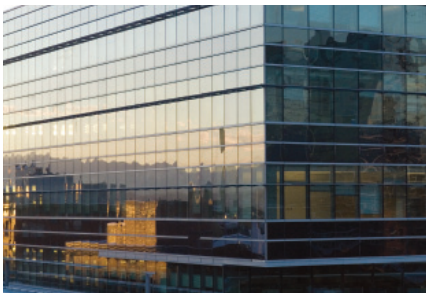
Energy Management and Conservation Program

Fiscal Year 2007 Annual Report



U.S. Environmental Protection Agency

Energy Management and Conservation Program

Fiscal Year 2007 Annual Report

February 20, 2008

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EXECUTIVE SUMMARY

Signed on January 26, 2007, Executive Order (E.O.) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* brought a new federal commitment to efficiency and sustainability. To encourage energy conservation efforts, E.O. 13423 further strengthened the federal energy reduction goals previously established by the Energy Policy Act of 2005 (EPAct 2005) and reinforced fiscal year (FY) 2003 as the baseline year against which energy conservation progress is measured. The new executive order also mandates annual water reductions in federal facilities and established FY 2007 as the baseline for water savings.

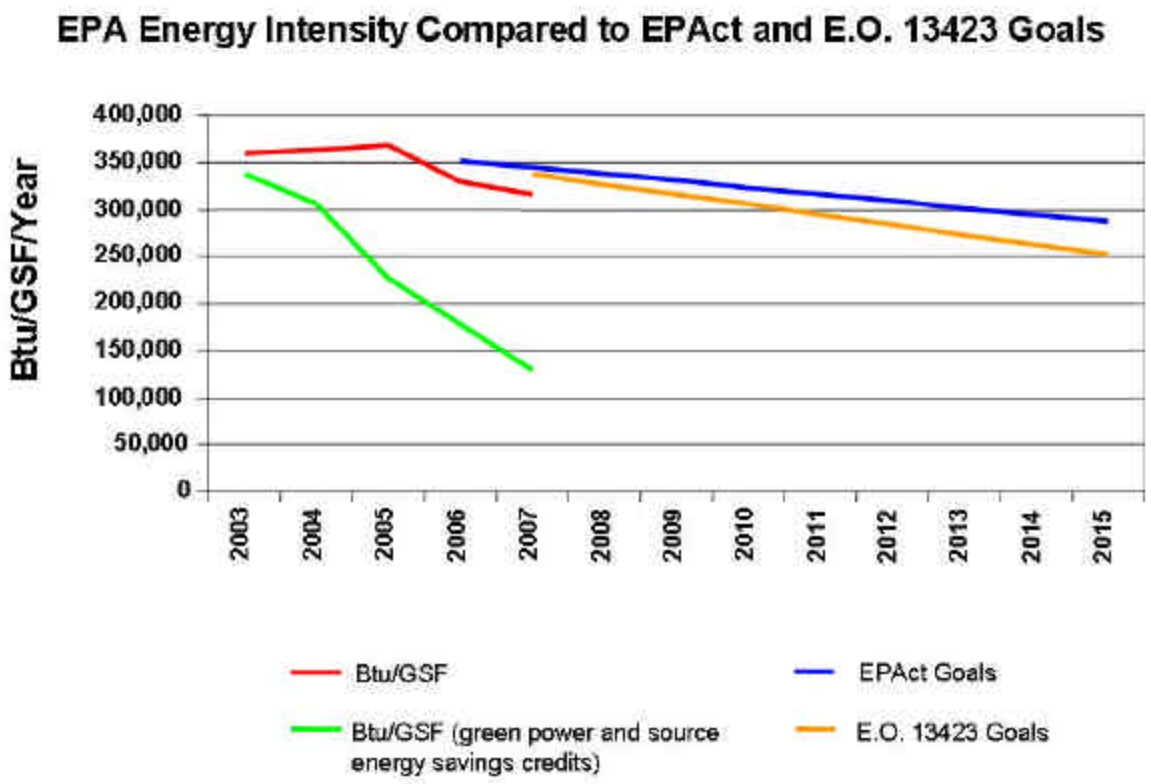
During FY 2007, the U.S. Environmental Protection Agency (EPA) continued to improve its energy and water performance and reduce its environmental footprint. The Agency refined its "ConservE" energy management strategy, improved management's focus on energy and environmental performance, and targeted mechanical improvements. At the end of FY 2007, EPA is pleased to report a significant decline in energy intensity and water use. The Agency also continued to offset 100 percent of the emissions associated with its electricity use. Most significantly, EPA has far exceeded its FY 2007 E.O. 13423 energy reduction goal, relative to the FY 2003 baseline, through a combination of recommissioning, mechanical improvements, improved reporting procedures, and other strategic efforts.

In FY 2007, EPA instituted a new quarterly management reporting system to brief management every three months on the energy performance status at all its reporting laboratories. Facility managers, laboratory directors, program administrators, and other key senior management are apprised of their facilities' progress on a "rolling four quarters" basis, in order to assess targeted projects and reprioritize efforts as needed.

As a result of numerous projects undertaken in FY 2007, EPA reduced its actual energy intensity by 4.04 percent compared to FY 2006. Compared to the FY 2003 baseline established by EPAct 2005 and E.O. 13423, EPA reduced its actual energy intensity by 12.02 percent. EPA reduced its energy in British thermal units per gross square foot (Btu/GSF) from 359,020 Btu/GSF in FY 2003 to 315,859 Btu/GSF in FY 2007. Please note that the FY 2003 baseline has been adjusted from the number EPA reported in previous years, as described below.

During FY 2007, EPA performed a comprehensive analysis of the historically reported energy consumption data for its Research Triangle Park (RTP), North Carolina, facilities, which represent 46.5 percent of EPA's reported annual energy consumption. During this analysis, EPA discovered that the Agency had used several inconsistent methodologies for reporting energy consumption at its Main Laboratory and National Computer Center facilities during FY 2003 through FY 2006. To make the reporting consistent, EPA synchronized the FY 2003 through FY 2006 energy consumption data for its RTP facilities using a consistent set of methodologies. In doing so, EPA revised its Agencywide FY 2003 baseline energy intensity from 346,518 Btu/GSF to 359,020 Btu/GSF (see Appendix C, *Summary of Adjustments to FY 2003-06 Energy Consumption Data for RTP Campus*, for more background and details about this baseline adjustment and Appendix D, *EPA's Revised FY 2003 Energy Baseline*).

In FY 2007, the Agency also offset the emissions associated with its energy use by continuing to purchase green power/renewable energy certificates (RECs) equal to 100 percent of its electricity consumption, in both its reporting facilities where EPA pays the utilities as well as in all regional offices, Headquarters, and satellite buildings where electricity is paid by the U.S. General Services Administration (GSA) or private building owners. Accounting for EPA's extensive green power purchases and source energy savings credit, EPA reduced its "reportable" energy intensity by 63.8 percent in FY 2007 compared to the Agency's revised FY 2003 baseline; although green power purchases are currently allowed to be counted according to the executive order, EPA far exceeded E.O. 13423 requirements without counting these purchases.



Most importantly, EPA continued to reduce energy use at its largest facility, the New Main building in RTP, which has been one of the Agency's most energy-intensive laboratories since it came online in FY 2003. Significant strides were made in FY 2007 to reduce energy use at New Main, including laboratory recommissioning, vivarium recommissioning, stabilization and improvement of the building control system, and other projects. This work helped contribute to an 8.1 percent reduction in energy use in FY 2007 over FY 2006. The NCC in RTP also reduced its energy use by 19.7 percent in the past year.

Another EPA facility that achieved significant energy use reductions in FY 2007 was the A.W. Breidenbach Environmental Research Center in Cincinnati, Ohio, which accounts for 11.8 percent of the Agency's total Btus and reduced its energy intensity more than 6.5 percent in FY 2007.

The Agency also showed its leadership in green buildings; in January 2007, EPA moved into a new 250,000 square foot regional office building in Denver, Colorado, that has achieved Gold certification through the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED®) program. In addition to furthering other sustainable construction and renovation projects in FY 2007, the Agency established its first Sustainable Buildings Implementation Plan, designed to assess each facility for sustainable progress and opportunities. This plan was called for in the instructions for E.O. 13423 Section X, *Sustainable Design/High Performance Buildings*.

EPA continued to make progress in its water conservation program, completing and signing two water management plans and reducing its water use by 23.9 percent (on a gallons per square foot basis) from last year, while establishing its FY 2007 water use baseline. EPA completed pollution prevention/recycling audits at 10 major laboratories in FY 2007, compiling best practices found at each location and initiating steps to develop baseline metrics for recycling across the Agency.

As EPA looks ahead to FY 2008 and beyond, there are several objectives the Agency will be focusing on to meet the challenges of E.O. 13423 and EPAct 2005. Programmatically, EPA will be striving to implement its energy conservation and green building principles across the Agency's facility portfolio. However, implementation of strategic priorities at EPA's highest energy-using facilities also will intensify, as federal requirements for energy reductions become more aggressive.

I. MANAGEMENT AND ADMINISTRATION

Prior to EPAct 2005 and E.O. 13423, EPA's energy management infrastructure was designed to meet federal energy use reduction requirements by focusing on projects at the facility level. Facilities identified energy savings opportunities and received support and technical assistance from EPA's Sustainable Facilities Practices Branch (SFPB), but individual facilities were not assigned specific reductions each year. With more stringent annual reduction requirements for energy, EPA has adopted an Agencywide approach and specific targets for each facility where the Agency pays utility bills, through a strategic planning process known as "ConservE."

Energy Management Infrastructure

EPA's senior environmental official is the Assistant Administrator for the Office of Administration and Resources Management (OARM), Luis A. Luna. In October 2007, EPA named a Senior Energy Advisor in OARM, whose responsibilities include national energy strategy management, reporting oversight, and liaison to coordinate energy-related issues among all of the Agency's interested program office partners. In addition, SFPB in the Office of Administration works to implement EPA's energy strategy in Agency facilities across the nation. For example, over the past year, SFPB developed the first draft of a Sustainable Buildings Implementation Plan in August 2007 and initiated in-house training this year for all of its facility staff on key EPAct 2005 and E.O. 13423 provisions, to give all affected employees the tools and knowledge needed to meet these new requirements.

As it implements ConservE, EPA is fostering more focused senior management attention on energy performance, especially at the Agency's most energy-intensive facilities. SFPB remains the main collection point for energy data and continues to serve as a key advisor on improvements within the various facilities, but the primary responsibility for implementing reductions has shifted to the facility energy managers. Further, performance metrics have been made available on a quarterly basis to senior management personnel, ensuring accountability and cooperation in the effort to reduce energy use Agencywide. A list of site energy managers can be found in Appendix E.

Management Tools

EPA employs a variety of incentives to motivate employees to undertake energy reduction initiatives. Annual performance evaluations are tied to and monitor progress on specific performance goals that correspond to the requirements under EPAct 2005 and E.O. 13423.

Awards and Incentives

Each year, EPA also recognizes its employees' commitment to energy reduction and sustainability goals through incentive programs, including awards. EPA's internal "Sustainability Champion" awards are given to facilities and programmatic staff annually to recognize their efforts in water efficiency, pollution prevention, and energy conservation. In FY 2007, awards in 10 different categories were distributed to recognize facility managers, building design/maintenance personnel, and other EPA staff who demonstrated exceptional effort and achievement in energy and water efficiency and other sustainability areas:

Btu Buster Award

- Rick Dreisch, Environmental Science Center Laboratory in Fort Meade, Maryland
- Rodney Booth, Environmental Research Laboratory in Duluth, Minnesota

Energy Partner of the Year–Field Award

- Steve Dorer, National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan

Green Thumb Award

- Mid-Continent Ecology Division Laboratory in Duluth, Minnesota

H_2Overachiever Award

- Linda Donahue, Region 10 Laboratory in Manchester, Washington
- Robert Manos, Region 10 Laboratory in Manchester, Washington
- Stephanie Bailey, Region 10 Laboratory in Manchester, Washington
- Bob Beane, Region 1 Laboratory in Chelmsford, Massachusetts

Leading Edge Award

- Russ Ahlgren, National Health and Environmental Effects Research Laboratory in Narragansett, Rhode Island
- Mark Tagliabue, National Health and Environmental Effects Research Laboratory in Narragansett, Rhode Island
- Chet McLaughlin, Region 7 Office in Kansas City, Kansas
- Region 7 Emergency Response Facility Relocation Team in Kansas City, Kansas

Lifetime Achievement Award

- Gail Miller Wray, Office of Solid Waste and SFPB at EPA Headquarters

Pollution Prevention Partner of the Year Award

- Ruth Schenk, National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan
- Dorothy Branham, National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan

Reporter of the Year Award

- Fred Childers, National Exposure Research Laboratory in Las Vegas, Nevada
- Art Zimmerman, Office of Research and Development Laboratory in Athens, Georgia

Senior Management Advocate for Sustainability Award

- Chris Grundler, National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan
- Martha Cuppy, Region 7 Office in Kansas City, Kansas

Sustainable Partner of the Year Award

- Cathy Berlow, Architectural, Engineering, and Asset Management Branch at EPA Headquarters

For more details about the 2006 winners, visit <www.epa.gov/oaintrnt/champions/index.htm>.

In addition to internal awards, EPA actively participates in the White House Closing the Circle Awards, the U.S. Department of Energy's (DOE's) Federal Energy and Water Management Awards and Federal Energy Saver Showcase Awards, the Presidential Awards for Energy Management Success, the GSA Real Property Management Awards, and other opportunities for professional recognition. In FY 2007, EPA received: three Closing the Circle Awards; the Presidential Award for Energy Management Success for its Labs21 program; the Federal Energy Saver Showcase Award for its Region 8 office and One and Two Potomac Yard Headquarters offices; and GSA's Real Property Management Award for a low impact development project at EPA Headquarters. Steve Dorer of EPA's National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan, also received an individual exceptional service award as part of the 2007 Federal Energy and Water Management Awards. Awardees are recognized in EPA's internal newsletter, *Energizing EPA*, and on the Office of Administration Web site, found at <www.epa.gov/greeningepa>.

Training and Education

To educate EPA employees on the requirements of EPAct 2005 and E.O. 13423, EPA's SFPB developed several internal energy and green buildings training sessions in FY 2007. These training sessions also meet a specific goal of E.O. 13423, which mandates that agencies establish an internal environmental training program that will provide initial awareness and review of the executive order goals and related instructions, including the environmental impacts of employees' actions. In addition to two sessions dedicated to meeting the requirements of E.O. 13423 and EPAct 2005, presentations were made on ASHRAE 90.1-2004, as it applies to laboratories, and facility commissioning. Nearly 100 EPA employees attended. These sessions will continue in FY 2008 with presentations on water conservation, green building ratings and requirements, life-cycle costing, advanced metering, renewable energy, energy savings performance contracts, emissions, green leases, and operations and maintenance.

Labs21

Labs21 is a voluntary partnership program dedicated to improving the environmental performance of U.S. laboratories. Co-sponsored by EPA and DOE, the program is committed to helping build sustainable, high-performing, and low-energy laboratories.

With eight new partners joining the program in FY 2007, there are now 48 federal and private sector organizations committed to support sustainable laboratory design and operations. Among the current Labs21 partners are eight federal agencies that receive information and technical assistance for more than 40 federal facilities. The success of the Labs21 Partnership Program was demonstrated in FY 2007 as two partners received LEED Platinum certification. The National Renewable Energy Laboratory's new Science and Technology Center (S&TC) and the Tahoe Center for Environmental Sciences are, respectively, the second and third laboratories in the world to receive USGBC's highest level of certification. Additionally, S&TC is the first federal facility to achieve LEED Platinum.

As of October 2007, 5,975 industry professionals were involved in Labs21 through the Labs21 Network, which provides monthly updates on the various program components, including an annual conference, partnership and supporter programs, and a tool kit of technical resources.

In FY 2007, Labs21 held its largest conference to date. From October 17 to 19, 2006, 565 architects, engineers, federal employees, facility managers, and other laboratory professionals—including 37 EPA employees—convened in San Antonio, Texas, to discuss the latest trends in sustainable laboratory design and construction. The International Institute for Sustainable Laboratories (I^2SL), the second nonprofit co-sponsor of the Labs21 conference, provided logistical and technology fair support. In 2007, EPA and DOE welcomed I^2SL back as the non-federal Labs21 Conference co-sponsor for 2007 and 2008. I^2SL also helped coordinate the Labs21 2007 Annual Conference from October 2 to 4, 2007, in North Charleston, South Carolina, and the Labs21 Design Courses held in 2007. Labs21 introductory and advanced courses trained more than 500 people in nine different locations across the country in FY 2007.

During FY 2007, Labs21 also completed three new case studies and one best practices guide as part of its tool kit of resources in support of sustainable design, construction, and operation of high-performance laboratories. In addition, the program released two new technical bulletins as the start of a new line of resources included in the tool kit. In just a few pages, the bulletins provide readers with a concise and valuable overview of a particular laboratory design issue, outlining the problem and the Labs21 recommended approach to solving it.

The success of the Labs21 program is tracked through various measures, such as attendance at the Labs21 Annual Conference and training courses, as well as the use of the Labs21 Environmental Performance Criteria—a rating system developed specifically for laboratories—and use of the Labs21 benchmarking tool—a Web-based database tool that allows users to compare the energy performance of their laboratory facilities to similar facilities.

The most valuable measure of the program's success, however, is the energy (Btu per square foot), emissions, and dollar savings achieved from Labs21 partner projects. EPA calculates that the 19 currently reporting Labs21 Partner projects have:

- Reduced their annual energy use by 533,442,000,000 Btu—equal to the average annual electricity use of more than 14,500 U.S. homes.[1]
- Reduced their annual carbon dioxide emissions by an estimated 242,560,504 pounds—the amount emitted by nearly 21,000 cars over the course of a year.[2]
- Saved $17,858,952 per year on their energy bills.

The Labs21 Web site (www.labs21century.gov) provides additional information on the program, including regularly updated conference details, opportunities to join the program as a partner or supporter, and access to the online tool kit.

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[1] According to the Energy Information Administration, the average annual electricity consumption by one U.S. home in 2001 was 10,656 kWh, (http://www.eia.doe.gov/emeu/recs/recs2001/enduse2001/enduse2001.html). 1 kWh = 3,413 Btu.

[2] According to ENERGY STAR, on average across the United States:

- One kWh of electricity emits 1.55 pounds of carbon dioxide.
- Amount of carbon dioxide emitted by one passenger car over the course of a year is 11,560 pounds.

<www.energystar.gov/index.cfm?c=energy_awareness.bus_energy_use>

Energizing EPA *Newsletter*
In an effort to educate all of its employees on the importance of environmental performance, EPA produces *Energizing EPA*, a quarterly, online newsletter that highlights the Agency's efforts to demonstrate sustainability, including energy and water efficiency, at its facilities.

Office of Administration Web Site
EPA's Office of Administration also continues to maintain and enhance its public Web site on sustainability efforts 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 the mechanical improvements, energy and water consumption data, LEED certification, and green building highlights for the major facilities EPA occupies. In FY 2007, the Web site received 1,457,738 "hits" from interested viewers, or an average of 121,478 visits to the site per month.

Showcase Facilities

Two new EPA office buildings received "Showcase Facility" designation from the Federal Energy Management Program (FEMP) in FY 2007.

In July 2006, EPA held grand opening ceremonies for its new office buildings at One and Two Potomac Yard in Arlington, Virginia. Potomac Yard consists of two connecting office towers containing 650,000 square feet of office space and 6,000 square feet of retail and public space. The structure received LEED Gold certification for new construction, with Building One earning 44 of 69 possible points and Building Two earning 43 out of 69 possible points. Building One also received the ENERGY STAR® label in August 2007 for performing in the top 25 percent of similar office buildings.

In addition to its DOE Showcase Facility designation, in May 2007, EPA's Potomac Yard facility won a 2007 White House Closing the Circle Award for its sustainable design and energy- and water-saving features. These features include low-flow, high-efficiency plumbing products, and a drought-resistant landscaping scheme. Kitchen appliances such as microwaves and refrigerators are ENERGY STAR-labeled, and the majority of the facility's roof is made with ENERGY STAR labeled materials that are designed to reduce the amount of solar heat absorbed, thereby reducing the building's cooling requirements.

Potomac Yard was also a finalist in the commercial design category of *Environmental Design + Construction* magazine's Excellence in Design Awards. In January 2007, Davis Carter Scott, a Potomac Yard One and Two architecture firm, received a Best Building, Environmentally Responsible—Green Construction Award of Merit from the Northern Virginia Chapter of the National Association of Industrial and Office Properties for its work on the facility's design.

EPA also received a Showcase Facility designation for its new Denver, Colorado, Region 8 office, which opened in January 2007 and received LEED Gold certification in September 2007, through a concerted effort among EPA, GSA, and the facility's development team (see page 28).

High Performance Buildings Database

DOE's High Performance Building Database seeks to improve the methods used to measure building performance by collecting data on various factors that affect a building's performance, such as energy, materials, and land use. As part of work to promote sustainable buildings, EPA ensures that building data for its new facilities are entered into the High Performance Federal Buildings Database. In FY 2007, as required by E.O. 13423, EPA submitted its One and Two Potomac Yard facility in Arlington, Virginia, and Region 8 office in Denver, Colorado, for inclusion in the federal version of the database.

EPA facilities now featured in this database include Potomac Yard One and Two; the New England Regional Laboratory in Chelmsford, Massachusetts; Region 7 Headquarters and Science and Technology Center in Kansas City, Kansas; and three entries from the RTP campus. Although data for the Region 8 office in Denver were submitted in FY 2007, the data have not yet appeared in the database.

II. IMPLEMENTATION STRATEGIES

EPA has consistently reduced its reportable energy intensity and associated environmental impact over the past several years, as a result of a targeted effort to improve existing facilities' energy performance and by ensuring that all new facilities in the building inventory perform to EPA's sustainability requirements. In addition to the strategic approach to facility improvements described below, EPA continues to purchase green power to offset its reported electricity use. EPA never intended to fully rely on green power purchases to meet energy conservation goals, but in the past did rely on green power to offset energy use. Based on the fact that DOE is beginning to transition away from counting green power purchase toward federal energy reduction requirements, EPA is ready for the challenge of meeting energy efficiency goals without green power, as outlined below.

Overall Strategy

Based on the success the Agency has achieved in the past several years with energy reduction, EPA will continue to implement the following overall energy strategy in FY 2007:

- *Promoting sustainable, energy-efficient design in new buildings.* Commissioning of new buildings, which EPA began requiring in 2004, ensures that planned and future facilities perform to the rigorous design standards EPA has set to ensure efficient energy use.

- *Improving the operation of existing buildings.* Based on the success of the "Top 10 O&M" operations and maintenance education (O&M) program initiated in FY 2006, EPA is working towards institutionalizing O&M assessments as a component of the national energy management program (pending funding).

- *Designing and constructing mechanical system changes.* Whether they are major projects such as the Infrastructure Replacement Project slated for one of EPA's largest laboratories in Cincinnati, Ohio, or smaller heating, ventilation, and air conditioning (HVAC) improvements, EPA commissions all mechanical system upgrade projects.

- *Concentrating efforts on the best opportunities.* EPA has prioritized its largest, most energy-intensive facilities for attention; regardless of size, however, the Agency will implement energy conservation at smaller laboratories where funding, local management, and local staff support are in place.

- *Allocating energy reductions across facilities.* As described in EPA's ConservE strategy below, the Agency requires all of the buildings for which it pays the utilities to share in the effort to reduce Agencywide energy use. Every facility has an annual energy reduction goal as part of the nationwide strategy; the specific goals are derived from the projects performed each year and the energy impacts anticipated for each project.

- *Sustainable Master Planning*: EPA continues to work to expand the scope of its master planning process, from its traditional focus on space needs and building locations to considering long-term mechanical system performance and other sustainable issues.

Facility-Specific Energy Reductions

The signing of EPAct 2005 introduced a new set of aggressive, annual energy reduction requirements for federal facilities in FY 2006. To meet the challenges associated with this new legislation, EPA's OARM initiated the ConservE Program. This Agencywide effort represented a new paradigm for energy conservation at EPA. In past years, the Agency has focused on individual facilities to reduce energy consumption and help the Agency meet its mandated energy savings. ConservE embodies a fundamental shift from voluntary actions to required savings by all facilities. Under this new framework, the Agency assigns annual energy reductions to each reporting facility, tailored to historical energy trends and assumed energy savings from funded energy projects. This approach helps EPA strategically disburse the Agencywide burden among all facilities and ensures EPA's continued success in meeting its required annual energy savings.

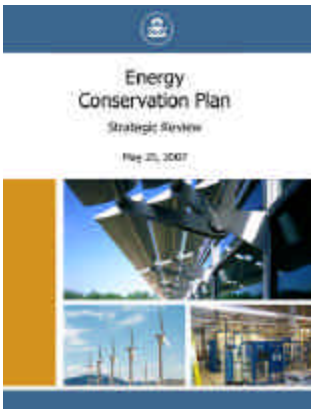
In January 2007, President George W. Bush signed E.O. 13423, which introduced even more stringent energy reduction requirements and renewable energy guidance for federal facilities. This guidance includes a requirement that renewable energy be purchased from "new" sources and will eventually not allow credit for green power purchases towards energy reduction requirements. With these new tougher requirements in place, EPA's ConservE Program continues to serve as an important management and planning tool for EPA in FY 2007 and beyond.

As in FY 2006, SFPB began FY 2007 by assigning each EPA reporting facility a "ConservE target"—a mandatory 2 percent reduction in energy consumption below FY 2006 consumption levels—as a starting point. EPA anticipated that each facility would be able to meet this goal through continued implementation of a variety of "Top 10 O&M" measures, which SFPB identified in FY 2006 and subsequently asked all facilities to complete. From this starting point, SFPB tailored each facility's respective ConservE target based on funded energy projects included in EPA's energy master planning framework. For facilities with energy projects that anticipated energy savings of more than 2 percent to be realized in FY 2007, SFPB used the estimated savings in place of the required minimum target. In developing FY 2007 ConservE targets, SFPB also accounted for facilities that failed to perform well the previous year. For those facilities that increased energy consumption in FY 2006, SFPB made the FY 2007 ConservE targets more stringent to help make up for lost ground in previous years.

To track and communicate ConservE progress in FY 2007, SFPB continued to develop and distribute a quarterly ConservE update for all facility managers and senior management. With a red/yellow/green rating system—similar to the one used in the Office of Management and Budget (OMB) Energy Management Scorecard—SFPB assigned each facility a quarterly progress rating to communicate year-to-date progress achieved relative to the site-specific FY 2007 ConservE target.

In FY 2007, SFPB continued Phase II of its energy master planning project, whereby SFPB collaborated with DOE's Lawrence Berkeley National Laboratory and a consulting engineer to examine each planned energy savings project. During this iterative process, the team refined estimates of energy savings and identified new opportunities for additional energy-saving

projects. As an outcome of EPA's continued work to refine the energy master plan, SFPB completed an update to its *Energy Conservation Plan—Strategic Review* report in May 2007, which includes:



- A summary of EPA's energy savings potential through FY 2015.
- A comprehensive list of funded and unfunded energy savings projects through FY 2015.
- EPA's FY 2006 year-end OMB Energy Management Scorecard.
- Future projections of Agencywide annual energy consumption and cost figures.
- EPA's buildings and facilities major spending plan through FY 2015.
- A summary of potential energy savings performance contract projects.

EPA uses this comprehensive report to inform senior management of the Agency's progress in meeting energy reduction requirements and the economic implications of continued success in terms of both invested and avoided costs.

Advanced Electricity Metering

To improve energy management and promote the use of demand-response incentives in the federal sector, EPAct 2005 requires that federal agencies install advanced metering in all federal facilities, where economically practicable, by October 1, 2012. While EPAct 2005 only requires agencies to install advanced metering for electricity, EPA plans to meet or exceed EPAct 2005 requirements with advanced metering of other utilities in all of its reporting facilities.

Additionally, EPA plans to integrate all metered energy data from different facilities into a single, Web-based "clearinghouse" of EPA's Agencywide energy consumption data. EPA anticipates that this new integrated nationwide metering system will replace the Agency's existing practice of manually tracking and entering energy consumption data, thus improving accuracy and saving time. The system will also provide facility staff and senior management instant access to valuable data at the click of a mouse, which will provide EPA an additional management tool to continue energy conservation efforts across its inventory of facilities.

EPA met 100 percent of its advanced metering goals in FY 2007. In November 2006, SFPB hosted an Agencywide teleconference, which introduced all facility managers and information technology staff to the advanced metering requirements included in EPAct 2005. During this teleconference, SFPB also announced a plan for visiting each facility over the next year to meet individually with staff and develop site-specific advanced metering implementation plans. In December 2006, SFPB conducted follow-up site-specific calls with each individual facility to review existing metering inventories, discuss plans for submetering, answer any technical questions, and schedule dates for follow-up site visits.

Within the next year, EPA had visited all 20 of its nationwide campuses to start developing advanced metering plans. During each site visit, EPA's advanced metering team met with the facility manager and information technology staff to review advanced metering goals and

logistics. The team also conducted discussions with utility company representatives to learn about existing utility meter specifications and capabilities, as well as existing rate incentive programs, such as demand-response, peak load shedding, and real-time pricing. After the initial kickoff meeting, the team performed a comprehensive review of the facility's mechanical systems and information technology (IT) infrastructure to develop a tailored strategy for installing appropriate advanced metering hardware and software components.

Following each site visit, SFPB prepared a site-specific advanced metering implementation plan, which serves as a documented path forward or "blueprint" for bringing each facility online to EPA's national advanced metering network. Each plan includes the following components:

- Proposed utility-level metering and submetering.
- Technical approach for connecting all hardware to the national software system.
- Discussion of software security and other data considerations.
- Detailed estimates of all hardware and software costs.
- Comprehensive cost-effectiveness analysis.

In spring 2007, SFPB completed development of both the advanced metering hardware and software performance specifications. The hardware specification fully identifies the technical requirements of any metering hardware procured and installed for an EPA facility. EPA's RTP campus in North Carolina completed the installation of a Web-based advanced metering system for the New Main building and the National Computer Center in December 2005. In developing EPA's software performance specification for the Agency's new nationwide advanced metering software platform, SFPB studied the lessons learned from the RTP procurement and implementation. Based on an interview with the lead of the RTP advanced metering implementation team, as well as extensive market research, SFPB developed EPA's advanced metering software performance specification. Included in this specification is a comprehensive requirements matrix scorecard, which will eventually allow EPA to systematically evaluate potential software packages against a set of specific performance requirements. Both the hardware and software specifications will be crucial to ensuring a seamless and successful implementation of advanced metering across EPA's reporting facilities over the next several years.

While EPA's pilot advanced metering system (ION system) in RTP has been in place for nearly two years, the Agency is not yet fully reliant on its new data stream. After identifying suspicious high-temperature hot water consumption trends reported by the ION system in November 2006, SFPB hired a consulting engineer to examine the issue in more detail. In November 2006, EPA discovered that a temperature sensor in New Main was originally placed in a location that caused the ION system to return erroneous data. In June 2007, EPA performed a weekend shutdown of New Main and relocated the hot water sensor in an effort to obtain more accurate readings of hot water energy consumption. Initial fourth quarter FY 2007 data from the ION system indicates that the repair has led to more reliable data collection.

Prior to the FY 2008 procurement of a nationwide advanced metering software system, in August 2007 SFPB initiated a comprehensive analysis of several commercially available packages. This process involved a multi-phase evaluation of each system's ability to meet EPA's

performance requirements, as well as an assessment of each option's lifetime costs and potential risks. In addition to this evaluation of commercially available systems, EPA's IT staff also developed an in-house proof of concept, representing an additional option that SFPB plans to evaluate in FY 2008.

In FY 2008, EPA plans to make additional progress towards Agencywide implementation of advanced metering. Based on the results of the software systems analysis, EPA plans to procure a software package that will serve as the Agency's nationwide advanced metering software platform. To continue developing the infrastructure necessary for advanced metering data collection, transfer, and analysis, EPA also plans to procure a new host server dedicated to the nationwide metering network, as well as integrate the newly procured system into EPA's existing Agencywide IT/communications infrastructure. Finally, by the end of FY 2008, EPA will procure and install new advanced metering hardware in several targeted facilities, starting with laboratories in RTP and Cincinnati.

Industrial Facility Improvements

In FY 2008, EPA will continue implementing and commissioning HVAC and other mechanical upgrades at several facilities to help attain the required conditions for supply air while reducing annual energy consumption. Key recommissioning activities and HVAC improvements at particularly energy-intensive facilities include the following:

RTP, North Carolina

RTP New Main Laboratory
With more than 1 million square feet of laboratory and office space, EPA's New Main Laboratory accounts for 29.8 percent of the Agency's overall annual energy use. Compared to FY 2006, New Main has reduced energy use by 30.9 billion Btu, or 8.1 percent. These energy savings resulted in more than $1.5 million of avoided energy costs. Many of EPA's efforts to improve facility efficiencies in FY 2007, therefore, continued to focus on RTP's New Main laboratory and the central utility plant that serves both New Main and EPA's National Computer Center. Over the past four years, a team of EPA employees from RTP and Headquarters has been developing and implementing extensive recommissioning projects to improve the performance and efficiency of critical building heating, cooling, ventilation, and controls systems.

At New Main, the team completed three significant energy-saving projects for RTP's laboratory space and vivariums (animal research) wing: the Laboratory Controls Optimization Project (LCOP), the Vivarium Controls Optimization Project (VCOP), and phases II and III of the Static Pressure Optimization and Reduction Test (SPORT), which were completed in August 2007. The LCOP and VCOP projects calculated and reconfirmed safe nighttime and daytime (occupied and unoccupied) supply and exhaust requirements for each laboratory module based on the fume hood sash position (open or closed). LCOP and VCOP also tested the ability of the control systems to reliably and consistently adjust to fume hood sash position and occupancy changes, replaced or repaired defective sensors and controllers, and verified congruency of the building automation system (BAS) reported flows and performance against actual flows and performance.

Through LCOP and VCOP, New Main achieved annual airflow reductions of 38 percent over baseline levels, resulting in more than $1.3 million in avoided energy costs annually. Following LCOP and VCOP, the team was also able to modify the operation of the air handling units (AHUs) and reduce static pressure throughout the system as part of the SPORT project, resulting in additional annual savings of more than 3.7 million kWh and energy cost avoidance of $160,000. All three of these projects were completed by August 2007.

As a follow-up to this extensive recommissioning, EPA compiled a Laboratory Ventilation Management Plan, which provides RTP's O&M contractors with a consolidated record of the lessons learned during LCOP, VCOP, and SPORT. In addition to providing O&M staff with a record of all the recently completed commissioning work, the plan contains screen shots from the BAS and other helpful information that will facilitate continuous commissioning and encourage continued energy savings.

In addition to improving energy efficiency in laboratory space and vivariums in FY 2007, EPA also completed the first two phases of a multi-phase project to optimize air handling in the facility's office wings. As part of this project, EPA completed upgrades to the air handling system and began optimizing the downstream air handling distribution network. The Agency is currently implementing a pilot project on one AHU to study the overall impacts and payback of the downstream recommissioning. EPA also started the design of office tower recommissioning work and provided funding for the project. In FY 2008, EPA expects to finish the design of the commissioning project and begin the implementation of the pilot.

EPA also completed implementation of the third year of a multi-year controls master plan in FY 2007. The focus this fiscal year was to improve the data transmission, data retention, and overall data quality of the BAS by reducing data overloads and data transit times on various sections of the building control system. The system has been significantly strengthened with the addition of an Ethernet backbone and by reorganizing controllers into smaller groups. For FY 2008, EPA will continue to optimize data flow in order to make the facility's automation system more reliable, consistent, and accurate.

In FY 2007 EPA funded and initiated work on several projects to improve the campus' chilled and hot water distribution system. In July 2007, EPA reprogrammed the facility's hot and chilled water pumps and added new controls for high-temperature hot water differential pressure sensors. EPA also funded revalving for the chilled water supply to the National Computer Center and added an additional chilled water meter at the central utility plant to help better assess the plant's energy efficiency.

National Computer Center

In FY 2007, EPA's National Computer Center (NCC) in RTP accounted for nearly 3.4 percent of EPA's reportable energy use. Through recommissioning and numerous energy saving projects in NCC's computer wing, the facility was able to save 9.7 billion Btu (BBtu) in FY 2007 compared to FY 2006, a reduction of 19.7 percent. An extensive, third-party review of the data center's operating conditions resulted in EPA shutting off six of the facility's 13 computer room air conditioners units, while still meeting the sensitive cooling needs of the computer equipment. EPA also optimized and diversified the location of energy-intensive equipment to better match

heat loads and cooling capacity. These projects helped reduce NCC's annual energy consumption by more than 7 percent compared to FY 2006 energy use. This energy savings resulted in annual cost savings of more than $111,000.

Central Utility Plant
In FY 2007, EPA recommissioned the RTP central utility plant's (CUP's) chillers, doubling their efficiency. EPA partnered with the National Institutes of Health, which owns the CUP and shares its output with EPA on a conceptual design for an upgrade of pipes and controls for the chilled water distribution system, which serves both RTP New Main and NCC. As an option to fund this project, EPA also worked with NIHES to produce an initial proposal for an energy savings performance contract in November 2007. Moreover, EPA contractors performed a hot and chilled water load analysis of New Main. EPA anticipates this will improve the coordination of CUP water output to better match New Main's heating and cooling needs.

Human Studies Facility
In FY 2007, the RTP Human Studies facility accounted for 8.1 percent of EPA's reportable energy use. In May 2007, EPA completed designs for upgrades to AHU #1 and AHU #2, the two largest air handling systems in the building. Although the estimate was too high to fund the project, EPA is considering an energy savings performance contract with the University of North Carolina to fund this project in FY 2008. Human Studies' energy use fell by nearly 4.2 percent in FY 2007 compared to FY 2006. EPA's continued emphasis on preventative maintenance at Human Studies contributed to the facility's energy savings realized in FY 2007.

Cincinnati, Ohio
The Andrew W. Breidenbach Environmental Research Center (AWBERC), EPA's second largest research facility and second largest energy consumer, uses 11.8 percent of EPA's annual reported energy. AWBERC will continue a series of upgrades as part of a multi-year, multi-phase Infrastructure Replacement Project. During the project, EPA will institute mechanical upgrades to replace AWBERC's 40-year-old HVAC system, including all air handlers, vertical and horizontal supply ductwork, control systems, exhaust systems, and associated equipment, as well as renovate 12 laboratory modules. EPA will install high-performance variable air volume (VAV) fume hoods, which use 30 to 40 percent less energy than conventional fume hoods, and replace single-pass supply air with a combination of return air and required outside air. EPA will also install a heat recovery system to recapture heating and cooling energy from the exhaust system, as well as install new building controls with nighttime setbacks. Phase I designs were completed in FY 2007, and EPA also awarded an Indefinite Delivery/Indefinite Quality contract for project construction in FY 2007. Phase I construction began in FY 2008; the projected completion date is late FY 2008.

Fort Meade, Maryland
EPA's Environmental Science Center (ESC) in Fort Meade, Maryland, accounts for 4.9 percent of the Agency's reportable energy use. In FY 2006, an extensive audit of the facility's ventilation system and laboratory and non-laboratory space was conducted and baseline airflow data collected. Following the audit, a comprehensive report was developed to document all existing exhaust devices in the laboratory, as well as a list of those devices that the laboratory staff was either not using or using inappropriately. This Phase I report also identified potential air flow

reductions, as well as opportunities to further segregate laboratory and non-laboratory activities to reduce operational requirements and further save energy. Results from Phase I of this project indicated that EPA is utilizing its ventilation system quite efficiently; however, the results also identified several problems with the calibration and accuracy of the HVAC controls.

During Phase II of this project, which was completed in FY 2007, EPA developed a revised ventilation plan that established new set points to meet the reduced air flow demand. Also as part of Phase II, EPA completed a pilot that implemented the ventilation plan in 20 percent of the facility's laboratory modules. In Phase III, which is expected to be completed in FY 2008, EPA will complete a full-scale implementation of the ventilation plan and recommission the HVAC system and controls to ensure optimum efficiency and continued employee safety and comfort. Although ESC's energy use rose slightly in FY 2007, EPA expects the implementation of the project to reduce annual energy consumption at ESC by approximately 10 percent in FY 2008.

Manchester, Washington

After completing a new wing with VAV fume hoods at the Region 10 Laboratory in May 2003, EPA implemented a multi-stage renovation project for VAV upgrades for existing wings. A construction contract was awarded in September 2006 for Phase II/Stage 2 of the project, and renovations were completed in September 2007. Pending funding, EPA will award a construction contract for Phase II Stage 3, the completion of the project. When all phases of the laboratory renovations are completed, EPA expects to reduce the facility's overall energy use by more than 15 percent compared to an FY 2005 baseline.

Ann Arbor, Michigan

From FY 2004 through FY 2006, EPA's National Vehicle and Fuel Emissions Laboratory (NVFEL), in Ann Arbor, Michigan, added several new, energy-intensive pump motors and laboratory analysis equipment to the facility's dynamometer and laboratory modules. With these additions, NVFEL's cooling load significantly increased, forcing EPA to investigate methods for increasing the laboratory's cooling capacity. In FY 2007, EPA entered into negotiations with the energy services company (ESCO) that provided the Ann Arbor facility with its ESPC. EPA hoped to modify its existing ESPC in an effort to increase NVFEL's cooling capacity; however negotiations stalled as the project was not financially viable for the ESCO.

Following the stalled negotiations, EPA worked to develop an alternative plan for continuing routine and safe laboratory operations during the 2007 summer cooling season. To address the summer heat and newly increased cooling loads of the facility, in spring 2007, SFPB developed an innovative load shedding tool, which allows the NVFEL facility manager and O&M staff to input forecasted wet bulb temperatures into an interactive database. The user can also specify which of the facility's rooftop AHUs must remain in operation. The database then returns to the user all possible combinations of AHUs that can operate together, given the input boundary conditions, without exceeding the building's maximum cooling capacity. This tool has enabled NVFEL's staff to anticipate upcoming hot and humid weather conditions and seamlessly adjust research activities within specific test cells of the laboratory, while ensuring continued optimum and safe operating conditions. Although NVFEL's energy use did not decrease in FY 2007, the amount it rose was negligible, and EPA was also able to avoid investing more than $1 million of taxpayers' money for a new chiller.

Duluth, Minnesota
EPA completed designs for the first phase of a large-scale VAV upgrade in FY 2006. Unfortunately, resource constraints in FY 2007 have caused the project to be postponed. In July 2007, however, EPA met with an ESCO regarding the funding of a proposed ESPC for the VAV project and will work to finalize the project's plans in FY 2008. If funding is provided, EPA expects this project to result in energy savings of 20 percent below the facility's current consumption.

Additionally, in FY 2007, Duluth completed a water recycling project to reduce the amount of water that was discharged into the facility's sewage system after having been drawn from Lake Superior and used for laboratory processes. Approximately half of the 94 million gallons of water used annually for cooling and aquatic research is cleaned and returned to the lake, reducing the facility's annual sewer charges. The addition of a water filtration project in FY 2008 is expected to increase the facility's water recycling rate to 95 percent.

Athens, Georgia
The Science and Ecosystems Support Division (SESD) Laboratory will undergo modifications to building controls, installation of an isolated HVAC unit, and transition from constant volume to variable frequency drive AHUs as part of an overall facility improvement. The design for the modification was completed in FY 2006, and GSA is currently evaluating proposals for the construction work. The projected completion date for the upgrade is mid-FY 2009. EPA anticipates reducing energy use at the SESD Laboratory by approximately 5 percent as compared to an FY 2005 baseline, with an estimated payback of less than five years.

Richmond, California
In October 2005, EPA's Region 9 Laboratory in Richmond, California, completed installation and formally began operation of a new, 60-kilowatt (kW) cogeneration unit. Using a separate dedicated natural gas line, this new cogeneration unit generates electricity on site for use by the facility and captures the associated waste heat for use by the laboratory's boilers. In theory, the captured waste heat reduces the need for natural gas to generate hot water, thus reducing site energy consumption. Because EPA observed trends of increased energy use beginning in FY 2006, the Agency initiated a joint study with DOE's Lawrence Berkeley National Laboratory to investigate possible reasons for the trend. Normal operations of the cogeneration unit resumed in FY 2007, and SFPB assigned the Region 9 Laboratory a ConservE target of returning to its "pre-upgrade" FY 2005 energy consumption, which translates into a 13.7 percent reduction from FY 2006 use. In FY 2007, however, the Richmond laboratory's energy use increased by more than 4 percent.

Energy Savings Performance Contracts

EPA has historically used energy savings performance contracts (ESPCs) as one of many tools employed to increase the Agency's energy efficiency and reduce its environmental impact. The Agency's first ESPC was at its NVFEL in Ann Arbor, Michigan, and resulted in an initial energy reduction of more than 42 percent. EPA's second ESPC in Ada, Oklahoma, helped contribute to the Agency's first carbon-neutral laboratory. In order to increase the use of ESPCs to accomplish the Agency's energy reduction goals, EPA has identified three potential ESPC opportunities that could lead to significant energy savings. EPA undertook feasibility studies in FY 2007 and is currently in the initial proposal phase of developing potential ESPC projects for the following locations:

Main Laboratory—RTP, North Carolina
As part of a series of mechanical improvements, EPA is examining heat recovery system projects at several of the RTP New Main campus laboratory buildings and the high bay as significant sources of potential energy savings. Through this ESPC, EPA anticipates installing heat recovery systems in Buildings B, D, E, and the high bay, and completing additional energy conservation measures as determined by the energy services company.

The heat recovery system alone could save 16.4 BBtu per year. On a percentage basis of EPA's reported energy use (based on FY 2007 figures), this project could provide annual savings of nearly 1.4 percent of Agencywide energy use, or 3.8 percent of the facility's FY 2006 energy use. The project is still in its exploratory phase, with an initial proposal presented to EPA in November 2007.

Central Utility Plant—RTP, North Carolina
EPA has also identified numerous upgrades to the CUP that serves the New Main Laboratory and NCC in RTP as significant sources of potential energy savings. Because EPA's New Main facility and NCC share the CUP's chilled water output with the NIH National Institute of Environmental Health Science Laboratory, the proposed ESPC will be a joint, interagency effort between EPA and NIH. Through improvements to the CUP's controls and other significant mechanical upgrades, EPA anticipates improved efficiency at the utility plant. The initial proposal was delivered to EPA and NIH in early FY 2008.

Mid-Continent Ecology Division Laboratory—Duluth, Minnesota
As part of a multi-year assessment process, EPA has identified VAV and heat recovery projects as significant sources of potential energy savings at its Mid-Continent Ecology Division Laboratory in Duluth, Minnesota. The VAV portion of this project is expected to result in annual energy savings of 5.3 BBtu (which represents 0.45 percent of the Agency's annual energy use). EPA completed an onsite brainstorming session in July 2007 and is researching initial proposal options.

Green Power

On September 1, 2006, EPA became the first major federal agency to purchase green power equivalent to 100 percent of its annual electricity use. In FY 2007, EPA purchased 330 million kWh[3] of green power. Reaching this milestone is a testament to EPA's dedication to "walk the talk" and improve the Agency's own environmental performance through an ever-expanding green power procurement program. The largest single purchase of green power by EPA to date, a contract for 110 million kWh that went into effect September 1, 2006, includes major EPA facilities not previously covered by green power contracts through FY 2007. In FY 2008, EPA's blanket green power purchase increased to 135 million kWh and went into effect in October 2007. The experience gained through the procurement of the blanket contract has helped EPA develop extensive expertise in green power procurement and increase the federal government's ability to buy renewable energy.

Since 1999, EPA has far exceeded its original green power purchasing expectations by buying enough green power or RECs to offset the electricity use at all of its 190 facilities nationwide, including the Agency's 34 reporting facilities, 10 regional offices, Headquarters complex in Washington, D.C., and small and remote locations. In total, EPA's FY 2007 green power purchases offset more than 673 million[4] pounds of carbon dioxide (CO_2) emissions—the amount emitted by nearly 58,000 cars[5] over the course of a year. In addition, these purchases offset more than 1.25 million[6] pounds of nitrogen oxides (NO_x), one of the main sources of ground level ozone, and 1.5 million[7] pounds of sulfur dioxide (SO_2), the main cause of acid rain. In the future, EPA plans to have a stronger focus on developing onsite renewable energy generation as part of its long-term emissions reduction strategy.

While supporting the market for renewable energy, RECs are just one method the Agency uses to procure green power. From its current onsite renewable energy projects, EPA generated more than 117,800 kWh of solar electricity and nearly 9.2 BBtu of renewable thermal energy in FY 2007, by employing a variety of onsite renewable energy technologies. EPA continued to operate numerous renewable energy self-generation technologies in FY 2007:

- ***Solar Arrays*:** The Agency continued to operate a 9-kW photovoltaic (PV) array installed in 2004 at the Western Ecology Division Laboratory in Corvallis, Oregon; a 100-kW PV array installed in April 2002 on the roof of the NCC in RTP; a 10-kW solar array installed on the roof of its Region 5 office in Chicago's Metcalfe Federal Building in

[3] EPA's total FY 2007 green power purchases = 329,880,513 kWh .

[4] Total calculated according to eGRID location of renewable energy project that purchased RECs support = 673,279,921 pounds CO_2. All references to CO_2 emission reductions resulting from EPA's green power purchases assume that all of EPA's purchased green power produces zero carbon emissions (i.e., there is no distinction made between the carbon emissions associated with electricity generated from wind and other renewable energy sources such as landfill gas and biomass).

[5] U.S. average annual car emissions = 11,450 pounds CO_2. EPA's Office of Transportation and Air Quality. <www.epa.gov/otaq/consumer/f00013.htm>.

[6] Total calculated according to eGRID location of renewable energy project that RECs support = 1,254,408 pounds NO_x.

[7] Total calculated according to eGRID location of renewable energy project that RECs support = 1,511,453 pounds SO_2.

2000; and, as part of the new regional office building in Denver, a new 48-panel, 10-kW PV array on the building's eighth floor.

- ***PV Lighting*:** EPA's campus in RTP includes solar streetlights that have served the entrance road and parking lot facilities since FY 2002. The Agency asserts 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 the 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 respective 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 Region 8 Laboratory's transpired solar collector has augmented the Golden, Colorado, facility's heating and cooling system since March 2002, generating approximately 1.38 MMBtu of solar power annually.

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

- ***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, reducing energy and water costs. In FY 2007, the facility used about 94 million gallons of lake water for cooling.

Having met its 100 percent green power goal, EPA is now working to improve the benefits from the green power procured. The Agency enlisted members of its Office of Research and Development, Air Pollution Prevention and Control Division, to study the opportunities to improve the environmental benefits of EPA's future green power purchases. The resulting report, *The Impact of EPA's Green Power Purchases* (EPA/600/R-07/019), examined:

- ***Various emissions associated with each type of green power.*** For example, the report found that wind power emits zero emissions; however landfill gas, which uses internal combustion energy, releases a small amount of emissions.

- ***Estimated greenhouse gas emissions from conventional generation that are displaced by new green power sources.*** Research revealed that emissions can vary depending on

which section of the grid is being examined. For example, renewable energy sources in a certain section of the grid will displace older, coal-fired generation, while they may displace new, cleaner, coal-fired generation or natural gas generation in another section.

- ***Identified areas in the national electric grid with the highest emissions from conventional generating sources.*** EPA will be able to examine these areas and focus on developing more green power sources in the high emitting areas so that the use of electricity produced from conventional generating sources can be reduced.

It is clear that EPA's green power purchases are beneficial to the environment. They have also provided other federal agencies lessons learned and valuable technical support, as indicated by the many federal agencies that have consulted EPA and the Agency's green power partners when making their own green power purchases.

Water Conservation

At the beginning of FY 2007, EPA's voluntary Agencywide water conservation goal was to reduce water consumption by 15 percent in FY 2010; now, under E.O. 13423, EPA will be pursuing facility-specific water consumption goals to reduce water use 16 percent by FY 2015 below its FY 2007 baseline. Overall, EPA's laboratories used 168.1 million gallons of water in FY 2007, or 45.2 gallons per square foot, a 23.9 percent reduction from FY 2006 (59.3 gallons per GSF).

Over the past year, EPA worked to restructure the water conservation program and establish a new FY 2007 water consumption baseline (per E.O. 13423 requirements), while continuing to conduct water assessments, undertake conservation measures, implement water management best practices, and manage stormwater runoff. The Agency completed three laboratory water assessments in FY 2007 and signed two water management plans by the end of the fiscal year. Highlights are included below.

Gulf Breeze, Florida
EPA completed and signed a water management plan for the Gulf Ecology Division (GED) Laboratory in Gulf Breeze, Florida, in September 2007. GED's environmental management system (EMS) established an objective of reducing fresh water use, among other objectives; GED plans to reduce consumption by 2 percent per year (relative to its FY 2007 baseline). The laboratory plans to achieve this goal by implementing a number of strategies, including: reducing heating and cooling demands in buildings with cooling towers; employing alternative cooling technologies (e.g., saltwater); installing high-efficiency appliances; and forming a Water Consumption Advisory Committee to discuss progress toward meeting water consumption objectives.

GED has also adopted best management practices in seven of the 10 areas identified by FEMP. For example, water consumption data are closely tracked and shared with the staff; resource conservation topics appear in the facility's *Greening GED* newsletter; and the landscape is composed of native, self-sustaining vegetation that does not require landscape irrigation.

Combined with an initiative to eliminate the use of single-pass cooling water, an adjustment to the cooling tower set points in May 2007 should significantly reduce overall facility water use. To further improve water efficiency in the future, GED has included a rainwater capture and reuse system in the design for a new building on the laboratory campus.

Montgomery, Alabama
In August 2007, EPA completed a draft of a water management plan at the Montgomery, Alabama, National Air and Radiation Environmental Laboratory (NAREL). No landscape irrigation water is used at the laboratory, as grasses and shrubs are climate-appropriate and survive on natural rainfall. NAREL has also eliminated all forms of single-pass equipment cooling.

The laboratory is currently constructing a new central chiller plant. Historically, cooling towers have been maintained by a cooling tower maintenance contractor that performs monthly quality, performance, and water chemistry reviews of cooling tower operation. The laboratory plans to regularly test the new towers, once they are operational, to achieve maximum water use savings.

Grosse Ile, Michigan
In September 2007, EPA completed and signed a water management plan for the Gross Ile, Michigan, Large Lakes Research Station (LLRS). The facility maintains an aggressive program to identify and respond to water leaks. A screening level system review was completed in July 2007, and known water uses account for more than 90 percent of water consumption. Facility staff is trained to report leaks and malfunctioning water-using equipment to the onsite facilities manager designee. The facility also makes use of an automatic leak detection system, based on conductivity bridges ("water bugs") placed on the floor adjacent to water-using equipment.

LLRS also uses minimal water for landscape irrigation. Across most of the 3-acre site, grasses and shrubs are climate-suitable and survive on natural rainfall. Some hand watering is performed, as necessary, during especially dry periods of summer, but such watering is limited and only applied to keep plants from dying off during dry conditions. LLRS is evaluating a potential option to divert rainwater from a roof drain and store it in a cistern in the basement of the main laboratory building for landscape irrigation.

Stormwater Management

In FY 2007, EPA continued to address the most common type of water pollution—stormwater runoff—through various stormwater management projects. Better management of stormwater through strategic site design, controlling the sources of runoff, and thoughtful landscape planning helps the Agency decrease stormwater runoff at various facilities.

Washington, D.C.
In collaboration with GSA, EPA is demonstrating LID and sustainable stormwater management practices in a landscape renovation project at EPA Headquarters in Washington, D.C. Initiated in May 2001, this multi-year project involves three landscape retrofit projects at EPA's Federal Triangle Headquarters complex.

The Federal Triangle complex's building roofs, sidewalks, courtyards, and parking areas make the area approximately 95 percent impervious to rain. Through this green infrastructure project, however, EPA is reducing the adverse impacts of stormwater flows from the 25-acre site. The Agency also hopes to reduce the peak volume and pollutant load of its stormwater runoff and serve as a model for urban LID projects nationwide.

Completed in December 2006, the 8,600-square-foot Ariel Rios South Courtyard, at the southeast corner of the Federal Triangle, is the second and largest phase of the project. Showcasing the sustainable strategy of addressing targeted watershed goals and objectives by using LID stormwater management techniques, the courtyard demonstrates a wide range of techniques in its 6,400 square feet of LID landscaping. Specifically, it includes two bioretention cells that provide more than 400 cubic feet of stormwater storage volume and a 1,128-gallon cistern to collect stormwater that is recycled for irrigation of the site.

Based on the rainfall in 2006, it is estimated that the LID components divert approximately 70 percent of the rainwater that falls on the courtyard throughout the year from the storm sewer. It is also estimated that reusing the rainwater collected in the cistern for irrigation will, in turn, reduce the need for potable water by approximately 30 percent.

The construction contract for the final phase of the project—an installation of six cisterns, with a total capacity of 6,000 gallons, in the parking garage under the EPA West Building—was awarded in August 2007. The cisterns are designed to collect runoff from the Federal Triangle complex roofs and reuse it for irrigation of a portion of the rain gardens EPA placed along Constitution Avenue as the first phase of the demonstration project (completed in FY 2006).

Athens, Georgia

As part of its National Exposure Research Laboratory (NERL) sustainable master plan, EPA is creating a stormwater detention pond for the NERL facility in Athens, Georgia. The pond will improve the laboratory's stormwater management and sediment control, and is expected to be completed by the end of FY 2008.

Sustainable Design and Construction

EPA accomplishes its mission with approximately 26,000 employees and contractors working in more than 9 million square feet of office buildings and laboratories located across the United States. The Agency ensures that its own buildings and practices reflect its mission, and is also committed to serving as a model of responsible environmental behavior, in order to help create a framework within which the building industry can shift towards practices that promote sustainable building design and construction.

EPA currently occupies three LEED Gold buildings and one LEED Silver building and anticipates LEED certification at four additional facilities currently in the design or construction phases or recently completed (an annex building in Cincinnati, Ohio; a renovated regional office building in Boston; a child care center in RTP; and a replacement office building in Gulf Breeze, Florida). While EPA uses the USGBC's LEED rating system as a way to promote sustainable

buildings, the Agency does not rely solely on LEED to ensure building performance in its new acquisitions and renovation projects. For example, EPA requires all new buildings in its inventory to achieve energy consumption levels that are at least 30 percent below those established under ASHRAE 90.1-2004. No new building designs were started on EPA-owned buildings in FY 2007, however. New office buildings must achieve the ENERGY STAR label after 12 months of occupation. Currently, all major new construction projects are expected to achieve LEED for New Construction Silver rating, although many achieve Gold. EPA also pursues LEED, or other green building rating systems, for existing buildings and tenant fit-out projects wherever practicable (e.g., Green Globes, LEED for Existing Buildings, and LEED for Commercial Interiors).

On January 24, 2006, EPA was one of 21 agencies to sign the *Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding* (MOU), committing to federal leadership in implementing common strategies for planning, acquiring, siting, designing, building, operating, and maintaining high-performance and sustainable buildings. The MOU goals are to reduce the total ownership cost of facilities; improve energy efficiency and water conservation; provide safe, healthy, and productive built environments; and promote sustainable environmental stewardship. The MOU establishes a common set of guiding principles to:

- Employ integrated design principles.
- Optimize energy performance.
- Protect and conserve water.
- Enhance indoor environmental quality.
- Reduce environmental impact of materials.

Over the past several years, EPA has been working to "green" its facility acquisition and procurement process. A few years ago, the Agency instituted "Green Architecture & Engineering" and "Green Check" processes, whereby architects and engineering firms are chosen with criteria that include energy and environmental performance experience. Internal project management is required to ensure environmental and energy considerations are incorporated into the acquisition process. EPA continued to formalize its commitment to green acquisition with the development of a Sustainable Building Implementation Plan. SFPB has been working with its sister branch in Architecture, Engineering, and Real Estate to instill a sense of organizational cooperation and ensure that sustainability is a priority throughout the projects' life cycle.

Sustainable Building Implementation Plan

E.O. 13423 requires that federal agencies immediately implement the guiding principles with all new construction and major renovation projects and with at least 15 percent of their existing building inventory by 2015. To respond to this requirement, during 2007, EPA initiated development of a Sustainable Building Implementation Plan outlining how EPA is implementing and will continue to implement the guiding principles. EPA will update the plan annually to ensure continuous improvement toward the goals.

This comprehensive plan details the Agency's implementation framework, applicable facilities, performance targets, and tools and strategies for achieving them. It documents the facility acquisition and master planning processes to implement sustainability and discusses training and

outreach needs to ensure that all responsible parties are onboard. It also sets forth reporting and tracking procedures and schedules. Technical chapters include sections on integrated design principles, optimizing energy performance, protecting and conserving water, enhancing indoor environmental quality, and reducing the Agency's environmental impact, among others. EPA's LEED, ASHRAE, ENERGY STAR, and other green building requirements are included as part of the Agencywide implementation plan.

In FY 2008, EPA will continue to focus on EPAct 2005 requirements that new buildings perform 30 percent better than ASHRAE standards. Although the Agency is not required to report in this regard on the facilities it does not own, EPA will continue to work with GSA and building developers on numerous sustainable design and building projects.

Denver, Colorado

After two and a half years of careful planning and construction in partnership with GSA, in January 2007, EPA took occupancy of the new Region 8 office in Denver, Colorado. This state-of-the-art, 418,000 GSF facility, which also includes retail space, received LEED Gold certification in September 2007 and is on track to achieve the ENERGY STAR building label.

The facility incorporates an extensive daylighting scheme around the perimeter to allow for maximum daylight penetration. Building design provides for natural light in 85 percent of floor space. Dimming controls and occupancy sensors further reduce the amount of artificial light being used when there is ample sunlight. Energy savings of approximately 9,600 Btu/GSF per year come from several high-efficiency, building-wide systems, such as: a unique under-floor air delivery system; an HVAC system that works at the lowest possible cooling loads during warmer weather; and air side economizers that cool the building using the city's cooler air instead of chillers, which saves energy and improves indoor air quality. Additionally, all mechanical and electrical systems in the facility are systematically commissioned for quality assurance.

With a projected energy intensity of 46,500 Btu/GSF per year, EPA expects the building to yield energy savings of nearly 12,000 Btu/GSF per year, or 40 percent more efficient than a base case office building meeting the ASHRAE Standard 90.1-1999.

The building's 19,200-square-foot "green roof" features a 3-inch to 4-inch soil layer and drought-resistant plants that help reduce rooftop and building temperatures and filter pollution. The green roof reduces stormwater runoff by approximately 27 percent, which will ease pressure on the city's sewer system and reduce the water pollution associated with runoff. Also located on the roof is a 48-panel, 10-kilowatt PV array, which, in conjunction with the 4.7 million kWh of RECs EPA is purchasing annually for the office, helps support renewable energy and offset emissions associated with the office's electricity use.

To promote water conservation, all plumbing fixtures installed in the facility are high-efficiency devices, including faucet aerators and auto-closing faucets, waterless urinals in the men's restrooms, and dual-flush toilets in the women's restrooms. Use of these plumbing fixtures will provide water savings of 36 percent compared to the typical office building.

During construction, the builders used low volatile organic compound interior adhesives, paints, sealants, and caulks, which improve indoor air quality. EPA also incorporated sustainable and renewable resources into the building's construction, and 80 percent of the construction waste was recycled rather than disposed of in a landfill. The building design also includes space for ongoing recycling efforts.

Cincinnati, Ohio

A new, 42,400-square-foot Research Support Annex (Annex 2) was completed in October 2007. Designed to achieve LEED Gold certification, the annex provides additional office space and frees up office space in AWBERC, which will be converted to laboratory space. Staff began moving into the Annex 2 space in September 2007, and the rest of the office space will be occupied in FY 2008. Sustainable features include energy-efficient temperature controls, VAV and water-side air economizers, under-floor ventilation, daylighting, a green roof, sustainable landscaping, water-efficient plumbing fixtures, and an advanced metering system. EPA is also offsetting 100 percent of the electricity used there with RECs.

Boston, Massachusetts

In September 2006, GSA awarded a renovation contract for the McCormick Post Office and Courthouse in Boston, Massachusetts, for EPA's Region 1 office. This historic 1930s structure will be converted into office space, and EPA, occupying approximately 225,000 square feet, will be the largest tenant. Besides major building envelope upgrades and mechanical system improvements, the building will feature an accessible green roof, which will control stormwater runoff and reduce the heat island effect. Construction completion is expected in April 2009. The project is designed to achieve the ENERGY STAR label and LEED Silver certification.

Gulf Breeze, Florida

The 8,000-square-foot Gulf Breeze Replacement Office Building was completed in October 2007. The facility provides office space and computer laboratories for the Gulf Ecology Division Laboratory and is slated to receive LEED Silver certification.

Best Practices in Lease Provisions

On June 15, 2007, EPA completed a draft version of "Best Practice Environmental Lease Provisions" based on previous EPA/GSA build-to-suit lease procurements. This document consists of EPA's modifications and additions to GSA's standard Solicitation for Offer (SFO) template document, which is used for new lease solicitations as well as lease renewals. Additions include provisions to pursue compliance with the *Federal Leadership in High Performance and Sustainable Buildings* MOU, E.O. 13423, and EPAct 2005, and to obtain green building certification for new and existing buildings. Several provisions in this document were adapted from two of EPA's most recent SFOs, Potomac Yard One and Two and the Denver Region 8 office, where EPA used their lease requirements to ensure LEED certification and additional EPA preferred sustainable building considerations.

This document will work as a menu of best practices that can be used in whole or in part, depending on the project scope. EPA intends for the *Best Practice Environmental Lease Provisions* to be a living document that applies a standardized lessons learned process to harvest knowledge gained from completed projects to improve future projects.

EPA has also developed specific language to be used in GSA's construction source selection plans that highlights the Agency's sustainable design priorities. Model lease submittals are still under development. They will include the following example plans that can be used as templates for SFO submittals:

- Indoor Air Quality Management Plan
- Green Housekeeping Plan
- Integrated Pest Management Plan
- Landscape Maintenance Plan
- Construction Period Recycling Plan
- Construction Phase Commissioning Plan

As a follow-on project to the lease provision effort, EPA will undertake a project to convert the SFO environmental provisions to building construction guidelines for EPA-owned facilities. The guidelines will become an addendum to the EPA Architectural and Engineering Guidelines.

Sustainable Master Planning

EPA continues to work to expand the scope of a traditional master planning process to include considerations for stormwater management, landscaping, security, and other sustainable issues. The Agency is developing or has developed multi-year plans to reduce the environmental impact of the following facilities:

Corvallis, Oregon

EPA completed a sustainable master plan for the Western Ecology Division Laboratory in September 2006. The 2006 master plan sets a path for a multi-year upgrade of aging HVAC systems and renovation of existing laboratory facilities to more energy-efficient systems. The Agency plans to incorporate stormwater management and security into the master plan and is currently assessing funding, design, and construction options.

Athens, Georgia

EPA completed a facility master plan in May 2006 for the Office of Research and Development (ORD) Laboratory in Athens, Georgia. The plan represents major progress in the Agency's move towards holistic master planning. The plan integrates space planning, building location planning, long-term migration of existing mechanical systems to more energy-efficient systems, site security, and stormwater management. EPA awarded a Phase I design contract, including construction of perimeter security measures and a stormwater detention pond, HVAC upgrades, and an energy-efficient roof in FY 2007; construction on perimeter security and the stormwater detention pond is set to begin in FY 2008. Phase II projects will include construction of a stand-alone central power plant and transition from constant volume to VAV ventilation systems.

Montgomery, Alabama

EPA awarded a design contract for a master plan at the National Air and Radiation Environmental Laboratory in FY 2006. The plan reviews perimeter security, mechanical systems, space needs, stormwater management, and landscape conditions. EPA is planning to upgrade the existing primary system. A construction contract was awarded in FY 2007, and the projected completion date is scheduled for FY 2008.

RTP, North Carolina
EPA is studying and developing a plan for the possible move of its Reproductive Toxicology Facility staff into the New Main facility. This move would eliminate a highly energy-intensive, leased facility from EPA's inventory. Within this plan, EPA will develop a comprehensive master plan, including stormwater management and security issues, for the consolidation. The Agency will complete the review of the consolidation study by early FY 2008.

Pollution Prevention and Recycling

In FY 2007, EPA continued efforts to reduce its environmental footprint by conducting recycling and pollution prevention assessments at 17 different facilities and conducted a follow-up assessment of all Headquarters facilities in the Washington, DC, metropolitan area. The purpose of these assessments is to understand the recycling efforts already in place, quantify the materials recycled, and offer suggestions to further increase recycling at each facility.

As required by E.O. 13423, EPA has set an Agencywide waste diversion goal of 45 percent by 2010. EPA will calculate recycling rates for each facility, as well as an Agencywide recycling rate each year to measure its progress toward this goal. EPA's Agencywide baseline recycling rate for FY 2006 is 39 percent, based on data from 12 facilities. While most EPA facilities record and track recycling tonnage, the recycling assessments have revealed that many facilities have had difficulty obtaining trash tonnage figures. EPA has requested that each facility consider renegotiating its trash hauling contract in order to capture trash figures. Each fiscal year, EPA will require facilities to collect weights for both recyclables and trash, if they have access to the data, to determine the Agency's progress toward the 2010 goal. Facilities that do not currently have the proper infrastructure to collect trash and recycling data must develop a method for collecting this information by FY 2010. Highlights from the 2007 recycling and pollution prevention assessments are presented below.

Narragansett, Rhode Island
The Atlantic Ecology Division (AED) Laboratory is championing pollution prevention in various ways, including requiring use of green cleaning supplies in its janitorial services contract. The laboratory encourages green commuting with bike lockers for employees. When new security barriers around the facility's perimeter were mandated, AED used boulders salvaged from a local construction site. AED is also practicing sustainable landscaping and is chipping woody debris into mulch.

Fort Meade, Maryland
The EMS is well established at Region 3's Environmental Science Center. An EMS logo and mascot promote the program, along with a lobby showcase that displays the laboratory's various environmental awards and achievements. EMS team members promote participation in the program among employees and an EMS refresher course is conducted annually for all employees and contractors.

Cincinnati, Ohio
EPA's Cincinnati facilities are supporting a number of charitable causes through recycling activities. Employees donate old shoes for recycling into playground equipment. Proceeds from an aluminum can pull-tab recycling program benefit the Ronald McDonald House. Surplus office equipment and supplies are donated to local schools.

Richmond, California
The Central Regional Laboratory is preventing pollution and reducing waste by triple-rinsing empty chemical stock bottles, which are then used to store the methylene chloride solvent that is recycled on site. To ensure safe handling, each bottle is labeled clearly with an indication of the number of times it has been reused. After 10 reuses, the bottle is rinsed and recycled. The laboratory also participates in a chemical adoption program with local universities.

Electronics Stewardship
During 2007, EPA strengthened its commitment to electronics stewardship throughout the Agency in response to E.O. 13423 and as a continuation of its existing efforts. In summer 2007, the Agency completed an electronics stewardship implementation plan, signed by the Chief Information Officer and the Assistant Administrator for OARM. Developed through a collaborative effort among representatives from EPA's property management, information technology, environmental management, and purchasing areas, the plan outlines a specific framework for advancing progress in critical areas to meet the goals of E.O. 13423 and continue to improve electronics stewardship within the Agency.

EPA uses the Federal Electronics Challenge (FEC) as a framework to help its numerous facilities reduce the environmental footprint of their purchase, use, and disposal of electronic equipment. FEC is a voluntary partnership program that supports federal agencies in purchasing electronics with environmental attributes, reducing the impact of the operations and maintenance of electronic products, and reusing or recycling equipment at the end of its useful life. As of 2007, more than 90 percent of EPA's targeted facilities were participating in the FEC program. Additionally, numerous regional and Headquarters offices were recognized for their accomplishments. Nine EPA offices won FEC awards at the gold level; three at the silver level; and three at the bronze level.

The Agency made great strides in purchasing more environmentally preferable electronic equipment by incorporating language from the new Electronic Products Environmental Assessment Tool (EPEAT) into each of the new blanket purchase agreements (BPAs) for computers and laptops awarded in March 2007. EPEAT is an EPA-funded tool launched in July 2006 to help purchasers in the public and private sectors evaluate high-performance, environmentally friendly computer equipment. The EPEAT language incorporated into the BPAs requires equipment to meet certain environmental specifications. For example, electronic equipment purchased by the Agency must, to the extent possible: contain reduced hazardous substances; bear the ENERGY STAR label; contain post-consumer recycled plastic or renewable/biobased materials; be designed to facilitate end-of-life recycling; and be shipped with documentation that educates the user about the unit's power management settings. Use of the BPA will be mandatory for all EPA purchasers, which will help to ensure increased environmental performance in all of EPA's electronics purchases.

For Earth Day 2007, EPA Headquarters in Washington, D.C., hosted recycling collections for employees' home electronics. Nearly 200 employees donated more than seven pallets of computers, televisions, stereos, printers, and other equipment. OARM issued a challenge to all 10 regions to meet or exceed (on a per employee basis) the amount that Headquarters employees collected. Most regions participated in the recycling challenge, and several collected even more per employee than Headquarters. The Region 8 office won the challenge, with more than 700 employees recycling more than 10,000 pounds of electronics. In total, EPA employees across the country brought in more than 45,000 pounds of personal electronic equipment for recycling.

Appendix A:
FY 2007 Data Report

For Submittal With EPA's
Energy Management and Conservation Program
FY 2007 Annual Report

20 February 2008

U.S. Environmental Protection Agency FY 2007 Energy Management Performance Summary

Goal Performance

Energy Management Requirement	FY 2003 Btu/GSF	FY 2007 Btu/GSF	Percent Change 2003 - 2007	FY 2007 Goal Target
Reduction in energy intensity in facilities subject to the EPACT and E.O. 13423 goals	359,020	129,841	**-63.8%**	-6.0%

Renewable Energy Requirement	Renewable Electricity Use (MWH)	Total Electricity Use (MWH)	Percentage	FY 2007 Goal Target
Eligible renewable electricity use as a percentage of total electricity use	200,260.5	130,422.6	**153.5%**	3.0%

Water Intensity Reduction Goal	FY 2007 Gallon/GSF	FY 2007 Goal Target	Baseline Status
Reduction in potable water consumption intensity	**45.2**	NA Base Year	**Final**

Metering of Electricity Use	Cumulative # of Buildings Metered	Cumulative % of Electricity Metered	FY 2012 Goal Target
Standard Electricity Meters in FY 2007	33	100.0%	100%
Advanced Electricity Meters in FY 2007	Reporting Begins FY 2008	Reporting Begins FY 2008	Maximum Extent Practicable
Percentage of agency metering plan milestones met in FY 2007:	**100%**		

Federal Building Energy Efficiency Standards	Percent of New Building Designs	FY 2007 Goal Target
Percent of new building designs started in FY 2007 that are 30 percent more energy efficient than relevant code, where life-cycle cost effective:	**N/A**	100%

Investments in Energy and Water Management

Sources of Investment	Investment Value (Thou. $)	Anticipated Annual Savings (Million Btu)
Direct obligations for facility energy efficiency improvements	$5,654.2	38,379.6
Investment value of ESPC Task/Delivery Orders awarded in fiscal year	$0.0	0.0
Investment value of UESC Task/Delivery Orders awarded in fiscal year	$0.0	0.0
Total	$5,654.2	38,379.6

	Percentage
Total investment as a percentage of total facilty energy costs	28.5%
Financed (ESPC/UESC) investment as a percentage of total facilty energy costs*	0.0%

* In response to the August 3, 2007 memorandum issued by the Council on Environmental Quality concerning the use of energy savings performance contracts (ESPCs) and utility energy savings contracts (UESCs), EPA submitted a response outlining its commitment to the investment and implementation of these alternative financing mechanisms. While EPA did not designate any FY 2007 funds for the implementation of any ESPCs/UESCs, the Agency identified two potential ESPC opportunities that could lead to significant energy savings. During FY 2007, EPA conducted feasibility studies and is currently in the initial proposal phase of developing two major ESPC projects on its largest energy-consuming campus in Research Triangle Park, North Carolina. Towards the end of FY 2007, EPA also began researching options for an initial proposal for an ESPC at its Mid-Continent Ecology Division Laboratory in Duluth, Minnesota.

U.S. Environmental Protection Agency

List of New Federal Building Designs and Construction*

New Construction Project Information			Design			Completed New Construction	
Project ID	Building Name	Location (City, State)	Design Started (FY)	Percentage below ANSI/ASHRAE/IESNA Standard 90.1--2004 in terms of energy use	If not at least 30% below ANSI/ASHRAE/IESNA Standard 90.1--2004, will design achieve maximum level of energy efficiency that is life-cycle cost-effective?	Date Construction Completed (FY)	In terms of energy use, percentage below ANSI/ASHRAE/IESNA Standard 90.1--2004 achieved
				0%	Yes or No		0%

* EPA obtained specific guidance on this table from Chris Tremper on November 26, 2007. EPA did not initiate design on any of its ***owned*** facilities in FY 2007 (see Appendix E for a complete list of EPA's reporting facilities which includes both owned and leased facilities). While the agency completed *construction* of one of its owned facilities (Cincinnati AWBERC, Annex II) in FY 2007, this facility is exempt from Table 2-5 because EPA initiated the design phase for this project prior to FY 2007. All of EPA's current new building projects in FY 2007 are GSA-leased, build-to-suit facilities owned by developers. EPA's progress in implementing the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* set forth in the *Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding* (required by Executive Order 13423), is reported in the Agency's year-end FY 2007 Environmental Stewardship Scorecard required by the Office of Management and Budget and the Office of the Federal Environmental Executive.

FY 2007 ENERGY MANAGEMENT DATA REPORT

Agency:	U.S. Environmental Protection Agency	Prepared by:	Luis Luna
Date:	2/20/2008	Phone:	202-564-4600

PART 1: ENERGY/WATER CONSUMPTION AND COST DATA

1-1. EPACT/E.O. 13423 Goal Subject Buildings

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Unit Cost ($)	Site-Delivered Btu (Billion)	Est. Source Btu (Billion)	Est. GHG Emissions ($MTCO_2e$)
Electricity	MWH	130,422.6	$9,577.4	$0.07 /kWh	445.0	1,545.5	86,290
Fuel Oil	Thou. Gal.	109.1	$239.7	$2.20 /gallon	15.1	15.1	1,110
Natural Gas	Thou. Cubic Ft.	369,153.9	$4,042.7	$10.95 /Thou Cu Ft	380.6	380.6	20,229
LPG/Propane	Thou. Gal.	7.7	$16.2	$2.09 /gallon	0.7	0.7	46
Coal	S. Ton	0.0	$0.0	N/A /S. Ton	0.0	0.0	0
Purch. Steam	BBtu	31.5	$951.3	$30.18 /MMBtu	31.5	43.8	4,204
Other	BBtu	303.1	$5,032.3	$16.60 /MMBtu	303.1	303.1	
		Total Costs:	$19,859.7	Total:	1,176.1	2,288.9	111,879
Goal Subject Buildings (Thou. Gross Square Feet)		3,723.3		Btu/GSF:	315,859	614,729	
				Btu/GSF w/ RE Purchase Credit:	132,560	(21,874)	
				Btu/GSF w/ RE & Source Btu Credit:	129,841	(21,874)	

1-2. EPACT/E.O. 13423 Goal Excluded Facilities*

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Unit Cost ($)	Site-Delivered Btu (Billion)	Est. Source Btu (Billion)	Est. GHG Emissions ($MTCO_2e$)
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
Goal Excluded Facilities (Thou. Gross Square Feet)		0.0		Btu/GSF:	N/A	N/A	
				Btu/GSF w/ RE Purchase Credit:	N/A	N/A	
				Btu/GSF w/ RE & Source Btu Credit:	N/A	N/A	

* According to FEMP's "Guidelines Establishing Criteria for Excluding Buildings from the Energy Performance Requirements of Section 543 of the National Energy Conservation Policy Act as Amended by the Energy Policy Act of 2005," released on January 27, 2007 (available at http://www1.eere.energy.gov/femp/pdfs/exclusion_criteria.pdf), the criteria for excluding buildings/facilities is as follows:

1) The facility is a non-federal building where tenant agency (EPA) receives no energy bills **(not applicable to EPA's reporting laboratories)**
2) The facility has assumed excluded structures and processes not qualified as federal buildings **(none of EPA's reporting laboratories have excluded space or processes)**
3) The facility is excluded from energy performance requirements for *all* of the following reasons:
   a) Impracticability due to energy intensiveness of national security function **(excludes EPA)**
   b) Completed energy management reports
   c) Compliance with all energy efficiency requirements
   d) Implementation of all cost-effective energy projects in the building

1-3. Non-Fleet Vehicles and Other Equipment (Does not include Fleet Vehicle Data Captured by FAST System)

	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Unit Cost ($)	Btu (Billion)	Est. GHG Emissions ($MTCO_2$)
Auto Gasoline	Thou. Gal.	6.0	$16.0	$2.67 /gallon	0.8	53
Diesel-Distillate	Thou. Gal.*	179.0	$370.0	$2.07 /gallon	24.8	1,816
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:	$386.0		25.6	1,869

* EPA had a large ship that was only in service half of FY 07. Diesel usage was reduced in FY 07 accordingly

Optional 1-3a. Fleet Vehicle Consumption and Costs Captured by the FAST System
(Input reflects format of Section IV, Part C, Annual Fuel Consumption Report, by Fuel Type of FAST SF 82 - Aggregate Combined Report)

Description	Consumption Units	Annual Consumption	Annual Cost (Actual $)	Btu (Billion)
Biodiesel	GEG	0.0	$0.0	0.0
Diesel	GEG	0.0	$0.0	0.0
Electric	GEG	0.0	$0.0	0.0
E-85	GEG	0.0	$0.0	0.0
Gasoline	GEG	0.0	$0.0	0.0
Hydrogen	GEG	0.0	$0.0	0.0
M-85	GEG	0.0	$0.0	0.0
LPG	GEG	0.0	$0.0	0.0
NG	GEG	0.0	$0.0	0.0
Other	GEG	0.0	$0.0	0.0
TOTAL	GEG	0.0	$0.0	0.0

1-4. RENEWABLE ENERGY GENERATED ON FEDERAL OR INDIAN LAND WHERE RECS ARE RETAINED BY THE GOVERNMENT
(New renewable energy is from projects placed in service after January 1, 1999)

Renewable energy project types in service during FY 2007, by age and source	Number of Projects	Annual Energy Produced	Energy Produced on Federal or Indian Land and Used at a Federal Facility
Electricity from *New* Solar projects (MWH)*	4	117.8	117.8
Electricity from *New* Wind projects (MWH)	0	0.0	0.0
Electricity from *New* Biomass projects (MWH)	0	0.0	0.0
Electricity from *New* Landfill Gas projects (MWH)	0	0.0	0.0
Electricity from *New* Geothermal projects (MWH)	0	0.0	0.0
Electricity from *New* Hydro/Ocean projects (MWH)	0	0.0	0.0
Electricity from *Old* Solar projects (MWH)	0	0.0	0.0
Electricity from *Old* Wind projects (MWH)	0	0.0	0.0
Electricity from *Old* Biomass projects (MWH)	0	0.0	0.0
Electricity from *Old* Landfill Gas projects (MWH)	0	0.0	0.0
Electricity from *Old* Geothermal projects (MWH)	0	0.0	0.0
Electricity from *Old* Hydro/Ocean projects (MWH)	0	0.0	0.0
Natural Gas from Landfill/Biomass (Million Btu)	0	0.0	0.0
Renewable Thermal Energy (Million Btu)	3	7,801.4	7,801.4
Other Renewable Energy (Specify Type) (Million Btu)	0	0.0	0.0
Total New Renewable Electricity (MWH)	4	117.8	117.8
Total Old Renewable Electricity (MWH)	0	0.0	
Non-Electric Renewable Energy (Million Btu)	3	7,801.4	
Total Renewable Energy Generation (Million Btu)	7	8,203.2	

* One of the solar projects reported here is under maintenance and did not produce electricity in FY 2007.

1-5. ON-SITE RENEWABLE ENERGY GENERATION WHERE RECS ARE NOT RETAINED BY THE GOVERNMENT
(This energy is only counted toward the renewable energy goal if the agency has enough new RECs to qualify for the on-site bonus.)

	Amount Produced or Used	Amount Qualified for Goal
Renewable energy reported here comes from projects: 1) placed in service **after 1/1/1999 (New)**; 2) where RECs have not been retained by the government; 3) where the amount has not been reported elsewhere on this data report; and 4) where the energy or RECs have not been sold to another agency that is counting it toward their renewable energy goal. (MWH)	0.0	0.0
Renewable energy reported here must come from projects: 1) placed in service **before 1/1/1999 (Old)**; 2) where RECs have not been retained by the government; 3) where the amount has not been reported elsewhere on this data report; and 4) where the energy or RECs have not been sold to another agency that is counting it toward their renewable energy goal. (MWH)	0.0	0.0

1-6. RENEWABLE ENERGY/RENEWABLE ENERGY CERTIFICATE PURCHASES IN FY 2007
(New renewable energy is from resources developed after January 1, 1999)

Description of *Each* Renewable Energy Purchase (examples below, insert additional rows as necessary for each separate purchase. Insert rows after the first row of each color-coded category.)	Total Amount Purchased (MWH)	Total Amount Purchased (Million Btu)	Portion of Total Purchased from Projects on Federal or Indian Lands	FY 2007 Goal Application Renewable Energy Goal (RE) Energy Efficiency Goal (EE) Credit	End Use Category (Goal or Excluded)	State or Region of Generation or Source
Electricity from *New* Renewable Source				RE: 100% EE-Credit: 100%		
Duluth	24.0		0.0	RE: 100% EE-Credit: 100%	Goal	Chandler Hills Wind Farm, owned by Great River Energy (Southwestern Minnesota)
Corvallis (Main)	360.0		0.0	RE: 100% EE-Credit: 100%	Goal	Oregon
RECs from *New* Renewable Sources				RE: 100% EE-Credit: 100%		
Chelmsford	3,000.0		0.0	RE: 100% EE-Credit: 100%	Goal	Hyde County, SD; Lamoure County, ND; and Carbon County, WY
Narragansett	3,070.0		0.0	RE: 100% EE-Credit: 100%	Goal	Dodge Center, MN
Edison (R2)	6,000.0		0.0	RE: 100% EE-Credit: 100%	Goal	Hyde County, SD; Lamoure County, ND; and Carbon County, WY
Athens (ESD)	1,729.2		0.0	RE: 100% EE-Credit: 100%	Goal	Kentucky and North Carolina
RTP (Total)	100,000.0		0.0	RE: 100% EE-Credit: 100%	Goal	Port Wentworth, GA
Duluth	1,566.7		0.0	RE: 100% EE-Credit: 100%	Goal	Dodge Center, MN
Grosse Ile	466.7		0.0	RE: 100% EE-Credit: 100%	Goal	Lenox, MI
Cincinnati (Total)	15,560.0		0.0	RE: 100% EE-Credit: 100%	Goal	wind: Mill Run, PA LFG: Illinois
Ada	3,000.0		0.0	RE: 100% EE-Credit: 100%	Goal	Unita County, WY; Solano County/Rio Vista, CA; and Brown County, NE
Kansas City (STC)	3,850.0		0.0	RE: 100% EE-Credit: 100%	Goal	Montezuma, KS
Golden	2,100.0		0.0	RE: 100% EE-Credit: 100%	Goal	Prowers County, CO
Las Vegas	3,100.0		0.0	RE: 100% EE-Credit: 100%	Goal	San Gorgonio Pass, CA
Richmond	1,900.0		0.0	RE: 100% EE-Credit: 100%	Goal	Plam Springs/Solano County, CA
Manchester	3,333.0		0.0	RE: 100% EE-Credit: 100%	Goal	Foote Creek IV, WY
FY07 Blanket Green Power Purchase	50,965.4		0.0	RE: 100% EE-Credit: 100%	Goal	Shiloh Wind Project, Solano County, Califomia; Bridger Butte Wind Project, Evanston, Wyoming; Centennial (Invenergy) Wind Project, Harper County, Oklahoma; Pine Ridge Reservation Wind Project, Pine Ridge Reservation, South Dakota
Electricity from *Old* Renewable Source	0.0		0.0	RE: Up to 1.5% of total electricty use EE-Credit: 100%		
RECs from *Old* Renewable Source	0.0		0.0	RE: Up to 1.5% of total electricty use EE-Credit: 100%		
Gas from Renewable Source		0.0	0.0	RE: no contribution to goal EE-Credit: 100%		
Thermal Energy from Renewable Source		0.0	0.0	RE: no contribution to goal EE-Credit: 100%		
Total Purchases of *New* Renewable Electricity or RECs	200,024.9					
Bonus for Purchases from New Projects on Federal or Indian Land	0.0					
Total Purchases of *Old* Renewable Electricity or RECs	0.0					
Purchases of Non-Electric Renewable Energy		0.0				
Total Purchases for Goal Buildings	200,024.9	0.0				
Total Purchases for Excluded Facilities	0.0	0.0				
Total All Purchases	200,024.9	0.0				

1-7. GOAL-ELIGIBLE RENEWABLE ENERGY USE AS A PERCENTAGE OF FACILITY ELECTRICITY USE

(Calculated from input above per FEMP Renewable Energy Guidance)

Components of Eligible RE Use	Renewable Electricity Use (MWH)	Total Facility Electricity Use (MWH)	RE as a Percentage of Electricity Use
Eligible RE Total	200,260.5	130,422.6	153.5%
New RE (without Bonus)	200,142.7		
Bonus, Federal or Indian Land	117.8		
Eligible Old RE	0.0		

1-8. ALL RENEWABLE ENERGY USE (INCLUDING NON-ELECTRIC) AS A PERCENTAGE OF FACILITY ELECTRICITY USE

(Calculated from input above for information only)

All Renewable Energy Use (Billion Btu)	Total Facility Electricity Use (Billion Btu)	RE as a Percentage of Energy Use
698.9	445.0	157.1%

1-9. WATER USE INTENSITY AND COST

Potable Water	Annual Consumption (Million Gallons)	Annual Cost (Thou. $)	Facility Gross Square Feet (Thou.)	Gallons per Gross Square Foot
Buildings & Facilities Subject to Water Goal	168.1	$1,196.0	3,723.3	45.2
				Percent
Approx. percentage of reported water consumption that is estimated:				0%
Is the FY 2007 agency water intensity baseline preliminary or final?				Final

PART 2: ENERGY EFFICIENCY IMPROVEMENTS

2-1. DIRECT AGENCY OBLIGATIONS

	FY 2007		Projected FY 2008	
	(Million Btu)	(Thou. $)	(Million Btu)	(Thou. $)
Direct obligations for facility energy efficiency improvements, including facility surveys/audits		$5,654.2		$5,750.0
Estimated annual savings anticipated from obligations	38,379.6	$613.6	21,836.7	$375.1

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

	Annual savings (Million Btu)	(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 ESPC contractors in fiscal year.		$0.0

* In response to the August 3, 2007 memorandum issued by the Council on Environmental Quality concerning the use of energy savings performance contracts (ESPCs) and utility energy savings contracts (UESCs), EPA submitted a response outlining its commitment to the investment and implementation of these alternative financing mechanisms. While EPA did not designate any FY 2007 funds for the implementation of any ESPCs/UESCs, the Agency identified two potential ESPC opportunities that could lead to significant energy savings. During FY 2007, EPA conducted feasibility studies and is currently in the initial proposal phase of developing two major ESPC projects on its largest energy-consuming campus in Research Triangle Park, North Carolina. Towards the end of FY 2007, EPA also began researching options for an initial proposal for an ESPC at its Mid-Continent Ecology Division Laboratory in Duluth, Minnesota.

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

	Annual savings (Million Btu)	(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

* In response to the August 3, 2007 memorandum issued by the Council on Environmental Quality concerning the use of energy savings performance contracts (ESPCs) and utility energy savings contracts (UESCs), EPA submitted a response outlining its commitment to the investment and implementation of these alternative financing mechanisms. While EPA did not designate any FY 2007 funds for the implementation of any ESPCs/UESCs, the Agency identified two potential ESPC opportunities that could lead to significant energy savings. During FY 2007, EPA conducted feasibility studies and is currently in the initial proposal phase of developing two major ESPC projects on its largest energy-consuming campus in Research Triangle Park, North Carolina. Towards the end of FY 2007, EPA also began researching options for an initial proposal for an ESPC at its Mid-Continent Ecology Division Laboratory in Duluth, Minnesota.

2-4. METERING OF ELECTRICITY USE

	Standard Meters		Advanced Meters	
FY	Cumulative # of Buildings Metered	Cumulative % of Electricity Metered	Cumulative # of Buildings Metered	Cumulative % of Electricity Metered
2007	33	100.0%		
2008 planned	33	100.0%	3	35.8%
				Percent
Percentage of agency metering plan milestones met in FY 2007:				100%

2-5. FEDERAL BUILDING ENERGY EFFICIENCY STANDARDS*

	Number of New Building Designs
Total new building designs started in FY 2007:	0
Total new building designs started in FY 2007 that are expected to be 30 percent more energy efficient than relevant code, where life-cycle cost effective:	0
	Percent
Percent of new building designs started in FY 2007 that are expected to be 30 percent more energy efficient than relevant code, where life-cycle cost effective:	N/A

* EPA obtained specific guidance on this table from Chris Tremper on November 26, 2007. EPA did not initiate design on any of its owned facilities in FY 2007 (see Appendix E for a complete list of EPA's reporting facilities which includes both owned and leased facilities). While the agency completed construction of one of its owned facilities (Cincinnati AWBERC, Annex II) in FY 2007, this facility is exempt from Table 2-5 because EPA initiated the design phase for this project prior to FY 2007. All of EPA's current new building projects in FY 2007 are GSA-leased, build-to-suit facilities owned by developers. EPA's progress in implementing the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding* (required by Executive Order 13423), is reported in the Agency's year-end FY 2007 Environmental Stewardship Scorecard required by the Office of Management and Budget and the Office of the Federal Environmental Executive.

2-6. TRAINING

	(number)	(Thou. $)
Number of personnel	153	$62.4

Appendix B: Project-Specific Calculations for Source Energy Reductions

For Submittal With EPA's
Energy Management and Conservation Program
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Appendix B: Calculations for Project-Specific Source Energy Reductions

Project 1: Replacement of aging heat pumps with new, energy-efficient, gas-fired boilers
Oregon Pacific Coastal Ecology Branch Laboratory, Newport, OR
Project completed in FY06

Base Care (without Project)		
Annual Source Energy Used	25,859	MMBtu
Annual Site energy Used	7,446	MMBtu
With Project		
Annual Source Energy Used	17,788	MMBtu
Annual Site energy Used After Project	13,274	MMBtu
Annual Source Energy Saved After Project	8,071	MMBtu
Annual Site Energy Increase After Project	5,829	MMBtu
502(e) Adjustment to Annual Site Energy, per DOE guidance	5,747	MMBtu
Annual electricity displaced as a result of the project:	681,120	kWh

Project 2: Installation of a natural gas-fired combined heat and power (CHP) unit for electricity and hot wate
Region 9 Laboratory, Richmond CA
Project completed in FY06

Base Care (without Project)		
Annual Source Energy Used	21,707	MMBtu
Annual Site energy Used	14,769	MMBtu
With Project		
Annual Source Energy Used	15,560	MMBtu
Annual Site energy Used After Project	17,635	MMBtu
Annual Source Energy Saved After Project	6,147	MMBtu
Annual Site Energy Increase After Project	2,866	MMBtu
502(e) Adjustment to Annual Site Energy, per DOE guidance	4,377	MMBtu
Annual electricity displaced as a result of the project:	518,727	kWh

Appendix C:

Summary of Adjustments to FY 2003-06 Energy Consumption Data for the U.S. Environmental Protection Agency's (EPA's) RTP, North Carolina, Campus

For Submittal With EPA's
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BACKGROUND

To meet the energy and water reduction requirements included in Executive Order (E.O.) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, the U.S. Environmental Protection Agency (EPA) is responsible for reporting energy and water consumption for 34 of its nationwide facilities to the U.S. Department of Energy (DOE) and the Office of Management and Budget (OMB) on an annual basis. Of these "reporting" facilities, EPA's Research Triangle Park (RTP), North Carolina, campus accounts for nearly 47 percent of EPA's reported FY 2007 energy consumption. Table 1 shows that, in fiscal year (FY) 2007, EPA's RTP facilities accounted for the following percentages of Agencywide reported energy consumption:

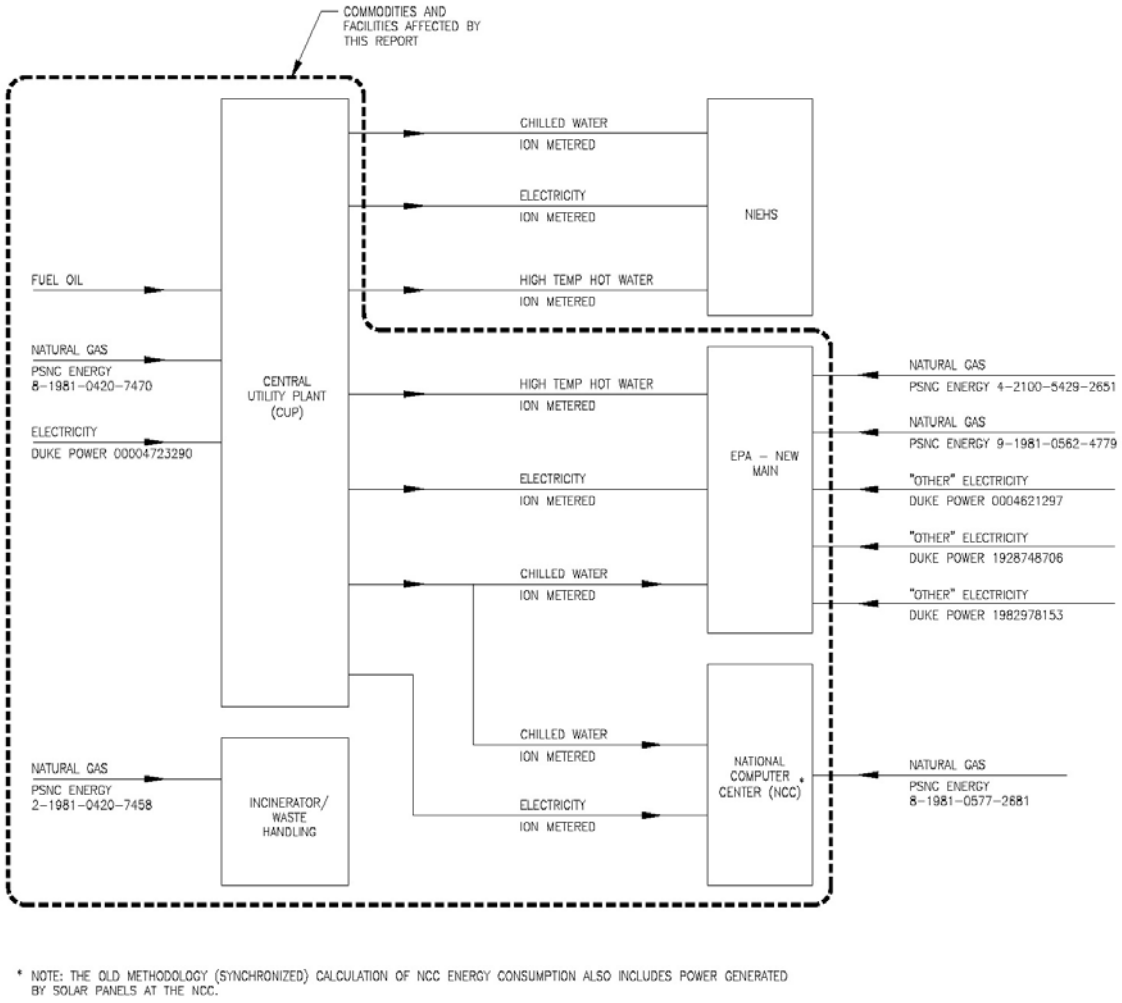
Table 1: RTP Facilities' Percentage of Agencywide Energy Consumption

RTP Facility	Percent of FY 2007 Agencywide Reportable Energy Consumption
New Main	29.8%
Human Studies	8.1%
National Health and Environmental Effects Research Laboratory (NHEERL)	4.4%
National Computer Center (NCC)	3.4%
Incinerator/Waste Handling	0.4%
Page Road	0.3%
First Environments Early Learning Center (Childcare)	0.2%
Burden/Jenkins	0.03%
Total	**46.5**

EPA maintains a comprehensive energy and water reporting framework to effectively manage the Agency's energy and water consumption and meet its annual reporting requirements. Using this framework, EPA collects and verifies quarterly energy and water consumption and cost data, as well as corresponding utility invoices and fuel logs from all reporting facilities to ensure that all compiled and reported data is of the highest possible quality. To meaningfully evaluate the Agency's energy and water performance and progress in meeting federally mandated energy and water reduction requirements, it is especially important that EPA have accurate and reliable baseline data (FY 2003 for energy reductions and FY 2007 for water reductions).

Two EPA facilities on the RTP campus—the New Main building and the National Computer Center (NCC)—share a central utility plant (CUP) with the National Institute of Environmental Health Sciences (NIEHS). New Main and NCC both receive direct electricity and chilled water from the CUP, and the New Main facility also receives high-temperature hot water from the CUP (see Figure 1 on the following page). When EPA first occupied New Main and NCC in fiscal years (FY) 2002-03, EPA was unable to accurately measure its portion of chilled and high-temperature hot water energy from the CUP as a result of the inadequate energy metering system delivered by the construction contractor. As a result, EPA's reported values of British thermal units (Btu) for chilled water and high-temperature hot water from the shared CUP (which EPA has cumulatively reported in the "other" energy type category in FY 2003-06 Energy Management Data Reports) have historically been based on engineering estimates.

Figure 1: Line Diagram of Energy Flow From CUP to New Main and NCC



* NOTE: THE OLD METHODOLOGY (SYNCHRONIZED) CALCULATION OF NCC ENERGY CONSUMPTION ALSO INCLUDES POWER GENERATED BY SOLAR PANELS AT THE NCC.

In December 2005, EPA completed the installation of a new, Web-based advanced metering system at New Main and NCC in an effort to improve the quality of reported energy data and enhance overall energy management. Instead of immediately transitioning to the new advanced metering data for reporting purposes, EPA decided to take a phased approach in order to ensure the integrity of the new data stream and to determine the most appropriate method for normalizing historical energy data previously reported using engineering estimates. As a result, at the outset of FY 2006 EPA's Sustainable Facilities Practices Branch (SFPB) and the RTP Energy Team agreed to continue to report energy consumption for New Main and NCC using the engineering estimates used since FY 2003 until the new advanced metering data was online for a full year. As part of its phased approach, EPA initiated a comprehensive analysis and adjustment of historically reported FY 2003-06 energy consumption data for the New Main and NCC facilities on the RTP campus. Following is a time line of recent events leading up to this analysis:

- ***2002*** – EPA occupied NCC.
- ***2002-03*** – EPA occupied New Main facility.

- ***Beginning of FY 2006*** – Energy reporting responsibilities within RTP Energy Team changed hands.

- ***4th Quarter, FY 2006*** – RTP Energy Team unexpectedly reported a 10 percent increase in energy consumption at New Main compared to 4th Quarter FY 2005, after three consecutive quarters of reported energy savings.

- ***November 2006*** – After closer review of 4th Quarter data, SFPB discovered that metered hot water Btu consumption at New Main was alarmingly erratic, marked by inexplicable up and down swings. SFPB immediately funded a consulting engineer to work with the RTP Energy Team to examine the hot water issue in more detail and analyze their energy reporting process during FY 2003-06.

- ***December 2006*** – SFPB formally kicked-off the RTP Historical Data Analysis project.

- ***1st Quarter, FY 2007*** – Following the reported 10 percent energy *increase* for New Main in 4th Quarter FY 2006, the RTP Energy Team reported a 40 percent energy *decrease* for New Main in 1st Quarter FY 2007, reinforcing the need for an examination of previously reported energy consumption data.

APPROACH TO HISTORICAL DATA ADJUSTMENT

After a thorough, independent review of RTP's historically reported energy data, SFPB's contractors determined that EPA used numerous, inconsistent methodologies to report energy consumption data for New Main and NCC throughout the FY 2003-06 period. SFPB decided to implement the following phased approach for properly adjusting historic FY 2003-06 energy consumption data to more accurately assess the energy performance of New Main and NCC, and EPA's Agencywide energy performance relative to the mandated FY 2003 baseline.

Phase I Adjustment – June 2007

"Synchronize" historical energy consumption data using a single, consistent methodology for each reported commodity during FY 2003-06 period. Submit revised Agencywide FY 2003 baseline energy intensity data to DOE/OMB with EPA's FY 2007 Annual Report.

Phase II Adjustment – Fall 2008

Normalize all "synchronized" FY 2003-06 data using one full year of new advanced metering data. Submit subsequent revised Agencywide FY 2003 baseline energy intensity data to DOE/OMB with EPA's FY 2008 Annual Report.

RESULTS OF PHASE I ADJUSTMENT

The Phase I "synchronization" of RTP's historic FY 2003-06 energy consumption data has resulted in the following, rather significant changes to EPA's reported energy performance in FY 2006 compared to the FY 2003 baseline:

Table 2: FY 2006 Energy Performance at RTP Facilities Compared to FY 2003 Based on Pre- and Post-Synchronized Energy Consumption Data

Facility/Quantity	As Originally Reported	After Phase I Adjustment
New Main - Total energy consumption	+0.30%	-18.43%
NCC – Total energy consumption	-14.20%	-5.08%
RTP (All facilities) – Total energy consumption	+1.87%	-11.02%
Agencywide – Energy intensity	-1.85%	-8.32%

For more detail on EPA's adjusted Agencywide energy consumption data for FY 2003-06, see Tables 3-5 on the next page, as well as EPA's revised FY 2003 energy intensity baseline (attached separately as Appendix F).

Table 3: Old Methodology

	BASELINE YEAR FY 2003 Btu	FY 2004 Btu	FY 2005 Btu	FY 2006 Btu	Percent Difference (FY 2006 vs. Baseline)
New Main	428,467,919,834	479,176,617,593	445,956,982,643	429,772,041,428	0.30%
NCC	53,868,317,524	48,352,830,650	46,473,888,617	46,220,885,475	-14.20%
Incinerator / Waste Handling	0	0	0	0	N/A
RTP (Total)	621,569,639,456	678,206,349,841	666,069,708,763	633,173,188,131	1.87%
Agencywide	1,264,391,288,457	1,311,260,339,975	1,310,335,804,301	1,252,499,466,455	-0.94%

Table 4: Synchronized Methodology

	BASELINE YEAR FY 2003 Btu	FY 2004 Btu	FY 2005 Btu	FY 2006 Btu	Percent Difference (FY 2006 vs. Baseline)
New Main	468,157,192,344	488,319,401,713	477,337,033,759	381,892,609,901	-18.43%
NCC	51,898,961,519	49,660,014,935	49,190,335,320	49,261,393,817	-5.08%
Incinerator / Waste Handling	7,897,377,043	7,993,370,150	4,416,600,927	5,315,372,674	-32.69%
RTP (Total)	667,186,933,005	696,649,688,397	704,582,807,510	593,649,637,621	-11.02%
Agencywide	1,310,008,582,005	1,329,703,678,530	1,346,902,020,051	1,212,109,498,599	-7.47%

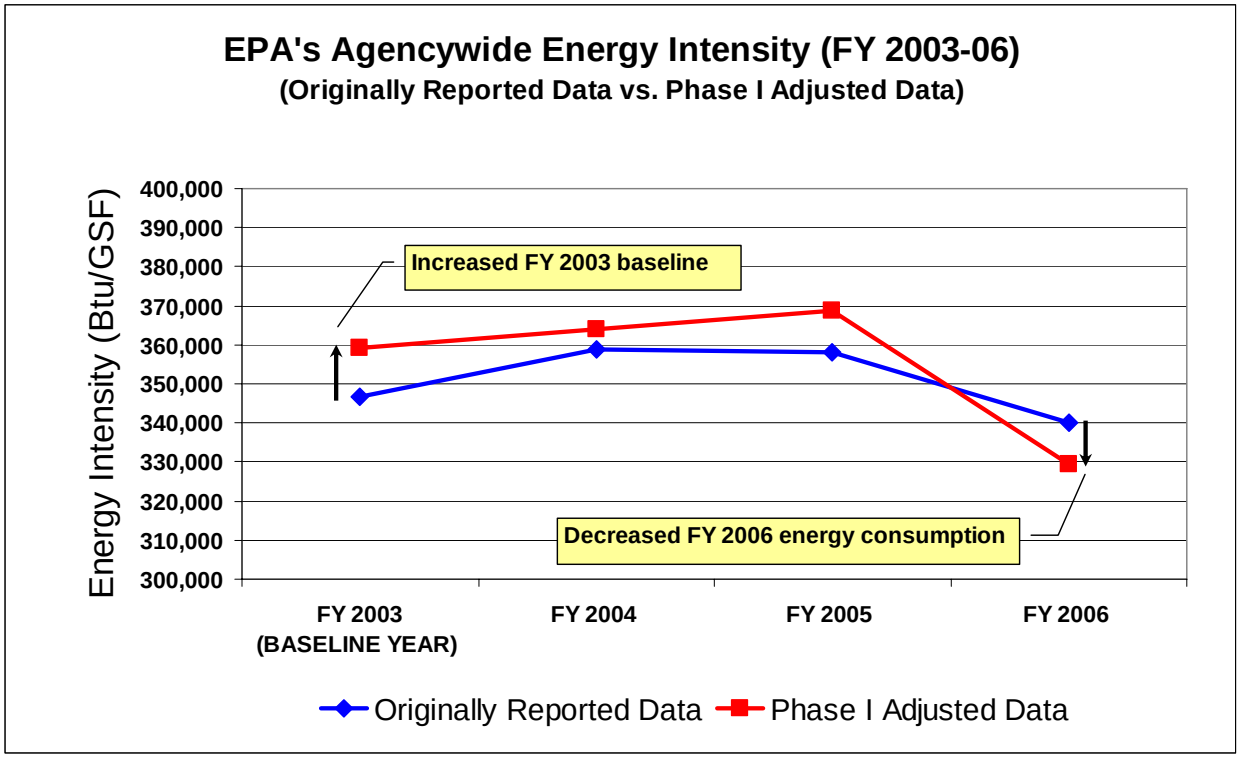
Table 5: EPA's Progress Against EPAct and E.O. 13423 Energy Reduction Goals

	BASELINE YEAR FY 2003 Btu/GSF	FY 2004 Btu/GSF	FY 2005 Btu/GSF	FY 2006 Btu/GSF	Percent Difference (FY 2006 vs. Baseline)
EPAct Requirement					-2.00%
E.O. 13423 Requirement					-3.00%
Agencywide GSF	3,648,847	3,654,427	3,658,680	3,682,608	
Agencywide Btu/GSF - Old Methodology	346,518	358,814	358,144	340,112	-1.85%
Agencywide Btu/GSF - Old (Synchronized) Methodology	359,020	363,861	368,139	329,144	-8.32%

PRIMARY CONTRIBUTING FACTORS

As Figure 2 further illustrates, the Phase I "synchronization" resulted in significantly improved FY 2006 energy performance for the RTP facilities and for EPA on an Agencywide basis, compared to the FY 2003 baseline.

Figure 2: Agencywide Energy Intensity (FY 2003-06)



There are three primary factors that contributed to these significant changes, which can be summarized as follows:

Increased FY 2003 Baseline Energy Consumption

1. EPA incorrectly reported FY 2003 fuel oil consumption for New Main due to missing consumption data from the CUP operator.

2. EPA significantly under-reported FY 2003 electricity consumption for New Main.

Decreased Year-End FY 2006 Energy Consumption

3. EPA significantly over-reported FY 2006 hot water Btu consumption for New Main.

Appendix D:
EPA's Revised FY 2003 Energy Baseline

For Submittal With EPA's
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Appendix D- FY 2003 ENERGY DATA BASELINE WORKSHEET

Agency: EPA Prepared by: Luis Luna

Date: 12/14/2007 Phone: 202-564-4600

EXECUTIVE ORDER 13123 REPORTING CATEGORIES

1-1. Standard Buildings/Facilities

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Site-Delivered Btu (Billion)
Electricity	MWH	0.0	$0.0	0.0
Fuel Oil	Thou. Gal.	0.0	$0.0	0.0
Natural Gas	Thou. Cubic Ft.	0.0	$0.0	0.0
LPG/Propane	Thou. Gal.	0.0	$0.0	0.0
Coal	S. Ton	0.0	$0.0	0.0
Purch. Steam	BBtu	0.0	$0.0	0.0
Other	BBtu	0.0	$0.0	0.0
		Total Costs:	$0.0	0.0
Standard Buildings/Facilities (Thou. Gross Square Feet)		0.0	Btu/GSF:	#DIV/0!

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

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Site-Delivered Btu (Billion)
Electricity	MWH	133,543.2	$7,844.1	455.6
Fuel Oil	Thou. Gal.	694.9	$513.9	96.4
Natural Gas	Thou. Cubic Ft.	354,630.9	$2,604.7	365.6
LPG/Propane	Thou. Gal.	9.8	$18.3	0.9
Coal	S. Ton	0.0	$0.0	0.0
Purch. Steam	BBtu	13.1	$526.1	13.1
Other	BBtu	378.3	$5,257.8	378.3
		Total Costs:	$16,764.8	1,310.0
Energy-Intensive Facilities (Thou. Gross Square Feet)		3,648.8	Btu/GSF:	359,020

1-3. Exempt Facilities

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Site-Delivered Btu (Billion)
Electricity	MWH	0.0	$0.0	0.0
Fuel Oil	Thou. Gal.	0.0	$0.0	0.0
Natural Gas	Thou. Cubic Ft.	0.0	$0.0	0.0
LPG/Propane	Thou. Gal.	0.0	$0.0	0.0
Coal	S. Ton	0.0	$0.0	0.0
Purch. Steam	BBtu	0.0	$0.0	0.0
Other	BBtu	0.0	$0.0	0.0
		Total Costs:	$0.0	0.0
Exempt Facilities (Thou. Gross Square Feet)		0.0	Btu/GSF:	#DIV/0!

ENERGY POLICY ACT 2005 REPORTING CATEGORIES

EPACT Goal-Subject Buildings/Facilities

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Site-Delivered Btu (Billion)
Electricity	MWH	133,543.2	$7,844.1	455.6
Fuel Oil	Thou. Gal.	694.9	$513.9	96.4
Natural Gas	Thou. Cubic Ft.	354,630.9	$2,604.7	365.6
LPG/Propane	Thou. Gal.	9.8	$18.3	0.9
Coal	S. Ton	0.0	$0.0	0.0
Purch. Steam	BBtu	13.1	$526.1	13.1
Other	BBtu	378.3	$5,257.8	378.3
		Total Costs:	$16,764.8	1,310.0
EPACT Goal Buildings/Facilities (Thou. Gross Square Feet)		3,648.8	Btu/GSF:	359,020

EPACT Excluded Facilities

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Site-Delivered Btu (Billion)
Electricity	MWH	0.0	$0.0	0.0
Fuel Oil	Thou. Gal.	0.0	$0.0	0.0
Natural Gas	Thou. Cubic Ft.	0.0	$0.0	0.0
LPG/Propane	Thou. Gal.	0.0	$0.0	0.0
Coal	S. Ton	0.0	$0.0	0.0
Purch. Steam	BBtu	0.0	$0.0	0.0
Other	BBtu	0.0	$0.0	0.0
		Total Costs:	$0.0	0.0
EPACT Excluded Facilities (Thou. Gross Square Feet)		0.0	Btu/GSF:	#DIV/0!

ALL FACILITIES COMBINED

Energy Type	Consumption Units	Annual Consumption	Annual Cost (Thou. $)	Site-Delivered Btu (Billion)
Electricity	MWH	133,543.2	$7,844.1	455.6
Fuel Oil	Thou. Gal.	694.9	$513.9	96.4
Natural Gas	Thou. Cubic Ft.	354,630.9	$2,604.7	365.6
LPG/Propane	Thou. Gal.	9.8	$18.3	0.9
Coal	S. Ton	0.0	$0.0	0.0
Purch. Steam	BBtu	13.1	$526.1	13.1
Other	BBtu	378.3	$5,257.8	378.3
		Total Costs:	$16,764.8	1,310.0
All Facilities (Thou. Gross Square Feet)		3,648.8	Btu/GSF:	359,020

Appendix E:
EPA Facility Inventory

For Submittal With EPA's
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APPENDIX E—EPAct Goal Subject Building Inventory[1]

Robert S. Kerr Environmental Research Laboratory
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 Laboratory
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: Primo Knight

Willamette Research Station
Corvallis, Oregon
Site Energy Manager: Primo Knight

[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, utility expenses for those facilities 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: L.C. Miner

Kansas City Science and 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: Linda Donahue

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: Primo Knight

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

New Computer Center
Research Triangle Park, North Carolina
Site Energy Manager: Sam Pagan

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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