

The background of the cover is a photograph of a modern, multi-story building with a curved facade. The building features large, dark-framed windows and a prominent entrance with a glass door. The sky is a clear, light blue. The text is overlaid on the upper portion of the image.

U.S. Environmental Protection Agency  
**Energy Management  
and Conservation Program**

Fiscal Year 2003  
Annual Report

U.S. Environmental Protection Agency  
Office of Administration and Resources Management  
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Cover photo: EPA's new Science and Technology Center  
Kansas City, Kansas  
Dedicated: May 9, 2003

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## EXECUTIVE SUMMARY

EPA is committed to energy and water efficiency in its laboratories and office facilities. In FY 2003, the Agency continued to realize reductions in the amount of energy and water used at its reporting laboratories, compared to the 1990 baseline stipulated in Executive Order (E.O.) 13123.

### Results

- *Energy Use:* Energy use in EPA's 29 reporting laboratories was 326,455 Btus per gross square foot (GSF) in FY 2003. This represents a decrease of 8.8 percent from the baseline year of FY 1990, when energy use was 357,864 BTUs per GSF, but an increase from energy use in FY 2002, when energy use was 303,078 BTUs per GSF (a 15.3 percent decrease from the baseline year of FY 1990). EPA should, nevertheless, meet the FY 2005 energy reduction goal of 20 percent. Efforts are currently underway to commission and re-commission laboratories representing 44 percent of EPA's energy use, which should contribute to a 4.4 percent to 8.8 percent reduction in energy use nationwide by FY 2005. Green power purchases completed in late FY 2003 should also reduce EPA's reportable energy use by an additional 10 percent in FY 2004.
- *Green Power Purchases:* In FY 2003, EPA purchased 25 million kilowatt hours (kWh) of green power, including 100 percent green power purchases at six of its laboratories and one regional office. When green power is netted out of EPA's energy use, the Agency used 305,660 Btus per GSF of non-renewable energy in FY 2003, or a reduction of 14.6 percent from its 1990 baseline energy consumption of 357,864 Btus per GSF. In addition, by the end of FY 2003, EPA had completed the procurement process for an additional 86 million kWh per year of green power, bringing the Agency's total green power use currently under contract to 40 percent of its electricity consumed in laboratories and offices. As noted above, these FY 2003 green power purchases will contribute significantly to EPA's success in meeting the FY 2005 energy use reduction goals.
- *Water Conservation:* EPA's water use decreased from 187.3 million gallons of water in FY 1990 to 171.7 million gallons of water in FY 2003, a reduction of more than 8 percent. EPA spent considerable effort in FY 2003 to assess water consumption in several laboratories, set goals for improving water management, implement water-saving procedures and technologies, and educate all of its laboratories on the importance of water conservation.

### EPA Refines its Focus on Targeted Energy Savings

With the creation of a Sustainable Facilities Practices Branch (SFPB) within the 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. For the past three years, SFPB has supported various EPA branches

and facility managers in the pursuit of sustainable building design, construction, mechanical systems, operations, landscaping, and other practices. In FY 2003, SFPB focused its efforts on improving energy performance in some of EPA's largest energy using facilities, including three laboratories in Research Triangle Park (RTP), North Carolina, and one major laboratory in Cincinnati, Ohio, because these facilities represented the greatest potential for energy savings.

In addition, in FY 2003, the Agency focused on several important areas:

- *Green Power Purchases:* In addition to the five laboratories already purchasing 100 percent green power this year, the Agency began delivery of 100 percent green power at its laboratory in Houston, Texas, and Region 2 Office in New York City, as well as significant portions of a laboratory in Edison, New Jersey. By the end of FY 2003, EPA had also signed contracts for major green power purchases in RTP, North Carolina, and the Headquarters buildings in the Federal Triangle complex of Washington, DC. By the end of FY 2003, EPA was under contract to receive 111 million kWh of green power annually, which represents 40 percent of the Agency's electricity use for offices and laboratories.
- *Energy Master Planning:* In FY 2003, EPA continued efforts to incorporate energy and engineering master planning as part of the architectural master planning process. For the following facilities, the Agency identified short, intermediate, and long-term opportunities to upgrade or replace mechanical systems to improve energy efficiency:
  - Cincinnati, Ohio, A.W. Breidenbach Environmental Research Center (AWBERC)
  - Narragansett, Rhode Island, Atlantic Ecology Division Laboratory
- *Tiered Audit Program:* To prioritize its energy 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. In FY 2003, EPA conducted an energy assessment as part of a SHEM audit at its Gulf Breeze, Florida, laboratory and completed more in-depth energy assessments at its National Health and Environmental Effects Research Laboratory (NHEERL) in RTP and Human Studies Laboratory in Chapel Hill, North Carolina.
- *Commissioning, Re-Commissioning, and Retro-Commissioning:* EPA is now focused on commissioning the new Main facility at RTP, North Carolina, and retro-commissioning its NHEERL facility in RTP and Human Studies Laboratory in Chapel Hill, North Carolina. Combined, these three RTP facilities represent approximately 45 percent of EPA laboratories' energy use. The Agency began these efforts in FY 2003. The Agency initiated a laboratory controls capability investigation (LCCI) at its new Main facility in RTP, as the first step in the Main facility commissioning effort to analyze ways to optimize operation of the fume hood ventilation systems and minimize flow during occupied and unoccupied periods.

- *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 2003, EPA worked closely with the U.S. General Services Administration (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 a historic post office)
  - Denver Regional Office (new facility)
  - Northern Virginia 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 Laboratory
  - Richmond, California, Laboratory
  - Houston, Texas, Laboratory
  
- *Construction Projects:* In FY 2003, EPA continued construction under its Ada, Oklahoma, Energy Savings Performance Contract, including several upgrades that will eventually lead to significant energy savings. And at the Fort Meade, Maryland, Environmental Science Center, the Agency completed installation on an energy-efficient summer “pony” boiler.
  
- *Occupancy:* This year, EPA moved into the Kansas City, Kansas, Science and Technology Center, where energy efficiency, water conservation, and sustainable practices were top priority in the design and construction. In August 2003, EPA received notification of LEED™ Gold Certification for the Kansas City laboratory.
  
- *Water Conservation:* In FY 2003, the Agency continued to emphasize water conservation in its facilities. By the end of FY 2003, water management assessments were conducted and plans were completed and signed at the following laboratories in FY 2003 (while additional plans and assessments were well underway):

  - Ann Arbor, Michigan, National Vehicle Fuel Emissions Laboratory
  - Chelmsford, Massachusetts, New England Regional Laboratory
  - Fort Meade, Maryland, Environmental Science Center
  
- *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 emails on energy consumption to senior, facility, and energy managers.
  - Recognized facility managers with a new awards program for energy conservation.
  - Held a national conference and workshops on Laboratories for the 21<sup>st</sup> Century.
  - Published a brochure on the sustainable features of its new Kansas City laboratory.

- Developed a “green poster” series on energy efficiency, water conservation, and more.
- Created an online version of its quarterly sustainability newsletter, *Energizing EPA*.
- Developed a water conservation educational poster for laboratories.
- Updated its Office of Administrative Services Web site with water conservation, alternative fuel vehicles, green tags, low impact development, and other energy and water efficiency information.

## **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 E.O. 13123, *Greening the Government Through Efficient Energy Management*, which mandates federal agency energy use reductions for laboratory and other industrial facilities 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, a water conservation/green power coordinator, a pollution prevention and recycling coordinator, and support staff.

OARM's management goal system includes milestones for energy conservation. EPA energy and facility managers report their energy consumption figures quarterly, and extensive quality control is conducted with their utility bills.

#### **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 Asset Management Branch (AEAMB) and with ventilation safety experts from EPA's Safety, Health, and Environmental Management Division (SHEMD). EPA also receives support from the U.S. Department of Energy (DOE) National Renewable Energy Laboratory on a project-specific basis. Site energy managers for each of the Agency's 29 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 that opened in FY 2003, 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 and offices. Finally, energy conservation demonstration projects serve to educate the public and develop markets for new technologies, such as a solar hot water heater completed in October 2003 at EPA's San Francisco Regional Office.

In FY 2003, EPA continued efforts to improve the quality and usefulness of its energy reporting system. One effort, a process to verify the gross square footage of its laboratories, resulted in the adjustment of the gross square footage of several labs to a more accurate figure. SFPB continued collecting copies of actual utility bills from facility managers to verify the data quality of energy consumption figures. In 2003, the Agency also focused specifically on the data gathering of one of its largest energy consuming facilities in RTP, North Carolina. The new Main facility is EPA's largest energy using facility and has had difficulty completing the construction and commissioning of its energy metering system. Currently, energy information reported for RTP's new Main facility and the National Computer Center are based on engineering estimates. EPA also continued to send quarterly energy email updates on energy consumption to facility managers and senior program managers; data include energy consumption on a year-to-date basis, increases or decreases from previous periods and the FY 1990 baseline, and laboratory-by-laboratory performance comparisons.

## 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. 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 2003, EPA honored the first recipients of a new "peer" awards program to recognize and encourage energy and water conservation among its facility managers and building design and construction personnel. Based on their work in FY 2002, EPA honored the following in February 2003:

- Rick Dreisch, the facility manager of the Fort Meade, Maryland, Environmental Science Center, received Btu Buster of the Year for achieving the greatest energy use reduction among all EPA laboratories, a decrease in Btus per GSF of 28.8 percent
- Frank Price of the Ada, Oklahoma, Office of Research and Development Laboratory received the Leading Edge Award for his leadership in implementing an Energy Savings Performance Contract.
- Steve Dorer, facility and project manager for the Ann Arbor, Michigan, Office of Air and Radiation Laboratory, received a Leading Edge Award for his work on the Ann Arbor Energy Savings Performance Contract in 2001.
- Rich Koch, director of the Facilities Management and Services Division in Cincinnati, Ohio, and Rhonda Hampton of EPA's Region 5 in Cincinnati received Energy Partner Awards for their work on Cincinnati's green power purchase and energy master plan.
- Stephanie James of EPA Headquarters also received an Energy Partner Award for her work on

the Fort Meade, Maryland, recommissioning and Cincinnati energy master plan projects.

## **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 FY 2003, Labs21 held 12 one-day workshops on energy-efficient laboratory design and operations, training nearly 500 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 FY 2003 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. The FY 2003 conference also featured tours of EPA's New Consolidated Facility in 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)>. EPA also spent a great deal of time in FY 2003 planning the FY 2004 Labs21 annual conference, which was held in Denver, Colorado, October 21-23, 2003.

- *Buildings and Facilities Conference*: In FY 2003, EPA conducted its annual three-day Buildings and Facilities Conference, which all EPA facility managers attend. This year's conference was held in Gulf Breeze, Florida, in February 2003. Conference attendees included facility managers from EPA-operated laboratories and GSA-assigned regional offices and headquarters. SFPB provided an update on energy conservation activities and presented energy conservation goals.
- *Credit Card Purchasing Guidelines*: EPA has 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

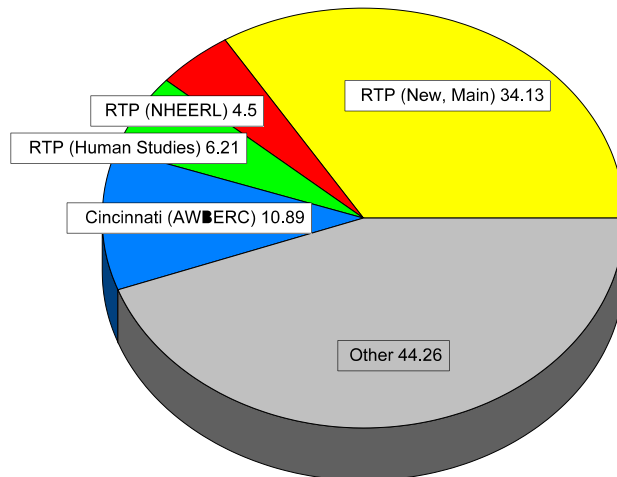
Purchasing (EPP) Program's Web site ([www.epa.gov/oppt/epp/tools/creditcard.htm](http://www.epa.gov/oppt/epp/tools/creditcard.htm)) to ensure their purchases comply with EPA policies. The guidelines recommend purchasing products with recycled content, reduced packaging, energy-efficient designs, and 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, in FY 2003 EPA's EPP Program worked with the Office of Acquisition Management and the Comprehensive Procurement Guidelines to create a "green" online ordering system for office products. Awarded as a blanket purchase agreement at the beginning of FY 2004, the new ordering system will consist only of products that meet or exceed EPA recycled content and other EPP standards, in order to make green purchasing easier for Agency personnel and increase such purchases throughout the Agency. It will be mandatory for government credit card purchases by Agency employees by the end of 2004.
- *Online Newsletter: Energizing EPA* is an internal EPA newsletter that highlights the Agency's efforts to improve energy and water efficiency at its facilities. In June 2003, EPA began distributing an online version of the newsletter to all EPA employees, to educate them about such issues as green buildings, distributed energy, recycling programs, water conservation, and low-impact development.
- *Office of Administrative Services Web Site:* EPA's Office of Administrative Services (formerly the Office of Administration) continued to update its public Web site on sustainability at the Agency on a quarterly basis. The Web site is a central source of information about energy conservation approaches and projects, renewable energy projects, and green buildings developed by and for EPA. In FY 2003, EPA updated the site to include sections on water conservation, low-impact development, and alternative fuel vehicles. 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.

## SECTION II: ENERGY EFFICIENCY PERFORMANCE

For FY 2003, EPA energy use on a BTU per gross square foot basis represented a decrease of 8.8 percent from the baseline year of FY 1990. In FY 2002, EPA energy use on a BTU per gross square foot basis was 15.3 percent below the FY 1900 baseline. EPA believes the FY 2003 increase in energy use was due to several factors. The weather in FY 2003 was not as mild as in FY 2002, when the country generally experienced a mild winter and a cooler than usual summer. In addition, RTP, North Carolina, facilities energy use increased slightly, as the operation of the new facilities there continued to stabilize and some energy use that had previously been overlooked by the energy reporting system was reported.

FY 2003 Percent of EPA Energy Use



EPA is still on the path to meet energy use reduction goals for FY 2005. EPA has commissioning and re-commissioning projects underway at laboratories that represent more than 44 percent of EPA's reportable energy use. Projected savings of 10 percent to 20 percent for these energy conservation efforts should reduce national energy use 4.4 percent to 8.8 percent in the next 24 months. In addition, several large green power purchases were made by EPA in late FY 2003; when these purchases are fully reflected in FY 2004 energy reporting data, EPA should see an additional 10 percent reduction in reportable energy use. EPA is also replacing the infrastructure at the AWBERC Cincinnati facility, EPA's second largest research facility; this multi-year project will also improve EPA's energy efficiency.

## ENERGY REDUCTION PERFORMANCE

All of the facilities that EPA reports on to OMB and DOE—the 29 facilities where the Agency pays utilities—are laboratories (see Appendix D for a full list). Standard facilities, such as EPA regional office buildings, are reported by GSA. Following are EPA’s FY 2003 totals for electricity, green power, fuel oil, natural gas, propane, purchased steam, and chilled water. Percent changes from FY 2002 and the base year FY 1990 are also included.

**EPA FY 2003 Energy Consumption  
For 29 Reporting Laboratories**

Source	Consumed	Percent change from FY 2002	Percent change from FY 1990
Electricity	125,829,394 kilowatt hours	-3.40	+18.50
Green power	23,437,364 kilowatt hours*	-2.76	N/A
Fuel oil	525,441 gallons	+328.52	+1,158.57
Natural gas	3,415 thousand cubic feet	-28.12	-7.05
Propane	9,770 gallons	+40.37	+769.89
Purchased steam	13.1 BBtus	-52.81	N/A
Chilled and Heated Water	387.0 BBtus	N/A	N/A
<b>Total BTUs/GSF</b>		<b>+7.72</b>	<b>-8.78</b>
<b>Total BTUs/GSF (green power netted out)</b>		<b>+10.1</b>	<b>-14.59</b>

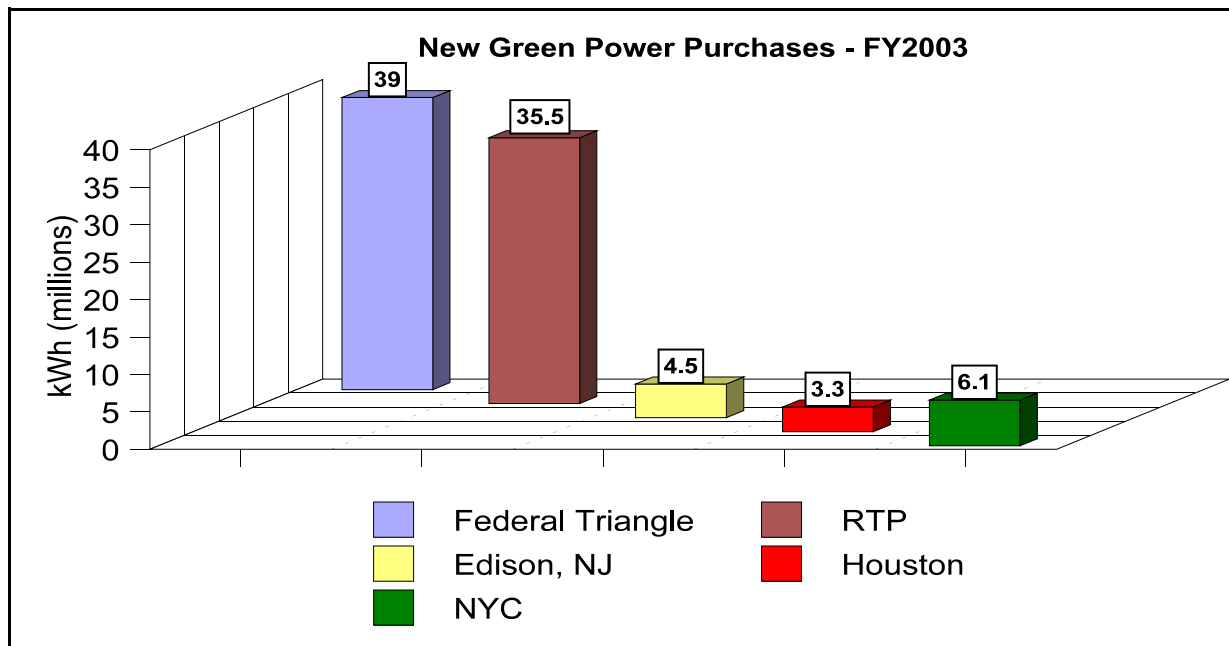
\*Green power accounted for 18.63 percent of the electricity EPA reporting labs purchased in FY 2003. Together with green power purchases at EPA offices, EPA purchased 25 million kilowatt hours of green power.

EPA’s overall energy consumption in FY 2003 reflects a nearly 9 percent decrease from the 1990 baseline. From FY 2002, however, the Agency’s energy use rose 7.7 percent on a Btu per GSF basis. This was due in part to the fact that overall weather was less mild in FY 2003, because EPA identified some sources that hadn’t been reported correctly, and because new facilities at RTP will take some time to stabilize their operations. With a combination of energy reduction efforts and green power purchases decreasing the emissions associated with its energy use, the Agency is well on track to meet the goals of E.O. 13123.

## Tactical Vehicle and Equipment Fuel Use

To reduce emissions and fuel consumption and increase fuel efficiency, EPA has incorporated alternative fuel vehicles (AFVs) into its nationwide fleet of 1,193 automotive vehicles. In FY 2003, EPA acquired 115 additional AFVs that use electricity, compressed natural gas, or ethanol/gasoline mixtures, bringing the Agency's total AFV fleet to 366 vehicles. In fact, for the fourth straight year, EPA exceeded by at least 10 percent the Energy Policy Act's requirement that 75 percent of nonexempt, new vehicles be AFVs. In FY 2003, EPA's petroleum use decreased by 15.6 percent from the FY 1999 baseline. In FY 2003, EPA increased average fleet miles per gallon 3 mpg from the FY 1999 baseline.

## RENEWABLE ENERGY



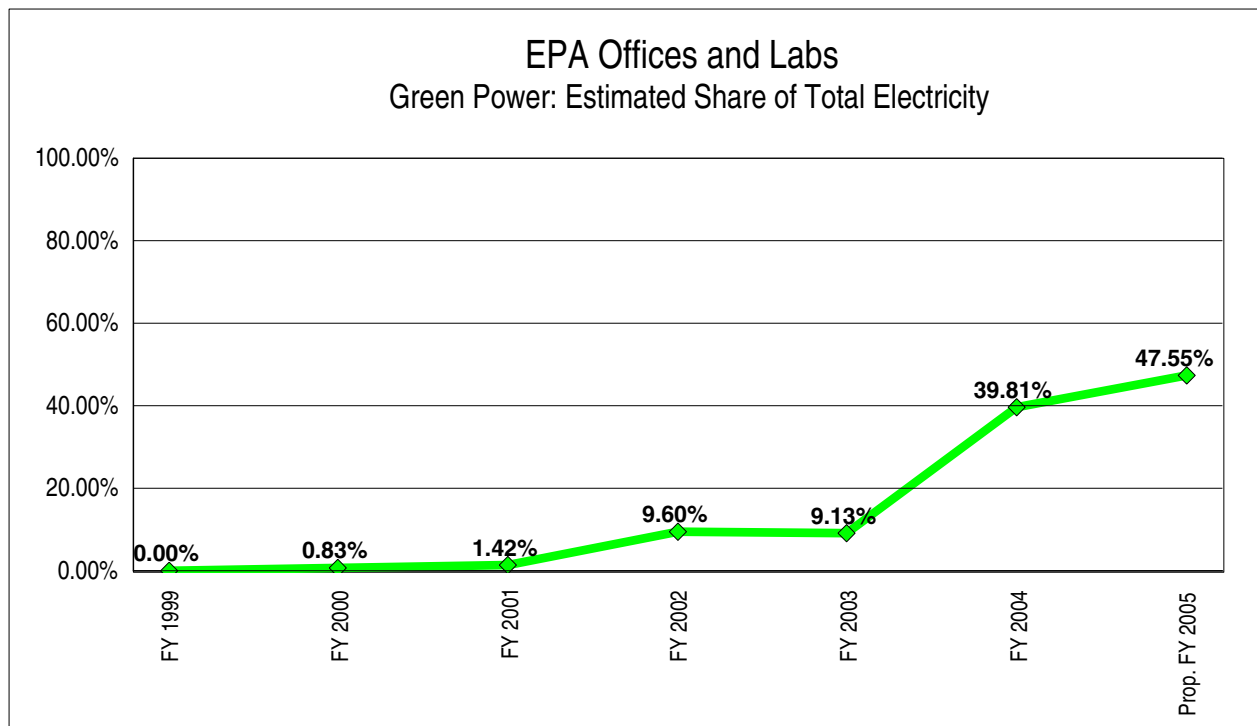
In FY 2003, EPA strengthened its commitment to buying green power, adding several facilities to the growing list of those powered by renewable energy. With these purchases, EPA's total commitment of green power has grown to approximately 111 million kWh annually, or 40 percent of total electric use at offices and laboratories. With FY 2004 commitments, eight facilities now obtain 100 percent of their electricity needs from renewable sources.

EPA's FY 2003 agreements were highlighted by its two largest green power purchases to date. In September 2003, EPA's Washington, DC, Headquarters committed to purchase 39 million kWh of green power annually for its Federal Triangle office buildings. Also in September, EPA's new Main RTP, North Carolina, facility contracted to receive more than 35 million kWh worth of renewable energy, including the Agency's largest ever purchase of "green tags" for FY 2004. When combined with five additional green power agreements, FY 2003 solidified EPA's commitment to renewable energy. The five new purchases of 2003 include:

- *Federal Triangle, Washington DC:* EPA has committed to purchase 39 million kWh of green power annually for its Federal Triangle buildings, with deliveries starting in October 2003. This is the Agency's largest green power purchase to date, representing approximately 100 percent of its Federal Triangle electricity use. PEPCO Energy Services distributes a blend of 25 percent wind and 75 percent landfill gas generated at facilities in the Mid-Atlantic states.
- *RTP, North Carolina:* In September 2003, EPA agreed to purchase more than 35 million kWh worth of renewable energy annually for its new consolidated RTP facility. This agreement represents approximately 50 percent of RTP's new Main and National Computer Center's electricity needs and is the Agency's second largest green power purchase to date. Contracted through the Defense Energy Supply Center (DESC), this procurement served as a template for future DESC green tag purchases for the U.S. Department of Defense. As part of the agreement, 30 million kWh worth of green tags will help support a wind farm in Algona, Iowa and a landfill gas facility in Jacksonville, Florida. The remaining 5.7 million kWh will be purchased through North Carolina's (and the country's) first Public Utility Commission-approved statewide renewable energy program, NC Green Power.
- *Edison, New Jersey:* In September 2003, EPA completed a 73 percent green power purchase that will bring 4.5 million kWh per year to its Edison, New Jersey, laboratory.
- *Houston, Texas:* In June 2003, EPA contracted to receive 3.3 million kWh worth of "green tags" equal to 100 percent of its electricity use at the Houston Environmental Laboratory. The tags represent 100 percent wind energy from the 204-Megawatt New Mexico Wind Energy Center near Clovis, New Mexico.
- *New York City:* In June 2003, EPA's Region 2 Office in New York City became the Agency's first regional office to purchase 100 percent green power. Working with GSA, EPA procured approximately 6.1 million kWh of electricity annual from the Fenner Wind Power Project, for the largest federal purchase of wind energy in New York State.

EPA has purchased renewable energy since 1999 and works to secure green power whenever possible. After a successful campaign in 2003, eight EPA facilities now procure 100 percent of their energy needs from renewable sources. In addition to the facilities that initiated green power purchases in





FY 2003 in Washington, DC, New York City, and Houston, Texas, five EPA laboratories continued to receive 100 percent green power in 2003:

- *Richmond, California:* EPA extended its 100 percent green power purchasing contract with the Sacramento Municipal Utility District (SMUD) through FY 2005. SMUD will supply the Richmond laboratory with 1.8 million kWh of landfill gas generated electricity each year.
- *Golden, Colorado:* Since June 2000, the Golden laboratory has purchased 100 percent green power, or 1.9 million kWh per year, through Xcel WindSource's green pricing program.
- *Manchester, Washington:* Since summer 2001, EPA has procured 100 percent wind power from the Bonneville Environmental Foundation (BEF). BEF purchases 2.1 million kWh worth of "green tags" that help support the generation of wind power from a 700-kilowatt wind turbine.
- *Chelmsford, Massachusetts:* EPA continued its contract to meet the facility's 2.8 million kWh annual electricity needs with 100 percent wind power from Green Mountain Utility's Searsburg wind farm in Vermont and new wind power from New York.
- *Cincinnati, Ohio:* Since May 2001, EPA has received green power equivalent to 100 percent of its electricity needs at the three main facilities in Cincinnati, Ohio. Community Energy, Inc supplies EPA with more than 15 million kWh of renewable energy generated at a wind farm in Pennsylvania and landfill gas facility in Illinois.

## Self-Generated Renewable Energy

EPA has undertaken a variety of activities across the country to take advantage of self-generating sources of renewable energy. In 2003, EPA added a solar hot water heater to its existing array of self-generating capabilities. EPA Region 9 Headquarters in San Francisco, California, completed the heater installation in October 2003 to serve its Fitness and Child Care facility. The new system eliminates the need for natural gas that would have gone into the previous system. Energy-efficient washers and high-efficiency shower heads installed during the upgrade further reduce energy and water consumption.

EPA has numerous self generation technologies that continued to operate throughout FY 2003:

- *Geothermal Heat Pump:* EPA's Ada, Oklahoma, laboratory has installed a geothermal heat pump (GHP) as part of its ESPC upgrade, which is expected to be completed in June 2004. The GHP has eliminated the use of natural gas and will continue to significantly lower energy consumption in the Ada laboratory. Substantial energy savings are already being achieved, and savings in excess of 50 percent are anticipated from this project upon completion. The geothermal system and reduction in current cooling tower operations will contribute to a reduction in water consumption of more than 80 percent.
- *Roof-top Solar Arrays:* In April 2002, EPA installed a 100-kilowatt (kW) photovoltaic (PV) roof on top of its National Computer Center in RTP, North Carolina. Since 2000, EPA's Region 5 Office in Chicago's Metcalfe Building has received renewable energy from a 10-kilowatt roof-top solar array.
- *Net Metering:* At the end of 2000, EPA's wet laboratory in Manchester, Washington, became the first commercial, solar-powered "net metering" project in the Northwest. The laboratory's energy use and costs are offset by 28 solar panels with a capacity of 2 kW of electricity.
- *Solar Water Heaters:* EPA's Edison, New Jersey, lab has three solar water heating systems that have been the primary source of hot water in their respective facility areas since 1998.
- *Photovoltaic Lighting:* Since 1998, EPA has used a photovoltaic system to generate on-site electricity to light two of its Gulf Breeze, Florida, piers, saving 900 kWh of electricity annually. EPA's new facility in RTP, North Carolina, installed solar street lights in parking lots and along facility roadways; EPA believes this is the largest solar road lighting project in the United States.
- *Solar Power Awnings:* In September 2001, EPA completed installation of photovoltaic awnings at its new Chelmsford, Massachusetts, laboratory. The awnings supply approximately 2,000 watts of electricity daily to the regional electric grid and provide shade for the office windows, thus reducing the amount of cooling needed.
- *Solar Wall:* EPA's lab in Golden, Colorado, completed installation of a solar wall in March 2002. The transpired solar collector augments the facility's heating and cooling system.

- *Lake Cooling Water:* EPA’s Duluth, Minnesota, Mid-Continent Ecology Division Laboratory uses water from nearby Lake Superior for cooling purposes, reducing energy and water use.

### **Million Solar Roofs**

EPA solar projects—several of which have been recognized on DOE’s Web site as examples of the Million Solar Roofs Initiative—continued to generate renewable energy and avoid creating emissions:

<b>Facility</b>	<b>Location</b>	<b>Project/Amount</b>	<b>Used Since</b>
Region 10 Laboratory	Manchester, WA	Three PV arrays	June 1999
National Computer Center	RTP, NC	100 kW solar roof	September 2002
New England Regional Lab	Chelmsford, MA	Solar sunshade panels	September 2001
Region 5 Headquarters/GSA’s Metcalfe Federal Building	Chicago, IL	10 kW solar roof array	FY 2000
Region 2 Laboratory	Edison, NJ	Solar hot water heater	

### **PETROLEUM**

In FY 2003, EPA used fuel oil in seven of its reporting laboratories (Narragansett, Rhode Island; Fort Meade, Maryland; Duluth, Minnesota; Golden, Colorado; Manchester, Washington; Edison, New Jersey; and Cincinnati, Ohio). Two lab facilities (Edison, New Jersey, and Manchester, Washington) also used propane. EPA used a total of 525,441 gallons of fuel oil in FY 2003 and 9,770 gallons of propane.

### **WATER CONSERVATION**

In FY 2003, EPA used 171,725,714 gallons of water in its 29 laboratories. EPA also set a goal to reduce water use in its laboratories by 10 percent (from a 2000 baseline) by 2010, and is now four-fifths of the way to meeting that goal (water use in FY 2003 is more than 8 percent less than the FY 2000 baseline of 187,252,375 gallons). Though cooling needs greatly affect annual water use, this figure is seen as a significant step forward for EPA water conservation. This year, EPA continued its commitment to assessing and reducing its water use and implementing water management plans incorporating a variety of best management practices. In fact, EPA has already more than met the E.O. 13123 requirement to have

water management plans in place in 10 percent of its facilities by FY 2004.

In FY 2003, EPA completed the water management planning process at facilities in Ann Arbor, Michigan, and initiated water assessments and management plans at facilities in Narragansett, Rhode Island, Golden, Colorado, and RTP, North Carolina. The Agency also launched a water conservation education effort with a poster for use in all of its laboratories (See attachment). The following facilities reduced water consumption significantly in FY 2003.

- *Ann Arbor, Michigan:* EPA's National Vehicle Fuel Emissions Laboratory is one of the Agency's greatest successes in water conservation, thanks in great part to an ESPC, which has helped reduce the laboratory's water use by nearly 60 percent since 2000.
- *Fort Meade, Maryland:* A water management plan completed in FY 2003 was key to helping the Environmental Science Center achieve more than 40 percent water reduction since FY 2000. In addition to reducing energy use (and thus cooling tower use), using the water-saving devices, landscaping, and processes in place at Fort Meade, the lab re-evaluated the operating schedule of its reverse osmosis system and was able to reduce the quantity of reject water generated by optimizing the system's schedule.
- *Ada, Oklahoma:* A geothermal heat pump installed as part of this lab's ESPC reduced cooling tower water needs—and the lab's water consumption by more than 40 percent from FY 2000.
- *Houston, Texas:* EPA installed a condensate recovery system in FY 1996 that allowed this lab to reduce its baseline water use significantly. Between FY 1997 and FY 2003, Houston saved 2.2 million gallons of water, or approximately 365,000 gallons per year.
- *Kansas City, Kansas:* EPA's Kansas City, Kansas, Science and Technology Center, which opened in FY 2003, includes a unique rooftop rainwater recovery system designed to save 763,000 gallons of water per year. The Kansas City Regional Office will also cut its water use by more than 62 percent in the next year, thanks to the installation of a water softener in FY 2003 that has made its cooling tower run more efficiently by reducing the amount of flushing required by the buildup of scales from the city's hard water.
- *Golden, Colorado:* With a new water management plan in place was completed in October 2003 that included recommendations to implement best management practices such as sub-metering of cooling tower water feeds and reverse osmosis/de-ionized water operations.

**Best Management Practices (BMPs) of EPA Laboratories With Water Management Plans**

✓ = BMP included in Water Management Plan

<b>Lab</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Chelmsford, Massachusetts	✓	✓	✓	✓	✓		✓			✓
Ann Arbor, Michigan	✓	✓	✓		✓	✓	✓	✓		
Fort Meade, Maryland	✓	✓	✓	✓	✓	✓	✓	✓		
Narragansett, Rhode Island		✓	✓		✓	✓		✓		
Golden, Colorado	✓	✓		✓	✓	✓	✓			

**Key: Best Management Practices**

- 1- Public Information and Education Program
- 2- Distribution System Audits, Leak Detection and Repair
- 3- Water Efficient Landscape
- 4- Toilets and Urinals
- 5- Faucets and Showerheads

- 6 - Boiler/Steam Systems
- 7 - Single-Pass Cooling Systems
- 8 - Cooling Tower System
- 9 - Misc. High Water-Using Process
- 10 - Water Reuse and Recycling

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

In FY 2003, 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, EPA has pursued ESPCs and ESPC-like arrangements to achieve improved energy and water performance, allowing the Agency to benefit from overall life-cycle cost savings. 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 energy conservation measures 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 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 the Kansas City Science and Technology Center, which opened in FY 2003, 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 2003, EPA completed energy/mechanical system master planning as part of the existing long-term master planning process for two of its facilities—Cincinnati, Ohio, and Narragansett, Rhode Island. Besides looking at future space and programmatic needs of facilities, the Agency identified short term, intermediate term, and long term opportunities for more energy-efficient mechanical systems. The Agency also initiated Energy Master Planning at its Corvallis, Oregon, facility in FY 2003. In FY 2003, EPA began moving toward a Sustainable Master Planning process, which it undertook at its Narragansett laboratory and for its new Edison, New Jersey, laboratory and campus, with a broader focus on sustainable building design and other features. The Agency is beginning development of a standard/base Sustainable Master Plan statement of work, for use in hiring architectural and engineering firms involved in this type of work.

## **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 2003, EPA's Gulf Breeze, Florida, laboratory included an energy assessment as part of a SHEM audit conducted there in April 2003. EPA is now working on developing a protocol for a broader sustainable opportunities audit, covering water conservation, storm water management, recycling, green power, and other green procurement activities.

In addition to the energy assessments conducted as part of the scheduled audits referenced above, SFPB performs more in-depth energy assessments. EPA has a standard operating procedure for what are known as Stage 2 energy audits, or comprehensive reviews 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 Energy Conservation Measures (ECMs). Facility managers work with SFPB staff to analyze the findings and determine future steps for energy performance improvement. In FY 2003, Stage 2 audits were completed in the following facilities:

- NHEERL Laboratory, RTP, North Carolina
- Human Studies Laboratory, Chapel Hill, North Carolina

## **FINANCING MECHANISMS**

In FY 2003, 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 by the end of June, 2004. EPA also continues to realize the benefits of the ESPC completed in April 2001 at its Ann Arbor, Michigan, laboratory.

In one other EPA laboratory, the Agency is pursuing an ESPC-like mechanism to finance upgrades to improve energy performance. EPA's Richmond, California, Central Regional Laboratory completed design of several upgrades in summer 2003, including a natural gas co-generator unit to provide electricity and hot water for laboratory operations and improve power reliability. EPA anticipates the contract award in early 2004. Richmond is also planning to upgrade HVAC controls equipment in the facility and replace one large boiler with two smaller staging boilers. 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 15 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. EPA and GSA had co-funded a project at the Atlanta Federal Center 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 EPP program. EPP helps train government purchase card users on buying energy-efficient and sustainable products. In FY 2003, EPP put out a bid for a blanket purchasing agreement (BPA) for a vendor to sell recycled content and other environmentally preferable office products that meet or exceed EPA requirements. The BPA was awarded in October 2003, to Corporate Express; the Agency expects to bring the first customers online by January 2004 and make the system mandatory for office product purchases made on government credit card by the end of 2004. EPA also continued to maintain a comprehensive database of environmentally preferable products for government credit card users and contract language for procuring green products. The Agency also distributes product guides that explain in greater detail the environmental attributes of available products such as light bulbs, light fixtures, and air conditioning equipment.

Several EPA newsletters, 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 September 2003, EPA designed an exhibit to promote the purchase of recycled-content and environmentally preferable products by Agency employees; the exhibit was placed outside of the EPA Administrator's Office for two months before it was made available on loan to other EPA offices and regions.

## **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 29 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, and in FY 2003 included language in Solicitations for Offers (SFOs) for new leased buildings requiring the ENERGY STAR label for office buildings. 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 Region 5 Office Building, and the Denver Region 8 Office Building. In Atlanta, EPA is participating in an ENERGY STAR working group which coordinates EPA, GSA, and other building tenants efforts to achieve a label for the Sam Nunn Federal Office Building which houses EPA Region 4's offices. The lease on the Denver Regional Office expires in 2006, and EPA has arranged for the solicitation for offers to include a requirement that any new building meet ENERGY STAR labeling criteria.

In FY 2003, EPA completed ENERGY STAR benchmarking exercises with its Dallas Regional Office Building, its office building in Ann Arbor, Michigan, and at the Kansas City, Kansas, Region 7 Office. In Dallas, the energy use is too high to obtain an ENERGY STAR label with economical energy investments, and in Ann Arbor the landlord was not receptive to accommodating the additional energy conservation measures that would have been necessary. EPA is currently working on achieving an ENERGY STAR label for the Region 7 Office.

## **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:

- *Kansas City, Kansas, Science & Technology Center (KCSTC):* EPA opened a new 72,000-square-foot laboratory in Kansas City, Kansas, May 9, 2003 with numerous sustainable design features. 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. Although the SFO required a minimum Silver rating from the U.S. Green Building Council's LEED™ certification program, KCSTC received Gold 2.0 certification on August 4, 2003. In addition to the variable air volume (VAV) laboratory and heat runaround loop included in the original proposal, extensive energy modeling was performed on the design drawings, and economical energy conservation measures were incorporated, 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 rooftop rainwater recovery system cuts domestic water use in half by capturing and filtering rainwater to flush toilets and reduce cooling tower makeup water requirements.
- *New Main Facility, RTP, North Carolina:* In Spring 2003 EPA completed the move into its new, state-of-the-art environmental research facility in RTP, North Carolina. This 1.2 million gross square foot complex is EPA's largest construction project to date and houses 2,000 researchers and support staff. The new Main facility includes an extensive laboratory complex, a conference center, cafeteria, and a child care center, as well as the National Computer Center, 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 recycled 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, which will apply for a LEED™ Silver rating in early 2004, 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, Laboratory:* EPA's 66,000-square-foot New England Regional Laboratory, which was completed in October 2001, received LEED™ Gold certification April 2, 2003 for including water conserving features such as low-flow sinks, electronic sensors, and a rooftop rain recovery system and energy-efficient skylights, tinted windows, photovoltaic awnings, and night system setbacks. 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 diverted more than 50 percent of the solid waste generated during construction from the landfill.
- *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 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 in the evening, over weekends, and in the winter, and still meet the computer center's cooling needs.
- *EPA Headquarters, Washington, DC:* EPA's Federal Triangle Headquarters complex is undertaking a number of green efforts, including a low impact development project to properly manage urban stormwater runoff. EPA hopes to reduce the peak volume and pollutant load of its stormwater runoff and, in doing so, serve as a model for future low impact development projects

in the DC metropolitan area. The project, which was initiated in summer 2003, includes a rainwater collection system for landscape irrigation, bioretention cells and soil/grass stabilization/parking area, permeable pavement material, and native landscaping, as well as several “green roofs,” specially planted rooftop gardens designed to detain and treat runoff water.

In addition to buildings that are now open or under construction, EPA is ensuring sustainable design elements are included 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 incorporating sustainable design language into the solicitations for these vendors. The Agency now requires a minimum of Silver LEED™ certification for all new office building leases; however, EPA is striving for Gold certification for its office buildings wherever possible. EPA also is planning to conduct energy modeling in FY 2004 in each of the following new facilities:

- *Boston, Massachusetts Region 1 Office:* Through a joint effort with GSA, EPA’s New England Regional Office is planning to move into the McCormick Post Office and Court House in 2006, incorporating a variety of sustainable and energy-efficient features during renovations. During FY 2003, these plans were temporarily put on hold, but the project was back on track by the end of the fiscal year. EPA will continue to partner with GSA to ensure that energy efficiency and other sustainable attributes are kept in mind in the future Region 1 Office plans.
- *Denver, Colorado, Region 8 Office:* In 2006, the lease for EPA’s Region 8 Office will expire. EPA hopes to achieve at a minimum the LEED™ Silver or Gold rating by including numerous environmental features in the SFO 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, providing 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 the pursuit of healthy indoor air quality levels, only environmentally preferable janitorial and cleaning products will be used. Lease award for the building is expected by fall 2004, and construction is expected to be completed by July 2006.
- *Northern Virginia Offices:* EPA worked with GSA in FY 2003 to prepare a Solicitation for Offers for office space incorporating green building specifications to replace expiring leases at two headquarters buildings in the Crystal City area of Northern Virginia. If the building is a new facility, it will be required to be a minimum LEED™ New Construction Silver rating, and if it is an existing facility, it will be required to meet the new LEED™ Existing Buildings Silver criteria. These green specifications are now available on EPA’s Office of Administrative Services Web site, <[www.epa.gov/greeningepa](http://www.epa.gov/greeningepa)>.

## **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 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.

As mentioned above, in FY 2003 EPA worked closely with GSA to incorporate sustainable design elements in the Denver Regional Office SFO and Northern Virginia Headquarters lease, to ensure that all construction features promote energy efficiency and environmentally preferable materials and design. Energy modeling planned for FY 2004 will contribute greatly to the energy performance of these buildings.

## **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, focusing on the largest energy consumers first. The following efficiency improvements are either recently completed, underway, or being considered for EPA’s 29 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 2003, 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 2002. The entire project is expected to be completed by mid-2004 and is expected to achieve energy savings of more than 50 percent and water savings of more than 80 percent.
- *Ann Arbor, Michigan:* EPA’s National Vehicle Fuel Emissions Laboratory (NVFEL) continues

to realize significant energy savings compared to a baseline average from FY 1993-1995. Installation of the following energy-saving technologies were completed by April 2001: new air handling units, a new cooling tower, a 200-kW fuel cell, and a new direct digital control system. NVFEL conducted a water conservation assessment and completed a water management plan in summer 2003 and plans to award a contract in FY 2004 to replace its water-based scrubber system with filter packets, thus cutting the lab's water use by approximately 20 percent.

- *Chelmsford, Massachusetts:* The New England Regional Laboratory features VAV HVAC and fume hoods, solar awnings, 100 percent renewable power, and extensive daylighting to reduce energy needs. In winter 2003, the lab installed a cooling tower blowdown meter, and by the end of FY 2004 the facility expects to complete initial design of a heat recovery loop. Finally, EPA conducted its first water conservation assessment at the New England Regional Laboratory in September 2002, and the facility worked in FY 2003 to implement the water-saving measures outlined in that plan.
- *Cincinnati, Ohio:* In April 2003, EPA's Andrew W. Breidenbach Environmental Research Center (AWBERC) completed 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. As the infrastructure changes to accommodate future growth in Cincinnati, the engineering master plan will have the flexibility to minimize energy consumption. EPA is still determining specific energy efficiency measures, but the Agency anticipates receiving funding for designing improvements to energy systems in FY 2004. Throughout FY 2003, the entire Cincinnati complex received 100 percent green power for its electricity needs.
- *Corvallis, Oregon:* In FY 2003, this lab continued to procure 5 percent of its electricity from renewable sources. EPA initiated the energy master planning process for its Corvallis and Newport, Oregon lab facilities in January 2003, and the Agency is waiting for the architectural master plan to move forward. Corvallis had already installed energy-efficient chillers and boilers.
- *Edison, New Jersey:* In FY 2003, EPA completed a green power purchase for approximately 75 percent of the electricity used in this laboratory; delivery started in September 2003. A new, 120,000-square-foot lab is planned to replace this older facility. In June 2003, EPA completed a sustainable master plan to incorporate energy efficiency and sustainable design issues into the new planned laboratory and the entire Edison campus.
- *Fort Meade, Maryland:* In July 2003, the Environmental Science Center began operation of a new pony boiler to improve the efficiency of summer operations at the lab. The lab also received ISO 14001 certification in the beginning of FY 2003. Fort Meade's energy-efficient performance is attributed to a re-commissioning effort completed in FY 2002, direct digital controls, VAV fume hoods, natural lighting, the new pony boiler completed in FY 2003, and other efforts. The lab has also been working in FY 2003 to implement its water management plan completed in FY 2002, including using a cooling tower metering system to better measure and manage water conductivity. Water use decreased more than 25 percent over FY 2002, due in part to a re-evaluation of the operating schedule of the facility's reverse osmosis system, which reduced the quantity of reject water generated.

- *Golden, Colorado:* As a followup to a Stage 2 energy audit conducted in 2001, in FY 2003 the facility completed an analysis of its chiller system, but additional measures were not found to be cost-effective. 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, a transpired solar collector to augment the heating system on the hazardous materials building, motion sensors, and one-inch thick, double-paned, thermal windows with solar flexing film. In addition, the Golden lab completed a water conservation assessment and management plan in March 2003.
- *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 direct digital controls (DDC). EPA also conducted a Stage 1 energy audit as part of a SHEM audit of the facility in April 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. Designs for the mechanical system upgrades were 75 percent complete by the end of FY 2003, and EPA anticipates construction will start in FY 2004. EPA is incorporating the use of a night setback system to control exhaust fans, laboratory fume hoods, and supply air. In July 2003, the lab began accepting green power tags, sufficient to cover 100% of its electricity use.
- *Kansas City, Kansas:* The new, LEED™ Gold certified Science and Technology Center opened in May 2003 and featured numerous energy-efficient aspects, including a VAV lab, heat recovery/runaround loop, zoned carbon dioxide sensors to adjust room conditioning based on occupancy, plate-frame heat exchanger, and a chiller system combination of variable frequency and constant volume units to optimize energy use. Water-conserving equipment included low-flow plumbing, waterless urinals, native landscaping, and rooftop rain recovery for cooling tower makeup water and toilets.
- *Manchester, Washington:* The facility completed construction of a new wing in May 2003, including VAV fume hoods to maximize lab energy efficiency. In FY 2003 the laboratory received 100 percent of its electricity from wind farms (in addition to the three photovoltaic arrays installed in June 1999).
- *Narragansett, Rhode Island:* EPA's Atlantic Ecology Division Laboratory and SFPB have established a partnership to make the facility more environmentally sustainable. The two completed an initial draft sustainable master plan at the end of FY 2003 to improve energy and environmental performance at the lab. In summer 2002, EPA conducted a study on a chiller primary loop upgrade; designs were completed in 2002, and a construction contract was in place by the end of FY 2003. To address inefficiencies in the chilled water system, the lab will: upgrade the entire chilled and condenser water system to allow for variable flow; reintegrate an existing small, air-cooled chiller into the primary chilled water loop; and upgrade the building controls. Narragansett did not complete a planned 100 percent green power procurement in FY

2003; however, the lab purchased 200,000 gallons of B20 biodiesel fuel. A water management plan was completed for the facility in September 2003, and a landscape master plan is scheduled for completion by the first quarter of FY 2004.

- *RTP, North Carolina New Main Facility:* In FY 2003 EPA employees completed their moves into a new Main facility complex in RTP, North Carolina. As part of a series of energy efficiency measures, 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 completed a green power purchase in September 2003 for more than 50 percent of the new facility's electricity needs in FY 2003. In addition, the National Computer Center in the RTP complex features a 100-kW integrated solar array on the roof. EPA launched an effort in FY 2002 to install separate energy meters at the new Main facility, National Computer Center, and the central utility plant it shares with the National Institute of Environmental Health Science to get a better understanding of energy consumption and energy charges. A multi-year re-commissioning effort was begun in FY 2003 with a goal to cut energy use at the facility. 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 during occupied periods, and training personnel in VAV operating modes. In August 2003, the first component of this re-commissioning effort a laboratory controls capability investigation was completed which set parameters for fume hood optimization; actual HVAC operating changes began in December 2003. A lighting control/automatic shutoff system was also phased in from June to October 2003.
- *RTP, North Carolina, NHEERL:* As part of its commitment to focus on the biggest energy-using facilities, in FY 2003 EPA focused energy efficiency efforts on retro-commissioning NHEERL. After reviewing a Stage 2 audit conducted for the NHEERL completed in FY 2003, EPA should complete a systems analysis and upgrade plan in the spring of 2004.
- *RTP (Chapel Hill), North Carolina, Human Studies:* EPA's other major energy-using laboratory in the RTP area is the Human Studies facility in Chapel Hill, North Carolina. The Human Studies facility was included in the FY 2003 Stage 2 audit, retro-commissioning efforts, and onsite engineering support. The retro-commissioning project at Human Studies is a total building commissioning that includes all mechanical air and water systems. Contract energy engineers began work on site in July 2003 to support the progress of this effort.
- *Richmond, California:* As part of financing arrangement with the building owner, in FY 2003 EPA completed the design of 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. EPA expects to sign a contract to upgrade the boiler cogeneration controls in January 2004. The work is expected to be completed in FY 2004 and reduce facility energy use by approximately 15 percent. EPA will also receive a \$60,000 rebate from Pacific Gas & Electric for installing the cogeneration unit. 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 utilize 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 200 kW fuel cell generates 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 operational in the June 2002. It is estimated that in FY2003, this system displaced 1,736,572 kWh of electricity and 124,329 ccf of natural gas, or 13,120 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.
- *Duluth, Minnesota:* By using lake water for cooling needs, the laboratory reduces its reliance on the regional electric grid.
- *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 was also working with GSA and DOE on the installation of a 100-kW fuel cell in the Metcalfe Building in Chicago, but this project was delayed in FY 2003 because of a lack of funding.

## ELECTRICAL LOAD REDUCTION MEASURES

Although FY 2003 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. 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 private spaces; and removing fluorescent tubes from fixtures in designated areas and 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:* 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. Equipment upgrades through ESPCs and other capital projects have led to significant water use reductions. In addition, EPA has established a program to conduct detailed water use assessments at each of its laboratory facilities and develop associated water conservation plans. This effort, coupled with the development of environmental management systems, is formally establishing water conservation goals and Best Management Practices (BMPs) at each laboratory. By the end of FY 2003, EPA has prepared and signed detailed water conservation plans and established BMPs in accordance with E.O. 13123 for three of its 29 facilities, with several more underway. Following are the highlights of EPA’s water efficiency efforts in FY 2003:

- *10 Percent Reduction Goal:* EPA has established a goal to reduce overall laboratory water use by 10 percent by 2010 (from a 2000 baseline).
- *Water Efficiency Awareness Campaign:* EPA kicked off a water efficiency awareness campaign in August 2003, “Every Drop Counts...Count Every Drop.” A poster promoting specific water conservation actions was distributed for display in each of EPA’s 29 laboratories.

- *Ann Arbor, Michigan:* EPA performed an in-depth water conservation assessment and prepared a water conservation plan for NVFEL in April 2003. Building upon the equipment upgrades and improvements made under the ESPC, BMPs have been established in seven key areas: public information and education programs; distribution system audits, leak detection and repair; water efficient landscape; faucets and showerheads; boiler/steam systems; elimination of single-pass cooling systems; and cooling tower systems. Overall water use has decreased by approximately 80 percent over the past decade, and the facility now qualifies as having met the water conservation requirements of E.O. 13123. In FY 2004, the lab plans to award a contract to replace liquid media scrubbers used in the facility with filter packets, which should reduce water use by another 20 percent.
  
- *Golden, Colorado:* EPA also completed an in-depth water conservation assessment and prepared a water conservation plan for the Region 8 Laboratory in Golden, Colorado in October 2003. BMPs have been established in six key areas, and the facility now qualifies as having met the water conservation requirements of E.O. 13123.
  
- *Narragansett, Rhode Island:* In coordination with the development of a Sustainable Master Plan for the Atlantic Ecology Division Laboratory, EPA performed a water conservation assessment and finalized a water conservation plan in December 2003. With BMPs in place such as public and employee education programs, water-efficient landscaping, elimination of single-pass cooling, and cooling tower upgrades, the facility now meets the water conservation requirements of E.O. 13123. Additional water conservation measures such as rainwater collection and reuse, retention ponds, and green roofing are being explored as the Sustainable Site Master Plan is developed for this facility.
  
- *Kansas City, Kansas:* In May 2003, EPA opened its new Science and Technology Center featuring low-flow plumbing fixtures on restroom sinks, waterless urinals, and water-efficient landscaping. As in most buildings, the cooling tower is the biggest water user. To reduce the use of city-supplied potable water, the cooling tower is connected to rooftop rainwater recapture system, designed to augment the water supply. Based on Kansas City's average annual rainfall, the rooftop rainwater collection system is expected to supply approximately 763,000 gallons of water per year to the cooling tower, outdoor water faucets, and toilet flushing. EPA's Region 7 Office building in Kansas City, Kansas, also realized water savings of 62 percent (about 700,000 to 900,000 gallons in FY 2003) by installing a water softener this summer that reduces the hardness of water going to the cooling tower, preventing the buildup of scale deposits and thus decreasing the need for flushing and draining of the water.
  
- *Research Triangle Park, North Carolina:* As part of a broad water assessment and management effort in this multi-facility complex, in summer and fall 2003, EPA conducted audits and prepared draft water management plans for the NHEERL in RTP and Human Studies laboratory in Chapel Hill, North Carolina.
  
- *Waterless Urinals:* EPA is installing waterless urinals at several of its facilities. The urinals use a special drain trap liquid and coated surface that eliminates the need for flushing water. The urinal design virtually eliminates the use of water, and provides reduced operation and maintenance costs. Waterless urinals have been installed in Chelmsford, Massachusetts, and were being installed at RTP in November 2003. Several other EPA facilities are evaluating the use of these water-saving features.

## FY 2003 ENERGY MANAGEMENT DATA REPORT

Agency: U.S. Environmental Protection Agency  
 Date: 12/29/2003

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
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	125,829.4	\$7,624.2	\$0.06 /kWh	429.3	1,301.8	20,792
Fuel Oil	Thou. Gal.	525.4	\$513.9	\$0.98 /gallon	72.9	72.9	1,454
Natural Gas	Thou. Cubic Ft.	341,502.0	\$2,544.5	\$7.45 /Thou Cu Ft	352.1	352.1	5,095
LPG/Propane	Thou. Gal.	9.8	\$18.3	\$1.87 /gallon	0.9	0.9	16
Coal	S. Ton	0.0	\$0.0	NA /S. Ton	0.0	0.0	0
Purch. Steam	BBtu	13.1	\$526.1	\$40.15 /MMBtu	13.1	18.2	467
Other	BBtu	387.0	\$5,257.8	\$13.59 /MMBtu	387.0	387.0	11,265
		Total Costs:	\$16,484.9		Total:	1,255.4	39,089
Energy-Intensive Facilities (Thou. Gross Square Feet)		3,845.4			Btu/GSF:	326,455	554,677

### 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.	51.0	\$61.0	\$1.20 /gallon	6.4	123
Diesel-Distillate	Thou. Gal.	114.0	\$98.0	\$0.86 /gallon	15.8	315
LPG/Propane	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0
Aviation Gasoline	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0
Jet Fuel	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0
Navy Special	Thou. Gal.	0.0	\$0.0	#DIV/0! /gallon	0.0	0
Other	Thou. Gal.	0.0	\$0.0	#DIV/0! /MMBtu	0.0	0
		Total Costs	\$159.0		22.2	439

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

	Consumption Units	Annual Consumption	Annual Cost (Thou. \$)
Water	Million Gal.	171.7	\$936.3
Best Management Practice Implementation Tracking Data			
Number of facilities* in agency inventory		29	
Number of facilities with completed water management plans		3	
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	23,437.4	\$222.0
Natural Gas from Landfill/Biomass	MMBtu	0.0	\$0.0
Renewable Thermal Energy	MMBtu	0.0	\$0.0
Other Renewable Energy_____*			

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

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

	Consumption Units	Total Annual Energy	Energy Used by Agency*
Electricity from Renewables	MWH	70.8	70.8
Natural Gas from Landfill/Biomass	MMBtu	0.0	0.0
Renewable Thermal Energy**	MMBtu	13,121.4	13,121.4
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 2003		Projected FY 2004	
	(MMBTU)	(Thou. \$)	(MMBTU)	(Thou. \$)
Direct obligations for facility energy efficiency improvements, including facility surveys/audits		\$2,439.0		\$1,620.0
Estimated annual savings anticipated from obligations	52,128.0	\$648.0	33,831.0	\$421.2

**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	125.0	\$75.0



## FY 2003 Federal Agency Energy Scorecard

Department/Agency Name	Contact Name and Phone
U.S. Environmental Protection Agency	Bucky Green, 202-564-6371 (12/23/03 version)
Name of Senior Energy Official	Signature of Senior Energy Official
Morris Winn, Assistant Administrator for Administration and Resources Management	

Did your agency . . .	Yes	No	Anticipated Submittal Date
1. Submit its FY 2003 energy report to OMB and DOE by January 1, 2004 (Sec. 303)?	→	→	January 7, 2004
2. Submit a FY 2004 Implementation Plan by January 1, 2004 (Sec. 302)?	→	→	January 7, 2004
Did your agency . . .	Yes	No	Comments
3. Implement or continue to use renewable energy projects at Federal installations or facilitate the siting of renewable generation on Federal land in FY 2003 (Sec. 204)? (Report all self-generated renewable energy from projects installed after 1990; refer to Table 1-7 on the Energy Management Data Report)	X		If yes, how many projects and how much energy generated? (Specify unit: MWH or MMBtu) Solar        5 <u>70.8</u> <u>MWH</u> Wind                _____ Thermal <sup>1</sup> 3 <u>13,121</u> <u>MMBtu</u> Biomass        _____ Other RE        _____
4. Purchase energy generated from new renewable energy sources in FY 2003 (Sec. 204)? <sup>2</sup>	X		If yes, how much: <u>23,437.4</u> MWH or _____ MMBtu
5. Invest direct FY 2003 appropriations in projects contributing to the goals of the Order (Sec. 301)?	X		If yes, how much: <u>\$2,439,000</u>
6. Specifically request funding necessary to achieve the goals of the Order in its FY 2005 budget request to OMB (Sec. 301)? (Refer to OMB Circular A-11, Section 25.5, Table 2)	X		If yes, how much: <u>\$2,800,000</u>
7. Perform energy audits of 10% of its facility space during the fiscal year (Sec. 402)?	X see note		What percentage of facility space was audited during the FY? <u>37.8%</u> How much facility space has been audited since 1992? <u>65.14%</u>
8. Issue to private-sector energy service companies (ESCOs) any energy savings performance contract (ESPC) task orders (Sec. 403(a))? (Refer to Table 2-2 on the Energy Management Data Report)		X	How many? _____ Annual savings (MMBtu): _____ Total investment value <sup>3</sup> : \$ _____ Cumulative guaranteed cost savings:             \$ _____ Contracts award value:     \$ _____

<sup>1</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>2</sup> “New” renewable energy means sources developed after 1990.

<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.

Did your agency . . .	Yes	No	Comments
9. Issue any utility energy services contract (UESC) task orders (Sec. 403(a))? (Refer to Table 2-3 on the Energy Management Data Report)		X	How many? _____ Annual savings (MMBtu): _____ Total investment value <sup>3</sup> : \$ _____ Cumulative cost savings: \$ _____ Contracts award value: \$ _____
10. Incorporate energy efficiency requirements into relevant acquisitions (Sec. 403(b)(3))?	X		
11. Adopt and apply the sustainable design principles (e.g., Whole Building Design Guide, Leadership in Energy and Environmental Design (LEED)) to the siting, design, and construction of new facilities or major (budget line item) renovations begun in FY 2003 (Sec. 403(d))?	X		Number of new building design/construction projects in FY 2003: <u>3</u> Number of these projects that can or will be certified under LEED: <u>3</u>
12. Provide training to appropriate personnel <sup>4</sup> on energy management (Sec. 406(d))?	X		Number of appropriate personnel trained: <u>125</u> Total number of appropriate personnel: <u>175</u>
13. Implement any additional management tools (Sec. 406)?	X		Check all that apply: Awards: <u>X</u> Performance Evaluations: <u>X</u> Showcase Facilities: _____ Number of Showcase Facilities designated in fiscal year: _____
14. Establish Water Management Plans (WMPs) and implement at least 4 Best Management Practices (BMPs) in at least 10% of agency facilities (Sec. 207,503(f))?	X		Number of facilities with WMPs and 4 BMPs: <u>3</u> Number of facilities in agency inventory: <u>29</u>

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

Please enter data from annual energy report pertinent to performance toward the goals of Executive Order 13123	Base Year	Previous Year (2002)	Current Year (2003)	% Change (Current vs. Base)
15. Site Energy Efficiency Improvement Goals (Sec. 202). 1985 Base Year	N/A Btu/Ft <sup>2</sup>	N/A Btu/Ft <sup>2</sup>	N/A Btu/Ft <sup>2</sup>	N/A %
16. Source Energy Use (Sec. 206). 1985 Base Year	N/A BBtu	N/A BBtu	N/A BBtu	N/A %
17. Industrial/Energy Intensive Facilities Goals (Sec. 203). 1990 Base Year	357,864 Btu/gsf	303,068 Btu/gsf	326,455 Btu/gsf	-8.78 %
17a. Green Power Netted Out	357,864 Btu/gsf	277,627 Btu/gsf	305,660 Btu/gsf	-14.59 %
18. Water Conservation Goal (Sec. 207). 2000 Base Year	187.3 MGal	N/A	171.7 MGal	-8.29 %
19. Renewable Energy (Sec. 204) Energy used from self-generation and RE purchases	N/A	88.8 BBtu	93.3 BBtu	N/A

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

from self-generation and RE purchases				
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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  
 BBtu = Billion British Thermal Units  
 RE = Renewable energy  
 N/A = Not applicable

The Agency also signed contracts for 45 million kilowatt hours of Green Power for delivery in FY 2004 for the New York Regional Office and the buildings it occupies in the Federal Triangle Complex in Washington D.C. GSA, which manages and pays the utilities for these buildings, will report on these Green Power acquisitions in its energy report.

Notes

Question 7: Technically EPA performed traditional energy audits at facilities that represent 7.8% of its square footage. However, it has started an intense commissioning process at its newest and largest research facility, located in Research Triangle Park, N.C. This facility represents approximately 30% of EPA's laboratory space. This work included testing the consistency and reliability of fume hood exhaust flows, the accuracy of flow monitors and the BAS system. EPA has also begun recalculating the theoretical air flows of all 400 laboratory modules, and reset exhaust volumes in 65 laboratories so far. While this work technically does not meet the definition of an energy audit, the work involved in commissioning this facility does represent a thoughtful evaluation of operations at the building and a tremendous effort to improve energy performance there.

Questions 8 and 9: EPA did not enter into any new ESPC's in FY 2003. EPA continues to work with its ESPC contractor, Johnson Controls Inc., which mis-engineered the Ada, Oklahoma ESPC. JCI has now re-engineered the project and is in the process of correcting several issues at the lab. EPA is also working to update the Verification framework for the Ann Arbor Michigan ESPC, to allow for a laboratory expansion there. EPA does not use UESC's.

## **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

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

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<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 - 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

Region 6 Environmental Laboratory  
Houston, Texas  
Site Energy Manager: Larry Streck

Kansas City Science & Technology Center  
Kansas City, Kansas  
Site Energy Manager: John Begley

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

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

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

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

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

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

New Computer Center  
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

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

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

# **U.S. Environmental Protection Agency**

## **FY 2004 Implementation Plan**

December 23, 2003

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 Asset Management Branch, the Headquarters Facility Operations and Transportation 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, a pollution prevention specialist, a water conservation/energy reporting/green power program analyst, and support staff.

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

EPA's Assistant Administrator for Administration and Resources Management (currently Morris X. Winn) serves as the Agency Energy and Environmental Executive, supported by the SFPB's national energy team described above. EPA's Deputy Assistant Administrator for Prevention, Pesticides and Toxics serves as Co-Agency Environmental Executive. The energy team is supplemented by architects and engineers from EPA's Architecture, Engineering, and Asset Management 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 29 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: commissioning; better, more efficient, mechanical systems for both new and existing facilities; and green power procurements.

## **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.

To recognize and encourage more specific energy and water conservation efforts, EPA developed a "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 and water use. In February 2004, EPA will present its second "Btu Buster of the Year" and "H<sub>2</sub>Overachiever" awards to facility managers who have reduced the largest percentage of their facilities' energy or water use, as well as to recognize employees who have led cutting-edge projects or partnered with EPA's facility organizations to reduce energy and water use during FY 2003.

## 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 2003 conference in Denver, Colorado. The 2004 conference will be held in St. Louis, Missouri, 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 2004 conference is planned for the San Francisco Bay Area February 2-5, 2004, 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. The Office of Acquisition Management and EPP are also working on the implementation of an online ordering system exclusively for "green" products. A contract was awarded for this system in October, 2003.

- *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 all EPA employees, including senior, program, and facility managers, to keep them up to date on energy and water conservation at new and existing labs, EPA's green vehicle fleet efforts, and storm water management.
  
- *Office of Administrative Services Web Site*: EPA's Office of Administrative Services (OAS) posted major updates on its Web site during FY 2003 including major upgrades of its Green Power, Water Conservation, Green Building, and Energy Conservation Web pages. OAS will continue to update the site each quarter, including new sections showcasing EPA's green printing and publication efforts, storm 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 month.

### **Showcase Facilities**

EPA is planning to submit its new Region 7 Science and Technology Center lab 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 was dedicated in May 2003.

## **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 life cycle 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:

- Ensure that new buildings coming into the EPA inventory, whether labs or offices, are energy efficient.
- Continue to work with our Research Triangle Park (RTP), North Carolina, facility personnel to complete the installation of energy meters at its new facilities there, and begin to actively monitor and manage energy use at this location. The RTP complex is EPA's largest energy using complex, accounting for in excess of 45 percent of EPA's reportable energy. Because of contractor non-performance and other issues, the newest and largest buildings are not yet able to measure their energy use. Metering will provide additional information to understand and reduce energy use at these new facilities.
- Start conceptual design of the Cincinnati AWBERC HVAC infrastructure replacement, which will involve the replacement of 35-year-old HVAC systems with state-of-the-art VAV systems.
- For existing facilities, prioritize 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.
- Institutionalize 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 update 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 2004, 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 facilities 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 2004, 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 NEIC laboratories in Denver, Colorado, and Fort Meade, Maryland.

EPA will also work to re-establish a standard agency commissioning and acceptance procedure for mechanical systems (to ensure energy conserving operations for safety reasons) connected with laboratory construction projects.

## **FINANCING MECHANISMS**

In June 2004, EPA's laboratory in Ada, Oklahoma, expects to complete an ESPC project worth more than \$4 million. This project has been plagued by poor contractor performance, but after a year of discussions with the contractor about its inability to commission newly constructed systems, the contractor has re-engineered the system and committed to re-build and complete the job as originally

contracted. 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 2004, 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 2004, EPA will complete a baseline energy use metering exercise, co-funded with 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, and new energy efficient lights and controls are being installed. 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 and the Office of Acquisition Management awarded a contract for an online ordering system consisting completely of "green" office products and energy-efficient office equipment at the beginning of FY 2004.

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® Buildings program does not encompass energy-intensive facilities such as laboratories; therefore EPA cannot designate its 29 laboratory facilities as ENERGY STAR® buildings. The Agency's Regional Offices in Denver, Chicago, and New York City, are, however, ENERGY STAR buildings. During FY 2003, EPA set procurement specifications that will require three new major office acquisitions meet Energy Star requirements. This includes the Northern Virginia, Denver, and Boston office procurements, which together represent more than 850,000 rentable square feet of office space. In addition the EPA Regional Office in Atlanta initiated a joint effort with the General Services Administration, the owner of the Sam Nunn Federal Office Building which houses EPA, and other building tenants to achieve an ENERGY STAR Building rating: this is a long term effort that will take several years.

In FY 2004, EPA will request that landlords of privately owned buildings leased by GSA and occupied by EPA report quarterly on their energy use to EPA, to assist in benchmarking EPA's major facilities and improving their energy performance.

## **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 2003, EPA continued the process of updating its facilities guidelines and construction specifications and improving 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 2004.

Sustainable building design projects that will continue in FY 2004 include: procurement of EPA's new Region 8 Office building in Denver, Colorado, a build- to-suit lease that should be completed

in 2006; a renovation of GSA's McCormick Post Office and Court House in Boston, which will house EPA's New England Regional Office (design currently underway); and the Northern Virginia office building contract, which should be awarded early in calendar year 2004.

## **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" or "green specifications" 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 lease to incorporate energy efficiency requirements into SFO language, and will continue to monitor this effort in FY 2004. For the new Northern Virginia office buildings, the Agency will work with GSA in FY 2004 to incorporate energy efficiency requirements.

As mentioned above, EPA will continue 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 or will be underway in FY 2004:

- *RTP, North Carolina, New Main:* EPA accepted this facility as substantially complete in September 2002. Moves into portions of the facility started in March 2002 and were completed in January 2003. This new facility is EPA's largest and represents approximately 35 percent of reportable energy use. In FY 2004, EPA will again focus on commissioning this building to



reduce energy use and completing installation/beginning operation of a utility/energy metering system. In the commissioning areas, EPA plans to replace and improve monitoring and air flow metering equipment on a selected number of labs, stabilize the ventilation systems in these labs to increase their reliability and predictability, reset the volume of fume hood exhaust air to safe but lower flow rates in occupied and unoccupied conditions, and calibrate the BAS system. Once these selected labs have been successfully commissioned, EPA will commission all the labs in the facility. This could result in energy savings in excess of 15 percent. EPA will also focus on installing energy meters and a meter reading system at this location to replace the estimating system currently being used to report energy use and allocate energy expenses. EPA awarded a Green Power Tags contract to cover 50 percent of the electric needs of this facility in FY 2004.

- *Cincinnati, Ohio:* In FY 2003, EPA completed a long range Energy Master Plan for the AWBERC facility, the second largest research facility in EPA's inventory. The plan called for conversion of the lab from constant volume to VAV fume hoods, replacement of the air distribution ductwork, and replacement of the existing air handling and exhaust systems with VAV supply and a manifolded exhaust system. These changes should allow EPA to expand lab capacity 20 percent and shave 20 percent in absolute terms in energy use. Conceptual design should start on this infrastructure replacement project in FY 2004.
- *Fort Meade, Maryland:* The installation of a "pony boiler" to improve the energy efficiency of summer operations was completed in May 2003. EPA will initiate a heat recovery feasibility study for this lab in FY 2004, to further reduce energy use.
- *Research Triangle Park, North Carolina. Human Studies:* EPA completed an energy audit on this facility in FY 2003. A draft re-commissioning plan should be completed, re-commissioning started and completed in FY2004.
- *Research Triangle Park, North Carolina. NHEERL:* EPA completed an energy audit on this facility in FY2003. A draft re-commissioning plan should be completed and re-commissioning started in FY 2004.
- *NEIC, Denver, Colorado:* EPA will commission this building to reduce energy use and overtime energy charges at this facility, one of EPA's largest labs, which was dedicated in October, 2003.
- *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 follow up, perhaps with a second ESPC to help meet the energy needs for clean and un-interrupted power for research needs and to provide HVAC for planned facility additions.
- *Research Triangle Park, North Carolina, National Computer Center:* EPA will also focus on installing energy meters and a meter reading system at this location to replace the estimating system currently being used to report energy use and allocate energy expenses. EPA awarded a Green Power Tags contract to cover 50 percent of the electric needs of this facility in FY 2004.
- *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 was completed and bid out in FY 2003. EPA's goal is to begin construction in December 2004. EPA will initiate a procurement for green power at this regional lab and expects deliveries to start in April 2004.

- *Manchester, Washington:* This facility, which will continue receiving 100 percent of its electricity from wind farms, added a new wing in FY 2003 which included VAV labs to maximize energy efficiency. The first phase of renovation of older lab wings will begin in FY 2004, and will also include conversion of constant volume hoods to VAV hoods.
- *Houston, Texas:* EPA awarded a three year contract for Green Power Tags for this lab in FY 2003. An energy audit of this facility conducted in September 2001 recommended significant mechanical system upgrades at this lab. Design is underway. Construction on these system upgrades should begin in FY 2004.
- *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 green power, and extensive daylighting features. In FY 2004, EPA will conduct a facility energy assessment of heat recovery approaches to improve the energy efficiency of this facility.
- *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 2004, 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.
- *Ada, Oklahoma:* As part of the ESPC to be completed in June 2004: a ground-source heat pump, VAV fume hoods and air supply; new fan motors; and an integrated direct digital control system for HVAC, energy, fire, and security management are expected to result in energy savings of more than 50 percent and water savings of more than 80 percent.

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 standards have been developed for all EPA laboratories, based on the Agency's success with the re-commissioning effort it undertook at the Fort Meade, Maryland, laboratory in FY 2002. The Fort Meade re-commissioning effort resulted in energy reductions of approximately 12 percent. In FY 2004, 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.

- *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, in FY 2004, EPA will begin internal reporting information on its 38 largest office facilities, even if EPA is not required to report this information to DOE and OMB. Better information should increase EPA's ability to manage its energy, motivate facility managers, and educate the public about energy conservation.

## **HIGHLY EFFICIENT SYSTEMS**

EPA will continue using the ESPC process to incorporate combined cooling, heating, and power systems and utilize 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 June 2004.

## **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 2004. 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.
- *Richmond, California:* Part of the planned upgrade that will be under construction at this facility in FY 2004 will be a 60 kilowatt natural gas co-generator unit for electricity and hot water.

## **WATER CONSERVATION**

EPA will continue to implement its water conservation initiative in FY 2004, 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 2003, EPA completed water management plans incorporating numerous best management practices in its Chelmsford, Massachusetts,

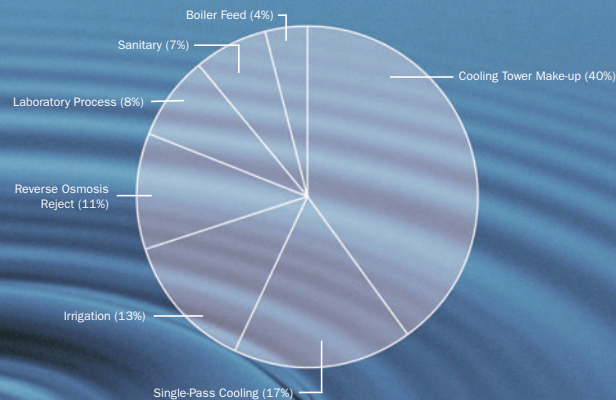
Golden, Colorado, Ann Arbor, Michigan, and Fort Meade, Maryland, labs, and those plans will continue to be monitored and upgraded to maximize water savings potential. Those plans have resulted in a 1.5 million gallon per year reduction in water used for reverse osmosis/de-ionized water production and the award of a contract to install a conductivity meter to reduce cooling tower water use at Fort Meade.

In FY 2004, the Agency will complete similar plans for its labs in Narragansett, Rhode Island; RTP, North Carolina - New Main; RTP, North Carolina - NHEERL, RTP, North Carolina - Human Studies, and Cincinnati, Ohio's three main facilities - AWBERC, Center Hill, and the Testing and Evaluation facility.

# WATER CONSERVATION AND MANAGEMENT AT EPA

## Every Drop Counts...

**Water**, one of our most precious resources, must be managed in a sustainable way to prevent pollution, protect human health, and preserve ecosystems. That's why EPA is working to reduce our water use by developing water management plans, installing water-conserving technologies in our facilities, and setting a goal to reduce water use in labs by 10 percent (from 2000 to 2010). And we need you to do your part to make every drop count.



### Your Actions...

**Report** leaks or malfunctioning equipment to the Facilities Team

**Eliminate** continuous flows of tap water used to cool equipment

**Use** water-saving procedures and equipment

**Close** lab fume hoods when not in use

**Evaluate** how YOU use water

### ...Make a Difference

One stuck toilet wastes more than **2,500 gallons** each day

1 GPM (gallons per minute) continuous flow is enough water to supply the sanitary needs of **100 employees**

A low-flow faucet saves **5,000 gallons** annually

Cooling towers evaporate **significant quantities** of water to cool laboratory air in warm months

On average, EPA laboratories consume **38,000 gallons** of water per year for every employee



water management plans at a percentage of their facilities. It also directs facilities to implement best management practices in at least four of 10 areas:

### Typical Laboratory Water Uses

#### Executive Order

**13123, Greening the Government Through Efficient Energy Management**, requires that all federal agencies report baseline water use and implement

- Public Information and Education Programs
- Distribution System Audits, Leak Detection and Repair
- Water-Efficient Landscape
- Toilets and Urinals
- Faucets and Showerheads
- Boiler/Steam Systems
- Single-Pass Cooling Systems
- Cooling Tower Systems
- Miscellaneous High Water-Using Processes
- Water Reuse and Recycling

# ...Count Every Drop!