U.S Environmental Protection Agency

Energy Management and Conservation Program

Fiscal Year 2005 Annual Report

U.S. ENVIRONMENTAL PROTECTION AGENCY

Energy Management and Conservation Program

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

The U.S. Environmental Protection Agency (EPA) is charged with protecting human health and the natural environment, and the Agency strives to set an example in its own facilities. In fiscal year (FY) 2005, EPA exceeded the goals outlined under Executive Order (E.O.) 13123, *Greening the Government Through Efficient Energy Management*, thanks to a combination of green power purchases, commissioning, mechanical system upgrades, water conservation efforts, and sustainable new building design. The following report is a snapshot of EPA's major projects and the results achieved in FY 2005.

Results

In FY 2005, EPA's reportable energy use (with green power netted out) was 213,886 British thermal units (Btus) per gross square foot (GSF) per year, down 40 percent from its FY 1990 baseline of 357,864 Btus per GSF per year. Primarily through green power purchases, EPA significantly exceeded the FY 2005 E.O. 13123 requirements to decrease reported energy use by 20 percent from the FY 1990 baseline.[1] In FY 2004, EPA decreased reported energy use by 17 percent from the baseline (green power netted out), and in FY 2003, EPA decreased reported energy use by 14.6 percent (green power netted out).[2] EPA's goal has always been to meet "reported" energy reduction numbers primarily through actual energy use reductions, and secondarily through green power procurements.

Although EPA achieved significant energy savings from specific mechanical system and re-commissioning projects through FY 2002, the poor performance of two new facilities and performance "creep" at two older facilities have essentially neutralized that progress. Energy savings performance contracts (ESPCs) at laboratories in Ann Arbor, Michigan, and Ada, Oklahoma, initially resulted in energy reductions of 40 percent and 45 percent respectively from their baseline years prior to completing an ESPC. Re-commissioning completed in 2002 at the Fort Meade, Maryland, Environmental Science Center resulted in a 15 to 18 percent reduction in energy use. Through these projects, EPA achieved a 15.3 percent reduction in actual energy use in FY 2002 from its FY 1990 baseline. However, the

[1] Current U.S. Department of Energy reporting guidelines allow agencies to deduct green power purchases from their reported energy use.

2 In FY 2005, EPA's actual energy use (green power not netted out) was 353,502 Btus per GSF per year, virtually equal to its FY 1990 reporting baseline of 357,864 Btus per GSF per year. In FY 2004, the Agency's actual energy use (green power not netted out), was 355,773 Btus per GSF per year, also essentially even with the 1990 baseline. In FY 2003, EPA's actual energy use (green power not netted out) was 326,455 Btus per GSF per year, representing an 8.8 percent reduction from EPA's FY 1990 baseline. In FY 2002, EPA's actual energy use (green power not netted out) was 303,078 Btus per GSF per year, representing a reduction of 15.3 percent from EPA's FY 1990 baseline.

Agency's actual energy use has increased each year since that time. These increases have been caused in large part by the energy performance of four large facilities. EPA's New Main Laboratory building and National Computer Center (NCC) in Research Triangle Park (RTP), North Carolina (where energy reporting began on October 1, 2002), have significantly exceeded the energy use estimates made during these facilities' design. In addition, an improvement in the accuracy of chilled water utility information at the Agency's Human Studies Laboratory in Chapel Hill, North Carolina, dramatically increased reported energy use beginning in June 2004. At EPA's Ann Arbor, Michigan, National Vehicle and Fuel Emissions Laboratory (NVFEL), which has an Energy Savings Performance Contract (ESPC) in place, changes in operating parameters, quirks in the ESPC's measurement and verification plan that provide disincentives for some energy efficiency measures, and inefficient facility additions have also resulted in significant increases in energy use.

EPA has initiated a study of NVFEL to develop a plan to return the facility to its previously good energy performance levels. EPA's other ESPC, meanwhile, has helped the Agency improve its environmental performance. In FY 2005, a combination of improved energy management and green power purchases resulted in EPA's first-ever "carbon neutral" facility, the Robert S. Kerr Environmental Research Laboratory in Ada, Oklahoma. With the acceptance of an ESPC featuring a ground-source heat pump in September 2005, the laboratory reduced its energy consumption by 45 percent and eliminated its use of natural gas. In May 2005, EPA also began purchasing renewable energy certificates to offset the greenhouse gas emissions associated with the facility's remaining electricity use.

Targeting Large Energy Users

In FY 2005, EPA's Facilities Management and Services Division (FMSD) continued to focus on the large and energy-intensive facilities located in RTP, North Carolina. EPA has initiated and/or substantially implemented projects that will show significant, real energy reductions at the RTP New Main facility, NCC, and Chapel Hill facilities by the end of FY 2006. Energy performance at the RTP laboratory complex, which uses approximately 50 percent of EPA's reportable energy, has a critical impact on EPA's overall energy performance.

In May 2005, EPA signed a contract for a utility metering system at the New Main and NCC facilities in RTP. The system became operational in December 2005 and will allow EPA for the first time to collect accurate energy data for budgeting, payment, and—most importantly—energy management purposes. EPA's largest re-commissioning project to date, at RTP New Main, continued in FY 2005. This project was 80 percent complete at the end of FY 2005 and should be 100 percent complete by the

middle of FY 2006. The goal of this project—the laboratory controls optimization pilot—is to safely reduce laboratory ventilation rates during occupied and unoccupied times. By eliminating excess single-pass air, EPA has achieved an 8 percent reduction in energy use (on an annual basis) at the New Main laboratory as of September 30, 2005—savings that will show up as a significant performance improvement in FY 2006.

Elsewhere in RTP, EPA completed the first phase of upgrades from a re-commissioning effort at the 10-year-old Human Studies Laboratory in Chapel Hill, North Carolina, and started controls master planning for that facility as well. Funding was provided for additional operations and maintenance personnel to address significant, short-term, preventative maintenance issues that were hurting energy efficiency. Three small air handling units were also repaired and re-commissioned. In June 2005, redesigns of the two largest air handling units and associated supply systems were also started. These efforts should result in performance improvements of 15 to 20 percent at the Chapel Hill facility upon successful implementation over the next two to three years.

During FY 2005, EPA completed the first phase of a controls master plan for the New Main laboratory and designed a pilot office re-commissioning project. EPA also completed the re-commissioning of RTP's New Main high bay laboratory building, where control sequences, equipment operation, and energy performance have varied significantly from the original design intent. EPA launched a study in Spring 2005 to identify energy savings opportunities, reclassified spaces, and then re-commissioned the facility appropriately.

In Cincinnati, Ohio, EPA continued to implement its energy master plan completed in FY 2003 for the Andrew W. Breidenbach Environmental Research Center (AWBERC). AWBERC is the Agency's second largest research facility and second largest consumer of energy. It is 30 years old, and its HVAC infrastructure is approaching the end of its useful life. The Agency has initiated a seven-year, multi-million dollar project to replace major AWBERC mechanical systems and improve its energy and water efficiency. When fully implemented, the energy master plan will increase laboratory space by 39 percent and cut energy use by 46 percent. During FY 2005, EPA completed construction on a new cooling tower and chilled water distribution system, which should reduce energy use by approximately 5 percent. A construction phasing plan was also completed that covers sequencing of the replacement and manifolding air handling units, replacement of the duct work and air distribution systems, and replacement and manifolding of the exhaust systems. In September 2005, EPA awarded a $12.5 million contract for an office and laboratory annex at AWBERC. This annex will serve as "swing space" for EPA staff, when

portions of the existing facility are shut down for infrastructure replacement and upgrades, which begin in FY 2007.

Smaller laboratory projects also demonstrate the Agency's commitment to improving energy efficiency when opportunities arise. EPA's Region 9 Laboratory in Richmond, California, completed mechanical upgrades in July 2005 that are expected to reduce the facility's energy consumption by at least 15 percent. Central to the package of upgrades–which were financed by utility savings and a rebate from the local utility–was the installation of a natural gas co-generation unit. The 60-kilowatt rated combustion engine is expected to reduce the laboratory's energy needs 17 to 23 percent, using generated waste heat to replace natural gas for heating purposes. In November 2005, EPA completed a laboratory module re-commissioning project at the Agency's National Enforcement Investigations Center in Denver, Colorado, that is expected to reduce energy use 10 to 20 percent by reducing excessive air flow.

Green Power Offsets Energy Use

While making physical and operational improvements to underperforming facilities will have the greatest positive long-term impact on the environment, EPA recognizes that it can reduce the current impact of its energy use through green power procurement. Since 1999, when the EPA Richmond, California, laboratory became the first federal facility with 100 percent green power, EPA has been a leader in purchasing and supporting the development of energy from new renewable sources. EPA continued to grow its Green Power Purchase Program in FY 2005, adding eight facilities to the list of those already offsetting their electricity use by procuring renewable energy certificates (RECs, also known as "green tags") and "delivered" renewable energy. It also extended or replaced green power contracts at six locations. EPA's largest green power purchase to date, for 100 million kilowatt hours (kWh) per year, was also completed in FY 2005 and will cover all facilities in RTP.

At the end of FY 2005, EPA was under contract to receive more than 83 percent of its electricity on an annual basis from renewable sources–the highest percentage of any major federal agency. As of October 1, 2005, EPA ranked second in EPA's Green Power Partnership's Top 25 green power purchasers in the United States.

Green power contracts are helping the Agency reduce the carbon dioxide emissions associated with its electricity use at a rate of 508 million pounds annually, or the equivalent of removing more than 44,000 cars from the road for a year. EPA's Air Pollution Prevention and Control Division is also looking at each type of green power the Agency is purchasing, to see which has the least global warming impact potential, then modeling the impact of EPA's operations with and without green power. This will help the

Agency in the future to develop options to maximize the environmental benefits of its green power purchases by focusing on certain regions of the country and/or types of green power purchases.

Sustainable Design Determines Future Facilities

EPA works to ensure that any new building it acquires is designed to maximize energy and water efficiency and environmental performance. In January 2005, the Agency achieved Silver certification for the NCC in RTP from the U.S. Green Building Council's Leadership in Energy and Environmental Design-New Construction (LEED®-NC) program. New leased office buildings under construction in Arlington, Virginia, and Denver, Colorado—as well as the planned renovation of a historic, government-owned courthouse in Boston, Massachusetts—are required to achieve ENERGY STAR® Building labels, perform 20 to 30 percent better than ASHRAE 90.1 (1999), receive Silver or higher level LEED-NC certification, and incorporate various energy- and water-efficient features. In FY 2005, construction was completed on the First Environments Early Learning Childcare Center in RTP, North Carolina, which was designed to LEED-NC Silver standards. Designs were also completed and a construction contract awarded for a laboratory annex in Cincinnati, Ohio, which should receive a LEED-NC Gold certification.

Water Conservation

EPA completed two water management plans in FY 2005, bringing the Agency's total to 13 plans (of a total 29 reporting facilities) and exceeding the E.O. 13123 requirement that 20 percent of federal agency facilities complete water management plans by FY 2005.

SECTION I: MANAGEMENT AND ADMINISTRATION

EPA recognizes that efficient energy and water management must involve senior EPA management as well as facility managers. 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 FY 2005 and 25 percent by FY 2010, measured from an FY 1990 baseline. Future energy mandates for E.O. 13123 have been replaced, in part, with tougher annual energy intensity reductions required at federal facilities in the Energy Policy Act of 2005 (EPAct 2005).

ENERGY MANAGEMENT INFRASTRUCTURE

E.O. 13123 requires each federal agency to assemble a technical support team to encourage the use of appropriated funds to meet the energy efficiency goals and requirements of the order. EPA's Office of Administrative Services (OAS) is dedicated to meeting these requirements. Within that office, the Sustainable Facilities Practices Branch (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. The branch is an example of the importance EPA places on energy efficiency, water conservation, and other sustainability issues. Key staff in the SFPB's energy team include the branch chief, a Laboratories for the 21st Century coordinator, two mechanical engineers, a water conservation/green power coordinator, and a pollution prevention and recycling coordinator.

Senior Agency Official and Energy Team

EPA has designated the Assistant Administrator (AA) of the Office of Administration and Resources Management (OARM) as the Agency Energy and Environmental Executive. Currently, the AA for OARM is Luis Luna.

Mr. Luna is supported by a national energy team located in OAS and FMSD. SFPB's energy team works closely with architects and engineers from EPA's Architecture, Engineering, and Asset Management Branch (AEAMB) and ventilation safety experts from EPA's Safety, Health, and Environmental Management Division (SHEMD). EPA also receives support from the U.S. Department of Energy's (DOE's) National Renewable Energy Laboratory and the Federal Energy Management Program (FEMP) on a project-specific basis. Site energy managers for each of the Agency's 29 reporting facilities are listed in Appendix D.

EPA's national energy team employed five principal approaches to meet the E.O. 13123 energy reduction goal of 20 percent by FY 2005 (from a 1990 baseline). These strategies are also appropriate to meet the more stringent requirements of EPAct 2005, which was signed into law on August 8, 2005:

- *Good design and oversight for new facilities:* For new facilities, such as the Denver, Colorado, Region 8 Office that broke ground in June 2005, the Agency gets involved early in the planning process and reviews projects regularly to ensure appropriate acquisition strategies, energy-efficient design, quality construction, extensive commissioning, and optimal operations.

- *Commissioning, re-commissioning, and retro-commissioning:* Whether a new building or system upgrade, EPA ensures that its facilities are performing the way they were designed by commissioning newly completed projects, such as the ESPC in Ada, Oklahoma, where commissioning was completed in FY 2005. Where necessary, EPA re-commissions facilities, such as the New Main facility in RTP, North Carolina, that are not reaching their peak energy performance. In FY 2005, the Agency continued its major re-commissioning effort launched in FY 2003 at RTP's New Main building, as well as a re-commissioning project at the Human Studies Laboratory in Chapel Hill, North Carolina, begun in FY 2004.

- *Mechanical systems improvements*: From the cogeneration unit recently installed in Richmond, California, to variable air volume upgrades under design at EPA's Mid-Continent Division Laboratory in Duluth, Minnesota, the Agency is identifying and implementing opportunities to increase the energy and water efficiency of its facilities.

- *Largest facilities first:* With limited funding and staff resources, EPA concentrates on its largest energy using facilities first, such as those in RTP and Cincinnati. EPA has approximately 10 laboratories that account for 80 percent of its reportable energy use. The remaining 19 smaller labs account for only 20 percent of EPA's reportable energy use. Resources are best focused on larger facilities, with greater energy conservation potential.

- *Green power procurement*: EPA has also found green power to be a quick and effective way to reduce the Agency's environmental footprint at Agency laboratories and offices. Also, renewable energy demonstration projects serve to educate the public and develop markets for new technologies, such as the 9.5-kilowatt solar array installed on the roof of EPA's Western Ecology Division Laboratory in Corvallis, Oregon, in December 2004. Under EPAct 2005, green power purchases may no longer count towards meeting the Agency's energy use reduction goals, but final guidance on the issue will not be released until 2006.

Energy Reporting

EPA energy and facility managers report their energy and water consumption figures to Headquarters on a quarterly basis, and extensive quality control is conducted by comparing reporting forms to monthly utility bills and tracking quarterly data against the same time period in previous years. EPA also sends quarterly e-mail 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. EPA managers can compare their energy performance against their peers and their historic energy use.

Currently, EPA relies on estimates for a majority of energy use at two of its largest facilities (the New Main laboratory and NCC in RTP) that together account for approximately 38 percent of the Agency's energy use. The energy metering systems for these new buildings were not functional at the time construction was substantially completed in Fall 2002. In May 2005, the Agency awarded a contract to install a Web-based comprehensive energy management and "real time" metering system. The project was completed in December 2005, improving EPA's data accuracy and ability to measure and manage energy at these facilities. In FY 2005, EPA also installed chilled water meters in its Human Studies Laboratory in Chapel Hill. The meters allow the Agency to confirm billing of chilled water Btus and report more accurate data from this laboratory.

EPA's National Enforcement Investigation Center (NEIC) in Denver, Colorado also installed an advanced metering system, which includes three electricity meters, two chilled water meters, and two high-temperature hot water meters. The installation of the new meters allows the Agency to be billed for actual energy use and was part of a two-year re-commissioning project that is expected to save 9,500 MMBtus and $100,000 annually.

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 and incentives, as well as continuing education and training programs, to support individual and team efforts in energy efficiency.

Awards (Employee Incentive Programs)

In FY 2005, SFPB continued its internal peer awards program, collectively known as the "Btu Buster Awards," first established in FY 2003. The program recognizes and encourages energy and water conservation among EPA facility managers and building design and construction personnel. The following winners were recognized at EPA's Buildings and Facilities Conference in Philadelphia, Pennsylvania, in March 2005:

- Energy Manager James White received EPA's Energy Partner of the Year (Field) award for continuous leadership in improving the energy performance of EPA's New Main, NCC, Human Studies, and Toxicology Research facilities in RTP, North Carolina.
- For effective, dependable, and friendly support of EPA sustainable facilities activities and staff in all endeavors, Steve Hinz of EPA Headquarters was named Energy Partner of the Year (Headquarters).

- Russ Ahlgren and Mark Tagliabue of EPA's Atlantic Ecology Division Laboratory were each honored with Btu Buster awards for implementing mechanical engineering upgrades that reduced energy use at the Narragansett, Rhode Island, laboratory by more than 10 percent annually, improving the working conditions of laboratory occupants, re-investing utility cost savings in green power, and leading the way in sustainable site planning.

- Stephanie Bailey received an H_2Overachiever award for helping the Agency save an estimated 120,000+ gallons of water per year by reducing the use and water consumption of autoclaves at EPA's Region 10 Laboratory in Manchester, Washington.

- Jay Gile of the Western Ecology Division Laboratory in Corvallis, Oregon, received a Leading Edge Award for conceiving, acquiring funding for, and managing the construction of a 9.5 kilowatt photovoltaic roof system that generates renewable power with zero emissions. Mr. Gile also received an H_2Overachiever award for helping the laboratory save approximately 5 million gallons of water annually, by installing a closed-loop glycol cooling system, autoclave control valves, waterless urinals, and flow restrictors on plumbing fixtures.

- Cynthia Greene received a Leading Edge award for aggressively and intelligently pursuing environmental performance improvements in all facets of the design and operation of the new Region 1 Office in Boston, Massachusetts.

- Jan Hemingway of EPA's Region 10 Laboratory in Manchester, Washington, won Reporter of the Year for timely and accurate energy and water reporting for a complex facility.

- Kim Bartels of EPA's Region 8 Office in Denver received a new award–P2 Pollution Prevention Performer of the Year–for her campaign to collect recyclables at that office, including a floor-by-floor paper collection competition that recycled nearly 11,000 tons.

EPA's designated "showcase" facilities include: the Kansas City, Kansas, Science and Technology Center; the Ralph H. Metcalfe Federal Building (a GSA-owned building housing EPA's Region 5 Office), and the New England Regional Laboratory in Chelmsford, Massachusetts.

Training and Education

Employees who have energy management responsibilities are evaluated annually against criteria based on the Agency's energy management principles. EPA uses several education and training programs to ensure that employees are aware of the latest technologies and opportunities to increase energy efficiency and overall sustainability:

- *Laboratories for the 21st Century*: The Laboratories for the 21st Century (Labs21) program is a joint partnership between EPA and DOE dedicated to improving the environmental performance and energy efficiency 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-efficient and sustainable projects.

In FY 2005, Labs21 held 14 one-day workshops on energy-efficient laboratory design and operations, training more than 600 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 laboratory design, air supply and distribution systems, commissioning, lighting, and resources and tools. An advanced half-day course was also given this year focusing on the Labs21 Environmental Performance Criteria, a rating system based on the LEED® Green Building Rating System, but specifically designed for laboratory facilities. The Labs21 Laboratory Ventilation Design Course, part of a series of advanced course modules on sustainable laboratory design and related topics, and based on Labs21 Best Practice Guides, was offered for the first time at the FY 2006 conference.

Additional information about these courses is posted on the Labs21 Web site at <www.labs21century.gov/training/index.htm>.

The FY 2005 Labs21 Conference took place in St. Louis, Missouri, October 5-7, 2004. More than 500 public and private sector laboratory energy managers, policymakers, and other technical experts from the United States, Canada, Great Britain, New Zealand, and Australia attended the conference, including 30 EPA employees. The conference presented an important training opportunity for EPA and other federal agencies' facility staffs. A mix of plenary and panel sessions highlighted strategies and technologies for improving energy and water efficiency and environmental performance in laboratories. The conference also featured the Labs21 poster session, which showcased 23 innovative laboratory designs, and the Labs21 Technology Fair, where exhibitors displayed state-of-the-art products for high performance laboratories. Optional tours included the Nidus Center for Scientific Enterprise; a plant and life science "incubator" with a reception at the Donald Danforth Plant Science Center; and a tour at the Washington University Earth and Planetary Sciences Building, which houses the research and investigative activities of the Department of Earth and Planetary Sciences at the university. The conference agenda, presentations, and speaker biographies are available at <www.labs21century.gov/conf/past/2004/agenda.htm>. EPA also spent a great deal of time in FY 2005 planning the FY 2006 Labs21 Annual Conference, which was held in Portland, Oregon, October 18-20, 2005.

- *Buildings and Facilities Conference*: In March 2005, EPA conducted its annual three-day Buildings and Facilities Conference. This year's conference was held in Philadelphia, Pennsylvania. The 75 conference attendees included facility managers from EPA-operated laboratories and GSA-assigned regional offices and headquarters.

- *Online Ordering System for "Green" Office Supplies:* EPA's Environmentally Preferable Purchasing (EPP) Program worked with the Agency's Office of Acquisition Management and the Comprehensive Procurement Guidelines program to award an online ordering system for "green" office products in FY 2004 as a Blanket Purchase Agreement (BPA) with Corporate Express. The BPA became mandatory for all EPA purchase card holders May 1, 2005. The system enables EPA purchase card holders to buy products that meet or exceed EPA recycled-content and other EPP standards, in order to make green purchasing and tracking easier for Agency personnel and increase such purchases throughout the Agency. In recognition of its efforts on the BPA, EPA received a 2005 *White House Closing the Circle Award*, which honors the Agency for its outstanding federal environmental stewardship. The online ordering system is accessible through EPA's Intranet or by directly accessing <www.epasupplies.com>. A training tutorial is also available on EPA's Intranet.

- *Recycling Electronics and Asset Disposition (READ) Services:* EPA initiated the READ Services program in FY 2005 to provide all federal agencies with a government-wide procurement tool to properly manage electronic inventories and to recycle and properly dispose of excess or obsolete electronics using an environmentally responsible approach. To make the program accessible to all federal agencies across the country, READ is being administered under a government-wide acquisition contract (GWAC). The GWAC will also help federal agencies meet the requirements of E.O. 13101. On December 16, 2004, EPA issued a five-year multiple award contract to eight small businesses. Under the contract, the companies will evaluate each piece of equipment and its components, and then will reuse, recycle, or dispose of them under the following hierarchy: 1) refurbish and resell them, using the proceeds to offset costs; 2) donate them to charitable causes; 3) recycle as much as possible; 4) properly dispose of the remainder.

  EPA-HQ, EPA Region 4, and EPA-RTP used the READ contracts in FY 2005 to dispose of approximately 250,000 pounds of hazardous electronics, representing approximately 14,332 pieces of computer and other electronic equipment.

- *Online Newsletter*: *Energizing EPA* is an internal EPA newsletter that highlights the Agency's efforts to improve overall sustainability, including energy and water efficiency, at its facilities. The newsletter is produced on a quarterly basis and distributed electronically to all EPA employees to educate them about such issues as energy efficiency, green power, green buildings, alternative energy, recycling programs, water conservation, and low-impact development. In FY 2005, EPA initiated a new section in each issue focusing on tips that employees can use to reduce energy, water, and other resource use in their day-to-day lives.

- *Office of Administrative Services (OAS) Web Site*: EPA's OAS continues to update and enhance its public Web site on sustainability at the Agency (www.epa.gov/greeningepa). The Web site is a central source of information about energy efficiency approaches and projects, renewable energy procurement, and green buildings developed by and for EPA. The site also provides information on facility gross square footage, energy and water consumption data, facility manager contact information, and "green" building highlights for each major facility EPA occupies. In FY 2005, EPA revamped the site to improve navigation and highlight facilities with energy efficiency, water conservation, and other sustainable accomplishments.

- *Environmental Management System (EMS) Training:* As part of its efforts to implement EMSs at 34 Agency locations, EPA has conducted a variety of training modules for its employees on energy and water conservation and other significant environmental aspects associated with the Agency's facilities and operations. At EPA Headquarters, for example, in Summer 2005 all employees were offered a brief, online training via the Intranet that educated them on how the Agency is purchasing green power for Headquarters and how they can reduce their personal energy and water use.

SECTION II: ENERGY EFFICIENCY PERFORMANCE

E.O. 13123 requires that by FY 2005 each federal agency reduce its reported energy use in its laboratory and industrial facilities by 20 percent from an FY 1990 baseline. Both actual energy use reductions and green power purchases can be used to meet the goal. EPA exceeded the FY 2005 goals primarily through green power purchases (97 percent) and energy use reductions (3 percent).

ENERGY REDUCTION PERFORMANCE

The following table details EPA's energy consumption in FY 2005 for its 29 reporting laboratories:

EPA FY 2005 Energy Consumption
For 29 Reporting Laboratories

Source	Consumed	Percent change from FY 2004	Percent change from FY 1990
Electricity	136,613,911 kilowatt hours*	0.42+	+29.0
Green power	150,549,837 kilowatt hours**	+140.80	N/A
Fuel oil	183,234 gallons	-73.19	+338.89
Natural gas	3,903,597 CCF	-1.18	+6.25
Propane	8,002 gallons	+15.44	+612.47
Purchased steam	32.7 Bbtus	+49.31	N/A
Biodiesel	3.8 Bbtus	+2.45	N/A
Chilled and heated water	379.0 Bbtus	+17.55	N/A
Total Btus/GSF	**353,502 Btu/GSF**	**-0.64**	**-1.22**
Total Btu/GSF (green power netted out)	**213,886 Btu/GSF**	**-27.95**	**-40.23**

*EPA ***buys*** approximately 35 million kilowatts of green power for the Central Utility Plant (CUP) that serves the RTP main campus, but ***reports*** this energy, per DOE implementing regulations, as chilled water consumed produced by the CUP and received at the RTP New Main and NCC. Thus the green power kilowatt hours consumed is higher than that electricity kilowatt hours consumed.

**Green power accounted for nearly 76 percent of the electricity that EPA laboratories and offices purchased in FY 2005 (a combined total of 225 million kWh of renewable energy purchases). Green power contracts completed partway through FY 2005 brought EPA's share of green power to 83 percent of its estimated electric use as of September 30, 2005.

Energy Use Reductions Combined With Green Power Purchases

Primarily through the purchase of green power or renewable energy certificates that offset the emissions associated with its electricity use, EPA has exceeded the E.O. 13123 goal of reducing reportable energy use by 20 percent from an FY 1990 baseline. EPA finished FY 2005 40.2 percent below its FY 1990 baseline, with green power netted out. In FY 2004, with green power netted out, EPA's energy use was down 17 percent, and in FY 2003 energy use was down 14.6 percent. While EPA currently relies heavily on green power purchases to achieve its reportable energy reductions, the Agency will continue to improve its energy efficiency through infrastructure improvements and conservation measures. EPA expects to have a better balance of energy use reduction and green power procurement by FY 2010 to meet federal greenhouse gas reduction requirements, and intends to significantly reduce its actual energy use to meet EPAct 2005 requirements, which begin in FY 2006.

Energy Use Reductions Alone

Without deducting green power, EPA's FY 2005 energy use on a Btu per GSF basis was virtually even with the baseline year of FY 1990. In FY 2004, EPA's energy use on a Btu per GSF basis was virtually even with FY 1990; in FY 2003, it was 8.8 percent lower (see Figure II-1); and in FY 2002, it was 15.3 percent lower. The Agency attributes this upward trend in energy consumption to:

- The beginning of energy data reporting for its New Main laboratory and NCC in RTP, North Carolina, on October 1, 2002 (FY 2003), both of which have greatly exceeded the energy use estimates made at the time the buildings were designed;
- A significant increase in Btus/energy use at its Human Studies Laboratory in Chapel Hill, North Carolina, where more accurate utility billing has greatly increased reported energy use; and
- Workload changes at the Ann Arbor, Michigan, NVFEL facility, as well as quirks in the ESPC's measurement and verification agreement that discourage additional energy saving efforts and recent energy-inefficient facility additions that have degraded the energy performance of the ESPC successfully completed there in 2001.

As indicated by Figure II-2 below, the two new RTP facilities account for approximately 38 percent of EPA's energy consumption. The Chapel Hill facility accounts for approximately 9 percent of EPA's energy consumption. Figure II-3, which lists EPA reporting laboratories by energy intensity, shows these three RTP facilities are among the five most energy-intensive EPA facilities. As previously

detailed, the Agency has made RTP facilities its top energy conservation priority, but the fruits of these labors may not be realized for at least a year. The Ann Arbor NVFEL, meanwhile, accounts for approximately 6 percent of EPA's energy consumption.

Figure II-1

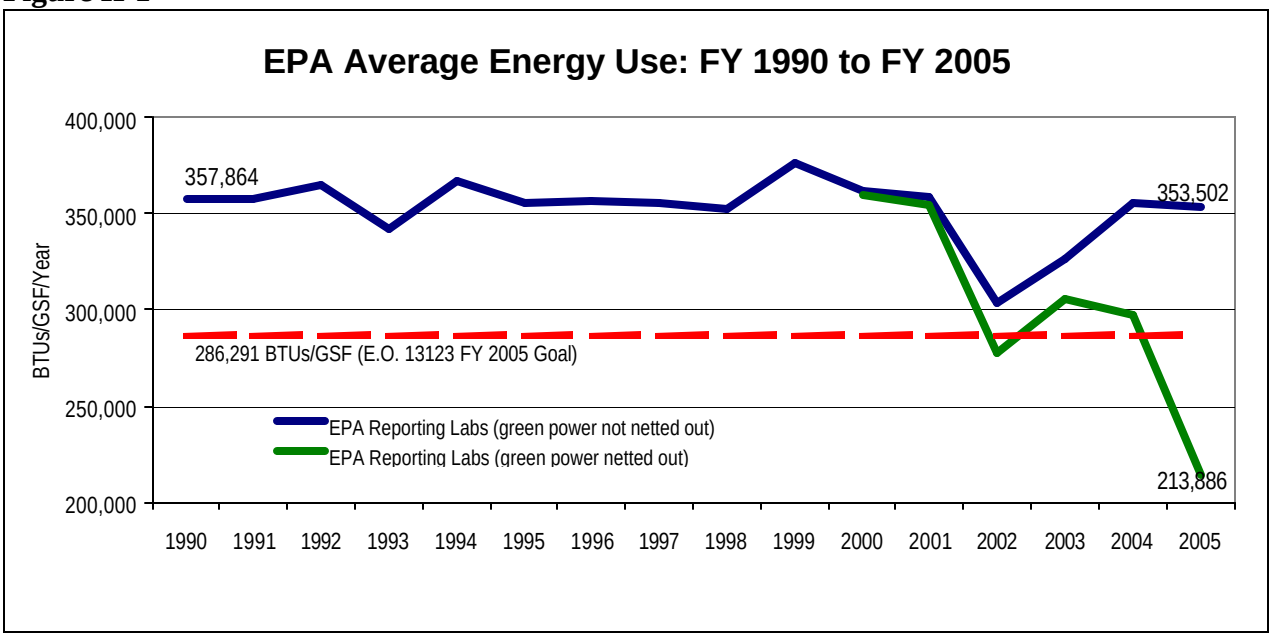


Figure II-2

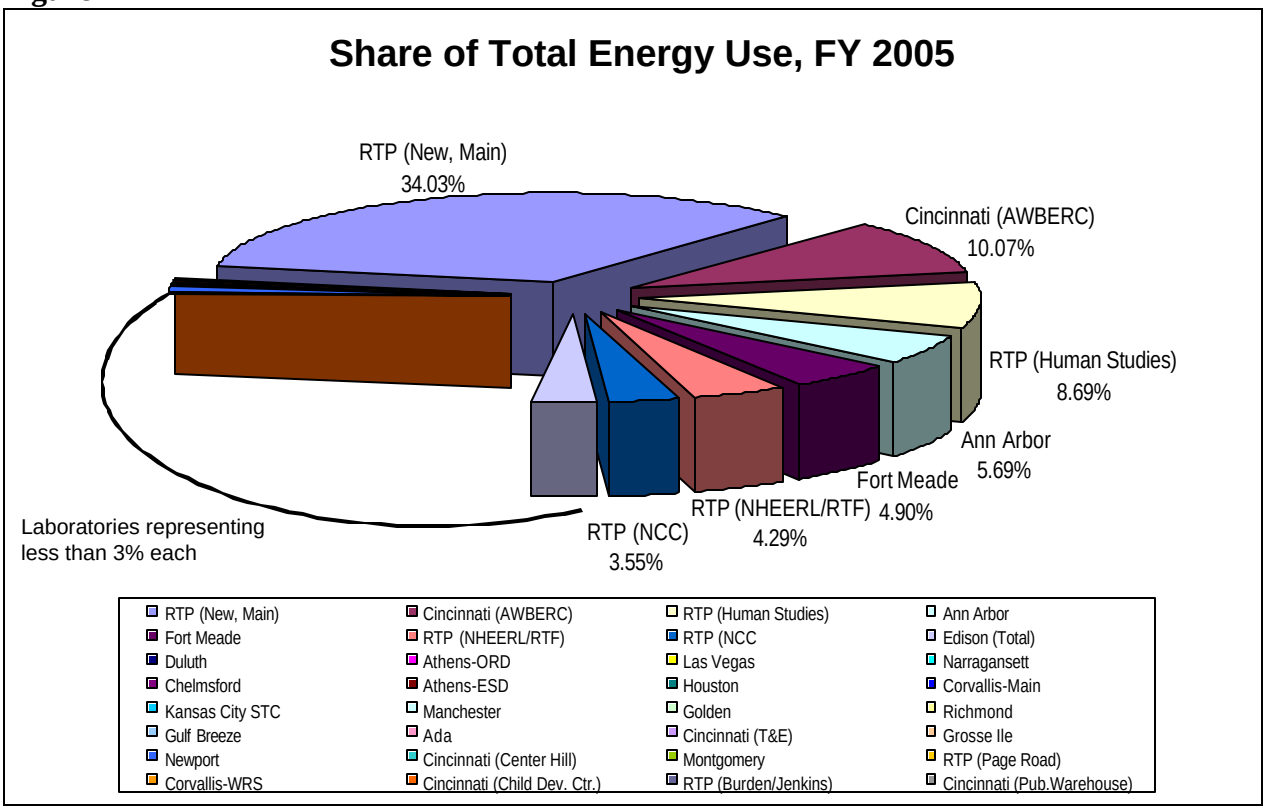
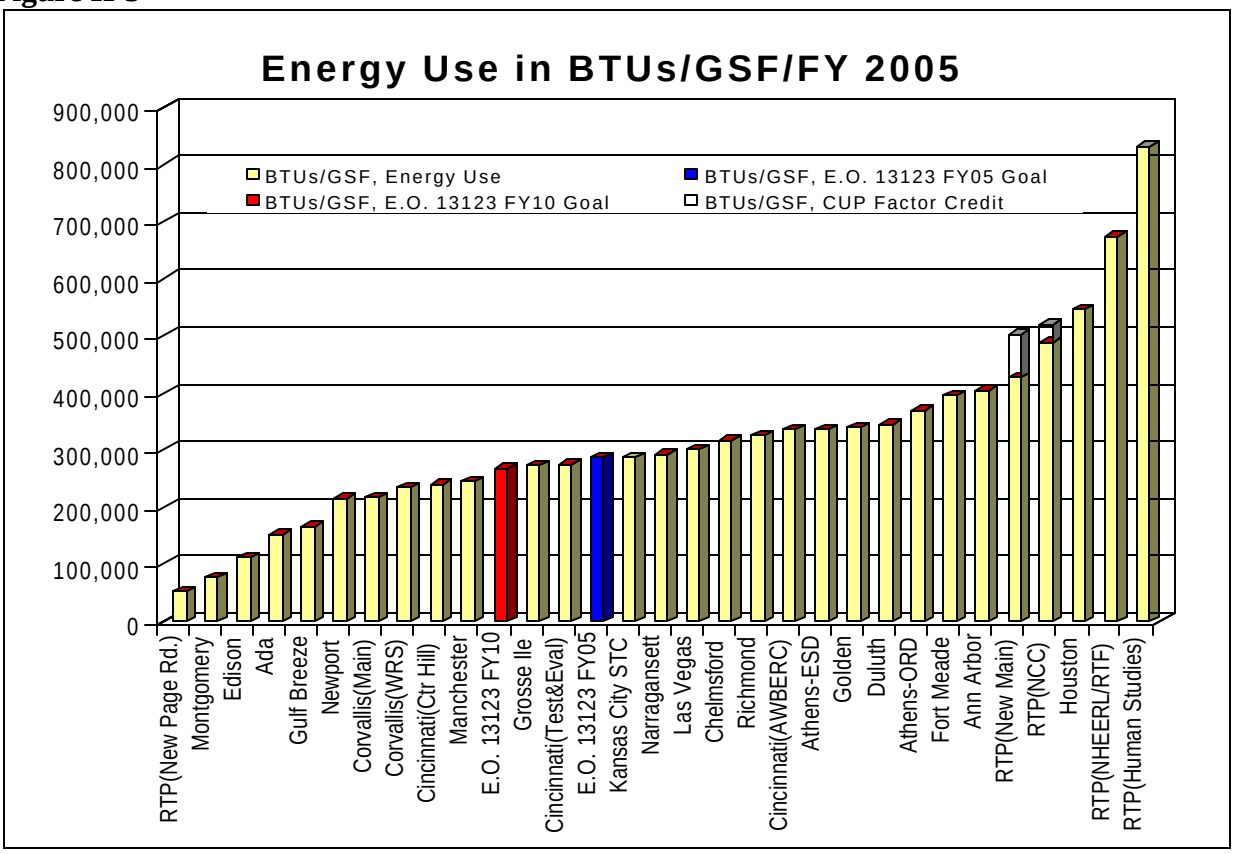


Figure II-3



Non-Fleet Vehicle and Equipment Fuel Use

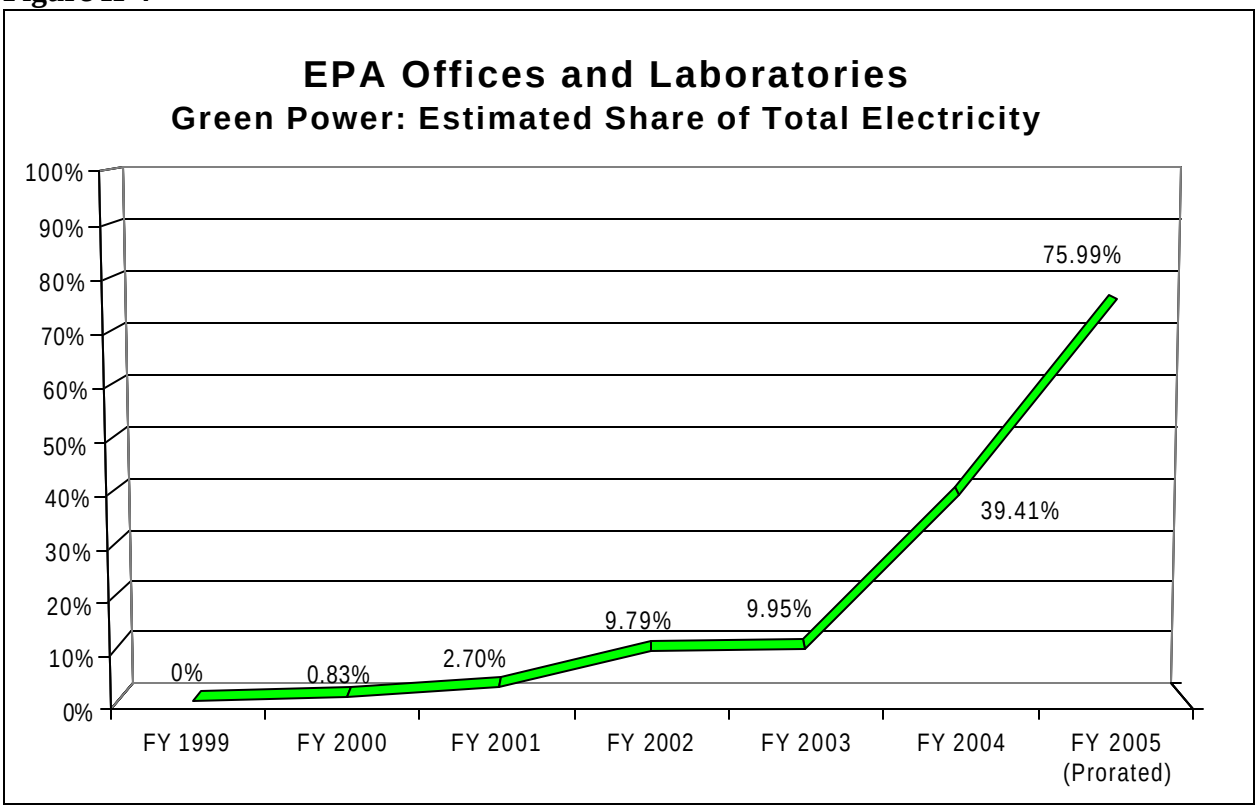
To reduce emissions and fuel consumption and increase fuel efficiency, EPA has incorporated alternative fuel vehicles (AFVs) into its nationwide fleet of 1,163 automotive vehicles. In FY 2005, EPA leased 96 (replacement or new) AFVs that use electricity (hybrid), compressed natural gas, or ethanol/gasoline mixtures, increasing the Agency's AFV fleet by 22 vehicles, for a total of 401 vehicles. In fact, for the sixth straight year, EPA exceeded the EPAct 1992 and E.O. 13149 requirements that 75 percent of nonexempt, new vehicles be AFVs. In FY 2005, 84 percent of the vehicles acquired by EPA were AFVs.

RENEWABLE ENERGY

In FY 2005, EPA continued its support of renewable energy development with the procurement of green power and/or RECs, or "green tags," at eight new facilities. Over the past six years, the Agency has seen its green power commitments grow from one facility in 1999 to 30 facilities in FY 2005. As a sign of the maturing of EPA's green power program, the Agency also has had to replace or exercise extension options on contracts serving nine major facilities. When combined with previous commitments,

the Agency purchased nearly 225 million[2] kWh of green power at the 30 facilities in FY 2005, a figure equivalent to nearly 76 percent[3] of total electric use at offices and laboratories. Nearly all of those 30 facilities procure green power to meet 100 percent of their electricity needs. As EPA's commitment to green power has grown since 1999, so has the efficiency of green power markets. EPA has seen prices fall significantly on a per kWh basis for green power. Newer contracts are typically 1/5 to 1/10 of the cost per kWh, compared to EPA's earliest contracts. On an annual basis, existing green power contracts will displace 83 percent of EPA's estimated annual electricity use. EPA also consumed 28,897 gallons of soy ester biodiesel in FY 2005 at its Narragansett, Rhode Island, and Manchester, Washington, laboratories.

Figure II-4



Because EPA has been a leader in green power procurement, it has also dealt with a number of procurement-related issues that have arisen from its Requests for Proposals. EPA has worked with and through its acquiring agencies to analyze procurement issues, respond to offeror concerns where appropriate, and defend certain green power acquisition principles (e.g., where the power is generated). In

[2] Total purchased as of September 30, 2005 = 224,892,145 kWh (prorated for FY 2005).

[3]Percentage is based on total FY 2004 electricity use (labs and offices) of 295,945,851 kWh.

FY 2005, EPA assisted DOE with issuing new green power procurement guidance allowing agencies to specify the type, location, and age of renewable energy technology, thus reducing procurement issues.

New Locations/Contracts

Contracts covering the eight new EPA facilities receiving green power in FY 2005 include:

- *San Francisco, California*: In November 2004, EPA completed a green power purchase for its Region 9 Office in San Francisco through the Western Area Power Administration (WAPA). The three-year contract with 3 Phases Energy Services will provide the Region 9 Office with approximately 2.3 million kWh of RECs per year. The purchase supports the generation of renewable energy at a geothermal facility in Middletown, California.

- *Denver, Colorado*: In early FY 2005, EPA worked with WAPA to procure green power for the Region 8 Office in Denver. A three-year contract with Aquila, Inc., for 4.7 million kWh of RECs annually will allow the facility to offset 100 percent of its annual electricity consumption by supporting the Colorado Green Wind Project in Prowers County, Colorado.

- *Kansas City, Kansas*: In December 2004, EPA finalized green power contracts through WAPA for two additional locations: the Region 7 Office and Kansas City Science and Technology Center (KCSTC)–both in Kansas City. EPA signed three-year contracts for both facilities covering a combined annual total of more than 8 million kWh of green power in RECs from Aquila, Inc. The procurement offsets 100 percent of annual electricity consumption at each location with renewable energy, 4.45 million kWh for the Region 7 Office and 3.85 million kWh of RECs each year for KCSTC. The RECs support the Gray County Wind Farm in Kansas.

- *Narragansett, Rhode Island*: In February 2005, EPA worked with the Defense Energy Support Center (DESC) to procure green power for the Atlantic Ecology Division Laboratory in Narragansett. The three-year contract with 3 Phases Energy Services for approximately 3 million kWh of RECs annually offsets 100 percent of annual electricity consumption at the laboratory and supports wind power generation in California and Minnesota.

- *Ada, Oklahoma:* In April 2005, EPA agreed to terms (through DESC) on a three-year contract for the procurement of 3 million kWh of RECs annually for the Robert S. Kerr Environmental Research Center in Ada. This allows the laboratory to offset 100 percent of its annual electricity consumption with green power and makes the Ada facility EPA's first carbon neutral laboratory, in conjunction with the ESPC there. The purchase supports the generation of renewable energy at wind farms in Wyoming, California, and Nebraska.

- *Chicago, Illinois:* In August 2005, EPA finalized a contract (through DESC) for green power at EPA's Region 5 Office in Chicago. Over the course of the one-year contract, the Region 5 Office will receive 9 million kWh in the form of RECs from the Basin Electric Power Company. With this purchase, the Region 5 Office now offsets 100 percent of its annual electricity consumption and supports wind power projects in Lamoure County, North Dakota, and Hyde County, South Dakota.

- *Fort Meade, Maryland*: In August 2005, EPA worked with DESC to finalize a contract for green power at the Environmental Science Center (ESC) in Fort Meade. According to the terms of the

one-year contract, ESC will receive 6.4 million kWh in RECs from the Basin Electric Power Company. The RECs, associated with renewable energy generation at wind power facilities in North Dakota and South Dakota, offset 100 percent of annual electricity consumption at ESC.

Contract Replacements and Extensions

EPA replaced or extended six green power contracts for nine major facilities in FY 2005:

- *Cincinnati Ohio*: In October 2004, EPA worked with the General Services Administration (GSA) to extend the green power contract at three facilities in Cincinnati: 1) the Andrew W. Breidenbach Environmental Research Center (AWBERC); 2) the Testing and Evaluation Center; and 3) the Center Hill facility. EPA exercised a three-year extension option in the original contract for RECs worth 15.56 million kWh, 100 percent of the three facilities' annual electricity consumption. As with the original contract, Community Energy provides 778,000 kWh per year of wind power from a wind farm in Pennsylvania, and ComEd (a subsidiary of Exelon Corporation) provides the additional 14.8 million kWh per year from landfill gas in Illinois.

- *RTP, North Carolina:* In November 2004, EPA finalized a replacement contract through DESC for several facilities on the Agency's RTP campus. In what was the largest EPA green power purchase to date, EPA procured 100 million kWh annually in RECs for FY 2005, enough renewable energy to offset 100 percent of annual electricity consumption at the four main facilities (Main Building, National Computer Center, National Health and Environmental Effects Research Laboratory, and the Chapel Hill Human Studies Facility) and all ancillary facilities. The contract with Unicoi Energy Services supports renewable energy generation at a wood and paper pulp waste plant in Port Wentworth, Georgia. This procurement replaces the previous one-year contract, which expired in October 2004, for 30 million kWh annually in RECs.

- *Golden, Colorado*: In December 2004, EPA signed a green power contract through WAPA for its Region 8 Laboratory in Golden. The three-year contract provides the laboratory with 2.1 million kWh in RECs, offsetting 100 percent of annual electricity consumption. The purchase supports the Colorado Green Wind Project in Prowers County, Colorado, and replaces an earlier contract for 2 million kWh in RECs annually.

- *Chelmsford, Massachusetts:* In August 2005, EPA signed a new green power contract through DESC for its New England Regional Laboratory (NERL) in Chelmsford. The new three-year contract provides 3 million kWh in RECs per year and supports renewable energy generation at wind farms in North Dakota and South Dakota. The new contract with Select Energy offsets 100 percent of the laboratory's annual electricity consumption. Previously, NERL had received 1.9 million kWh annually in RECs.

- *Edison, New Jersey*: In August 2005, EPA worked with DESC to replace its green power contract for the Region 2 Laboratory in Edison. The new, three-year contract with Select Energy will provide the laboratory with 6 million kWh per year in RECs, offsetting 100 percent of its annual electricity consumption and supporting wind power from Wyoming and North and South Dakota. The Region 2 Laboratory had previously received 4.5 million kWh annually in delivered green power from biomass and landfill gas.

- *Richmond, California*: In August 2005, EPA worked with DESC to finalize a replacement contract for green power at the Region 9 Laboratory in Richmond. The new three-year contract with 3 Phases Energy Services provides 1.9 million kWh per year in RECs and offsets 100

percent of the laboratory's electricity consumption. The purchase supports wind farms in Northern and Southern California and replaces a previous contract for 1.85 million kWh in RECs from landfill gas.

Additional Green Power Purchases in FY 2005

In addition to these procurement efforts, EPA continued to receive green power at 11 other facilities in FY 2005:

- *Federal Triangle, Washington, D.C.*: Beginning in October 2003, EPA began receiving green power RECs for the Federal Triangle Complex at a rate of 39 million kWh per year through a short-term purchase coordinated through GSA. In September 2004, EPA updated the initial contract with a new, three-year contract with Community Energy and Pepco Energy Services for 44 million kWh in RECs per year. The purchase, offsetting 100 percent of annual electricity consumption at EPA Headquarters' Federal Triangle complex, supports the generation of renewable energy at wind and landfill gas facilities in the Mid-Atlantic states and extends through September 2007.

- *1310 L Street, Washington D.C.*: This EPA Headquarters satellite facility began receiving 4.56 million kWh per year in RECs in June 2004 as part of a three-year contract with Old Mill Power Company. The purchase supports the generation of renewable energy at a wind farm in Meyersdale, Pennsylvania.

- *Athens, Georgia*: Starting in March 2004, EPA has been purchasing green power in the form of RECs to offset 100 percent of the electricity consumption at its Region 4 Science and Ecosystem Support Division Laboratory. A three-year contract with 3 Phases Energy Services, procured through DESC, supports annual production of 4.15 million kWh of renewable energy from landfill gas facilities in North Carolina and Kentucky.

- *Atlanta, Georgia*: In March 2004, EPA's Region 4 Office became the Agency's second regional office to offset 100 percent of its annual electricity consumption with renewable energy. The three-year contract with 3 Phases Energy Services (procured through DESC) for 7 million kWh in RECs annually supports renewable energy generation at landfill gas facilities in North Carolina and Kentucky.

- *Duluth, Minnesota*: The Mid-Continent Ecology Division Laboratory in Duluth currently purchases RECs from QVINTA, Inc., to offset approximately 90 percent of the facility's annual electricity consumption with renewable energy. A three-year contract that began in 2004 supports the annual generation of 2.35 million kWh of green power from a wind farm in Dodge Center, Minnesota.

- *Grosse Ile, Michigan*: EPA currently receives 700,000 kWh in RECs annually to offset 100 percent of the electricity consumption at its Large Lakes and Rivers Research Station. A three-year contract with 3 Phases Energy Services, which began in June 2004, supports renewable energy generation at a landfill gas facility in Lenox, Michigan.

- *Houston, Texas*: EPA's Environmental Services Branch Laboratory in Houston continued to receive 3.35 million kWh of RECs, offsetting 100 percent of the laboratory's annual electricity consumption. The laboratory has been receiving green power since June 2003 through a contract

procured through GSA with 3 Phases Energy. The purchase supports green power generated at a wind farm near Clovis, New Mexico.

- *Las Vegas, Nevada*: EPA's National Exposure Research Laboratory and its Radiation and Indoor Environments National Laboratory on the University of Nevada Las Vegas campus continued to receive 4.65 million kWh per year in RECs as part of a three-year contract with 3 Phases Energy Services that began in 2004. The RECs offset 100 percent of the laboratory's annual electricity consumption with renewable energy and support the generation of wind power in San Gorgonio Pass, California.

- *Manchester, Washington*: Since October 2001, EPA has purchased RECs to offset 100 percent of the annual electricity consumption at its Region 10 Laboratory. During FY 2005, the facility continued its 10-year demonstration grant with the Bonneville Environmental Foundation and received approximately 3.3 million kWh in RECs that support the generation of wind power in Wyoming and Oregon.

- *New York City*: EPA's Region 2 Office, the first regional office to purchase 100 percent green power, continued to offset its annual electricity consumption with 6.18 million kWh of RECs from Constellation New Energy. The three-year contract, procured through GSA and signed in June 2003, supports the generation of wind power at the Fenner Wind Power Project in upstate New York.

- *Corvallis, Oregon*: Since 2002, the Western Ecology Division Laboratory in Corvallis has been purchasing green power to help meet a percentage of its electricity needs. In 2004, the laboratory increased this percentage from 5 percent to 10 percent. Currently, the laboratory receives 360,000 kWh of delivered renewable energy each year from Oregon wind facilities.

Self-Generated Renewable Energy

In December 2004, EPA completed installation of a 9.5 kW photovoltaic (PV) array on the roof of its Western Ecology Division Laboratory in Corvallis, Oregon. EPA continued to operate numerous other self-generation technologies in FY 2005:

- *Solar Arrays*: The Agency continued to operate a 100-kW PV array installed in April 2002 on the roof of its National Computer Center in RTP, North Carolina, and a 10 kW solar array installed on the roof of its Region 5 Office in Chicago's Metcalfe Federal Building in 2000. EPA's Region 10 Laboratory also continued operation of 28 solar panels with a combined 2 kW capacity.

- *PV Lighting*: EPA's campus in RTP, North Carolina, includes solar street lights that have served the entrance road and parking lot facilities since FY 2002. The Agency believes this is the largest solar road lighting project in the United States.

- *Solar Water-Heating Systems*: In FY 2004, the Agency installed a solar water-heating system at its Region 9 Child Care and Fitness Center in San Francisco, California. EPA's Region 2 Laboratory in Edison, New Jersey, utilizes three solar water-heating systems that have been the primary source of hot water in their respective facilities since 1998. Each system helps augment its facility's energy use by reducing the need for electricity and natural gas.

- *Solar Power Awnings*: EPA's New England Regional Laboratory in Chelmsford, Massachusetts, has operated a PV awning system since September 2001. The 2-kW capacity awnings feed the regional electric grid and reduce cooling needs by providing shade for the facility's office windows.

- *Solar Wall*: EPA's Region 8 Laboratory's transpired solar collector has augmented the facility's heating and cooling system since March 2002, generating approximately 1.38 MMBtus of solar power annually at the Golden, Colorado, facility.

- *Ground-Source Heat Pump*: A geothermal heat pump (GHP) was installed as part of the Robert S. Kerr Environmental Research Station's ESPC upgrade in Ada, Oklahoma, for which construction was completed in June 2004. This GHP generates approximately/reduces EPA's need for primary fuels (electric and gas) by 7,800 MMBtus annually.

- *Lake Cooling Water*: EPA's Mid-Continent Ecology Division Laboratory in Duluth, Minnesota, uses water from nearby Lake Superior as non-contact cooling water for building air conditioning and other mechanical equipment. The facility used an estimated 72 million gallons of water in FY 2005 for these purposes, greatly reducing energy and water costs.

Several of these projects have been recognized on DOE's Web site as examples of the Million Solar Roofs initiative:

Facility	**Location**	**Project/Amount**	**Used Since**
Western Ecology Division Laboratory	Corvallis, OR	Six 150-watt PV panels	December 2004
Region 9 Office, Child Care and Fitness Center	San Francisco, CA	One solar water-heating system	October 2003
National Computer Center	RTP, NC	100 kW solar roof	September 2002
New England Regional Lab	Chelmsford, MA	2 kW solar sunshade panels	September 2001
Region 5 Office/GSA's Metcalfe Federal Building	Chicago, IL	10 kW solar roof array	FY 2000
Region 10 Laboratory	Manchester, WA	28 solar panels in three PV arrays	June 1999
Region 2 Laboratory	Edison, NJ	Three solar water-heating systems	Approx. 1997

Petroleum

In FY 2005, EPA used a total of 183,234 gallons of fuel oil at six of its reporting laboratories (Narragansett, Rhode Island; Edison, New Jersey; Fort Meade, Maryland; RTP, North Carolina; Duluth, Minnesota; and Manchester, Washington). Of those six facilities, two are using a blend of soy ester biodiesel fuel as a clean-burning alternative to traditional diesel fuel. The Atlantic Ecology Division Laboratory in Narragansett, Rhode Island, and Region 10 Laboratory in Manchester, Washington, used a

combined 28,897 gallons of 100 percent biodiesel, mixed with traditional diesel fuel in a one-to-four ratio. In addition, the Agency used a total of 8,002 gallons of propane at two facilities during FY 2005 (Edison, New Jersey, and Manchester, Washington).

WATER CONSERVATION

EPA has set an internal goal to reduce water consumption by 15 percent (from an FY 2000 baseline) by FY 2010. In pursuit of this goal, and in accordance with E.O. 13123, EPA has conducted water use assessments and prepared detailed water management plans that include best management practices (BMPs) for 45 percent of its laboratories. Through FY 2005, EPA has completed such plans for 13 of its 29 laboratories, with more underway. EPA far exceeds the FY 2005 E.O. 13123 requirement to complete water management plans at 20 percent of its facilities (as well as the FY 2006 requirement for water management plans at 30 percent of its facilities). These and other efforts to promote water efficiency and implement water-saving projects have allowed EPA to significantly reduce water consumption.

During FY 2005, EPA facilities reaped the benefits of water conservation initiatives and continued to take steps to significantly reduce water consumption at the following facilities:

- *Corvallis, Oregon*: In December 2004, the National Health and Environmental Effects Research Laboratory (NHEERL) replaced a single-pass cooling system in the computer room of its main laboratory with a closed loop system that uses recycled glycol for cooling instead of a continuous flow of chilled water. This upgrade was part of a water management plan completed in 2004 that also included the installation of water control valves on three autoclaves (which has already saved an estimated 1 million gallons of water), irrigation system controls, and less water-intensive plumbing fixtures. As a result of these improvements, in FY 2005 NHEERL used less than half the water consumed on average during the same time period in FY 2003 to FY 2004. In that time, the water efficiency upgrades have saved 5.4 million gallons of water and approximately $27,000 in costs.

- *Federal Triangle, Washington, DC*: In January 2005, EPA began construction of a small cistern as a pilot of a larger multi-year, multi-phased low-impact development (LID) project to manage stormwater and conserve water at EPA Headquarters' Federal Triangle complex. Eventually, significant amounts of rain water runoff collected in the cisterns will be used to supply a new irrigation system that will include rain sensors and timers. This, along with the planting of native species, will reduce the amount of water necessary to maintain the lawn and planting beds.

- *Golden, Colorado*: In Summer 2005, EPA conducted a sustainable landscaping project at its Region 8 Laboratory. A feasibility study will assess alternatives that will minimize or eliminate the water consumed to maintain trees and plants on the facility grounds. The study will seek to identify stormwater utilization strategies, appropriate native plant species, as well as project costs,

benefits, and payback periods. Xeriscaping, for example, could save nearly 17 percent of the laboratory's total water consumption, or about 750,000 gallons per year.

- *Newport, Oregon*: In FY 2005, the Pacific Coastal Ecology Branch Laboratory devised a system that utilized old laboratory equipment to provide a year-round supply of freshwater. Following retrofits, the laboratory no longer used several 2,500 gallon plastic holding tanks. Two tanks were relocated to the boat wash-down area, pumps were installed, and runoff was diverted to fill the tanks, taking advantage of Oregon's high annual precipitation. The reused tanks now supply the water needed to wash the laboratory's five small boats and two hovercraft.

New Water Management Plans

During FY 2005, EPA also completed water conservation assessments and water management plans for the following facilities:

- *Houston, Texas*: In July 2005, the Region 6 Laboratory completed a water assessment and established a water management plan that set a goal to reduce water consumption in 2010 by 3 percent. Under the environmental management system set forth in the plan, the laboratory will be tracking and evaluating water consumption in pursuit of the conservation target. Additionally, the laboratory will be investigating the feasibility of upgrading the irrigation system with a rain or moisture sensor, incorporating low flow toilets, urinals, and showerheads, installing faucet flow restrictors, and promoting water conservation awareness. The Region 6 Laboratory already recovers air handler condensate for reuse as cooling tower make-up water at the rate of 1.4 million gallons per year, resulting in more than $3,500 annual savings.

- *Manchester, Washington*: In August 2005, the Region 10 Environmental Laboratory drafted a water management plan following the completion of a facility water management assessment. The plan sets a target of a 5 percent reduction in potable water consumption by 2005. The laboratory has already started to save an estimated 17,000 gallons per year after reducing the eye wash flush frequency from weekly to monthly. Potential improvements, which in the future could save more than 100,000 gallons of water and $1,000 per year, include: installing a water control valve on the autoclave; installing faucet flow restrictors and low-flow showerheads; and upgrading toilets and urinals to current water-efficient design standards.

- *Ada, Oklahoma*: At the close of FY 2005, the Robert S. Kerr Environmental Research Center was finalizing a water management plan based on the results of a water conservation assessment. Though the facility has already achieved significant water savings from the installation of a ground-source heat pump, the plan identifies several additional conservation opportunities. The laboratory is considering adding flow restrictors to bathroom faucets as a relatively inexpensive means of reducing water consumption, with annual estimated savings of 65,000 gallons and $125. The facility will also be exploring installation of rain or moisture sensors to minimize water use for irrigation, a feature that could potentially save 400,000 gallons and $900 per year.

SECTION III: IMPLEMENTATION STRATEGIES

In FY 2005, the Agency focused on its largest and most energy-intensive facilities–particularly the four in RTP, North Carolina. Addressing energy efficiency in RTP will be critical to meeting the new EPAct 2005 energy reduction requirements, because these facilities represent 50 percent of EPA's energy consumption and are four of EPA's five highest energy users on a Btu per gross square foot per year basis. The Agency will continue to implement its five-part energy conservation strategy in FY 2005:

- Promoting sustainable design in its new buildings and leases so that new buildings entering the inventory are better than the ones they replace.
- Re- and retro-commissioning to achieve large energy savings in the near term.
- Designing and constructing physical mechanical system changes to achieve energy savings in the long run.
- Concentrating efforts where the greatest opportunities for energy efficiency exist, at the Agency's largest facilities. Regardless of size, however, EPA will also implement energy conservation projects on smaller laboratories where funding, local management, and local staff support exist.
- Purchasing green power, which is a separate requirement in EPAct 2005 and will always serve as an important component of EPA's balanced effort to reduce its environmental footprint.

EPA will also continue to conduct energy audits, support life-cycle cost analysis, benefit from ESPCs, use energy-efficient products, and incorporate water conservation measures across all of its facilities.

LIFE-CYCLE COST ANALYSIS

When developing, constructing, and operating its facilities, EPA makes every effort to conserve energy and water, incorporate sustainable design, and identify innovative technologies, products, and services that are environmentally sound and cost-effective throughout their life cycles. All energy projects, for example, go through life-cycle cost analysis, as evidenced in the two ESPCs EPA implemented at its Ann Arbor, Michigan, and Ada, Oklahoma, laboratories. These projects have allowed the Agency to realize significant energy efficiency upgrades and life-cycle savings that would have gone unrealized under the traditional funding process, which emphasizes up-front costs. Life-cycle cost analyses help EPA justify energy efficiency improvements; in Richmond, California, for example, the six-year payback on the upgrades EPA was seeking was short enough to warrant making those mechanical system investments, as EPA's lease expires at the end of 2013.

EPA is working to institutionalize its energy master planning process, investigating energy performance projects over a 15- or 20-year time frame, since laboratories are long-term investments. The Agency has taken that idea one step further and in FY 2005 drafted a standard statement of work for sustainable master planning to examine all types of sustainable features on a life-cycle basis for EPA's future facility projects. When procuring new buildings, EPA generally uses energy modeling during the design process, to help identify additional opportunities for improvement. Such modeling, conducted during the 35 percent drawings for EPA's recently completed Science and Technology Center in Kansas City, Kansas, revealed additional economical energy conservation measures that were incorporated into the project.

FACILITY ENERGY AUDITS

To help identify opportunities for energy efficiency improvements to mechanical systems, EPA's office and laboratory facilities are regularly audited as part of a tiered process. The first tier, or Stage 1 audit, is a basic energy use assessment conducted as a stand-alone activity or in conjunction with water use assessments. Stage 2 assessments encompass more thorough energy consumption analysis, focus on specific areas of concern, identify various energy conservation measures, and calculate simple payback schedules, allowing facility managers to make decisions and prioritize energy improvements. Nearly every EPA reporting laboratory has had a Stage 1 or Stage 2 audit conducted in the past one to five years.

FINANCING MECHANISMS

As mentioned earlier, EPA has taken advantage of the ESPC financing mechanism to realize significant energy and cost savings at its Ann Arbor, Michigan, laboratory (completed in 2001) as well as in Ada, Oklahoma (accepted in September 2005). EPA is also using ESPC-like mechanisms to finance future improvements. Under an agreement with the firm from which EPA leases its Richmond, California laboratory, the lessor is financing a natural gas co-generator to produce electricity and hot water, two small staging boilers to replace a larger version, and an HVAC controls upgrade. The contract for these projects was awarded in May 2004, and they were completed in Summer 2005. Lease payments will be made by EPA using the 15 percent utility savings, plus a one-time $60,000 rebate from the utility, PG&E.

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 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 2005, EPA made mandatory for Agency purchase card holders use of a Blanket Purchasing Agreement (BPA) with office supply company Corporate Express, which provides environmentally preferable non-electronic office products Through the BPA and its EPP program, EPA maintains a comprehensive database of environmentally preferable products for government purchasers and other users, as well as sample contract language for procuring these products. The Agency also published newsletters, including the *EPP Update* and *Energizing EPA*, that promote the use of energy-efficient products and provide resources to EPA purchasers through articles on specific products and purchasing procedures.

ENERGY STAR BUILDINGS

ENERGY STAR recognizes buildings that perform in the top 25 percent of their respective sectors with a special label. Because the ENERGY STAR program does not encompass laboratories in its labeling program, EPA cannot designate its 29 reporting laboratory facilities as ENERGY STAR Buildings. However, the Agency continues to work with GSA to achieve the ENERGY STAR Building label in office facilities it occupies:

- *Seattle, Washington*: The Park Place Building, which houses EPA's Region 10 Office, received the ENERGY STAR label in November 2004, after a series of improvements by both the building's owner, Benaroya Companies, and EPA, which occupies 10 of the facility's 21 floors. EPA installed occupancy sensors and energy-efficient light fixtures, and the owner replaced the HVAC systems and modified the penthouse ventilation system to recover heat leaving the building.

- *Atlanta, Georgia*: In April 2005, EPA received the ENERGY STAR label at the Sam Nunn Federal Center in Atlanta, where its Region 4 Office is located. Through a pilot project with GSA and other tenants in the building, a multi-agency team evaluated the building, conducted pilot tests, and identified simple, low-cost modifications, such as occupancy sensors, lighting upgrades, and repairs.

- *New York, New York*: EPA's Region 2 Office is located within the Foley Square Federal Office Building, which was labeled an ENERGY STAR Building in 1999. Some of the energy-efficient features within the building include a building energy management system, T-8 lighting fixtures, steam turbine centrifugal chillers, high efficiency motors, and a variable air volume (VAV) air handling system. The building no longer performs in the top 25 percent of similar office buildings. EPA plans to initiate a re-certification effort with GSA in FY 2006. Plans include re-

commissioning the building, correcting the "operational drift" (or a slow creep towards non-optimal building operations and energy waste), and obtaining a current ENERGY STAR label again.

- *Chicago, Illinois*: EPA's Region 5 Office is located within the 28-story Metcalfe Federal Building, which achieved the ENERGY STAR label in 1999. The building features an energy management system, a comprehensive green lighting system, and a rooftop solar array with a capacity of 10 kW. In addition, the domestic water pumps and cooling tower fans feature high efficiency motors and variable frequency drives. As with Region 2, EPA anticipates initiating a re-commissioning effort in FY 2006 to re-optimize energy performance and re-establish the ENERGY STAR label for this building.

- *Denver, Colorado (existing office)*: EPA's Region 8 Office has achieved the ENERGY STAR Building label in multiple years, including, most recently, 2004. In the past it implemented the Green Lights program, a precursor to ENERGY STAR.

- *Denver, Colorado (future office)*: EPA is working with GSA to develop a new facility to house its Region 8 Office. EPA requires that this new building achieve an ENERGY STAR Building label within 14 months of 95 percent occupancy, which is expected in Fall 2006.

- *Arlington, Virginia*: Several EPA Headquarters facilities in Arlington will soon move to one consolidated 422,000 square foot complex. EPA is requiring that the new building meet ENERGY STAR performance criteria within 14 months of occupancy, which is expected in Summer 2006. Energy-efficient mechanical system controls and a highly reflective roof are being considered for the facility.

- *Improved Data Collection*: In addition to focusing on ENERGY STAR labeling at its office buildings, EPA continued to expand collection of energy data from each of its major regional and Headquarters office buildings in FY 2005. Although GSA has had the responsibility to report energy use for these buildings under E.O. 13123, EPA wants to use this data to further identify opportunities to improve energy performance in the offices it occupies.

SUSTAINABLE BUILDING DESIGN

EPA incorporates sustainable building design principles into the siting, design, and construction of all new facilities, as well as the renovation and maintenance of existing facilities. The Agency outlined in its *Green Buildings Vision and Policy Statement* a holistic approach to minimize environmental impacts while maintaining a healthy, comfortable workplace, and its *Architecture and Engineering Guidelines* reflect these principles in all aspects of design, construction, and operation of its facilities.

The Agency works closely with GSA in the selection of architects, mechanical engineers, and building developers, and incorporates sustainable design language into the solicitations for these vendors. The Agency requires a minimum LEED®-New Construction (LEED® - NC) Silver rating for its major new office building leases and requires that each major new office facility obtain the ENERGY STAR

label within a fixed post-occupancy time period. EPA also typically sets a 30 percent better than the ASHRAE 90.1 (1999) goal for energy performance for all new major facilities. Future projects with sustainable design features include:

- *EPA Headquarters, Northern Virginia Offices*: In May 2004, GSA signed 10-year leases for 422,000 square feet of newly constructed space in Arlington, Virginia. The new space will house EPA employees currently working at three separate facilities in the Crystal City section of Arlington. As with all of its major new buildings, EPA is requiring that this space obtain a minimum LEED Silver-NC rating and meet ENERGY STAR building energy performance standards to receive a label. Water conservation will be a priority, as builders plan to incorporate low-flow plumbing fixtures. Stormwater management techniques will be used to reduce the environmental impact of runoff. In addition, the building contractor has agreed to recycle at least 75 percent of construction period waste and incorporate EPA Headquarters' recycling program into the building design. EPA occupancy is expected by the end of Summer 2006.

- *Denver, Colorado, Region 8 Office*: In June 2005, EPA and GSA broke ground for the new 250,000-square-foot Region 8 headquarters building in downtown Denver. Designed to achieve a minimum Silver LEED-NC certification, the building is likely to exceed expectations and achieve Gold. Numerous environmental features include: a 50,000-square-foot, highly reflective ENERGY STAR-rated roof to reduce energy consumption and heat island effects; native vegetation in the roof-top garden to manage and filter rain water; a nine-story atrium that provides abundant natural lighting to reduce energy consumption; photovoltaic panels that generate electrical power to supplement green power purchases and reduce energy consumption; low-flow plumbing fixtures and native, drought-tolerant landscaping to conserve water; low volatile organic compound (VOC) interior adhesives, paints, sealants, and caulks to improve indoor air quality; environmentally preferable janitorial and cleaning products to improve indoor air quality and reduce the use of toxic chemicals; an integrated pest management (IPM) plan to reduce the use of toxic chemicals; a recycling collection program for newspapers, mixed office paper, cardboard, glass, plastics, metals, and toner cartridges; and extensive bike parking and shower facilities to encourage healthy, low-impact commuting. The project should be completed and ready for occupancy in October 2006.

- *Boston, Massachusetts, Region 1 Office*: GSA is renovating and rehabilitating the John W. McCormack Post Office and Courthouse federal building, with an estimated completion date of 2008. EPA's Region 1 Office will be the largest and lead tenant in the building, occupying approximately 225,000 square feet. EPA started meeting with GSA in April 2001 to ensure that sustainable design and energy efficiency experience were considered when selecting the architect and engineering firms for the project. EPA continues to work with GSA and the design team to influence and improve the energy efficiency and sustainability of the project, as well as seek outside funding for energy upgrades. EPA has also funded a "green roof" for this building, which will help control stormwater runoff and mitigate the urban heat island effect. Occupancy is scheduled for late FY 2008.

- *New Childcare Facility, RTP, North Carolina*: Construction of EPA's new childcare facility in RTP, North Carolina, began in April 2004 and was completed in November 2005. Like the rest of the RTP campus, the new childcare facility incorporated green building features such as effective daylighting and energy-efficient design. By incorporating these and other sustainable design principles, the facility will strive to achieve a LEED-NC Silver rating.

- *Lab Annex 2, Cincinnati, Ohio*: As part of a new annex to one of EPA's largest laboratories, the Agency hopes to incorporate a green roof, under-floor ventilation, and a variety of other sustainable features as it strives for LEED-NC Silver certification at a minimum and possibly Gold. Construction on this 42,400 square foot annex was awarded in September 2005, with completion slated for May 2007.

- *Central Regional Laboratory, Golden, Colorado*: In addition to sustainable building features such as a passive solar wall, the 50,000 square foot building on six acres initiated a feasibility study in FY 2005 to eliminate or minimize the amount of water needed for landscaping. Site analysis was completed in Summer 2005 and designs were completed at the end of FY 2005.

Sustainable Design at Existing Facilities

Some of the newer EPA facilities that have incorporated sustainable design include:

- *National Computer Center, RTP, North Carolina (NCC)*: Built on the main campus in RTP, North Carolina, and opened in January 2002, NCC houses EPA's central data processing and exchange operations. The facility includes extensive daylighting and a rooftop photovoltaic system that helps power the facility. In January 2005, the facility received LEED-NC Silver certification.

- *EPA Headquarters, Washington, DC*: In collaboration with GSA, EPA Headquarters initiated a low-impact development (LID) demonstration project in FY 2004 designed to reduce the peak volume and pollutant load of stormwater runoff entering Washington, DC-area waterways from the Agency's Federal Triangle campus. The first phase of the project was completed in Summer 2005 and included bioretention cells and a soil/grass stabilization/parking area installed along Constitution Avenue. Construction has started in the Ariel Rios South Courtyard on a porous paving, native landscaping, and rainwater collection system, with construction expected to be completed by Spring 2006. Design for the EPA West garage cistern began in Fall 2005, with construction also scheduled for completion in 2006. Stormwater management and water conservation features will be included in GSA's design for the Benjamin Franklin Circle (12th Street), and will require final review and approval by the Commission of Fine Arts and the Washington, D.C., government before moving from concept design to the construction document and construction phases. The remaining phases, for which designs will be developed beginning in FY 2007, include plans to introduce native landscaping in the EPA West Courtyard and green roofs installed on two of the buildings.

- *Kansas City, Kansas, Science & Technology Center (KCSTC)*: In May 2003, EPA opened a 72,000-square-foot laboratory in Kansas City designed to conserve energy, water, and natural resources. Energy-efficient features include VAV fume hoods and systems, heat recovery, a plate and frame heat exchanger system, and a variable frequency drive chiller system combined with two conventional chillers. Water conservation features include a rooftop rainwater recovery system that reduces water use up to 735,000 gallons per year, low-flow plumbing fixtures, and Xeriscaping. In addition, environmentally preferable building materials and a construction period recycling plan were used to help conserve resources. In August 2003, these features helped the facility earn a LEED-NC Gold 2.0 rating from the U.S. Green Building Council. Energy performance at this laboratory has been quite good, with Btus per GSF running approximately 18 percent less than other new EPA VAV laboratories.

- *New Main Facility, RTP, North Carolina*: In constructing its largest facility, which was fully occupied in January 2003, EPA emphasized solid waste reduction, increased energy and water efficiency, healthy indoor environmental quality, environmentally preferable building materials, and natural landscapes. The 1.1 million gross square foot facility was designed to minimize site disruption and fit within the natural contours of the land. During construction, more than 3,500 plants were transplanted and the entrance road was moved to help preserve and maintain natural vegetation. The facility installed a digitally controlled building automation system with variable speed motors, fans, and pumps designed to conserve energy used by the heating and cooling systems. In addition, native landscaping, stormwater management techniques, and low-flow plumbing fixtures were incorporated to help conserve water. Unfortunately, energy performance at this laboratory has not met original projections, and EPA is re-commissioning the facility and stabilizing its operations.

- *Chelmsford, Massachusetts, Laboratory*: EPA's New England Regional Laboratory, which opened in October 2001, incorporates low-flow plumbing, electronic sensors, a rooftop rain recovery system, a nighttime system setback, and photovoltaic awnings. In April 2003, the facility received a LEED-NC Gold 2.0 rating. Relative to other VAV laboratories in EPA's inventory, this facility has been performing well from an energy use standpoint.

- *Kansas City, Kansas, Region 7 Office*: EPA's Region 7 Office, which opened in 1999, included a green rider in its lease to incorporate sustainable design elements, including environmentally preferable construction materials, lighting motion sensors, low-flow plumbing fixtures, native landscaping, and drip irrigation systems.

ENERGY EFFICIENCY IN LEASE PROVISIONS

GSA leases most of the office buildings EPA uses. When EPA needs new space, the Agency works with GSA to ensure the new office facility, whether the lease of an existing building or a build-to-suit (newly constructed) lease facility, adheres to minimum environmental performance standards. EPA originally used "green riders" to get the best possible existing or newly constructed building, recognizing that there may be limitations. Green riders were appended to GSA standard language in leases for the Region 3, Region 7, and Region 10 office buildings, including requirements for reusing materials, purchasing environmentally preferable products, recycling construction and demolition debris, promoting public transportation, and improving the facilities' energy performance through energy-efficient HVAC systems. As green buildings have become more accepted, GSA has upgraded the environmental performance requirements of its standard leases, and EPA has continued to raise the environmental performance expectations and specifications for its facilities. Now, numerous GSA and EPA environmental performance standards are incorporated throughout lease documents.

As mentioned previously, green lease provisions ensure that the new and renovated buildings under development in Denver, Boston, and Northern Virginia will promote energy efficiency, water

conservation, resource reuse, and a healthy work environment. Using appropriate lease language, the Agency is able to ensure that all new facilities achieve a minimum LEED-NC Silver rating, the ENERGY STAR building label, and, typically, 20 to 30 percent better than the ASHRAE 90.1-(1999) standard (for both offices and laboratories).

Even though the Agency is not required to report energy use in its offices, EPA is currently working with GSA to incorporate mandatory quarterly energy reporting in all of its major office building leases, so that it can better understand its office energy use profile, identify poor energy performers in its inventory, and target locations where collaboration among EPA, GSA, and the landlord will economically reduce energy use.

INDUSTRIAL FACILITY EFFICIENCY IMPROVEMENTS

Even as EPA met the FY 2005 goal outlined in E.O. 13123 with a combination of mechanical improvements and green power purchases, the Agency kept its focus on commissioning, re-commissioning, and retro-commissioning the facilities that use the most energy and water, as well as identified opportunities to improve efficiencies cost-effectively within laboratories and offices of all sizes. Following are some of the highlights of work accomplished to increase energy and water efficiency in EPA facilities in FY 2005:

- *Research Triangle Park, North Carolina*: EPA's largest energy consumers–the New Main building, NCC, and their sister facilities, the National Health and Environmental Effects Research Laboratory in Durham and the Human Studies Laboratory in Chapel Hill–continued to be a major area of focus for EPA in FY 2005. The following are just a few of the efficiency measures underway or completed:

  - *New Main*: This new facility was fully occupied in January 2003. When the facility was accepted, the energy metering system for the building was not functional. One of EPA's current priorities is to properly meter the facility; a contract for a Web-based metering and energy management system was awarded in May 2005, and the project was completed in December 2005.

    Implementation of a laboratory controls optimization pilot (LCOP) project initiated in FY 2004 should be completed by the end of March 2006. Using laboratory commissioning protocols developed in Summer 2004, EPA has been safely reducing the ventilation rates of laboratory modules campus-wide since November 2004. The Agency anticipates saving 187,000 cfm of outside air by eliminating single-pass air, for an anticipated campus-wide energy savings of 10 percent.

    An office re-commissioning pilot project was designed in Summer 2005 to ensure proper operation of the VAV boxes and economizers and appropriate integration with the building automation system. If a pilot project that reconfigures one air handling unit

(AHU) succeeds, EPA will apply it to all the office AHUs, for an energy savings of approximately 15 percent.

Humidification problems that first appeared in FY 2004 in one of the four main laboratory wings (the "A" Wing or the animal wing) have turned into an energy savings opportunity as well. A humidity system upgrade was designed in December 2004 for the A wing, which includes heat recovery. EPA awarded a construction contract for this mechanical system change in July 2005 and expects completion of construction in January 2006. Together, these projects should solve humidification problems in the A wing and save 25 to 30 percent of the energy used in the A wing, for a savings to taxpayers of approximately $200,000 per year. In addition to this project, the A wing is reconfiguring its controls to reduce airflow in the vivarium laboratory 10 to 15 percent, which will result in a 1 to 2 percent campus-wide energy use reduction.

In addition to these projects, the first phase of a five-year controls master plan was completed in the new Main complex in FY 2005, and a study to identify additional areas for energy/controls improvements in the high bay laboratory was completed at the end of the fiscal year.

- *Human Studies Laboratory*: Implementation of energy efficiency projects resulting from a major energy assessment in FY 2004 began in FY 2005. Air Handling Units (AHU's) 3, 4, and 5, and related systems, were repaired and optimized by the end of CY 2005. Re-design of AHUs 1 and 2, and related systems, started in Summer 2005. The design of a glycol loop heating project was completed in FY 2005, with construction award in FY 2006 pending funding. Controls master planning and an operations and maintenance study were also completed for this facility in Summer 2005.

- *National Health and Environmental Effects Research Laboratory*: Mechanical engineers developed an implementation plan for energy savings opportunities identified in a Fall 2003 energy audit. They completed the implementation plan in spring 2004. Recommendations from the energy audit will be turned into projects for this facility in FY 2006.

- *Ada, Oklahoma:* In September 2005, the ESPC at EPA's Robert S. Kerr Environmental Research Center was formally accepted, with the review and approval of a measurement and verification plan. Major systems construction was completed in November 2004. The ground-source heat pump, VAV fume hoods and air supply, new fan motors, and integrated direct digital control system for HVAC, energy, fire, and security management have resulted in energy savings even higher than expected. Energy use has decreased approximately 45 percent compared to pre-ESPC baseline consumption. Between the geothermal heat pump, which replaced natural gas use, and the green power purchase to offset energy use, the Ada laboratory became EPA's first "carbon-neutral" facility in 2005, meaning the building has virtually eliminated the greenhouse gas emission footprint associated with its energy use. To track the ESPC's success, EPA completed the review and approved a measurement and verification protocol in Summer 2005, which includes cost verification of energy, water, and operations and maintenance expenditures.

- *Ann Arbor, Michigan:* A new cooling tower, air handling units, 200-kW fuel cell, and direct digital control system completed in April 2001 helped NVFEL use 40 percent less energy than the ESPC baseline years of FY 1993 to FY 1995. Facility additions since the completion of this ESPC, however, have recently degraded energy performance since 2001. In response, EPA has

initiated another round of energy studies to improve energy efficiency at this laboratory. An upgrade to the facilities scrubber, expected to be completed in March 2006, will also help NVFEL save an estimated 1.2 million gallons of water annually, by replacing a water-based system with dry filter packets. EPA initiated a controls upgrade on the scrubber in Summer 2005 as well.

- *Athens, Georgia:* EPA has two adjacent laboratories in Athens, one for its Ecosystem Support Division (ESD) and one for the Office of Research and Development (ORD), as well as a childcare center. As part of its overall architectural and engineering master planning conducted for the campus in FY 2005, the Agency decided to incorporate long-term security and sustainability planning into the master planning process, which has given EPA the opportunity to consider numerous efficiency opportunities. The ESD laboratory (a leased facility), for example, requires emergency, off-grid power generation, so EPA is looking into installing a fuel cell., micro-turbine, or other co-generation facility on the ORD laboratory property (which is owned by EPA) as part of its master plan. Contracts for upgrading the master plan with security and site sustainability assessments were awarded in August 2005.

- *Cincinnati, Ohio:* The Agency's second largest laboratory, AWBERC, is implementing an infrastructure/energy master plan to replace the facility's long outdated mechanical systems over the next several years. Construction on a new "lead and lag" cooling tower with variable volume/separate cells and a water distribution system featuring variable drive pumps was completed in March 2005. The replacement of these 30-year-old cooling towers with new, more efficient ones should reduce energy use by approximately 4.5 percent or 5,895 MMBtus annually. An infrastructure phasing plan for air handling units, ducts, and exhaust systems replacements was completed in December 2004, and design of these systems will be awarded in FY 2006. In March 2005, EPA completed a steam study, which determined that using steam to generate hot water was more economical that replacing the steam boilers with hot water boilers. However, the laboratory will replace two 45,000 lb/hour boilers, which would have required extensive repairs, with three 22,500 lb/hour boilers, which can run more efficiently and require full capacity only at peak loads.

  AWBERC is in the process of adding a second annex, Annex 2, that will feature two buildings with a combined 42,000 square footage designed to LEED-NC Gold standards, including an efficient underfloor heating and cooling supply. A construction contract was awarded in September 2005 and construction should be completed May 2007.

- *Corvallis, Oregon:* In May 2005, EPA awarded an architecture and engineering sustainable master planning contract for a large-scale renovation planned at its Western Ecology Division (WED) Laboratory. The master plan will delineate all aspects of future changes in terms of laboratories, office space, and sustainable opportunities. The new VAV laboratory will feature high-performance fume hoods, a state-of-the-art BAS controls system for nighttime setbacks, and a more efficient and secure window glazing for added security and energy efficiency. EPA anticipates completing the master plan by March 2006. WED also realized significant water savings in FY 2005, due in part to the replacement of a computer room single-pass air conditioning unit and installation of water-reducing valves on three autoclave units in July 2004.

- *Duluth, Minnesota:* EPA's Mid-Continent Ecology Division Laboratory continued to design a variety of VAV upgrades to existing units in FY 2005. Designs are expected to be 100 percent complete by the end of 2005, and construction contracts will be out for bid in 2006. EPA also

undertook a test and balance study at the Duluth facility in June 2005 to examine the feasibility of making the entire laboratory VAV.

- *Manchester, Washington:* Following completion of a new wing featuring VAV fume hoods at the Region 10 Laboratory, EPA undertook multi-stage upgrades and renovations to the facility's existing wings. During FY 2005, the Agency focused on Stage 2 of the project, which has two phases: the Phase I design, which encompasses six fume hoods, was completed in Summer 2004, and construction and commissioning continued through 2005; the Phase II design started in Summer 2005 and scheduled for completion in March 2006, will include high-performance fume hoods that use 30 to 40 percent less energy than conventional ones.

- *Richmond, California:* Construction started in Fall 2004 on several mechanical upgrades to EPA's Region 9 Laboratory. Funded by utility savings through an agreement with building owner Wareham Development, the project includes installation of a natural gas co-generation unit for electricity and hot water; replacement of a single, oversized boiler with two smaller ones; and an HVAC controls upgrade. Energy savings from the upgrades, which were completed in June 2005, are expected to be at least 15 percent. In addition to the six-year payback resulting from these savings, local utility company Pacific Gas & Electric gave a one-time rebate of $60,000 to Wareham, or $10,000 for every 10 kW it removed from the grid by generating energy onsite through the natural gas unit.

- *Washington, D.C.:* In an effort to "walk the talk" at its own Headquarters, EPA is working to increase energy efficiency at its historic Federal Triangle buildings leased from GSA. The Agency initiated a three-phase commissioning effort in January 2005 that covers an evaluation of the mechanical systems/plumbing/HVAC; current status of fire/life/safety systems and certifications; and an analysis of contractor-performed operations and maintenance activities. Upon completion of the final report in October 2005, EPA began partnering with GSA to prioritize needed mechanical system changes, address required improvements in operations and maintenance services, and continue to provide expert mechanical engineering support to GSA.

HIGHLY EFFICIENT SYSTEMS

EPA has worked to install highly efficient combined cooling, heating, and power systems at a number of its laboratories. As part of an energy infrastructure upgrade installed at its Richmond, California, laboratory in 2005, the Agency began operating a natural gas combined heat and power unit. The co-generator will help conserve energy while serving both electricity and hot water needs. The Agency utilizes a geothermal heat pump system installed at its Ada, Oklahoma, laboratory as part of the ESPC upgrade there. The system, which has been in operation since June 2002, generates approximately 7,800 MMBtus of energy each year, which helps augment the facility's use of electricity and natural gas.

DISTRIBUTED GENERATION

EPA utilizes distributed generation to diversify its energy portfolio and improve the reliability of its electric supply. Off-grid electricity sources are an important fixture at NVFEL in Ann Arbor, Michigan. As part on an energy infrastructure upgrade in 2001, a 200-kW capacity natural gas fuel cell

was installed to provide both base load power and emergency backup power for the facility. The fuel cell supplies heating water for the reheat water loop serving the air handling units, saving significant amounts of energy that would otherwise be wasted in cooling towers and radiators.

ELECTRICAL LOAD REDUCTION MEASURES

In addition to the off-grid projects described earlier at the Ada and Richmond laboratories, EPA is doing its part to work with local utilities to reduce its buildings' electricity loads during peak times and throughout the day:

- *Atlanta, Georgia*: As part of the building's efforts to achieve the ENERGY STAR building label in FY 2005, EPA's Region 4 Office: strategically reduced lighting in excessively lit areas; installed occupancy sensors as standard operating procedure; repaired improperly installed or broken equipment; adjusted after-hours energy usage and system start-up by carefully analyzing the energy management system; developed policies to ban space heaters; and mandated air balancing when offices are constructed in open space. A team of GSA, EPA, and DOE personnel were recognized at the 2004 FEMP Energy Awards in October 2004 for their work to improve the performance of this building.

- *Edison, New Jersey*: The laboratory has three solar water-heating systems that are the primary source of hot water in their respective facility areas. Because the building relies on the electrical systems only for auxiliary water heating when necessary, the solar heaters allow the facility to conserve electricity and fossil fuel. So far, Edison's solar technology has registered energy savings results significantly higher than expected.

- *Golden, Colorado*: The Region 8 Laboratory employs extensive daylighting, energy-efficient lighting, a solar wall, nighttime setbacks for the ventilation system, and direct digital controls to monitor the HVAC system as part of its energy-efficient operations.

- *Gulf Breeze, Florida*: EPA utilizes timers on approximately 20 electric water heaters to save energy during off-peak hours.

- *Houston, Texas*: The Environmental Services Branch Laboratory incorporates a night setback system to control exhaust fans, fume hoods, and supply air.

- *Kansas City, Kansas*: Motion sensors controlling general lighting and timers controlling exterior lighting have been installed throughout EPA's Region 7 Office building.

- *Research Triangle Park, North Carolina*: A lighting control/automatic shutoff system was phased in to the new Main Facility from June to October 2003 to reduce the amount of electricity needed for lighting the building.

Appendix A

Data Tables

FY 2005 ENERGY MANAGEMENT DATA REPORT

Agency: U.S. Environmental Protection Agency
Prepared by: Bucky Green
Date: 12/15/2005
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	N/A /kWh	0.0	0.0	0
Fuel Oil	Thou. Gal.	0.0	$0.0	N/A /gallon	0.0	0.0	0
Natural Gas	Thou. Cubic Ft.	0.0	$0.0	N/A /Thou Cu Ft	0.0	0.0	0
LPG/Propane	Thou. Gal.	0.0	$0.0	N/A /gallon	0.0	0.0	0
Coal	S. Ton	0.0	$0.0	N/A /S. Ton	0.0	0.0	0
Purch. Steam	BBtu	0.0	$0.0	N/A /MMBtu	0.0	0.0	0
Other	BBtu	0.0	$0.0	N/A /MMBtu	0.0	0.0	
		Total Costs:	$0.0	Total:	0.0	0.0	0
Standard Buildings/Facilities (Thou. Gross Square Feet)				Btu/GSF:	#DIV/0!	#DIV/0!	
				Btu/GSF w/ RE Purchase Credit:	#DIV/0!	#DIV/0!	
				Btu/GSF w/ RE & Sec. 502(e) Credit:	#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	136,613.9	$8,853.2	$0.06 /kWh	466.1	1,618.9	23,325
Fuel Oil	Thou. Gal.	183.2	$333.9	$1.82 /gallon	25.4	25.4	507
Natural Gas	Thou. Cubic Ft.	390,359.7	$3,621.1	$9.28 /Thou Cu Ft	402.5	402.5	5,824
LPG/Propane	Thou. Gal.	8.0	$14.9	$1.87 /gallon	0.8	0.8	13
Coal	S. Ton	0.0	$0.0	N/A /S. Ton	0.0	0.0	0
Purch. Steam	BBtu	32.7	$706.7	$21.60 /MMBtu	32.7	45.5	1,171
Other	BBtu	382.8	$5,715.5	$14.93 /MMBtu	382.8	382.8	
		Total Costs:	$19,245.3	Total:	1,310.3	2,475.8	30,839
Energy-Intensive Facilities (Thou. Gross Square Feet)		3,706.7		Btu/GSF:	353,502	667,932	
				Btu/GSF w/ RE Purchase Credit:	214,083	528,514	
				Btu/GSF w/ RE & Sec. 502(e) Credit:	214,083	528,514	

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	N/A /kWh	0.0	0.0	0
Fuel Oil	Thou. Gal.	0.0	$0.0	N/A /gallon	0.0	0.0	0
Natural Gas	Thou. Cubic Ft.	0.0	$0.0	N/A /Thou Cu Ft	0.0	0.0	0
LPG/Propane	Thou. Gal.	0.0	$0.0	N/A /gallon	0.0	0.0	0
Coal	S. Ton	0.0	$0.0	N/A /S. Ton	0.0	0.0	0
Purch. Steam	BBtu	0.0	$0.0	N/A /MMBtu	0.0	0.0	0
Other	BBtu	0.0	$0.0	N/A /MMBtu	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!
Btu/GSF w/ RE Purchase Credit:	#DIV/0!	#DIV/0!
Btu/GSF w/ RE & Sec. 502(e) Credit:	#DIV/0!	#DIV/0!

1-4. Non-Fleet Vehicles and Other Equipment

	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Unit Cost ($)	Btu (Billion)	Est. Carbon Emissions (Metric Tons)
Auto Gasoline	Thou. Gal.	37.0	$62.0	$1.68 /gallon	4.6	89
Diesel-Distillate	Thou. Gal.	70.0	$22.0	$0.31 /gallon	9.7	194
LPG/Propane	Thou. Gal.	0.0	$0.0	N/A /gallon	0.0	0
Aviation Gasoline	Thou. Gal.	0.0	$0.0	N/A /gallon	0.0	0
Jet Fuel	Thou. Gal.	0.0	$0.0	N/A /gallon	0.0	0
Navy Special	Thou. Gal.	0.0	$0.0	N/A /gallon	0.0	0
Other	BBtu	0.0	$0.0	N/A /MMBtu	0.0	
		Total Costs	$84.0		14.3	283

1-5. WATER CONSUMPTION, COST AND EFFICIENCY MEASURES

	Consumption Units	Annual Consumption	Annual Cost (Thou. $)
Water	Million Gal.	176.0	$962.2

Best Management Practice Implementation Tracking Data	
Number of facilities* in agency inventory	29
Number of facilities with completed water management plans	13
Number of facilities with at least four (4) BMPs fully implemented	13

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

1-6. RENEWABLE ENERGY/RENEWABLE ENERGY CERTIFICATE PURCHASES IN FY 2005

(Only include renewable energy purchases from resources developed after 1990)

Description of *Each* Renewable Energy Purchase (examples below, insert additional rows as necessary for each separate purchase)	Amount Purchased (MWH)	Amount Purchased (Million Btu)	State or Region of Generation or Source	End Use Category (Standard, EI, or Exempt)
Electricity from Renewable Source				
Region 2 Laboratory (Edison, New Jersey)	4,277.3		New Jersey	EI
Environmental Research Laboratory (Duluth, Minnesota)	24.0		Minnesota	EI
Environmental Research Laboratory (Corvallis, Oregon)	360.0		Oregon	EI
Renewable Energy Certificates				
Region 1 Laboratory (Chelmsford, Massachusetts)	375.0		North Dakota, South Dakota, Wyoming	EI
Atlantic Ecology Division Laboratory (Narragansett, Rhode Island)	1,790.8		California, Minnesota	EI
Region 2 Laboratory (Edison, New Jersey)	750.0		North Dakota, South Dakota, Wyoming	EI
Region 3 Laboratory (Ft. Meade, Maryland)	800.0		North Dakota, South Dakota	EI
Region 4 Laboratory (Athens, Georgia)	4,150.0		Kentucky, North Carolina	EI
Research Triangle Park Laboratories (Research Triangle Park, North Carolina)	100,000.0		Georgia	EI
Large Lakes Research Station (Grosse Ile, Michigan)	700.0		Michigan	EI
Environmental Research Laboratory (Duluth, Minnesota)	2,350.0		Minnesota	EI
Cincinnati Laboratories (Cincinnati, Ohio)	15,531.9		Pennsylvania, Midwest	EI
Environmental Research Center (Ada, Oklahoma)	1,250.0		California, Nebraska, Wyoming	EI
Region 6 Laboratory (Houston, Texas)	3,180.6		New Mexico	EI
Region 7 Laboratory - Science and Technology Center (Kansas City, Kansas)	3,529.2		Kansas	EI
Region 8 Laboratory (Golden, Colorado)	2,100.0		Colorado	EI
UNLV Campus Laboratory (Las Vegas, Nevada)	4,400.0		California	EI
Region 9 Laboratory (Richmond, California)	1,434.1		California	EI
Region 10 Laboratory (Manchester, Washington)	3,333.0		Wyoming	EI
Natural Gas from Landfill/Biomass				
Renewable Thermal Energy				
Other Renewable Energy (describe)				
Biodiesel				
Atlantic Ecology Division Laboratory (Narragansett, Rhode Island)		2,080.5	Massachusetts	EI
Region 10 Laboratory (Manchester, Washington)		1,759.9	Washington	EI
Total All Purchases	150,336.0	3,840.4		

Total Purchases for Standard Buildings	0.0	0.0		
Total Purchases for Energy Intensive Facilities	150,336.0	3,840.4		
Total Purchases for Exempt Facilities	0.0	0.0		

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

	Consumption Units	Total Annual Energy	Energy Used by Agency*
Electricity from Renewables	MWH	107.4	107.4
Natural Gas from Landfill/Biomass	MMBtu	0.0	0.0
Renewable Thermal Energy**	MMBtu	7,800.0	7,800.0
Other Renewable Energy_____***	MMBtu	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. Energy savings from geothermal heat pumps should be based on energy savings compared to conventional alternatives like air-to-air heat pumps. If only electricity savings are known, multiply kWh savings by 3,412 to estimate renewable energy BTUs.

***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.

1-8. TOTAL RENEWABLE ENERGY USE AS A PERCENTAGE OF FACILITY ELECTRICITY USE*

Renewable Energy Use (BBtu)	Facility Electricity Use (BBtu)	RE as a Percentage of Electricity Use
525.0	466.1	112.6%

* includes green power, bio diesel and on site generation

PART 2: ENERGY EFFICIENCY IMPROVEMENTS

2-1. DIRECT AGENCY OBLIGATIONS

(Agencies may attach their final OMB Circular A-11 Energy and Transportation Efficiency Management Exhibit in lieu of completing Table 2-1.)

	FY 2005		Projected FY 2006	
	(MMBTU)	(Thou. $)	(MMBTU)	(Thou. $)
Direct obligations for facility energy efficiency improvements, including facility surveys/audits		$3,790.0		$3,511.0
Estimated annual savings anticipated from obligations	76,700.0	$962.0	38,350.0	$602.5

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	1,540.0	$60.0
Funds spent in order to receive incentives		$100.0

2-5. TRAINING

	(number)	(Thou. $)
Number of personnel trained/Expenditure	35	$50,000.0

Appendix B

Energy Scorecard for FY 2005

FY 2005 Federal Agency Energy Scorecard 12-15-2005rvdc

Department/Agency Name	Contact Name and Phone
U.S. Environmental Protection Agency	Bucky Green, 202-564-6371
Name of Senior Energy Official	**Signature of Senior Energy Official**
Luis A. Luna, Assistant Administrator for Administration and Resources Management	*Luis A. Luna* 12/28/05

Did your agency . . .	Yes	No	Anticipated Submittal Date
1. Submit its FY 2005 energy report to OMB and DOE by January 1, 2006 (Sec. 303)?	X		January 1, 2006
2. Submit a FY 2006 Implementation Plan by January 1, 2006 (Sec. 302)?	X		January 1, 2006
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 2005 (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) # Projects / Energy / Unit Solar 5 / 107.4 / MWh Wind ___ / ___ / ___ Thermal[1] 3 / 7,800 / MMBtu
4. Purchase energy generated from new renewable energy sources in FY 2005 (Sec. 204)?[2] (Refer to Table 1-6 on the Energy Management Data Report)	X	See Note	If yes, how much: Delivered Electricity 4,661.3 MWh; Renewable Energy Certificates 145,674.6 MWH; Biodiesel 3,840.4 MMBtu
5. Invest direct FY 2005 appropriations in projects contributing to the goals of the Order (Sec. 301)?	X		If yes, how much: $ 3,790,000
6. Specifically request funding necessary to achieve the goals of the Order in its FY 2007 budget request to OMB (Sec. 301)? (Refer to OMB Circular A-11, Section 25.5, Table 2)	X		If yes, how much: $ 3,511,000
7. Perform energy audits of 10% of its facility space during the fiscal year (Sec. 402)?	X*		How much facility space has been audited since 1992?[3] 72% *EPA, in partnership with GSA, completed audits of mechanical systems and operation and maintenance practices at its Federal Triangle buildings.
8. Issue to private-sector energy service companies (ESCOs) any energy savings performance contract (ESPC) delivery orders (Sec. 403(a))? (Refer to Table 2-2 on the Energy Management Data Report)		X See Note	How many? ___ Annual savings (MMBtu): ___ Total investment value[4]: $ ___ Cumulative guaranteed cost savings: $ ___ Award value: $ ___

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

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

3 Should be greater than 100% if all facility space has been audited at least once since 1992.

4 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) delivery orders (Sec. 403(a))? (Refer to Table 2-3 on the Energy Management Data Report)		X See Note	How many? _____ Annual savings (MMBtu): _____ Total investment value[4]: $_____ Cumulative cost savings: $_____ 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 2005 (Sec. 403(d))?		X[5] See Note	Number of new building (or major renovation) design/construction projects in FY 2005[5]:_____ Number of these projects that can or will be certified under LEED[5]:_____
12. Provide training to appropriate personnel[6] on energy management (Sec. 406(d))?	X		Number of appropriate personnel trained: 35 Total number of appropriate personnel: 175
13. Implement any additional management tools (Sec. 406)?	X		Check all that apply: Awards: X Performance Evaluations: X 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 20% of agency facilities (Sec. 207, 503(f))?	X	See Note	Number of facilities with WMPs and 4 BMPs: 13 (2 new, 11 old) Number of facilities in agency inventory: 29

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

5 Count projects only once, regardless of phase. For example, if in FY 2005, your agency had 10 new building or major renovation projects, of which 2 can be LEED certified, then report 10 and 2, respectively, in the spaces provided. If the project was designed and reported on in response to this question in a previous year, do not report it as a new project in FY 2005, even if construction commenced or continued in FY 2005.

6 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.

Please enter data from annual energy report pertinent to performance toward the goals of Executive Order 13123	Base Year	Previous Year (2004)	Current Year (2005)	% Change (Current vs. Base)
15. Site Energy Efficiency Improvement Goals (Sec. 202). 1985 Base Year	N/A Btu/Ft^2	N/A Btu/Ft^2	N/A Btu/Ft^2	N/A %
16. Industrial/Energy Intensive Facilities Goals (Sec. 203). 1990 Base Year	357,864 Btu/Ft^2	355,773 Btu/Ft^2	353,502 Btu/Ft^2	-0.64%
16a. Green Power Netted Out	357,864 Btu/Ft^2	296,877 Btu/Ft^2	213,886 Btu/Ft^2	-40.23%
17. Source Energy Use (Sec. 206). 1985 Base Year	N/A BBtu	N/A BBtu	N/A BBtu	N/A %
18. Water Conservation Goal (Sec. 207). 2000 Base Year	187.3 MGal	167.5 MGal	176.0 MGal	-6.01%
19. Renewable Energy (Sec. 204) Energy used from self-generation and RE purchases	N/A	246.0 BBtu*	525.0 BBtu*	N/A

Abbreviation Key: Btu/Ft^2 = British thermal units per gross square foot
Btu/unit = British thermal units per unit of productivity (or gross square foot when such a unit is inappropriate or unavailable)
MGal = Million gallons
MMBtu = Million British Thermal Units
BBtu = Billion British Thermal Units
RE = Renewable energy
N/A = Not applicable

*This figure does not include the green power EPA purchases for its offices. GSA reports office electricity use under DOE implementing guidelines for EO13123.

Notes

Question 4: EPA purchased 150,336.0 MWh of green power (delivered electricity and renewable energy certificates) and 3,840.4 MMBtu of biodiesel fuel (28,897 gallons of biodiesel at 132,900 Btu/gallon) at its 29 reporting locations. The Agency also purchased an additional 65,407 MWh of green power in FY 2005 for six regional offices and its headquarters complex. Under EO 13123 guidelines, GSA reports utility data at these office locations.

Question 8: EPA did not enter into any new ESPCs in FY 2005. However, the Agency accepted ESPC upgrades at its Ada, Oklahoma laboratory in June 2005.

Question 9: EPA does not use UESCs.

Question 11: EPA continued design and construction on four of the five facilities listed in FY 2004 (Region 1 Office renovation of the historic McCormack Courthouse in Boston, Massachusetts; construction of the new EPA Headquarters satellite building in Northern Virginia; construction of a Lab Annex 2 at EPA's Cincinnati, Ohio Laboratory; and construction the new Region 8 Office in Denver, Colorado) and completed construction on the fifth (RTP Childcare).

Question 14: EPA also completed a draft plan for its facility in Ada, Oklahoma (to be finalized in FY 2006).

Appendix C

Not Required

Appendix D

Industrial and Laboratory Facilities Inventory

APPENDIX D—INDUSTRIAL AND LABORATORY FACILITIES INVENTORY[1]

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: Harvey Holm

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: Dave Burr

Willamette Research Station
Corvallis, Oregon
Site Energy Manager: Dave Burr

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[1] 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: Daniel Young

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: Fred Childers

Region 10 Laboratory
Manchester, Washington
Site Energy Manager: Mark Ader

National Air and Radiation Environmental Laboratory
Montgomery, Alabama
Site Energy Manager: Mike Clark

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: Dave Burr

New Consolidated Facility
Research Triangle Park, North Carolina
Site Energy Manager: Sam Pagan

New Computer Center
Research Triangle Park, North Carolina
Site Energy Manager: James White/Glen Lowery

National Health and Environmental Effects Research Laboratory
Research Triangle Park, North Carolina
Site Energy Manager: Sam Pagan

Human Studies Facility
Research Triangle Park (Chapel Hill), North Carolina
Site Energy Manager: Sam Pagan

New Page Road
Research Triangle Park, North Carolina
Site Energy Manager: Sam Pagan

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

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U.S. Environmental Protection Agency

FY 2006 Energy and Water Implementation Plan

December 15, 2005

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

SECTION I: MANAGEMENT AND ADMINISTRATION

The U.S. Environmental Protection Agency (EPA) recognizes that efficient energy and water management must involve all facility management employees as well as senior management. This section describes EPA's energy management infrastructure and the management tools it has been using to implement Executive Order (E.O.) 13123, *Greening the Government Through Efficient Energy Management,* and will continue to use to meet the new requirements of the Energy Policy Act of 2005 (EPAct 2005).

ENERGY MANAGEMENT INFRASTRUCTURE

E.O. 13123 requires each federal agency to assemble a technical support team to encourage meeting the energy efficiency goals and requirements of the order. EPA's Sustainable Facilities Practices Branch (SFPB), which EPA's Office of Administration and Resources Management (OARM) created at the end of 2000, is dedicated to meeting these requirements. SFPB will continue to serve 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 for both E.O. 13123 and EPAct 2005. Key staff in the SFPB's energy team include the branch chief, education/outreach and Laboratories for the 21st Century coordinator, two mechanical engineers, a water conservation/green power coordinator, and a pollution prevention and recycling coordinator.

Senior Agency Official and Energy Team

EPA's Assistant Administrator for Administration and Resources Management (currently Luis Luna) will continue to serve as the Agency Energy and Environmental Executive, supported by SFPB's national energy team described above. The energy team will continue to be supplemented by architects and engineers from EPA's Architecture, Engineering, and Asset Management Branch, by members of EPA's Safety, Health, and Environmental Management Division, 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.

In FY 2006, EPA will issue new and more challenging guidance from the Agency's Environmental Executive to EPA's senior managers, program managers, and facility managers to capture

short-term energy savings available at EPA's 29 reporting locations. This move is in response to tighter energy conservation requirements set out in the EPAct 2005. In addition, the Agency will peer review its current agency-wide energy master plan to ensure it meets the new energy intensity reduction requirements in EPAct 2005. The Agency will review the currently proposed energy projects at all of its laboratories, particularly the energy-intensive ones, to confirm that the best opportunities for increasing efficiency within its facilities and operations have been identified. EPA will also continue focusing on sustainable design and procurement for new facilities, re-commissioning of existing facilities, improving existing mechanical systems, concentrating on large energy users, and making green power procurements to reduce its environmental footprint and achieve federal agency greenhouse gas reduction goals.

MANAGEMENT TOOLS

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

Awards (Employee Incentive Programs)

EPA will continue encouraging and recognizing its employees for their achievements in conserving energy and in overall promotion of energy efficiency awareness. In FY 2006, EPA will present its fourth annual "Btu Buster" and "H_2Overachiver" awards to facility managers that have reduced the largest volume or percentage of their facilities' energy use and significantly cut water consumption, as well as recognize employees who have led cutting-edge projects or partnered with EPA's facility organizations to reduce energy during FY 2006.

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

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

- *Laboratories for the 21st Century:* SFPB's Laboratories for the 21st Century (Labs21) program, a joint partnership between EPA and DOE dedicated to improving the environmental performance of U.S. laboratories, will continue to support a Web site, workshops, e-mail network, and annual conference in FY 2006. Approximately 35 EPA employees attended the October 2005 conference in Portland, Oregon. The 2006 conference will be held in San Antonio, Texas, October 17-19. Details on registration, the annual call for papers, and other details are available on the Labs21 Web site at <www.labs21century.gov>. Labs21 will also continue to hold its one-day workshops on energy-efficient laboratory design and operations throughout FY 2006.

- *Green Online Ordering System*: EPA's on-line, "green" credit card ordering system under a blanket purchase agreement (BPA) is now mandatory for all EPA offices, so that employees can make purchasing decisions consistent with EPA's Environmentally Preferable Purchasing Program's (EPP) guidelines. The BPA, which was launched in FY 2004 at EPA Headquarters, consists only of non-electronic office products that meet or exceed EPA recycled content and other EPP standards. EPA also conducts training to make green purchasing easier for Agency personnel and increase such purchases throughout the Agency. Credit card purchasing guidelines on EPA's EPP Web site also provide easy access for credit card holders to ensure their purchases comply with environmental laws and EPA policies. The guidelines identify specific environmental attributes to look for when selecting products, including the ENERGY STAR® label or other energy efficiency designations.

- *Energizing EPA Newsletter*: EPA will continue to distribute this quarterly newsletter to all EPA senior, program, and facility managers and other employees to keep them up to date on energy and water conservation at new and existing laboratories, green power purchases and projects, and energy and water efficiency activities in EPA facilities, as well as offer tips on how to conserve energy in their own jobs and lives.

- *Office of Administrative Services Web Site*: The Office of Administrative Services Web site provides the latest information on energy and water performance at EPA facilities, "how to's", lessons learned, and basic conservation principals, energy efficiency project explanations, green power procurement information, green fleet updates, and details on other efforts that make EPA more efficient. In FY 2006 EPA will continue to update the site on a quarterly basis.

- *Energy 2006*: Approximately 1,200 federal energy managers and other employees attend this annual conference, which covers topics such as commissioning, energy savings performance contracts, green power, and sustainable building design. EPA will be actively marketing the conference internally to EPA managers, facility managers, and green building policy staff.

Showcase Facilities

EPA anticipates nominating its new regional office in Denver and the Child Care Center in Research Triangle Park, North Carolina as showcase facilities in FY 2006.

SECTION II: IMPLEMENTATION STRATEGIES

EPA is committed to continuing to use a variety of strategies to reduce energy consumption and improve energy and water efficiency in its facilities, including: sustainable and energy-efficient new building design; energy master planning; commissioning, re-commissioning, and retro-commissioning; Operations and Maintenance (O&M) assessments; heating, ventilation, and air conditioning (HVAC) system upgrades; focusing on large energy users; green power and renewable energy certificate purchases; and water conservation efforts. As a key component of this effort, and to focus limited resources, EPA will make energy issues at its facilities in Research Triangle Park (RTP), North Carolina its top priority. These facilities use 50 percent of EPA's reportable energy and present tremendous opportunities for energy savings.

OVERALL STRATEGY

The Agency will continue to implement its five-part energy conservation strategy in FY 2006:

- Promoting sustainable and energy-efficient design in its new buildings and leases, so that new buildings entering the inventory are less energy-intensive and more sustainable than the ones they replace. EPA will also implement mandatory commissioning of new buildings.

- Improving the operation of existing buildings in the near term through re- and retro-commissioning and O& M program assessments.

- Designing and constructing physical mechanical system changes to achieve energy savings in the long run. EPA will also implement mandatory commissioning of major mechanical system projects.

- Concentrating efforts where the most opportunities are, at the Agency's largest energy consuming facilities. Regardless of size, however, EPA will also implement energy conservation projects at smaller laboratories where funding, local management, and local staff support exist.

- Purchasing green power, which will always serve as an important component of EPA's balanced effort to reduce its environmental footprint.

Addressing energy efficiency in RTP is critical to meeting the new requirements of EPAct 2005, because these facilities not only represent 50 percent of EPA's energy consumption, but four of EPA's five highest energy users on a Btu per gross square foot per year basis are in the RTP complex.

LIFE-CYCLE COST ANALYSIS

When designing, constructing, and maintaining its facilities, EPA will seek to maximize energy and water efficiency and incorporate innovative technologies that are cost-effective and environmentally sound throughout their life cycles.

In FY 2006, EPA will continue to recognize the long-term energy and water savings from its ESPCs in Ann Arbor, Michigan, and Ada, Oklahoma, completed mechanical upgrades Richmond, California, and Narragansett, Rhode Island, and completed re-commissioning projects at Fort Meade, Maryland. EPA only reports on laboratories that are owned by the Agency or leased under very long-term leases. EPA will continue implementing its policy of using longer time frames to determine life-cycle cost savings, examining savings over a 15- or 20-year time frame, as EPA has longer time frames to recoup the taxpayers' investments in energy efficiency improvements.

FACILITY ENERGY AUDITS

In accordance with the EPAct 2005 and E.O. 13123, and to help identify opportunities for energy system improvements, EPA's facilities will be strategically audited for energy and water efficiency. EPA has completed energy assessments at nearly all of its laboratories and major regional offices, but the Agency will focus on key facilities to examine new opportunities for increasing efficiencies.

Based on re-commissioning experience gained over the last two years in EPA's RTP laboratories, and O&M assessments at its Headquarters office complex and at a major laboratory, EPA recognized that many Agency facility managers often do not have an adequate mechanical systems background to judge the performance of the O& M contractors, that O&M contractors frequently don't understand the overarching concepts of the mechanical systems they run, that O and M contracts requirements may not be rigorous enough, and that O&M contractors often don't adequately run preventative maintenance programs. EPA has initiated a three-step O&M assessment pilot for FY 2006, which will review existing EPA O&M contract language, evaluate O&M contractor performance, and analyze the effectiveness of O& M contractors' preventative maintenance programs. The assessments are geared to help EPA facility managers identify energy savings opportunities and improve building operations. EPA has targeted five

facilities for this pilot for FY 2006. EPA believes O&M assessments are a significant step forward in making our energy auditing more robust and effective.

FINANCING MECHANISMS

EPA will continue to use innovative financing strategies where possible and appropriate. Since ESPC authority was extended in EPAct 2005, EPA is currently investigating new opportunities for using the ESPC mechanism and is encouraging GSA to explore this approach at a number of EPA occupied, GSA owned facilities.

ENERGY STAR® AND OTHER ENERGY-EFFICIENT PRODUCTS

EPA will continue promoting the purchase of energy-efficient products that carry the ENERGY STAR label, including photocopier equipment and computers, during FY 2006. EPA employees are encouraged to become involved and responsible participants in the Agency's energy management activities through the EPP program, training for government purchase card users on buying energy-efficient and sustainable products, and guides and databases that include the environmental attributes of available products. All EPA purchase cardholders have access to the Blanket Purchase Agreement/online green products ordering system started in FY 2004, which provides green office products and energy-efficient office equipment. EPA newsletters including *EPP Update* and *Energizing EPA* will continue to promote the use of energy-efficient products, provide resources to EPA purchasers, and offer employees energy-saving tips.

ENERGY STAR BUILDINGS

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. However, a re-commissioning effort at EPA's Atlanta Regional Office (a GSA owned building) resulted in an ENERGY STAR Building certification in April 2005, and EPA's Region 10 Office in the Park Place Building in Seattle achieved its ENERGY STAR label in October 2004. The building housing EPA's Denver regional office also has recently received the ENERGY STAR building label. The Agency has made it a requirement that all new major office facilities (i.e. Northern Virginia, Boston, and Denver) achieve the ENERGY STAR label. In FY 2006, EPA hopes to form a partnership

with GSA to re-commission the GSA-owned buildings that it occupies in Chicago and New York, both of which obtained the ENERGY STAR Building label many years ago, but have since drifted away from good energy performance.

SUSTAINABLE BUILDING DESIGN

As part of its *Green Buildings Vision and Policy Statement*, EPA incorporates sustainable design principles into the siting, design, and construction of new facilities, as well as the renovation and maintenance of existing facilities. The Agency currently requires that all major newly constructed or renovated buildings: achieve at least a minimum Silver rating from the Leadership in Energy and Environmental Design (LEED®) New Construction (NC) or Existing Buildings (EB) program of the U.S. Green Building Council; benchmark energy use and achieve the ENERGY STAR label within a fixed post-occupancy time period; and achieve 30 percent better than the ASHRAE 90.1-(1999) energy performance standard. The newly enacted "30 percent better than ASHRAE 90.1- (2004)" established in the EPACT 2005, will be a much more difficult standard for federal agencies to meet, because of the significant tightening of the ASHRAE standards. EPA looks forward to the challenges this new much tighter standard will present.

In FY 2006, EPA will continue work on numerous sustainable design building projects, most notably:

- *Denver, Colorado.* Construction of the Agency's new Region 8 Office building, a 250,000 rentable square foot facility with a build-to-suit lease, will be completed in FY 2006 and the building ready for occupancy in the Fall of 2006. This building will be LEED™-NC Silver or Gold.

- *Arlington, Virginia*. Construction for this 422,000 rentable square foot headquarters satellite facility in Northern Virginia will be completed in early 2006, and occupancy is anticipated in Summer 2006. This building will be LEED™-NC Silver or Gold.

- *Boston, Massachusetts.* EPA will continue working with GSA to rehabilitate and renovate the McCormack Post Office and Courthouse. EPA will occupy 225,000 square feet in the building, which will house EPA's New England Regional Office and is expected to be ready for occupancy in late FY 2008. This building will be LEED™-NC certified or Silver.

- *Cincinnati, Ohio.* Construction of the second Research Support Annex for EPA's Andrew W. Breidenbach Environmental Research Center (AWBERC) was awarded in September 2005. By providing 42,400 square feet of additional office space, Annex 2 will free up space in AWBERC

that can be converted to accommodate new, more energy efficient laboratories. This building will be LEED™-NC Gold.

- *Research Triangle Park, North Carolina.* Construction of a new childcare facility in RTP that began in April 2004 was completed in November 2005. This building was designed and constructed to the LEED™-NC Silver standard. The 25,400 square foot facility replaces the current center and allows EPA to extend services to 54 additional children of federal employees.

ENERGY EFFICIENCY IN LEASE PROVISIONS

GSA leases most of the office buildings EPA occupies. When EPA needs new office space, the Agency works with GSA to lease existing buildings or newly constructed build-to-suit facilities that meet minimum environmental performance standards. The Agency requires that all major newly constructed office buildings achieve the ENERGY STAR® label for buildings. EPA has historically required a 30 percent better energy performance than ASHRAE 90.1-(1999) requirements. In FY 2006, EPA will continue working closely with GSA to achieve superior energy performance for the Agency's new offices in Denver and Northern Virginia, including a commissioning effort at both facilities.

INDUSTRIAL FACILITY EFFICIENCY IMPROVEMENTS

In coordination with its energy master planning exercise, in FY 2006 the Agency intends to expend its greatest facility improvement efforts on several buildings in Research Triangle Park, North Carolina. The following are just a few of the improvements that will be underway in FY 2006:

- *New Main*: One of EPA's current priorities is to properly meter the facility; a contract for a Web-based metering and energy management system was awarded in May 2005, and the project was substantially completed in December 2005. An office re-commissioning pilot project designed to ensure proper operation of the VAV boxes and economizers and appropriate integration with the building automation system will be completed in FY 2006. If reconfiguring works on one "pilot" air-handling unit (AHU), EPA will apply it to all the office AHUs, for an energy savings of approximately 15 percent.

  Humidification problems that first appeared in FY 2004 in one of the four main laboratory wings (the "A" Wing or the animal wing) have turned into an energy savings opportunity. In February 2006, EPA expects to complete a humidity system upgrade for the A wing, including heat recovery. Together, these projects should solve humidification problems in the A wing and save 25 to 30 percent of the energy used in the A wing, for a savings to taxpayers of approximately $200,000 per year. In addition to this project, the A wing is reconfiguring its controls to reduce airflow in the vivarium laboratory 10 to 15 percent, which will result in a 1 to 2 percent campus-wide energy use reduction.

- *Human Studies Laboratory*: As the third and fourth steps in a major re-commissioning effort begun in FY 2004, a major re-design of two major air handling systems, AHU #1 and AHU #2, should be completed in FY 2006 and construction should start on a glycol heating and domestic hot water project if funding is secured.

- *National Health and Environmental Effects Research Laboratory*: Mechanical engineers developed an implementation plan for energy savings opportunities identified in a Fall 2003 energy audit. They completed the implementation plan in spring 2004. Contracting for some of the identified opportunities should be awarded in FY 2006 and FY 2007.

The following efficiency improvement opportunities are also underway or being considered for other EPA facilities in FY 2006:

- *Athens, Georgia*: During FY 2006, EPA is incorporating long-term security and sustainability planning into the master planning process at its two Athens, Georgia, laboratories, including numerous efficiency opportunities such as a fuel cell. Work on the plan, which was initiated in August 2005, should be completed in FY 2006. Contracts for upgrading the master plan with security and site sustainability assessments were awarded in August 2005. The Agency anticipates completing design of a controls upgrade at its Ecosystem Support Division laboratory in June 2006, with estimated energy savings of up to 10 percent.

- *Cincinnati, Ohio*: AWBERC completed an energy master planning process in April 2003 to replace the facility's mechanical systems over the next seven years. Design for the air-handling units, ductwork, and exhaust systems should be completed in FY 2006.

- *Corvallis, Oregon:* By April 2006, EPA anticipates completing a sustainable master plan for a large-scale renovation planned at its Western Ecology Division (WED) Laboratory. The master plan will delineate all aspects of future changes in terms of laboratories, office space, and sustainable opportunities. The new VAV laboratory will feature high-performance fume hoods, a state-of-the-art BAS controls system for nighttime setbacks, and a more efficient and secure window glazing for added security and energy efficiency.

- *Duluth, Minnesota*: At the Mid-Continent Division Laboratory, design is nearly completed and construction is scheduled for FY 2006 for a manifold variable air volume (VAV) exhaust system for nine laboratory modules, manifolding eight laboratory fume hoods into one exhaust fan (versus eight existing exhaust fans) and updating the air handling unit that feeds these modules.

- *Manchester, Washington*: During FY 2006, design will be completed on the installation of six new high-performance fume hoods that will use 30 to 40 percent less energy than the old versions. This is part of a multi-stage laboratory upgrade.

- *Richmond, California*: In FY 2006, EPA should begin to fully realize energy savings of 17 to 23 percent from the mechanical upgrades completed at the Region 9 Laboratory in Summer 2005.

HIGHLY EFFICIENT SYSTEMS

In FY 2006, EPA will monitor energy savings from a natural gas combined heat and power (CHP) unit, part of the energy infrastructure upgrade at its Richmond, California, Region 9 Laboratory completed in 2005. The co-generator will help conserve energy while serving both electricity and hot water needs. EPA will also continue to operate a geothermal heat pump at the Robert S. Kerr Environmental Research Center in Ada, Oklahoma, which generates approximately 7,800 MMBtus each year and helps augment the facility's use of electricity and natural gas.

DISTRIBUTED GENERATION

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

- *Ann Arbor, Michigan*: A 200 kW natural gas fuel cell, installed in FY 2001, provides heating water for the reheat water loop serving the air handling units. By integrating the heating and cooling plant, EPA recovers significant amounts of energy that would have otherwise been wasted in cooling towers or radiators.

- *Chelmsford, Massachusetts*: Solar awnings with a capacity of 2,000 watts will continue to supply electricity daily to the regional electric grid and will provide shade for the facility's office windows, thus reducing the amount of cooling needed.

- *Corvallis, Oregon*: The Western Ecology Division Laboratory installed 60 150-watt PV panels and a 9.5 kW grid-tied PV inverter to convert the power for use by the laboratory in December 2004. The system is designed with an energy meter to measure the amount of electricity produced by the PV array.

- *Edison, New Jersey*: The laboratory has three solar water-heating systems, allowing the building to rely on the electrical systems only for auxiliary water heating.

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

- *Manchester, Washington*: The facility will continue to utilize a net metering system that includes 28 solar panels.

- *Research Triangle Park, North Carolina*: A 100-kW roof-top solar array contributes to electricity use reduction at RTP's National Computer Center. In addition, solar street lights operate throughout the facility.

- *San Francisco, California:* The Region 9 Child Care and Fitness Center will continue to use a solar water heater to offset the natural gas consumed by the previous gas-fired water heating system.

ELECTRICAL LOAD REDUCTION MEASURES

Following are just a few examples of how EPA will continue to do its part to reduce its buildings' electricity loads during peak times and throughout the day:

Better Mechanical Controls: The Environmental Services Branch Laboratory in Houston, Texas, incorporates a night setback system to control exhaust fans, fume hoods, and supply air. The Region 8 Laboratory in Golden, Colorado, employs nighttime setbacks for the ventilation system and direct digital controls to monitor the HVAC system as part of its energy-efficient operations.

Occupancy Sensors and Timers: Motion sensors controlling general lighting and timers controlling exterior lighting are installed throughout EPA's Region 7 Office building. EPA's Region 4 Office in Atlanta installed occupancy sensors as standard operating procedure, in addition to adjusting after-hours energy usage and banning space heaters. A lighting control/automatic shutoff system was phased in to the New Main facility in RTP from June to October 2003 to reduce the amount of electricity needed for lighting the building. EPA's laboratory in Gulf Breeze, Florida, utilizes timers on approximately 20 electric water heaters to save energy during off-peak hours.

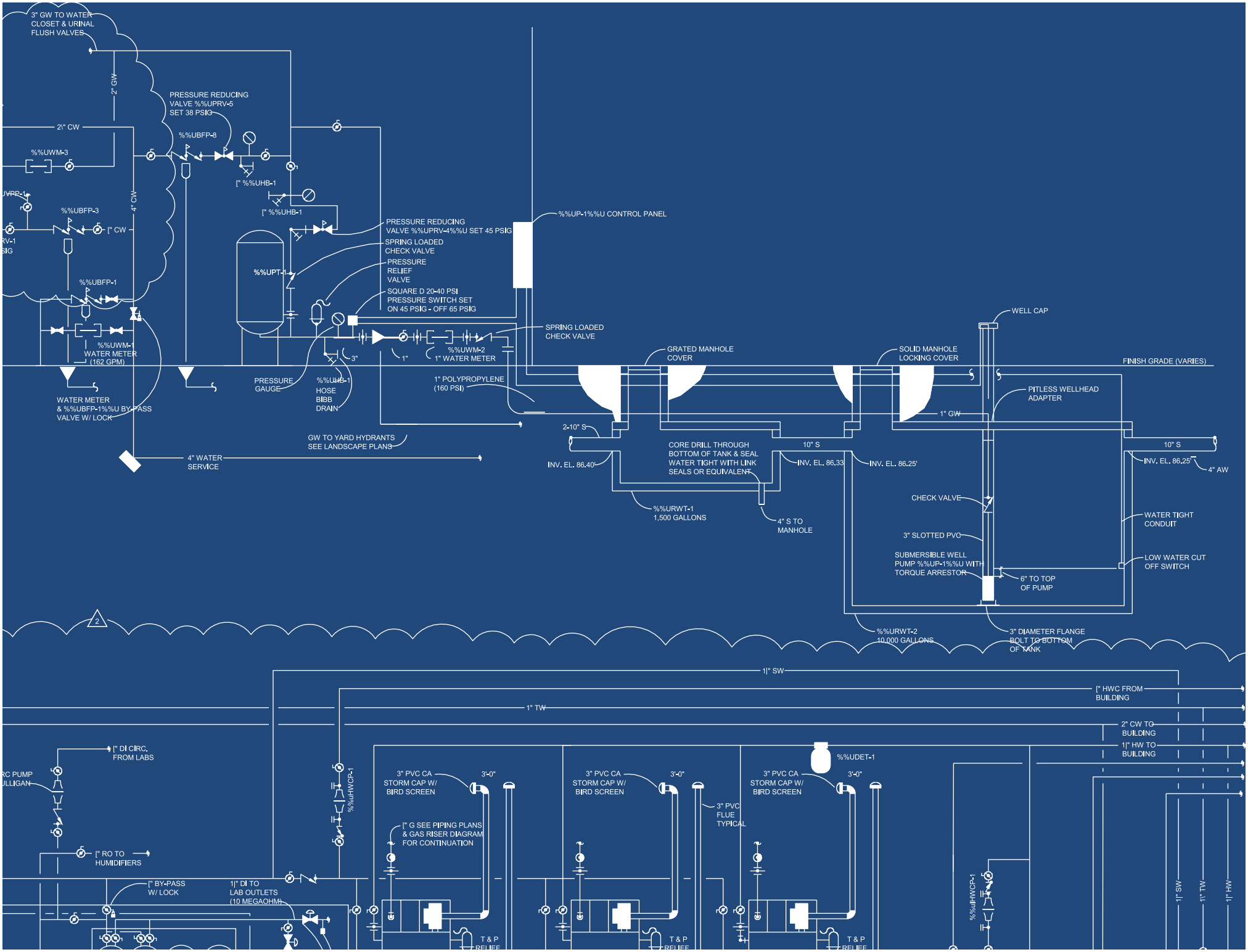
RENEWABLE ENERGY

A total of 30 EPA facilities are already receiving more than 225 million kilowatt hours (kWh) per year of electricity from renewable sources. As of October 1, 2005, the Agency placed number two on the EPA Green Power Partnership's list of top renewable energy purchasers; in FY 2006 EPA will continue to work toward a goal of purchasing green power or renewable energy certificates for 100 percent of the Agency's electricity needs. Green power contracts up for renewal in FY 2006 include the Region 5 Office in Chicago and laboratories in Fort Meade, Maryland, and Houston, Texas. New facilities to be served by green power in FY 2006 include the Dallas Regional Office and the Potomac Yard Office building in Northern Virginia.

WATER CONSERVATION

EPA will continue to implement its water conservation initiative in FY 2006, including: collecting and analyzing water use data in each of its facilities; developing and implementing water management plans; conducting in-depth water assessments at select laboratories; and investigating water conservation projects. EPA's Region 8 Laboratory in Golden, Colorado will be completing a feasibility study to assess water conservation opportunities. The study will identify strategies, as well as project costs, benefits, and payback periods for water saving methods such as xeriscaping, which could save nearly 17 percent of the laboratory's total water consumption, or about 750,000 gallons per year

December 15, 2005


3" GW TO WATER CLOSET & URINAL FLUSH VALVES
2" GW
PRESSURE REDUCING VALVE %%UPRV-5 SET 38 PSIG
2" CW
%%UBFP-8
%%UWM-3
[" %%UHB-1
[" %%UHB-1
%%UBFP-3
[" CW
4" CW
%%UBFP-1
%%UPT-1
PRESSURE REDUCING VALVE %%UPRV-4%%U SET 45 PSIG
SPRING LOADED CHECK VALVE
PRESSURE RELIEF VALVE
SQUARE D 20-40 PSI PRESSURE SWITCH SET ON 45 PSIG - OFF 65 PSIG
%%UP-1%%U CONTROL PANEL
SPRING LOADED CHECK VALVE
%%UWM-1 WATER METER (162 GPM)
%%UWM-2 1" WATER METER
3"
1"
PRESSURE GAUGE
%%UHB-1 HOSE BIBB DRAIN
1" POLYPROPYLENE (160 PSI)
WATER METER & %%UBFP-1%%U BY-PASS VALVE W/ LOCK
GW TO YARD HYDRANTS SEE LANDSCAPE PLANS
4" WATER SERVICE
GRATED MANHOLE COVER
SOLID MANHOLE LOCKING COVER
WELL CAP
FINISH GRADE (VARIES)
PITLESS WELLHEAD ADAPTER
1" GW
2-10" S
10" S
10" S
INV. EL. 86.40'
CORE DRILL THROUGH BOTTOM OF TANK & SEAL WATER TIGHT WITH LINK SEALS OR EQUIVALENT
INV. EL. 86.33'
INV. EL. 86.25'
INV. EL. 86.25'
4" AW
%%URWT-1 1,500 GALLONS
4" S TO MANHOLE
CHECK VALVE
WATER TIGHT CONDUIT
3" SLOTTED PVC
SUBMERSIBLE WELL PUMP %%UP-1%%U WITH TORQUE ARRESTOR
LOW WATER CUT OFF SWITCH
6" TO TOP OF PUMP
%%URWT-2 10,000 GALLONS
3" DIAMETER FLANGE BOLT TO BOTTOM OF TANK
2
1|" SW
[" HWC FROM BUILDING
1" TW
2" CW TO BUILDING
1|" HW TO BUILDING
[" DI CIRC. FROM LABS
RC PUMP ULLIGAN
%%uHWCP-1
3" PVC CA STORM CAP W/ BIRD SCREEN
3'-0"
[" G SEE PIPING PLANS & GAS RISER DIAGRAM FOR CONTINUATION
3" PVC FLUE TYPICAL
%%UDET-1
[" RO TO HUMIDIFIERS
[" BY-PASS W/ LOCK
1|" DI TO LAB OUTLETS (10 MEGAOHM)
T & P RELIEF
%%uHWCP-1
1|" SW
1" TW
1|" HW