health, and Environmental Management Division (SHEMD). EPA also receives support from DOE's National Renewable Energy Laboratory on a project-specific basis. Site energy managers for each of the Agency's 28 reporting facilities are listed in Appendix D.

EPA's Office of Administration and Resources Management employs three principal approaches to meet the E.O. 13123 energy reduction goals: mechanical systems improvements, green power procurement, and demonstration projects. The Agency considers mechanical improvements for both new and existing facilities. For new facilities, such as the Kansas City Science and Technology Center currently under construction, the Agency gets involved early in the planning process and reviews projects regularly to ensure energy-efficient design, commissioning and operations. For existing facilities, such as EPA's Narragansett, Rhode Island laboratory, EPA identifies conservation opportunities through energy audits and energy master planning, followed by design and construction of mechanical system improvements. EPA has also found green power to be a quick and effective way to reduce the Agency's environmental footprint in several Agency laboratories, including in one of its largest complexes in Cincinnati, Ohio. Finally, energy conservation demonstration projects serve to educate the public and develop markets for new technologies, such as a solar hot water heater planned for EPA's San Francisco Regional Office and a fuel cell planned for the Metcalfe Federal Office Building in Chicago.

## **MANAGEMENT TOOLS**

EPA realizes that the commitment of its employees to improve energy efficiency is vital to achieving the Agency's goals 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 close to 30 employees as energy champions. This year, members of the project team for the New England Regional Lab in Chelmsford, Massachusetts, which opened October 1, 2001, were “You Have the Power” recipients. 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 highlight the selected EPA individuals and their achievements.

In FY 2002, EPA developed a new “peer” awards program to recognize and encourage energy and water conservation among its facility managers and building design and construction personnel. For FY 2002, the Agency will award “Btu Busters of the Year” and other similar awards to honor managers that have spearheaded projects to reduce a facilities’ energy use and employees who have led cutting-edge projects or partnered with SFPB to reduce energy.

EPA also 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. On June 13, 2002, 11 EPA employees received the Assistant Administrator’s Award for Innovation: eight for their efforts in procuring green power and three for their work on ESPCs at EPA facilities.

On September 30, 2002, EPA’s Facilities Management and Services Division and EPA’s facility managers were recognized as “Green Power Leaders” by the U.S. Department of Energy, the Center for Resource Solutions, and EPA’s Office of Air and Radiation at their 2002 Green Power Leadership Awards. EPA was recognized for the high percentage of green power it procures and its commitment to purchase additional green power.

## 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 21<sup>st</sup> Century*: The Laboratories for the 21<sup>st</sup> Century (Labs21) program is a joint partnership between EPA and DOE dedicated to improving the environmental performance of U.S. laboratories. Through its Web site, workshops, e-mail Network, and annual conference, the program 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 and sustainable projects.

In 2002, Labs21 held six one-day workshops on energy-efficient laboratory design and operations, training nearly 250 professionals, each of whom is eligible for continuing education credits. 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 energy efficient lab design, air supply and distribution systems, commissioning, lighting, and resources and tools. Additional information about the course is posted on the Labs21 Web site at <[www.epa.gov/labs21century/training/index.htm](http://www.epa.gov/labs21century/training/index.htm)>.

The 2002 Labs21 Conference took place in Durham, North Carolina, from October 7-9, 2002. More than 450 public and private sector laboratory energy managers, policymakers, and other technical experts from the United States, Canada, Singapore, Australia, and New Zealand attended the conference, including 24 EPA employees. A mix of plenary and panel sessions highlighted strategies and technologies for improving energy and water efficiency and overall environmental performance in laboratories. This year's conference also featured tours of EPA's New Consolidated Facility in Research Triangle Park (RTP), North Carolina, a new 1.2 million gross square foot research and office facility and one of the largest green buildings ever constructed. A technology fair where exhibitors displayed state-of-the-art products for high performance labs was also part of the conference. The conference agenda, presentations, and speaker biographies are available online at <[www.epa.gov/labs21century/conf/conf2002/index.htm](http://www.epa.gov/labs21century/conf/conf2002/index.htm)>.

- *Buildings and Facilities Conference*: In FY 2002 EPA also conducted its annual three-day Buildings and Facilities Conference, which all EPA facility managers attend. This year's conference was held in Research Triangle Park, North Carolina, in February 2002. Conference attendees included facility managers from EPA-operated laboratories and General Services Administration (GSA)-operated regional offices and headquarters. SFPB provided an update on

FY 2001 energy conservation activities and presented energy conservation goals for FY 2002, including mechanical systems upgrades for four of EPA's facilities, reporting on the success/results from RTP, supporting the Fort Meade re-commissioning, and getting involved early in the design/retrofit process for the new regional offices in Boston and Denver.

- *Credit Card Purchasing Guidelines:* EPA established credit card purchasing guidelines that identify specific environmental attributes to look for when selecting products, such as the ENERGY STAR<sup>®</sup> label. Credit card holders can access the guidelines at EPA's Environmentally Preferable Purchasing (EPP) Program's Web site ([www.epa.gov/oppt/epp/tools/creditcard.htm](http://www.epa.gov/oppt/epp/tools/creditcard.htm)) to ensure their purchases comply with EPA policies. The guidelines recommend purchasing products with recycled content, reduced packaging, energy-efficient designs, 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.
- *"Green" Online Ordering System:* As part of its efforts to increase environmentally preferable purchasing (EPP) and improve the overall tracking of Agency purchases, EPA's EPP Program is working with the Office of Acquisition Management and the Comprehensive Procurement Guidelines to create a "green" online ordering system. Scheduled to come online by summer 2003, this new ordering system will consist only of products that are considered environmentally preferable, in order to make green purchasing easier for Agency personnel and increase such purchases throughout the Agency. EPP is also compiling a "lessons learned" document from other agencies with similar online purchasing systems and will share this information with other federal agencies.
- *"Energizing EPA" Newsletter:* *Energizing EPA* is an internal EPA newsletter that highlights the Agency's efforts to improve energy and water efficiency at its facilities. In August 2002, EPA resumed publishing the newsletter, with an issue focused on the Agency's green vehicle fleet efforts, the new RTP campus, water conservation efforts at various EPA facilities, energy master planning, re-commissioning, and the 2002 Labs21 Conference.
- *Office of Administration Web Site:* EPA's Office of Administration completely revamped its public Web site, which was posted in February 2002. The Web site is a central source of information about energy conservation approaches and projects, water conservation planning, renewable energy projects, and green buildings developed by and for EPA. It is hoped that by sharing EPA's experience, the Agency can make it easier for others to develop green buildings. EPA updates and improve its Web site each quarter as projects move from conception, through construction, to completion and operation. The site also provides information on facility gross square footage, energy and water consumption data, facility manager contact information, and "green" building highlights for each major facility EPA occupies. In addition, the latest *Energizing EPA* newsletters and annual energy reports can be found on the site, along with updates on the Agency's efforts to procure green power for its facilities, and links to more information on green power, sustainable design, and environmentally preferable purchasing.

## **Showcase Facilities**

In FY 2002, EPA's New England Regional Laboratory in Chelmsford, Massachusetts, received the Energy Showcase Facilities Award. The lab features numerous energy efficient products and techniques including: gas-fired boilers, variable air volume ventilation systems, skylights, and occupancy sensors. The windows are not only insulated and tinted, but also are shaded with photovoltaic sunshades which produce approximately 2,000 watts of solar energy daily.

## **SECTION II: ENERGY EFFICIENCY PERFORMANCE**

This section describes the data reported on the accompanying A-11 Data Report and Energy Scorecard (see Appendices A and B) regarding EPA's energy and water consumption and reduction efforts in FY 2002. This section also discusses EPA's green power purchases, onsite renewable energy generation, and contributions to the Million Solar Roofs Initiative.

### **ENERGY REDUCTION PERFORMANCE**

#### **Standard Facilities**

The Energy Policy Act of 1992 (EPACT), which required federal agencies to report their energy and water use and set goals for energy reduction, specifically exempted laboratories and other major industrial facilities that use large amounts of energy. All of the facilities that EPA owns and for which the Agency pays utilities are laboratories. However, as part of its ongoing commitment to resource conservation and emissions reduction, since 1993 EPA has measured and reported its laboratory energy and water consumption and worked to improve its energy performance, using EPACT's standard facility 1985 baseline and reduction requirements.

In 1999, E.O.13123 broadened federal energy reduction requirements to include industrial and laboratory facilities and stipulated use of a 1990 baseline. Since E.O. 13123 was issued, EPA has been reporting its laboratory energy and water consumption under the industrial facility designation, using a 1990 baseline.

#### **Industrial and Laboratory Facilities**

All of the laboratories that EPA owns and/or pays utilities for (28 total<sup>1</sup>) are identified in Appendix D. Although EPA occupies other facilities, the utilities are paid and reported by GSA. EPA compiles its energy and water consumption data using a quarterly reporting form, which is completed by a site energy manager for each facility.

---

<sup>1</sup>Generally, EPA reports laboratories complexes on a geographical basis as one unit; for some large lab complexes (e.g., the campus in Research Triangle Park), EPA breaks out the data by building to more accurately identify energy consumption and improvement opportunities. A full list is included in Appendix D.

In FY 2002, EPA began an effort to improve the quality and usefulness of its energy reporting system. The Agency initiated a process to verify the gross square footage of its laboratories. SFPB also began collecting copies of actual utility bills from facility managers to improve the data quality of energy consumption figures. Finally, EPA initiated quarterly energy emails from SFPB; facility managers and senior program managers receive a brief, graphic PowerPoint presentation highlighting their energy consumption on a year-to-date basis, increases or decreases from previous periods and the FY1990 baseline, and laboratory by laboratory performance comparisons.

EPA's energy consumption reports for FY 2002 show that the Agency's 28 owned laboratory facilities consumed the following that year:

- 130,252 Mega Watt hours of electricity of which 24,102 Mega Watt hours or 18.5% was Green Power
- 122,600 gallons of fuel oil
- 475,073 thousand cubic feet of natural gas
- 7,000 gallons of propane
- 27.8 BBtu's of Purchased Steam

In the spirit of E.O. 13123 and as the leading federal agency on environmental issues, EPA recognizes the need to not only improve energy performance, but to reduce the emissions created from its energy use. As such, EPA has been purchasing "green power," or electricity produced from renewable sources such as wind or landfill gas, since 1999. That year, EPA was the first federal agency to purchase 100 percent green power at a facility, at its Richmond, California, laboratory. By the end of FY 2002, EPA was using 100 percent green power in five of its laboratories, or 18.5% percent of the electricity used in its 28 reporting facilities. We also have been working in FY 2002 to procure green power at several additional lab facilities.

EPA's FY 2003 budget proposed a \$2.6 million fund for energy conservation projects, as part of an FY 2003 Energy Conservation Initiative.

## **Exempt Facilities**

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

## **Tactical Vehicle and Equipment Fuel Use**

To reduce harmful vehicle emissions and fuel consumption and increase fuel efficiency, EPA has incorporated alternative fuel vehicles (AFVs) into its nationwide fleet of more than 1,100 automotive vehicles. In FY 2002, EPA acquired 60 additional AFVs that use compressed natural gas, ethanol/gasoline mixtures, or electricity, bringing the Agency's total AFV fleet to 324 vehicles. This helped EPA once again meet the Energy Policy Act's requirement that 75 percent of nonexempt, new vehicles acquired by federal agencies must be AFVs. In fact, for the fourth straight year, EPA exceeded this requirement by 10 percent or more.

E.O. 13149 requires that, by 2005, agencies reduce fuel usage by 20 percent, increase miles per gallon by 3 percent, and use alternative fuels the majority of the time (51 percent). An example of this effort is the use of compressed natural gas in EPA Headquarters' shuttle buses that started service in January 2002, helping to reduce the Agency's petroleum use by more than 5,000 gallons this past year. In FY 2002, EPA's petroleum use decreased by 16% from the FY 1990 baseline. By the end of FY 2002, EPA had increased average fleet miles per gallon 2 miles per gallon from the FY 1999 baseline.

EPA Administrator Whitman has committed to continue the Agency's fuel efficiency efforts and increase AFV use, directing EPA's Office of Transportation and Air Quality (OTAQ) and Facilities Management and Services Division (FMSD) to work with GSA to further improve EPA's own fleet and to invite other federal and private fleets to join in the effort. In FY 2002, FMSD and OTAQ worked on developing a new "Fleet Excellence" fuel-efficiency program that will encourage private-sector organizations to reduce their fleet's miles per gallon by 3 percent annually. The program aims to attract private-sector partners as leaders, with an overall goal of reducing harmful vehicle emissions by promoting the use of AFVs, fuel-efficient vehicles, and other technological advancements that improve fuel efficiency.



## RENEWABLE ENERGY

EPA is committed to buying green power whenever possible and has assisted the Federal Government in accelerating the growth of renewable energy sources by requiring the purchase of green power for a percentage of its overall energy requirements. In the summer of 1999, with assistance from GSA and DOE, EPA's laboratory in Richmond, California, became the first federal building to receive 100 percent of its electricity from renewable sources, when 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. This contract was renegotiated and extended for another three years in July 2002.

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 24.1 million kWh per year, or approximately 18.5 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 July 2001 to recognize and encourage the use of renewable energy. When EPA joined in July 2001, it had already surpassed the required percentage goals of the Green Power Partnership. New and ongoing green power purchasing efforts at EPA facilities 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, and EPA makes up a portion of the cost of this premium through a reduced cost natural gas supply contract with GSA. EPA also installed a transpired solar collector on the south wall of the facility's hazardous materials building in March 2002.
- *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. Since summer 2001, EPA has procured 100 percent renewable wind power through a 10-year demonstration grant agreement with the Bonneville Environmental Foundation (BEF). BEF, an independent nonprofit organization promoting renewable energy, will purchase "green tags" from the Bonneville Power Administration (BPA). These tags, which represent the environmental benefits of the wind power over traditional energy sources, are also known as renewable energy credits. BEF, working with BPA, developed a 700-kilowatt wind turbine which went into service in November 2001. The turbine delivers at least as much green power to the regional electric grid as the Manchester lab pulls from the regional grid.

- *Chelmsford, Massachusetts:* EPA 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 from Green Mountain Utility's Searsburg wind farm in Vermont and new wind power from New York. The lab also has photovoltaic window awnings (see below) that were installed upon the facility's completion in September 2001.
- *Cincinnati, Ohio:* EPA signed a green power contract in May 2001 for 100 percent of its 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 supplies 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, supplies the remainder of the renewable energy contract with landfill gas from Illinois.
- *Richmond, California:* EPA recently renewed its 100 percent green power purchasing contract with SMUD. The Richmond, California, laboratory uses 1.9 million kWh of electricity annually. 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. The renegotiated contract, which goes through July 2005, stipulates a cost increase of \$0.006, \$0.007, and \$0.008 cents per kWh in 2002-3, 2003-4, and 2004-5, respectively.
- *Corvallis, Oregon:* This lab reported purchasing nearly 133,000 kWh of green power in FY 2002, or about five percent of its electricity needs.
- *Narragansett, Rhode Island:* EPA is currently working on the purchase of green power for this facility to start in April 2003.
- *Research Triangle Park, North Carolina:* EPA is pursuing green power procurement at all of its facilities in the RTP area. This will be EPA's largest such purchase to date, estimated at 100,000,000 kWh. Given the size of the purchase and the current state of renewable energy markets in the state, this purchase may be phased in to increase EPA's share of green power over three to four years, eventually reaching 100 percent.
- *Fort Meade, Maryland, and Houston, Texas:* EPA is also looking into green power purchases for these laboratories, with goals to complete the purchase by December 31, 2002 in Fort Meade, and by March 30, 2003 in Houston.

### **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 Arrays:* In April 2002, EPA installed a photovoltaic (PV) roof, one of the two largest on the East Coast, on top of its National Computer Center in Research Triangle Park, North Carolina. The 100-kilowatt, integrated roof power system converts the sun's light into energy, feeding it directly to the building and supplementing the main power utility. The system incorporates PV cells backed with insulating polystyrene foam, turning solar energy into usable power while increasing the building's thermal insulation. The system supplies the equivalent amount of electricity that is needed to power the entire building's lights for 24 hours each day. 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. Since 2000, EPA's Region 5 Office in Chicago's Metcalfe Building has received renewable energy from a solar array on the roof that provides 10 kW of power to the office building.
  
- *Net Metering:* EPA's wet laboratory in Manchester, Washington, uses 28 solar panels to generate approximately 2 kW of electricity for the facility. At the end of 2000, the lab became the first commercial, solar-powered "net metering" project in the Northwest. Under net metering, any electricity produced by the lab's solar panels will offset the lab's energy use and costs. EPA undertook the project to demonstrate the benefits of net metering and solar technology, as well as provide an uninterrupted power supply.
  
- *Geothermal Heat Pump:* EPA's Ada, Oklahoma, laboratory includes installation of a geothermal heat pump (GHP) as part of its ESPC upgrade, which is expected to be completed in March 2003. 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. In addition to the environmental benefits, 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, and reduce the burden on the facility's cooling tower, which will only be needed during the peak summer months. The geothermal system and reduction in current cooling tower operations will contribute to reduction in water consumption of 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's Edison, New Jersey, lab has three solar energy water heating systems that have been the primary source of hot water in their respective facility areas since 1998. 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 Laboratory (NREL). The 600-watt photovoltaic system saves the facility 900 kWh of electricity annually. EPA's New Consolidated Facility in Research Triangle Park, North Carolina, 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.

- *Solar Power Awnings:* EPA completed installation of photovoltaic awnings at its new Chelmsford, Massachusetts, laboratory in September 2001. The awnings supply approximately 2,000 watts of electricity daily to the regional electric grid, and a meter connected to the awnings displays a readout in the facility lobby showing the total power generated for the day. The awnings also provide shade for the office windows on the outside and reduce glare and heat gain, thus reducing the amount of cooling needed. Special skylights in the corridors with reflective tubing systems bring daylight deep into the building, reducing the need for artificial light.
- *Solar Wall:* EPA's lab in Golden, Colorado, completed installation of a solar wall in March 2002. The transpired solar collector was installed on the south wall of the Hazardous Materials Building to augment the facility's heating and cooling system.

### **Purchased Renewable Energy**

As discussed above, EPA's facilities in Richmond, California; Golden, Colorado; Cincinnati, Ohio; and Chelmsford, Massachusetts all purchased 100 percent renewable energy for the entirety of FY 2002; Manchester, Washington's green power delivery started November 1, 2001, and Corvallis, Oregon, purchased nearly 133,000 kWh of green power in FY 2002. Combined, these facilities purchased 24.1 million kWh of renewable energy in 2002. This represented 18.5 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. EPA is currently working on green power purchases in Narragansett, Rhode Island; Houston, Texas; Fort Meade, Maryland; and Research Triangle Park, North Carolina. Deliveries for Fort Meade are expected to start in January 2003, and deliveries for Narragansett and Houston are expected to start by April 2003. When completed, EPA's use of green power should be approximately 40 percent of its total electricity needs for both labs and offices.

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. 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**

Several EPA solar initiatives and project leaders have been recognized on DOE's Web site as examples of the Million Solar Roofs Initiative. EPA Region 10 lab in Manchester, Washington, was recognized for its photovoltaic panels, which eliminated 50,000 tons of carbon emissions annually. On September 19, 2002, the National Computer Center at RTP began using its solar panels to generate electricity. The New England Regional Laboratory in Chelmsford, Massachusetts, also began to reap the benefits of its unique solar sunshade panels in September 2001. In addition, EPA has funded solar panels in facilities it occupies but does not manage, such as the Region 5 headquarters Metcalfe Building in Chicago. The Agency's Edison, New Jersey, and Athens, Georgia, solar thermal systems also qualify under this initiative.

## **PETROLEUM**

In FY 2002, EPA used fuel oil in five of its reporting laboratories (Narragansett, Rhode Island; Fort Meade, Maryland; Duluth, Minnesota; Golden, Colorado; and Manchester, Washington). Fewer EPA facilities used fuel oil in FY 2002 than in FY 2001, due to the fact that natural gas prices did not rise as high as the previous year. As a result, some boilers geared for natural gas burned more efficiently than last year. Two lab facilities (Edison, New Jersey, and Manchester, Washington) also used propane. EPA used a total of 122,619 gallons of fuel oil in FY 2002 and 6,960 gallons of propane.

## **WATER CONSERVATION**

In FY 2002, EPA used 186 million gallons of water in its 28 laboratories. This year, EPA also made a commitment to assessing and reducing its water use by launching an Agency-wide water conservation initiative. E.O. 13123 requires federal agencies to implement water management plans incorporating a variety of best management practices in 5 percent of their facilities by FY 2002. This year, EPA undertook the water management planning process at two facilities—its New England Regional Laboratory in Chelmsford, Massachusetts, and the Environmental Sciences Center in Fort Meade, Maryland. Best management practices incorporated in the Chelmsford lab when it opened in October 2002 include: water-efficient landscaping; toilets and urinals; faucets and showerheads; distribution system audits, leak

detection, and repair; public information and education programs; single-pass cooling systems; and water reuse and recycling. At the Fort Meade lab, which opened in 1999, EPA's water management plan addresses public information and education; distribution system audits, leak detection, and repair; water-efficient landscaping; low-flow toilets and urinals; low-flow faucets and showerheads; boiler/steam systems; single-pass cooling systems; and cooling tower systems. In addition, EPA achieved water conservation through a variety of individual facility efforts, sustainable design features, and ESPC efforts at several other laboratories (See Section III, L. Water Conservation).

### **SECTION III: IMPLEMENTATION STRATEGIES**

In FY 2002, EPA continued its commitment to use a variety of strategies to reduce energy consumption and improve energy performance in its owned laboratory facilities, as well as influence energy performance in several of its leased facilities. These strategies include 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 developing, constructing, and operating its facilities, EPA makes every effort to conserve natural resources, incorporate sustainable design, and incorporate innovative technologies, products, and services that are environmentally sound and cost-effective throughout their life cycles.

As part of its energy and water reduction goals, for example, EPA has actively pursued ESPCs and ESPC-like arrangements to achieve improved energy and water performance. ESPCs are an effective way to address life-cycle cost analysis decisions, because they combine energy and water-efficiency projects, allowing the Agency to benefit from overall life-cycle cost savings. Certain energy conservation measures (ECMs) within an ESPC, while they might not be the most cost-effective solution on their own, may provide higher levels of energy efficiency, and therefore contribute to overall project cost-effectiveness when combined with other energy ECMs. In EPA's Ann Arbor, Michigan, lab, for example, the ESPC project team determined the optimal energy conservation system based on an analysis of an entire list of ECMs and their relative merits in certain combinations, taking into account the effect of any relevant rebate programs or more favorable rate structures. This process allowed the Agency to identify and implement significant energy efficiency upgrades and life-cycle savings that would have gone unnoticed under the traditional process, which emphasized initial costs.

EPA also expanded the time frame it uses to examine life-cycle cost savings. While many life-cycle cost analysis models examine savings over a five- to 10-year time frame, EPA is investigating projects—such as renewable technologies—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 life-cycle cost analysis. In a new lab EPA is building in Kansas

City, Kansas, the Agency conducted extensive energy modeling on the 65 percent design documents and identified and incorporated additional economical energy conservation measures into the project.

In FY 2002, EPA initiated energy/mechanical system master planning as part of the existing long term master planning process for its facilities. Besides looking at future space and programmatic needs of facilities, the Agency now works to identify short term, intermediate term, and long term opportunities for more energy-efficient mechanical systems. The Agency initiated Energy Master Planning at its second largest facility, the Cincinnati laboratory, and at its Narragansett, Rhode Island laboratory.

## **FACILITY ENERGY AUDITS**

To help identify opportunities for energy efficiency improvements to mechanical systems, EPA's office and laboratory facilities are regularly reviewed for their energy efficiency. As part of the Agency's joint safety, health, environmental management, energy, and water audit process (SHEM audits), a facility's energy and water management practices and status are assessed. Each major facility is audited once every three years. The energy and water assessors identify, on a preliminary basis, opportunities for energy and water conservation measures. In FY 2002, the following EPA facilities and offices included energy assessments as part of SHEM audits:

- Chelmsford, Massachusetts, New England Regional Laboratory
- Edison, New Jersey, Laboratory
- Atlanta Regional Office

In addition to the energy assessments conducted as part of the scheduled audits referenced above, SFPB performs more in-depth energy assessment program for several EPA labs this year. In FY 2002, EPA developed a standard operating procedure for what is known as Stage 2 energy audits, a comprehensive review of laboratory energy use, mechanical systems, and potential upgrades. Following the Stage 2 audits, participating laboratories receive a draft report of findings, complete with recommended ECMs. Facility managers work with SFPB staff to analyze the findings and determine future steps for energy performance improvement. In FY 2001, two such audits were conducted in EPA's laboratories in Golden, Colorado, and Houston, Texas; during FY 2002 these laboratories continued to work with SFPB to review the ECMs identified through the Stage 2 audit and develop a strategy for implementation of specific energy efficiency measures. In FY 2002, Stage 2 audits were conducted at the following EPA facilities:



- Montgomery, Alabama
- Narragansett, Rhode Island (with a focus on the chiller/cooling tower/primary loop)
- Chicago Regional Laboratory
- NHEERL Laboratory, Research Triangle Park, North Carolina
- Chapel Hill Laboratory, Research Triangle Park, North Carolina

In addition to the scheduled and Stage 2 audits, EPA has incorporated an audit report process into the overall ESPC project evaluation process for facilities considering these types of contracts. Audits performed through an ESPC tend to be more aggressive and thorough, and often result in energy projects because the energy service company's payment is generated from the savings in energy costs. Both Ann Arbor, Michigan, and Ada, Oklahoma, laboratories have been audited as part of this process.

## **FINANCING MECHANISMS**

EPA continues to seek opportunities to utilize 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 efficiency upgrades using future utility cost savings, enabling agencies such as EPA to achieve improvements in energy performance and reduce energy costs through private investments.

As part of the ESPC agreement between a federal facility and an energy service company (ESCO), the ESCo evaluates a facility for energy and water conservation opportunities, then designs a project to increase the facility's energy and water efficiency. The ESCo purchases and installs the necessary equipment, such as 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 2002, work continued on an ESPC worth more than \$4 million at EPA's Ada, Oklahoma, laboratory. EPA expects to achieve a reduction of more than 50 percent from current energy consumption levels from this effort when the project is completed in March 2003. In FY 2002, EPA also continued to realize the benefits of the ESPC completed in April 2001 at its Ann Arbor, Michigan, laboratory. In the first full year of operation for the ESPC, the Ann Arbor lab saved 267,637 Btus per gross square foot from what the facility used on average in the baseline years of FY 1993-1995. The ESPC also helped

Ann Arbor save more than 17 million gallons of water, or 74 percent from the baseline years.

In one other EPA laboratory, the Agency is pursuing an ESPC-like mechanism to finance upgrades to improve energy performance. EPA's Richmond, California, laboratory signed a design contract in FY 2002 to replace a single, oversized boiler with two smaller boilers, install a natural gas co-generator unit to provide electricity and hot water for laboratory operations, and upgrade HVAC controls equipment in the facility. Under an arrangement with the firm from which EPA leases the building, the lessor will finance the improvements, and EPA will convert its utility savings into lease payments. These upgrades are expected to result in a 20 percent energy savings for the Richmond facility.

EPA has also worked with other agencies to finance projects that could lead to energy performance improvements beyond its own offices. At the Atlanta Federal Center this year, EPA and GSA co-funded a project to sub-meter energy use on the 15<sup>th</sup> floor, where EPA occupies office space owned and operated by GSA. The main objective of the project is to accurately measure the energy efficiency and cost savings of installing occupancy sensors of lighting, occupancy-controlled surge outlets, and LED emergency lights on the 15<sup>th</sup> floor. The results of this study will be used to justify cost-effective retrofits throughout this federal building, benefitting EPA, GSA, and other federal agencies.

## **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 and computers. The Agency reviews and updates its purchasing specifications regularly and incorporates ENERGY STAR and other sustainable product requirements into new lease provisions when the occasion arises.

EPA also encourages its employees and other federal purchasers to participate in the Agency's energy management activities through its Environmentally Preferable Purchasing (EPP) program. EPP helps train government purchase card users on buying energy-efficient and sustainable products. In FY 2002, EPP has been working on a comprehensive database of these products for government credit card users. 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, including the *EPP Update* and *Energizing EPA*, promote the use of

energy-efficient products and provide resources to EPA purchasers through articles on specific products and purchasing procedures. In addition, EPA's model "green" home helps educate citizens and other federal agencies understand and promote energy-efficient products.

## **ENERGY STAR® BUILDINGS**

Because the ENERGY STAR program does not encompass energy-intensive facilities such as laboratories in its labeling program, EPA cannot designate its 28 lab facilities as ENERGY STAR buildings. However, the Agency continues to work with GSA to achieve the ENERGY STAR label in its leased office facilities. Currently, three EPA office buildings that are owned or leased by GSA have been awarded the ENERGY STAR label, including the Region 2 Office Building in New York City, the Chicago Regional Office Building, and the Denver Regional Office Building. The lease on the Denver Regional Office expires in 2004, and this year EPA has arranged for the solicitation for offers to include a requirement that any new building meet ENERGY STAR criteria, as well as many other sustainable design requirements.

In FY 2002, EPA undertook efforts to achieve the ENERGY STAR label at more of its office buildings throughout the country. EPA contracted for ENERGY STAR benchmarking studies at its Dallas Regional Office Building, at its office building in Ann Arbor, Michigan, and at the Kansas City Region 7 Office. In Dallas, the energy use is too high to obtain an ENERGY STAR label with economical energy investments. The Ann Arbor benchmarking revealed additional ECMs that might help EPA achieve the ENERGY STAR label for that office, and EPA is currently reviewing and assessing those measures. With the installation of a small winter "pony" chiller in December 2001, EPA expects its new Kansas City Region 7 Office to obtain an ENERGY STAR label. The benchmarking assessment is scheduled for completion at the beginning of the 2<sup>nd</sup> quarter of FY 2003, when the 12 months of energy data required for ENERGY STAR benchmarking are available.

## **SUSTAINABLE BUILDING DESIGN**

As part of its mission to protect human health and the environment, EPA incorporates sustainable building principles into the siting, design, and construction of all new facilities, as well as the renovation and maintenance of existing facilities. Even where EPA does not own the building, the Agency works with GSA to incorporate its holistic, systems approach to building design and renovation wherever possible. In fact, EPA has a Green Buildings Vision and Policy Statement that serves as a guide for each

of these sustainable projects. Some of the EPA facilities that are applying these principles include:

- *New Consolidated Facility, RTP, North Carolina:* In September, 2002, EPA accepted as substantially complete its new, state-of-the-art environmental research facility at Research Triangle Park, North Carolina. This 1.2 million gross square foot facility is EPA's largest construction project to date and will house 2,000 researchers and support staff. Approximately 1,500 researchers have moved into the building, and the remaining moves will be completed by March, 2003. The New Consolidated Facility includes an extensive laboratory complex, a conference center, cafeteria, and a child care center, as well as the National Computer Center, completed in January 2002, which houses EPA's mainframe computer. From the beginning of the planning stages to the completion of the facility's construction, environmental stewardship remained a high priority for EPA. As a result, the RTP campus has become a global model for sustainable design and construction. Throughout each phase of the project, several environmental goals were in place, including: solid waste reduction, increased energy and water efficiency, healthy indoor air quality levels, and natural landscapes. The facility also used recycled carpet and other recycled building materials. The project was rewarded for its efforts as it received GSA's Demolition Derby Award for successful construction waste management disposal—recycling more than 80 percent of its construction debris. A digitally controlled Building Automation System works with variable speed motors, fans, and pumps to serve only the actual energy demand, preventing energy waste. The National Computer Center is outfitted with approximately 2,183 photovoltaic roof tiles, which produce an amount of power equivalent to the electricity needed to light the building year round. The facility incorporates low volatile organic compound (VOC) paints, sealants, and adhesives to improve indoor air quality and ensure the safety of EPA's employees. Outside the building, EPA minimized ground clearing to preserve forests, streams, and wetlands, and a plant rescue saved thousands of native plants and eliminated the need for watering. Additionally, the campus will be designated and maintained as a Corporate Wildlife Habitat.
- *Chelmsford, Massachusetts, Region 1 Laboratory:* EPA moved to its newly constructed 66,000-square-foot New England Regional Laboratory in October 2001. The facility received several honors in FY 2002 for its innovative design and construction, including a White House Closing the Circle Award in June 2002 for sustainable design and recycling. Sustainable design features included water conservation products, such as low-flow sinks, electronic sensors, and a rooftop rain recovery system; energy efficient designs included skylights, tinted windows, photovoltaic awnings, and night system setbacks. These and other energy-efficient features garnered a DOE Energy Showcase Award for the Chelmsford facility. From the beginning of the project, recycling efforts were in place. During construction, materials such as metals, plastics, glass, gypsum drywall, and carpet were separated into clearly labeled bins and brought to appropriate recycling centers. In addition, all the soil and gravel on the site was stockpiled and graded for later reuse as fill or topsoil. The Chelmsford lab won a national GSA Demolition Derby Award for these onsite construction recycling efforts, which diverted more than 50 percent of the solid waste generated during construction from the landfill. This lab was also featured on the cover of the Office of Federal Environmental Executive's special September 20002 publication on the "Closing the Circle Awards" sponsored by the White House.
- *Fort Meade, Maryland, Environmental Science Center:* This facility, completed in April 1999, was constructed with concrete containing recycled fly ash and included recycled asphalt for

parking and roadway surfaces. As part of its energy conservation efforts, the facility maximizes natural light and high efficiency fixtures. Direct digital controls monitor the status of mechanical systems, and VAV fume hoods minimize heating and cooling costs. Native plants on the grounds reduce irrigation and pesticide needs. EPA completed a months-long re-commissioning of the HVAC controls and system in March of 2002, which reduced energy consumption approximately 12 percent, with minimal expenditures. This re-commissioning project had a payback period of less than one year.

- *Kansas City, Kansas, Region 7 Office:* This office, which opened in June 1999, used a green rider in its lease to incorporate myriad sustainable design elements, for which it won several awards. Recycled-content construction products were used wherever possible, from fly ash in the foundation to recycled ceramic tiles and carpeting. All occupied spaces contain motion sensors to control interior lighting, and timers control exterior lighting. Water is conserved through low-flow faucets, native landscaping, and drip irrigation systems. In December 2001, the facility installed a small “pony” chiller to serve the evening and winter cooling needs of its computer operations center. This allowed EPA to turn off a much larger, 500-ton chiller, which was operating at very low capacity, and still meet the computer center’s cooling needs. EPA believes this “pony” chiller will increase the energy efficiency of the building enough to earn the facility an ENERGY STAR label in early 2003.
- *Kansas City, Kansas, Science & Technology Center:* EPA signed a 20-year lease for a new build-to-suit lab facility in August 2000, and construction is expected to be completed by April 2003. The solicitation for offers included language to ensure that the facility and all its construction features promote energy efficiency and environmentally preferable materials and design and requires a Silver rating from the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED™) certification program. Extensive energy modeling has been performed on the design drawings and recommendations for economical ECMs were made, including zoned carbon dioxide sensors, plate-frame heat exchanger, heat recovery, and a chiller system combination of variable frequency and constant volume units to optimize energy use. A unique rooftop rainwater recovery system will capture and filter rainwater to flush toilets, reducing domestic water use by half and reducing cooling tower makeup water requirements.

In addition to buildings that are now open or under construction, EPA is ensuring sustainable design elements in new and renovated office buildings currently under development, by working closely with GSA in the selection of architects, builders, and other contractors, as well as the incorporating sustainable design language into the solicitations for these vendors.

- *Boston, Massachusetts Region 1 Office:* GSA is planning to house EPA’s New England Regional Office in the McCormick Post Office and Court House, after renovation and repairs to this facility are completed in 2006. EPA partnered early with GSA in the process. At EPA’s request, sustainable building experience and energy efficiency were included in the November 2001 *Commerce Business Daily* announcement regarding the hiring of an architectural/engineering (A/E) team. These factors were also used in evaluating the A/E teams that competed for the work. EPA will continue to partner with GSA to ensure that energy efficiency and other sustainable attributes are kept in mind during the design and renovation of this historic structure.
- *Denver, Colorado, Region 8 Office:* In 2004, the lease for EPA’s Region 8 Office will expire. To

achieve the U.S. Green Building Council's LEED™ Silver rating for environmental performance, EPA is including numerous environmental features into the solicitation for offers for the new office space. To increase energy and water efficiency, EPA will incorporate advanced and efficient mechanical systems, low-flow plumbing fixtures, and landscape design using native species. Throughout the planning, construction, and operation of the facility, EPA is working to maximize resource conservation by selecting materials with post-consumer recycled content, strict construction waste recycling guidelines, and designing spaces for ongoing recycling efforts. EPA hopes to address indoor air quality through careful placement of exhaust and air intakes and the use of low VOC paints, sealants, and adhesives. To further their pursuit of healthy indoor air quality levels, only environmentally preferable janitorial and cleaning products will be used.

- *Cincinnati, Ohio*: EPA reviewed its 30,000-square-foot addition to Office of Research and Development for sustainable design issues during FY 2002.
- *Northern Virginia Headquarters Offices*: EPA is working with GSA as it prepares to request offers for office space in FY 2003 to replace expiring leases at three headquarters buildings in the Crystal City area of Northern Virginia. SFPB and AEREB will be involved in incorporating green building specifications as part of the request for bids.

## **ENERGY EFFICIENCY IN LEASE PROVISIONS**

Because EPA does not own most of the buildings it uses, but works with GSA to lease suitable facilities or directly leases them from building owners, the Agency works with its lessors to maintain some control over the energy and water management of its offices and leased laboratory buildings. For the past few years, EPA has been requiring “green riders” as part of its leases. The green rider, which includes energy and water efficiency measures and other environmentally preferable criteria, 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 in the past, including specifications such as: reusing materials; purchasing recycled content products; recycling construction and demolition debris; promoting public transportation; minimizing the use of harmful or toxic substances; and improving the facilities’ energy performance through energy-efficient HVAC systems. The New England Regional Laboratory in Chelmsford, Massachusetts, was designed to be eligible for a Silver rating from the LEED™ program, through numerous environmental attributes required in lease provisions.

In FY 2002, EPA worked closely with GSA to incorporate sustainable design elements in two lease projects—the Boston Regional Office and the Denver Regional Office. EPA’s SFPB assisted GSA throughout the year in developing green rider provisions in the Denver SFO. Currently under

construction, the Kansas City Science & Technology Center also has green language in its SFO to ensure that all construction features promote energy efficiency and environmentally preferable materials and design. In FY 2003, EPA will also be working closely with GSA to incorporate sustainable design elements in the procurement documents used in the competition for approximately 300,000 rentable square feet of office space in Northern Virginia.

## **INDUSTRIAL FACILITY EFFICIENCY IMPROVEMENTS**

As it strives to meet the energy reduction and water conservation goals outlined in E.O. 13123, EPA is continuing to maximize the energy and water efficiency and environmental performance of its facilities, through in-depth energy audits, controls reviews, re-commissioning projects, and energy master planning efforts, to name a few. The following efficiency improvements are either recently completed, underway, or being considered for EPA's 28 reporting laboratories:

- *Ada, Oklahoma:* As part of the ESPC underway at the Ada laboratory, the facility is incorporating a ground-source heat pump, variable air volume fume hoods and air supply, new fan motors, and an integrated digital direct control system for HVAC, energy, fire, and security management. By the end of FY 2002, construction was approximately 90 percent complete. The groundwater well field has been completed, and the lab has been serviced by the groundwater heat pump system since Spring of 2002. The entire project is expected to be completed in March 2003 and is expected to achieve energy savings of more than 50 percent and water savings of more than 80 percent.
- *Ann Arbor, Michigan:* After its first complete year in operation, in FY 2002 EPA's National Vehicle Fuel Emissions Laboratory has recorded significant energy savings compared to a baseline average from FY 1993-1995. Installation of the following energy-saving technologies was completed by April 2001: new air handling units, a new cooling tower, a 200-kW fuel cell, and a new direct digital control system.
- *Chelmsford, Massachusetts:* The New England Regional Laboratory, which officially opened in October 2001, features VAV HVAC and fume hoods, solar awnings, 100 percent renewable power, and extensive daylighting to reduce energy needs and the environmental impact of traditional energy sources. These efforts, detailed throughout this report, earned the facility DOE's Federal Energy Saver Showcase Award, GSA's Planet GSA Environmental Award, and an article in the *Innovation Yearbook of Industrial Design Excellence*, as well as the 2002 White House Closing the Circle Award for Model Facility Demonstration.
- *Cincinnati, Ohio:* In summer 2002, EPA's Andrew W. Breidenbach Environmental Research Center (AWBERC) began the process of energy master planning, or taking into account the energy efficiency and mechanical needs of the facility as part of the overall engineering master planning process. The facility is more than 30 years old and its mechanical infrastructure will need to be replaced over the next 10 years. Results of this effort should identify opportunities and

approaches for improvements to the energy performance of the systems being replaced. AWBERC and several other EPA Cincinnati facilities, including the Center Hill and Testing & Evaluation facility, participated in a solid waste audit in spring 2002 to identify ways to improve their recycling efforts and recycled product purchases. Throughout 2002, the entire Cincinnati complex received 100 percent green power for its electricity needs.

- *Corvallis, Oregon:* In FY 2002, this lab began purchasing 5% of its electricity from renewable sources. EPA started conducting an onsite assessment for the Stage 2 energy audit in the Corvallis and Newport, Oregon lab facilities. Corvallis had already installed energy-efficient chillers and boilers.
- *Duluth, Minnesota:* Since FY 1997, the lab has reduced its energy consumption by 18 percent through improved equipment controls and the replacement of two large boilers with a more efficient “pony boiler.”
- *Edison, New Jersey:* In addition to the three solar water-heating systems in place at this lab, EPA conducted an assessment of energy use and reduction opportunities as part of a scheduled audit in March 2002.
- *Fort Meade, Maryland:* Thanks to a re-commissioning effort begun in FY 2001 and completed in March 2002, EPA has made the operations of this laboratory much more energy efficient, realizing a 12 percent decrease in energy use in FY 2002. Team members from EPA’s Region 3, SFPB, AEREB, and SHEMD worked together to correct system programming errors, reduce exhaust velocities on exhaust stacks, improve the operation of bypass dampers, and identify other energy savings opportunities. Fort Meade’s energy performance is also attributed to direct digital controls, VAV fume hoods, natural lighting, and other efforts. In September 2002, a contract for a pony boiler was signed to improve the efficiency of summer operations at the lab. Construction is expected to be completed by April 2003.
- *Golden, Colorado:* While EPA has been reviewing the results of an energy efficiency assessment conducted for the lab in June 2001, the facility already realizes energy savings with the following energy reduction technologies: a direct digital control system to monitor the HVAC system, ventilation system nighttime setbacks to 25 percent of maximum volume, daylighting, T-8 fluorescent bulbs, motion sensors, and one-inch thick, double-paned, thermal windows with solar flexing film. A followup analysis of the facility’s chiller system is also underway. The transpired solar collector was installed on the south wall of Golden’s hazardous materials building to augment the heating system in March 2002. This will reduce an estimated 7.4 metric tons of carbon per year while reducing natural gas use 215 million Btus annually.
- *Gulf Breeze, Florida:* Energy-efficient equipment in this facility includes a Dinh-style heat pipe dehumidification system, a photovoltaic lighting system of two piers, and timers on electric water heaters, which save energy during off-peak hours. In addition, the main lab (Building 49) will be getting an HVAC upgrade, including an air-to-air heat exchanger and DDC controls. EPA’s AEREB reviewed plans in FY 2002, and the project will be funded in FY 2003.
- *Houston, Texas:* Houston’s hot and humid climate contributes to this facility having the highest Btu per gross square foot of any EPA laboratory. In September 2001, EPA conducted an extensive energy audit of the facility to identify ways to improve its energy performance and



upgrade its mechanical systems. Currently, the mechanical system upgrades are under design, and EPA anticipates construction will start in FY 2003. Upgrades are expected to be completed in 2004. EPA is incorporating the use of a night setback system to control exhaust fans, laboratory fume hoods, and supply air. EPA is also working with GSA to supply this lab with a green power purchase, with plans to initiate renewable power deliveries by March 30, 2003. The facility has already 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.

- *Manchester, Washington:* In addition to the three photovoltaic arrays installed in June 1999, the laboratory now receives 100 percent of its electricity from wind farms. The facility is adding a new wing, including VAV labs to maximize energy efficiency, which is planned for occupancy in January 2003.
- *Montgomery, Alabama:* EPA conducted a Stage 2 energy audit of this facility in March 2002 to identify energy savings opportunities.
- *Narragansett, Rhode Island:* EPA's Atlantic Ecology Division Laboratory and SFPB have established a partnership to make the facility more environmentally sustainable. A chiller/cooling tower study conducted in June 2002 identified issues and solutions within the chilled water primary and secondary loops, and design of corrections was underway by August 2002. In the summer of 2002, the lab and SFPB initiated a sustainable and energy master planning process to provide a vision of the long-term improvements that will reduce the facility's environmental impact and improve its energy performance. EPA has also been working with GSA and EPA's Office of Research and Development on a green power purchase for this lab, with deliveries starting on or before April 1, 2003.
- *RTP, North Carolina New Consolidated Facility:* In September, 2002, EPA accepted as substantially complete a New Consolidated Facility, although employees are still moving into the facility. The National Computer Center was also completed in RTP in January 2002. As part of the energy efficiency measures incorporated into the sustainable design of EPA's newest lab, 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. EPA is pursuing a green power purchase for the entire RTP facility, with initial deliveries expected on October 1, 2003. Because of the large electric needs of the facility, EPA anticipates it will have to phase in its green power purchase over a three- to four-year period before green power is obtained for 100 percent of the complex. In addition, installation of a 100-kW integrated solar array on the roof of the National Computer Center was completed in September 2002. EPA also completed a lighting commissioning project at the New Consolidated Facility in September 2002, replacing old fluorescent bulbs with more efficient models and adjusting occupancy sensors to improve overall lighting energy use. And in September 2002, the Agency completed a preliminary multi-year re-commissioning plan that could, if implemented, cut energy use at the facility significantly in the laboratory areas. The plan involves reducing fume hood exhaust flows during unoccupied periods, optimizing static

pressure, modifying existing sequence of operations to maximize energy savings, optimizing laboratory fume hood flow volumes, and training personnel in VAV operating modes.

- *RTP, North Carolina, Other Buildings:* To improve the utility of the energy consumption information it collects, In FY 2002, EPA began separately reporting energy use at large individual laboratory buildings rather than consolidating them as one organizational unit. For example, in RTP, EPA now tracks energy use at seven buildings, rather than having one energy use figure for all buildings at the research complex. As a result of this individual reporting, EPA identified two laboratories that are some of EPA's most energy-intensive facilities on a Btu per gross square foot per year basis. EPA began Stage 2 energy audits in its National Health and Environmental Effects Research Laboratory and Human Studies Laboratories in summer 2002 to identify a variety of energy and water conservation opportunities at these existing RTP facilities. The NHEERL and Human Studies facilities will also be part of the RTP future green power purchase.
- *Richmond, California:* As part of financing arrangement with the building owner, EPA signed a design contract in April 2002 for several energy performance upgrades at this leased facility: installation of a natural gas co-generator unit for electricity and hot water; a boiler replacement (two smaller boilers instead of one oversized one); and HVAC controls upgrade. The building owner will increase the rental payments as a result of this work, but the utility savings that EPA realizes from these upgrades will cover the increased rental cost. EPA, meanwhile, will reduce energy use by approximately 25 percent. The work is expected to be completed in FY 2004. The facility will continue to purchase 100 percent landfill gas from SMUD, the local utility district, under a three-year contract renewed in July 2002.

## **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.

## **OFF-GRID GENERATION**

EPA is using and studying distributed generation technologies to diversify its electric resources and provide more reliable, off-grid sources for the uninterrupted power its labs need:

- *Ada, Oklahoma:* The laboratory has had a ground-source heat pump system was installed as part of an ESPC and became operation in the Spring of 2002. It is estimated that in FY2002, this system displaced 607.8 MWH of Electricity and 43,515 ccf of natural gas, or 6,560 MMBtus of conventional energy.
- *Ann Arbor, Michigan:* A 200-kW natural gas fuel cell was included as part of the lab's ESPC upgrade. In addition, as an alternative to six or more internal combustion engines that would provide clean/grey power, EPA teamed up with DOE's Oak Ridge laboratory to study microturbine and fuel cell options, which had a payback period of only two years.
- *National Computer Center, RTP, North Carolina:* EPA conducted another feasibility study with Oak Ridge National Laboratories in RTP to consider a natural gas-fired turbine or fuel cell for emergency power for the computer center. Plans originally called for a two-megawatt diesel generator, but Oak Ridge determined that one of these diversified electricity options could be implemented with a simple payback period of 11 years.
- *Richmond, California:* Part of the planned upgrade at this facility will be the natural gas co-generator unit for electricity and hot water.

In addition to the laboratory projects, EPA is working with GSA and DOE on the installation of a 100-kW fuel cell in the Metcalfe Building in Chicago.

## **ELECTRICAL LOAD REDUCTION MEASURES**

Although FY 2002 did not bring a repeat of the energy crisis that some areas of the country experienced in 2001, many EPA buildings continued to work with their local utilities to reduce their electricity load during peak times and throughout the day:

- *Cincinnati, Ohio:* Under a "Power Share" agreement with the local utility, in the event of a power emergency, EPA Region 5 facility voluntarily reduces 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 addition, the following ECMs undertaken over the past two years are producing an estimated yearly utility savings of \$140,000: reducing maximum temperature set point from 72 to 68 degrees and raising the lowest cooling set point from 73 to 75 degrees; installing 123 motion sensors in conference rooms and all private spaces; and removing fluorescent tubes from fixtures in designated areas and in the stairwells.
- *San Francisco, California:* The Region 9 office has a "Green Lights" project that results in average monthly energy savings of 35,000 kWh, as well as 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.

- *Richmond, California:* In August 2001, the Region 9 laboratory has changed temperature set points for cooling and heating to reduce energy use.

## **WATER CONSERVATION**

Since water is also an important component of laboratory operations, EPA places a high priority on reducing water use within its owned and leased facilities. Since 1994, the Agency has required the use of water-conserving equipment in all newly leased and built facilities. Assessments of water efficiency opportunities have been a part of EPA's auditing process and ESPC upgrades and have led to operational and management measures that reduce water consumption. This year, EPA renewed its commitment to water conservation with a new emphasis on water assessments and reduction opportunities at its 28 laboratories. Following are the highlights of EPA's existing water efficiency measures and increased efforts in FY 2002:

- *Ada, Oklahoma:* As part of the ESPC, EPA expects water consumption at the Ada facility to decrease by 80 percent when the upgrade is completed.
- *Ann Arbor, Michigan:* As a result of the improvements made under the ESPC, the facility's water consumption has decreased by more than 70 percent.
- *Chelmsford, Massachusetts:* The New England Regional Laboratory, which EPA accepted for occupancy in September 2001, included a variety of water conservation measures in order to reduce the facility's resource water use. A number of water efficiency features were incorporated into the new building and landscape design, including: restrooms with electronic sensors on plumbing fixtures, low-flow sinks, and waterless urinals; Xeriscaping, the use of native plants and mulches to reduce watering needs; an onsite well to supply non-potable water for bioassay process water in the lab; and roof drains configured to divert water to replenish onsite wetlands. To review the effectiveness of these water conservation measures, review lab process water use, and determine opportunities for replicating the water conservation strategies elsewhere, EPA in FY 2002 made Chelmsford its first laboratory to receive a water conservation "special assessment". After a review of existing best management practices already in place and an in-depth water conservation assessment, a water conservation plan was developed and completed for the Chelmsford lab in 2002. This facility now qualifies as having met the water conservation requirements of E.O. 13123.
- *Fort Meade, Maryland:* In 2002, the Environmental Science Center also has a water management plan developed and completed. The water conservation planning process found eight of the 10 best management practices recommended under E.O. 13123 in place. The facility uses native plants and other natural landscaping techniques to reduce irrigation requirements. Low-flow faucets, showers, toilets, and urinals are used throughout the center. Use of single-pass cooling has been eliminated from laboratory processes. Point of use, closed-loop chillers are used in

individual laboratories where water cooling is required. Water consumption, storm water discharge, and wastewater discharge targets have been established under the facility Environmental Management System.

- *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.
- *Kansas City, Kansas, Region 7 Science and Technology Center:* EPA plans to capture rainwater from the roof, filter it, and use it to flush the toilets in this facility, which is currently under construction. This system will cut domestic water use alone by 40 percent and significantly reduce stormwater runoff from the site. In addition, excess rainwater captured will be used as cooling tower makeup water. Finally, after the lab is completed, a condensate capture system is planned that will also supply up to 500 gallons per day for cooling tower makeup water.
- *Manchester, Washington:* Since the lab replaced its four-inch PVC water lines with six-inch ductile iron water lines in June 1998, 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, in October 1999. 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.
- *New Consolidated Facility, RTP, North Carolina:* 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. Native plants also reduce the need for irrigation of landscaping.

## FY 2002 Federal Agency Energy Scorecard (12/30/02)

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	<h3 style="margin: 0;">Morris X Winn</h3> <h3 style="margin: 0;">1/15/2003</h3>

Did your agency . . .	Yes	No	Anticipated Submittal Date
Submit its FY 2002 energy report to OMB and DOE?	X		January 10, 2003
Submit a FY 2003 Implementation Plan (Sec. 302)?	X		January 10, 2003
Did your agency . . .	Yes	No	Comments
Implement or continue to use new renewable energy projects at Federal installations or facilitate the siting of renewable generation on Federal land in FY 2002 (Sec. 204)? <sup>1</sup> (Refer to Table 1-7 on the Energy Management Data Report)	X		If yes, how many projects and how much energy generated? (Specify unit: MWH or MMBtu) Solar            3___ <u>4.0 MWH</u> Wind Thermal <sup>2</sup> 2___ <u>6561.0 MMBtu</u> Biomass        ___     ___ Other RE        ___     ___
Purchase energy generated from new renewable energy sources in FY 2002 (Sec. 204)? <sup>1</sup>	X		If yes, how much: <u>24,102.1</u> MWH or                    ___ MMBtu
Invest direct FY 2002 appropriations in projects contributing to the goals of the Order (Sec. 301)?	X		If yes, how much:    \$ <u>1,683,979</u>
Specifically request funding necessary to achieve the goals of the Order in its FY 2004 budget request to OMB (Sec. 301)?	X		If yes, how much:    \$ <u>1,800,000</u>
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 FY? <u>31.13%</u> How much facility space has been audited since 1992? <u>73.48%</u>
Issue to private-sector energy service companies (ESCOs) any energy savings performance contract (ESPC) task orders (Sec. 403(a))? (Refer to Table 2-2 on the Energy Management Data Report)		X	How many? _____ Annual savings (MMBtu): _____ Total investment value <sup>3</sup> : \$ _____ Cumulative guaranteed cost savings:            \$ _____ Contracts award value: \$ _____
Issue any utility energy services contract (UESC) task orders (Sec. 403(a))? (Refer to Table 2-3 on		X	How many? _____ Annual savings (MMBtu): _____

<sup>1</sup> "New" renewable energy means sources developed after 1990.

<sup>2</sup> Examples are geothermal, solar thermal, and geothermal heat pumps. Thermal energy from geothermal heat pumps should be determined as follows: Thermal energy = Total geothermal heat transferred – electrical energy used.

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

the Energy Management Data Report)			Total investment value <sup>3</sup> : \$ _____
<b>Did your agency . . .</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
Incorporate energy efficiency requirements into relevant acquisitions (Sec. 403(b)(3))?	X		
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 (budget line item) renovations begun in FY 2002(Sec. 403(d))?	X		Number of new building design/construction projects in FY 2002: <u>4</u> Number of these projects that incorporated sustainable design principles: <u>4</u>
Provide training to appropriate personnel <sup>4</sup> on energy management (Sec. 406(d))?	X		Number of appropriate personnel trained: <u>52</u> Total number of appropriate personnel: <u>98</u>
Implement any additional management tools (Sec. 406)?	X		Check all that apply: Awards: <u>X</u> Performance Evaluations: <u>X</u> Showcase Facilities: <u>X</u> Number of Showcase Facilities designated in fiscal year: <u>1</u>
Establish Water Management Plans and implement at least 4 Best Management Practices in at least 5% of agency facilities?	X		Number of facilities with Water Management Plans: <u>2</u>

**NOTE: Provide additional information if a No<sup>o</sup> reply is used for any of the questions above.**  
Two ESPCs have been contracted for in the past but none were issued in FY2002

Please enter data from annual energy report pertinent to performance toward the goals of Executive Order 13123	Base Year	Previous Year (2001)	Current Year (2002)	% Change (Current vs. Base)
Site Energy Efficiency Improvement Goals (Sec. 202). 1985 Base Year	N/A Btu/Ft <sup>2</sup>	N/A Btu/Ft <sup>2</sup>	N/A Btu/Ft <sup>2</sup>	N/A %
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	357,864 Btu/gsf	358,446 Btu/gsf	303,078 Btu/gsf	-15.31 %
Green Power Netted Out - Industrial/Energy Intensive Facilities Goals (Sec. 203). 1990 Base Year <sup>5</sup>	357,864 Btu/gsf	354,429 Btu/gsf	277,627 Btu/gsf	-22.42 %
Water Conservation Goal (Sec. 207). 2000 Base Year	187.3 MGal	190.1MGal	186.0 MGal	- 0.68 %
Renewable Energy (Sec. 204). Energy used from self-generation and RE power purchases	N/A	12.5 BBtu	88.8 BBtu	N/A

Abbreviation Key: Btu/Ft<sup>2</sup> = British thermal units per gross square foot  
Btu/unit = British thermal units per unit of productivity (or gross square foot when such a unit is inappropriate or unavailable)  
MGal = Million gallons  
MMBtu = Million British Thermal Units

<sup>4</sup> Appropriate personnel include the agency's headquarters facilities team as well as EPA employees in the field who are facility, design, or energy managers or project managers.

<sup>5</sup> Green power netted out: FY2001: Golden and Richmond used 100% green power. FY2002: Golden, Richmond, Chelmsford, Cincinnati, and Manchester used 100% green power, and Corvallis-Main used 5% green power.

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



**U.S. Environmental Protection Agency**  
**FY 2003 Implementation Plan**

December 30, 2002

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

## **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 formed the Sustainable Facilities Practices Branch (SFPB) reflecting the importance EPA places on these issues. The SFPB focuses, coordinates, advances, and implements energy conservation approaches, programs, and projects with all EPA facility construction and operating organizations. In cooperation with the Architecture, Engineering, and Real Estate Branch, the Headquarters Facility Operations Branch, the Safety Health and Environmental Management Division, and local facility managers, SFPB advocates full-time for sustainable approaches, works to institutionalize energy awareness in facility decision making practices, and in some areas, implements conservation projects. Key staff in SFPB's national energy team include the branch chief, national energy coordinator, energy audit/program manager, two mechanical engineers, an architect, and support staff.

#### **Senior Agency Official and Energy Team**

EPA's Assistant Administrator for Administration and Resources Management (currently Morris X. Winn) will continue to serve as the Agency Energy and Environmental Executive, supported by the SFPB's national energy team described above. 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 28 facilities are listed in Appendix D of the annual report.

EPA's Office of Administration and Resources Management will continue to employ three principal approaches to meet the E.O. 13123 energy reduction goals: mechanical systems improvements for both new and existing facilities, green power procurements, and demonstration projects.

## **MANAGEMENT TOOLS**

EPA will encourage its employees' commitment to improving energy efficiency. EPA's national energy 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 encouraging and recognizing its employees for their achievements in conserving energy and in overall promotion of energy-efficiency awareness.

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 nearly 30 employees as energy champions. In addition, EPA will continue to participate in the White House Closing the Circle Awards for energy and resource conservation and green buildings. EPA also has an Agency-wide awards program to address sustainable design and resource conservation. Past award winners have been recognized for their work to procure green power or energy efficient projects. EPA will continue this program in 2003.

To recognize and encourage more specific energy and water conservation efforts, EPA developed a new "peer" awards program in 2002 to reward facility managers and building design and construction personnel that have made significant efforts and progress toward reducing the Agency's overall energy use. In February 2003, EPA will present its first "Btu Buster of the Year" awards to facility managers that have reduced the largest volume or percentage of their facilities' energy use, as well as to recognize employees who have led cutting-edge projects or partnered with EPA's facility organizations to reduce energy during FY 2002.

## 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 21<sup>st</sup> Century*: EPA's Laboratories for the 21<sup>st</sup> Century (Labs21) initiative is dedicated to improving the environmental performance of laboratories throughout the United States. The program provides information on cutting-edge technologies to improve energy and water efficiency of labs and creates a forum for laboratory designers, owners, and operators to obtain up-to-date information and support for implementing a "whole building" approach to laboratory design and maintenance. The annual Labs21 conference includes various sessions where participants can discuss successful strategies and technologies to improve the overall environmental performance of laboratories. Approximately 24 EPA employees attended the October 2002 conference in Durham, North Carolina. The 2003 conference will be held in Denver, Colorado, in October. Once again the conference will feature educational sessions and a technology fair. Details on registration, the annual call for papers, and other details are available on the Labs21 Web site at <[www.epa.gov/labs21century](http://www.epa.gov/labs21century)>. Labs21 will also continue to hold its 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 energy efficient lab design, air supply and distribution systems, commissioning, lighting, and resources and tools. Additional information about the course is posted on the Labs21 Web site at <[www.epa.gov/labs21century/training/index.htm](http://www.epa.gov/labs21century/training/index.htm)>.
- *Buildings and Facilities Conference*: EPA encourages all Agency facility managers to attend an annual three-day Buildings and Facilities conference. The 2003 conference is planned for February 3-7 in Gulf Breeze, Florida and will include presentations on energy use, architecture, engineering, real estate, green buildings, environmental health and safety, fume hoods, and commissioning.
- *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 (EPP) 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<sup>®</sup> 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 the U.S. General Services Administration's (GSA's) *Environmental Products Guide* or office supply catalogs), and other information and guidance. EPP is also developing an online ordering system exclusively for "green" products.

- *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*. EPA will continue to distribute this quarterly newsletter to EPA's senior, program, and facility managers and other employees to keep them up to date on energy and water conservation at new and existing labs, EPA's green vehicle fleet efforts, and distributed electrical resources.
- *Office of Administration Web Site*: EPA's Office of Administration (OA) posted its reorganized Web site in February 2002 to provide more information more efficiently and meet the Agency's new formatting requirements. OA will continue to update the site each quarter, including new sections showcasing EPA's green vehicle fleet efforts, water conservation initiative, new energy efficiency projects, and energy and water use data. The Web site currently receives an average of 4,000 hits per day.

## **Showcase Facilities**

EPA is planning to submit its new Region 7 Science and Technology Center lab, currently under construction in Kansas City, Kansas, as a Showcase Facility. The project is 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 the award to improve the facility design further. This lab will be completed in FY 2003, and this year EPA will also finish improvements and upgrades at a number of its other facilities which the Agency hopes to designate as showcase facilities.

## **SECTION II**

### **IMPLEMENTATION STRATEGIES**

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, use of energy-efficient products, sustainable building design, green lease riders, green power purchases, renewable energy technologies, and water conservation measures.

#### **OVERALL STRATEGY**

As EPA makes the cultural shift to integrate energy efficiency and resource conservation into its facilities' operations, it will focus on several key areas:

- Ensuring that new buildings coming into the EPA inventory, whether labs or offices, are energy efficient.
- For existing facilities, prioritizing energy audits, HVAC system re-designs, and HVAC mechanical system replacements based on highest total energy use and highest Btu-per-gross-square-foot-per-year energy consumption.
- Institutionalizing energy and sustainability considerations into facility decision making and facility development processes including the selection of architects and engineers based on previous experience with green building design, energy efficiency, controls and commissioning, energy master planning, energy modeling, specialized HVAC systems controls review, and HVAC system commissioning .
- Continuously updating Agency facility architectural and engineering standards to improve the energy efficiency and sustainability of all construction related projects.

#### **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.

In FY 2003, EPA will continue to recognize the long-term energy and water savings from its ESPC in Ann Arbor, Michigan, and begin to realize the benefits of the ESPC in Ada, Oklahoma, to

achieving Agency-wide energy and water reduction goals. EPA will continue its policy of using longer time frames to examine lifecycle cost savings. Many LCCA models only examine savings over a five- to 10-year time frame. Because our labs are specialized facility with long lease terms or long lives, EPA considers 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. In FY 2003, EPA will schedule several energy and water assessments at Agency facilities. The Agency is also planning followup studies to initial assessments or more in-depth audits at its Chelmsford, Massachusetts, and Golden, Colorado, labs.

In 2002, EPA has been moving into its new 1.2 million gross square foot Consolidated Facility in Research Triangle Park (RTP), North Carolina. Since this is a new building, it will be some time before operations of the mechanical systems stabilize. EPA will continue develop the energy reporting systems and conduct in-depth monitoring of energy use in FY 2003 to gauge this new buildings energy performance. RTP uses approximately 45% of the Agency's energy, and it will continue to be a major focus of EPA's conservation efforts.

## **FINANCING MECHANISMS**

In March 2003, EPA's laboratory in Ada, Oklahoma, expects to 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 through the mechanical upgrades provided by this project.

Under a design contract signed in FY 2002, EPA's Richmond, California, lab is using an ESPC-like mechanism to finance upgrades to improve energy performance that will be installed in FY 2003, including a boiler replacement, natural gas co-generator unit, and HVAC controls equipment. Under an internal financing agreement, EPA will use the utility savings (EPA pays the utilities directly at this lab) to offset the increased lease payments associated with the project. These upgrades are expected to result in a 20 percent energy savings for the facility.

During 2003, EPA will complete a baseline energy use metering exercise, co-funded with the GSA, on the 15<sup>th</sup> floor of the Atlanta Federal Center, where EPA's Region 4 offices are located. This floor was sub-metered before energy efficiency measures are installed, new energy efficient lights and controls will be installed, and energy use on the floor will be measured after the new equipment is installed. EPA and GSA hope that the results of this study will justify a cost-effective retrofit of the entire building.

## **ENERGY STAR<sup>®</sup> AND OTHER ENERGY-EFFICIENT PRODUCTS**

EPA will continue promoting the purchase of energy-efficient products that carry the ENERGY STAR<sup>®</sup> label, including photocopier equipment and computers. The Agency reviews and updates its purchasing specifications as necessary. EPA will keep encouraging its employees to become involved and responsible participants in the Agency's energy management activities. EPA's EPP Program is developing an online ordering system consisting completely of "green" products such as energy-efficient equipment. 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 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<sup>®</sup> 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<sup>®</sup> Buildings program does not encompass energy-intensive facilities such as laboratories; therefore EPA cannot designate its 28 laboratory facilities as ENERGY STAR<sup>®</sup> buildings. The Agency's Regional Offices in Denver, Chicago, and New York City, are, however, ENERGY STAR buildings. During FY 2002, EPA initiated ENERGY STAR benchmarking at several facilities, including its Dallas Regional Office and Ann Arbor, Michigan, office building. The Agency identified energy conservation measures to help the Ann Arbor building achieve the ENERGY STAR rating, and the facility will work to address those issues in FY 2003.



Furthermore, EPA initiated assessments and planning in FY 2002 that could result in an ENERGY STAR rating at its New Consolidated Facility in RTP, North Carolina; beginning in FY 2003 the facility should begin collecting the annual energy data needed to benchmark the office portions of that facility under the ENERGY STAR program.

In FY 2003, EPA will benchmark its Regional Office in Kansas City, Kansas. The Agency is working with GSA to achieve ENERGY STAR-level performance at the Atlanta Federal Center, where EPA and several other agencies have regional offices.

For all newly leased office facilities, the Agency works with GSA to achieve the ENERGY STAR Buildings label.

## **SUSTAINABLE BUILDING DESIGN**

To promote a healthy, efficient, and productive working environment, EPA has committed to incorporating 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.

In FY 2002, EPA initiated 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, which are applicable to both EPA's owned and leased facilities, will continue to be refined in FY 2003.

Sustainable building design projects that will continue in FY 2003 include: construction of EPA's Region 7 Science and Technology Center in Kansas City, Kansas, which should be completed in the spring of 2003; a renovation of the McCormick Post Office and Court House in Boston, which will house EPA's New England Regional Office (design currently underway); a new Regional Office for EPA's Region 8 Office in Denver, where the current building's lease expires in 2004 (procurement documents

under development); new EPA Headquarters Offices in Northern Virginia, which will go out for bid in 2003; and a 30,000-square-foot addition to EPA's Office of Research and Development in Cincinnati.

## **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. EPA has been working closely with GSA on its Denver Regional Office leases to incorporate energy efficiency requirements into SFO language, and will continue to monitor this effort in FY 2003. For an SFO planned for new Northern Virginia EPA Headquarters buildings, the Agency will work with GSA in FY 2003 to incorporate energy efficiency requirements.

As mentioned above, EPA will initiate a process to update its facilities guidelines and construction specifications and improve its 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 either underway or being considered for EPA facilities in FY 2003:

- *Ada, Oklahoma:* As part of the ESPC under construction at this laboratory, a ground-source heat pump, variable air volume fume hoods and air supply; new fan motors; and an integrated direct digital control system for HVAC, energy, fire, and security management will be completed in March 2003. These improvements are expected to result in energy savings of more than 50 percent and water savings of more than 80 percent.

- *Ann Arbor, Michigan:* As part of ESPC renovations completed in FY 2001, the laboratory will continue to realize energy, water, and cost savings. EPA will also consider the results of study conducted by DOE's Oak Ridge National Laboratory to assess microturbine and fuel cell options as an alternative to six or more internal combustion engines being considered to meet the facility's need for an uninterrupted power supply.
- *Chelmsford, Massachusetts:* The New England Regional Laboratory, which opened in October 2001, will continue to realize the benefits of VAV HVAC and fume hoods, solar awnings, 100 percent renewable power, and extensive daylighting features. In FY 2003, EPA will conduct a facility energy assessment to ensure that all energy efficiency opportunities are maximized.
- *Cincinnati, Ohio:* Since October 1, 2002, this facility has been receiving 100 green power for its electricity needs. Results of the energy master planning process initiated at the A.W. Breidenbach Environmental Research Center on this campus should also yield plans for additional improvements in energy performance in the future. Furthermore, as the Office of Research and Development facility in Cincinnati prepares for a 30,000-square-foot addition, energy efficiency will be a major priority in design specifications.
- *Fort Meade, Maryland:* The facility is installing a "pony boiler" to improve the energy efficiency of summer operations and should be completed by April 2003. EPA is also working on a green power purchase for this laboratories, with a goal to complete the purchase by December 31, 2003.
- *Golden, Colorado:* As a followup to an in-depth energy audit conducted at this facility in June 2001, EPA is conducting an analysis of the lab's chiller system to identify improvements. Thanks to a transpired solar collector installed on the south wall of Golden's hazardous materials building, the facility will continue to realize reductions in natural gas use. The lab will also continue to purchase 100 percent green power from wind.
- *Gulf Breeze, Florida:* In FY 2003, EPA plans to fund an HVAC upgrade to Building 49 of this laboratory, including an air-to-air heat exchanger and DDC controls.
- *Houston, Texas:* EPA has initiated a procurement for green power at this regional lab and expects to award a contract in FY 2003. An energy audit of this facility conducted in September 2001 has led to significant mechanical system upgrades at this lab, with designs underway and continuing in FY 2003. The Agency is also working with GSA to supply this lab with a 100 percent green power purchase, with plans to initiate power deliveries by March 30, 2003.
- *Manchester, Washington:* This facility, which will continue receiving 100 percent of its electricity from wind farms, is adding a new wing, which includes VAV labs to maximize energy efficiency. Occupancy is planned for January 2003.
- *Narragansett, Rhode Island:* A chiller/cooling tower study conducted at this lab in June 2002 identified issues and solutions within the chilled water primary and secondary loops, and design corrections are underway and ongoing. Design for the chiller system corrections will be completed in FY 2003, and EPA's goal is to begin construction this year. A sustainable and energy master planning process initiated at this facility in FY 2002 will provide a vision for more

long-term improvements that will reduce the facility's environmental impact and enhance its energy performance. EPA has also initiated a procurement for green power at this regional lab and expects deliveries to start in April 2003.

- *Research Triangle Park, North Carolina:* In September 2002, EPA accepted as substantially complete a New Consolidated Facility that has numerous energy-efficient features. This new facility and two large older laboratory facilities in Research Triangle Park are some of EPA's biggest energy consumers, and the Agency will place much of its focus in FY 2003 on improvements in these RTP buildings. Many of these efforts were started in FY 2002 and will continue throughout the year, including an completion of in-depth energy audits at the two older RTP facilities, a lighting commissioning project at the new facility, and a multi-year recommissioning plan at the new facility that should cut energy use significantly. The plan involves reducing fume hood exhaust flows during unoccupied periods, optimizing static pressure, modifying existing sequence of operations to maximize energy savings, optimizing laboratory fume hood flow volumes, and training personnel in VAV operating modes. Furthermore, EPA is pursuing a green power purchase for the entire RTP facility, with initial deliveries expected on October 1, 2003. Because of the large electrical needs of this campus, EPA anticipates it will have to phase in its green power purchases of a three- to four-year period before green power is obtained for 100 percent of the facilities. For the National Computer Center in RTP, EPA and Oak Ridge conducted feasibility study to consider a natural gas-fired turbine or fuel cell for emergency power at the Agency's National Computer Center in RTP. During FY 2003, EPA will consider the results of this study and may install a turbine or fuel cell instead of a two-megawatt diesel generator originally planned.
  
- *Richmond, California:* Under a design contract signed in FY 2002, EPA's Richmond, California, lab is using an ESPC-like mechanism to finance upgrades to improve energy performance that will be installed in FY 2003, including a boiler replacement, natural gas co-generator unit, and HVAC controls equipment. Under an internal financing agreement, EPA will use the utility savings (EPA pays the utilities directly at this lab) to offset the increased lease payments associated with the project. These upgrades are expected to result in a 20 percent energy savings for the facility. Under a three-year contract renewed in July 2002, the facility will also continue purchasing 100 percent green power from the Sacramento Municipal Utility District, which is generating power from landfill gas.

EPA continues to address overarching issues at many of its labs to ensure opportunities for improvements are not overlooked and energy efficiency is maximized:

- *Emphasis on Commissioning:* New commissioning and re-commissioning requirements have been developed for all EPA laboratories, based on the Agency's success with the re-commissioning effort it undertook at the Fort Meade laboratory in FY 2002. The Fort Meade re-commissioning effort resulted in energy reductions of approximately 12 percent. In FY 2003, EPA will provide its labs with these improved specifications to require more thorough commissioning of facilities including: review of installation procedures; design and operation of control systems; and measuring facility operations after occupancy.

- *Best Practices for Controls:* 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.) In FY 2003, EPA plans to develop a "best practices" guide for the newly installed direct digital control systems to supplement recently updated facility specifications.
- *Quarterly Energy Results.* As part of the quarterly email reports on energy use the Agency has distributed to facility and senior managers since FY 2001, EPA will include reporting information on its 38 largest facilities, including regional offices, even if EPA is not required to report this information to DOE. Better information should increase EPA's ability to manage its energy, motivate facility managers, and educate the public about energy conservation.
- *Regional Utility Bills:* 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 2003, when it is completed. EPA is currently working to get the FY 2005 budget process set up to complete the transition of energy bill funding to occupying organizations.

## **HIGHLY EFFICIENT SYSTEMS**

EPA will continue using the ESPC process to incorporate combined cooling, heating, and power systems and locally available renewable energy sources. The geothermal heat pump installed as part of the EPSC in Ada, Oklahoma, should be operational once the ESPC is completed in March, 2003.

## **OFF-GRID GENERATION**

EPA will continue to use and study distributed generation technologies to diversify its electric resources and provide more reliable, off-grid sources for uninterrupted power needs at its labs:

- *Ada, Oklahoma:* As mentioned above, the geothermal heat pump should be completely operational in FY 2003. The system will displace 1,736 Mwhrs of electricity and 124, 329 CCF of natural gas on an annual basis.

- *Ann Arbor, Michigan:* A 200 kW natural gas fuel cell was installed in FY 2001. In addition, the EPA/DOE Oak Ridge study on alternatives to internal combustion engines could result in microturbine or fuel cell technology to meet the facility's clean/grey power needs.
- *RTP, North Carolina.* EPA and Oak Ridge conducted another feasibility study to consider a natural gas-fired turbine or fuel cell for emergency power at the Agency's National Computer Center in RTP. During FY 2003, EPA will consider the results of this study and install a turbine or fuel cell instead of a two-megawatt diesel generator originally planned.
- *Richmond, California:* Part of the planned upgrade that will be under construction at this facility in FY 2003 will be a 60 kilowatt natural gas co-generator unit for electricity and hot water.

In addition to these lab projects, in FY 2003 EPA will continue working with GSA and DOE on the installation of 100-kW fuel cell in the Metcalfe Building in Chicago, which houses EPA and other federal tenants.

## **WATER CONSERVATION**

EPA will continue to implement its water conservation initiative in FY 2003, including the ongoing development and implementation of water management plans, the collection and analysis of water use data in each of its facilities, in-depth water audits at select labs, and requirements for water conservation measures in all newly leased and built facilities. In FY 2002, EPA completed water management plans incorporating numerous best management practices in its Chelmsford, Massachusetts, and Fort Meade, Maryland, labs, and those plans will continue to be monitored and upgraded to maximize water savings potential. In FY 2003, the Agency will complete similar plans for its labs in Ann Arbor, Michigan; RTP, North Carolina; Manchester, Washington; and Kansas City, Kansas. One of the features of the new Kansas City lab will be a rooftop rain recovery system, which will cut domestic water use in half by filtering and reusing rainwater in toilets and cooling tower makeup water.

## APPENDIX D -INDUSTRIAL AND LABORATORY FACILITIES INVENTORY<sup>1</sup>

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

New England Regional Laboratory  
Chelmsford, Massachusetts  
Site Energy Manager: Bob Beane

Andrew W. Breidenbach Environmental Research Center  
Cincinnati, Ohio  
Site Energy Manager: Rich Koch

Test and Evaluation Facility  
Cincinnati, Ohio  
Site Energy Manager: Rich Koch

Center Hill Test and Evaluation Facility  
Cincinnati, Ohio  
Site Energy Manager: Rich Koch

Publications Warehouse  
Cincinnati, Ohio  
Site Energy Manager: Rich Koch

Child Development Center  
Cincinnati, Ohio  
Site Energy Manager: Rich Koch

---

<sup>1</sup>EPA is required to report to DOE and OMB the energy use at facilities for which the Agency pays utility bills. Although EPA occupies other facilities, the utilities are paid by GSA.

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

Willamette Research Station  
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

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

Large Lakes Research Station  
Grosse Ile, Michigan  
Site Energy Manager: Rod Booth

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: Renne Watt

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

Environmental Research Center Annex and Administration Building  
Research Triangle Park, North Carolina  
Site Energy Manager: E.B.Roberts

National Health and Environmental Effects Research Laboratory  
Research Triangle Park, North Carolina  
Site Energy Manager: E.B.Roberts

Human Studies Facility  
Research Triangle Park (Chapel Hill), North Carolina  
Site Energy Manager: E.B.Roberts

Burden Creek/Jenkins Road  
Research Triangle Park, North Carolina  
Site Energy Manager: E.B.Roberts

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

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

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

## FY 2002 ENERGY MANAGEMENT DATA REPORT

Agency: U.S. Environmental Protection Agency  
 Date: 12/17/2002

Prepared by: Bucky Green  
 Phone: 202-564-6371

### PART 1: ENERGY CONSUMPTION AND COST DATA

#### 1-1. Standard Buildings/Facilities

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)	Unit Cost (\$)	Site-Delivered Btu (Billion)	Est. Source Btu (Billion)	Est. Carbon Emissions (Metric Tons)
Electricity	MWH	0.0	\$0.0	NA /kWh	0.0	0.0	0
Fuel Oil	Thou. Gal.	0.0	\$0.0	NA /gallon	0.0	0.0	0
Natural Gas	Thou. Cubic Ft.	0.0	\$0.0	NA /Thou Cu Ft	0.0	0.0	0
LPG/Propane	Thou. Gal.	0.0	\$0.0	NA /gallon	0.0	0.0	0
Coal	S. Ton	0.0	\$0.0	NA /S. Ton	0.0	0.0	0
Purch. Steam	BBtu	0.0	\$0.0	NA /MMBtu	0.0	0.0	0
Other	BBtu	0.0	\$0.0	NA /MMBtu	0.0	0.0	0
		Total Costs:	\$0.0	Total:	0.0	0.0	0
Standard Buildings/Facilities (Thou. Gross Square Feet)		0.0		Btu/GSF:	#DIV/0!	#DIV/0!	

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

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)	Unit Cost (\$)	Site-Delivered Btu (Billion)	Est. Source Btu (Billion)	Est. Carbon Emissions (Metric Tons)
Electricity	MWH	130,252.4	\$7,724.0	\$0.06 /kWh	444.4	1,347.6	20,506
Fuel Oil	Thou. Gal.	122.6	\$80.0	\$0.65 /gallon	17.0	17.0	339
Natural Gas	Thou. Cubic Ft.	475,073.6	\$2,582.8	\$5.44 /Thou Cu Ft	489.8	489.8	7,087
LPG/Propane	Thou. Gal.	7.0	\$11.2	\$1.61 /gallon	0.7	0.7	11
Coal	S. Ton	0.0	\$0.0	NA /S. Ton	0.0	0.0	0
Purch. Steam	BBtu	27.8	\$643.3	\$23.14 /MMBtu	27.8	38.6	990
Other	BBtu	0.0	\$0.0	NA /MMBtu	0.0	0.0	
		Total Costs:	\$11,041.3	Total:	979.7	1,893.7	28,934
Energy-Intensive Facilities (Thou. Gross Square Feet)		3,232.5		Btu/GSF:	303,078	585,836	

\* Green power not netted out.

**1-3. Exempt Facilities**

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)	Unit Cost (\$)	Site-Delivered Btu (Billion)	Est. Source Btu (Billion)	Est. Carbon Emissions (Metric Tons)
Electricity	MWH	0.0	\$0.0	NA /kWh	0.0	0.0	0
Fuel Oil	Thou. Gal.	0.0	\$0.0	NA /gallon	0.0	0.0	0
Natural Gas	Thou. Cubic Ft.	0.0	\$0.0	NA /Thou Cu Ft	0.0	0.0	0
LPG/Propane	Thou. Gal.	0.0	\$0.0	NA /gallon	0.0	0.0	0
Coal	S. Ton	0.0	\$0.0	NA /S. Ton	0.0	0.0	0
Purch. Steam	BBtu	0.0	\$0.0	NA /MMBtu	0.0	0.0	0
Other	BBtu	0.0	\$0.0	NA /MMBtu	0.0	0.0	0
		Total Costs:	\$0.0	Total:	0.0	0.0	0
Exempt Facilities (Thou. Gross Square Feet)		0.0		Btu/GSF:	#DIV/0!	#DIV/0!	

**1-4. Tactical Vehicles and Other Equipment**

	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)	Unit Cost (\$)	Btu (Billion)	Est. Carbon Emissions (Metric Tons)
Auto Gasoline	Thou. Gal.	45.0	\$61.0	\$1.36 /gallon	5.6	109
Diesel-Distillate	Thou. Gal.	120.0	\$110.0	\$0.92 /gallon	16.6	332
LPG/Propane	Thou. Gal.	0.0	\$0.0	NA /gallon	0.0	0
Aviation Gasoline	Thou. Gal.	0.0	\$0.0	NA /gallon	0.0	0
Jet Fuel	Thou. Gal.	0.0	\$0.0	NA /gallon	0.0	0
Navy Special	Thou. Gal.	0.0	\$0.0	NA /gallon	0.0	0
Other	Thou. Gal.	0.0	\$0.0	NA /MMBtu	0.0	0
		Total Costs	\$171.0		22.3	441

**1-5. WATER CONSUMPTION, COST AND EFFICIENCY MEASURES**

	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)
Water	Million Gal.	186.0	\$886.8
Best Management Practice Implementation Tracking Data			
Number of facilities* in agency inventory			28
Number of facilities with completed water management plans			2
Number of facilities with at least four (4) BMPs fully implemented			3
*number in the agency inventory, can be buildings, bases, or campuses			

**1-6. RENEWABLE GREEN ENERGY PURCHASES**

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

	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)
Electricity from Renewables	MWH	24,102.1	220.1
Natural Gas from Landfill/Biomass	MMBtu	0.0	\$0.0
Renewable Thermal Energy	MMBtu	0.0	\$0.0
Other Renewable Energy_____*			

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

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

	Consumption Units	Total Annual Energy	Energy Used by Agency*
Electricity from Renewables	MWH	4.0	4.0
Natural Gas from Landfill/Biomass	MMBtu	0.0	0.0
Renewable Thermal Energy**	MMBtu	6,561.0	6,561.0
Other Renewable Energy_____***		0.0	0.0

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

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

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

**PART 2: ENERGY EFFICIENCY IMPROVEMENTS**

**2-1. DIRECT AGENCY OBLIGATIONS**

	FY 2002		Projected FY 2003	
	(MMBTU)	(Thou. \$)	(MMBTU)	(Thou. \$)
Direct obligations for facility energy efficiency improvements, including facility surveys/audits		\$1,684.0		\$6,400.0
Estimated annual savings anticipated from obligations	12.3	\$139.3	21.7	\$245.8

**2-2. ENERGY SAVINGS PERFORMANCE CONTRACTS (ESPC)**

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

**2-3. UTILITY ENERGY SERVICES CONTRACTS (UESC)**

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

**2-4. UTILITY INCENTIVES (REBATES)**

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

**2-5. TRAINING**

	(number)	(Thou. \$)
Number of personnel trained/Expenditure	52.0	\$26.0