FISCAL YEAR 1999

ANNUAL REPORT

ON

U.S. ENVIRONMENTAL PROTECTION AGENCY'S

ENERGY MANAGEMENT AND CONSERVATION PROGRAMS

U.S. Environmental Protection Agency
Office of Administration and Resources Management
1200 Pennsylvania Avenue, NW (3101A)
Washington, DC 20460

SECTION **PAGE**

EXECUTIVE SUMMARY

Through innovative measures and commonsense initiatives, the U.S. Environmental Protection Agency (EPA) has made great strides in decreasing its energy and water consumption. This report describes EPA's energy and water conservation progress in fiscal year 1999. EPA's primary objectives in these areas include effective and efficient use of natural resources in the design, construction, and maintenance of the Agency's facilities and facility systems.

In the past year, EPA continued implementing its first energy savings performance contract (ESPC); incorporated energy- and water-efficiency standards for building systems into its leases and construction projects; purchased 100 percent green electricity for one of its laboratories; and invested in energy- and water-efficient products and sustainable design techniques for retrofit, repair, and design projects. These efforts helped EPA reduce its overall energy consumption by 10.1 percent from 1985 to 1995 and meet the 10 percent milestone mandated by the Energy Policy Act of 1992. EPA is poised to continue the trend and decrease energy consumption 30 percent by 2005, surpassing its required reduction goal under Executive Order 13123.

Currently, EPA is upgrading existing heating, ventilation, and air conditioning systems in many of its facilities to make them even more energy efficient and environmentally friendly. The Agency also is using cutting edge renewable and low emission technologies, such as photovoltaic lighting, a solid oxide fuel cell power station, and electricity generated from renewable resources. Information on these energy savings and pollution prevention projects is included in this report.

In addition, the report discusses ESPCs, the innovative funding mechanism EPA is using to finance comprehensive energy- and water-efficiency upgrades. The report discusses EPA's first ESPC-funded energy upgrade at its Ann Arbor, Michigan, facility and lists the other facilities that are slated to award ESPCs in the future.

As evidenced by the projects and goals discussed in the pages ahead, EPA is striving to virtually eliminate Agency reliance on polluting energy sources and significantly reduce its water usage. Through ESPCs, green power purchases, and an Agency-wide commitment to sound energy and water management, EPA will achieve this goal.

Romulo Diaz
Assistant Administrator
EPA Office of Administration and Resources Management
February 15, 2000

I. INTRODUCTION

The Energy Policy Act of 1992 (EPACT) requires federal agencies to reduce energy consumption and to report energy use in buildings and vehicles. Using 1985 as the baseline year, EPACT mandated that federal agencies reduce energy use in nonindustrial facilities 10 percent by 1995, 20 percent by 2000, and 30 percent by 2005. In the spring of 1999, the President signed Executive Order (EO) 13123, *Greening the Government Through Efficient Energy Management*, which requires agencies to reduce energy consumption 30 percent by 2005 and 35 percent by 2010. This EO also mandated that federal industrial facilities, including laboratories, be included as part of the reporting and energy efficiency improvement goals—facilities that were exempt under EPACT and EO 12902, an earlier energy-efficiency EO. Laboratories and manufacturing facilities now are required to meet and report on the reduction goals detailed in the text box to the right.

EO 13123 Energy Reduction Goals

Industrial and Laboratory Facilities (1990 baseline):

20 percent by 2005
25 percent by 2010

Other Federal Facilities (1985 baseline):

30 percent by 2005
35 percent by 2010

Note: Every federal facility must meet these goals unless it meets exemption criteria.

This report addresses the U.S. Environmental Protection Agency's (EPA's) energy and water efficiency and conservation activities for the buildings and vehicles it owns and operates. The first portion of this document outlines EPA's buildings program. Appendix A provides data on EPA's progress in energy and water efficiency for fiscal year (FY) 1999 (October 1998 through September 1999).

Appendix B, *EPA's Alternative Fuel Vehicles Acquisition Report for Fiscal Year 1999*, is the Agency's update of its efforts to purchase alternative fuel vehicles (AFVs). EPACT and EO 13031 mandated that federal agencies increase the percentage of AFVs in their motor vehicle fleets to 33 percent for FY97, 50 percent for FY98, and 75 percent for FY99 and beyond. This report reflects the Agency's efforts to comply with these mandates. As Appendix B indicates, while EPA has significantly increased its AFV acquisitions during the past few years, the Agency has not yet been able to meet these targets. The agency has embarked, however, upon a more deliberate and aggressive strategy and intends to achieve compliance and demonstrate leadership in this arena.

EPA Sets a Standard

Under EPACT, EPA is not required to report its facility energy or water consumption because all of its facilities are laboratories and, therefore, are exempt from EPACT requirements. To prove its environmental commitment, EPA voluntarily decided in 1993 to report the energy and water consumption for its laboratory facilities and to meet or exceed the energy reduction goals that were set for less energy intensive nonindustrial facilities.

This report addresses and includes the following:

Energy performance goals.

Energy-efficiency implementation.

Energy and water reporting.

New construction.

Partnerships.

Incentive awards.

Appendix A containing current and projected energy and water consumption data for each EPA laboratory.

Appendix B containing EPA's AFV acquisition report.

Recent Lessons Learned

Due to energy-intensive health and safety requirements for the one-pass air required in a laboratory, EPA's energy consumption is extraordinarily high when compared to more traditional government facilities such as office buildings. One-pass air, strict temperature and humidity level requirements, as well as high-tech energy intensive laboratory equipment cause EPA's level of energy consumption to dwarf that of other federal agencies, which have a lower percentage of laboratory space or have not been reporting their laboratory facilities' energy consumption. To reduce these energy demands, EPA is aggressively pursuing energy-efficient upgrades at several of its laboratories.

EPA has learned its largest opportunity to improve energy efficiency is within the laboratories' heating, ventilation, and air-conditioning (HVAC) systems. The Agency's strategy for achieving the EPACT mandated 20 percent reduction goal by 2000 is to incorporate

comprehensive, advanced energy-efficient HVAC technologies in as many laboratories as possible in the time available. The 30 percent reduction by 2005 and 35 percent reduction by 2010 will be met by purchasing renewable energy and renewable energy technologies and by continuing the program of retrofits and advanced engineering in existing and new laboratories.

In pursuit of these goals, EPA conducted audits of its laboratories to better understand how these facilities used energy and to determine the best approach for reducing their energy consumption. From its audits and experiences, EPA developed a number of important conclusions regarding energy- and water-efficiency improvements in laboratory facilities. These conclusions include the following:

1. At EPA laboratories, HVAC systems account for approximately 70 percent of energy consumption, while 20 percent goes to plug loads (e.g., computers, copiers, and laboratory equipment), and lighting consumes the remaining 10 percent.

2. Lighting retrofits produce no observable energy reductions in electric meter readings because they represent such a small percentage of overall energy use.

3. Water consumption in restrooms is minor compared to consumption by the HVAC system and process loads.

4. One-for-one replacement of inefficient with efficient HVAC components produces relatively small energy-efficiency improvements for the building because energy efficiency is a systemic goal that must be addressed from a systemic perspective.

5. Significant and measurable efficiency improvements will result only from a comprehensive, integrated replacement of all HVAC components.

6. Advances in integrated HVAC component automation can significantly increase energy efficiency.

7. Highly integrated, advanced HVAC systems can provide laboratory energy-efficiency improvements of greater than 50 percent.

8. Improvements of this type greatly exceed the Agency's funding ceilings, but affordable, piecemeal projects will do little to achieve the 2005 20 percent reduction goal mandated by EO 13123.

9. Energy savings performance contracts (ESPCs) are the most likely funding vehicle available to pay for the upgrades.

10. New laboratory designs must include integrated, advanced HVAC systems approaches as one part of an integrated, sustainable design process.

11. HVAC designs for all retrofit or new laboratories must consider the application of combined heat and power to replace stand-by power.

12. Due to the long life cycles of government laboratories, renewable power and other advanced technologies can be viable cost saving and environmentally desirable options. Furthermore, according to EO 13123, energy consumed from renewable sources will not count in the Agency's energy per square foot calculation.

Although EPA could have exempted all of its facilities from reporting because as laboratories they all fall under the original industrial facility exclusion, the Agency established and met the 10 percent energy reduction goal in 1995 as required by EPACT for nonindustrial facilities. The Agency will continue to strive to meet EPACT's more ambitious 30 and 35 percent reduction goals. In doing so, it will simultaneously meet and exceed the EO 13123 mandates for industrial facilities. EPA recognizes that although these goals are achievable for laboratory facilities, they are quite ambitious and require a total commitment to the elements noted above.

Even with its commitment to energy efficiency, several challenges confront the agency. These challenges include the following:

Designs for its newest laboratories were completed before the elements listed above were proven and generally accepted.

Funding levels for new construction generally force the agency to "value-engineer" its projects, sometimes eliminating aggressive energy-efficiency measures with long term payback periods in order to reduce initial construction costs.

ESPC contracting cannot be used in new construction so these laboratories must be built as designed. EPA must then implement aggressive energy-efficiency modifications at additional costs after occupancy.

Laboratories for the 21st Century

EPA believes laboratory facilities provide a significant opportunity for improving energy and water efficiency throughout the federal government. EPA's own experiences improving laboratory efficiencies have encouraged the Agency to work with the Department of Energy's (DOE's) Federal Energy Management Program and academia to organize a new, national initiative. At the most recent "Laboratories for the 21st Century" conference, held September 8 to 10, 1999, in Cambridge, Massachusetts, EPA announced the development of its Laboratories for the 21st Century initiative known as Labs21. Labs21 will become a national program promoting energy efficiency and improved environmental performance in federal and private sector laboratories and will provide the tools and expertise to dramatically improve laboratory efficiencies. EPA believes the energy- and water-efficiency technologies promoted by Labs21 and incorporated into the nation's laboratories will "trickle down" to other building types to provide even greater environmental and economic benefits at the national and global levels. As the most innovative and

important engines of economic growth, our laboratory facilities must demonstrate the value of preserving natural resources and protecting the environment. Labs21 will help ensure they do. As currently envisioned, Labs21 will focus on the following activities:

Create a national database of current environmental practices, including energy and water consumption data for a variety of laboratory types. The data can be used to compare laboratory performance.

Negotiate voluntary goals for laboratory environmental performance, including energy- and water-efficiency goals, with each potential Labs21 participant.

Provide training or other opportunities to exchange technical information.

Establish partnerships with interested Labs21 participants.

Promote the Labs21 initiative.

II. ENERGY PERFORMANCE GOALS

When designing, constructing, and maintaining its facilities, EPA uses natural resources conservatively and seeks to incorporate innovative technologies that are cost-effective and environmentally sound throughout their life cycles. EPA's Energy and Water Efficiency Program is committed to reducing energy consumption by upgrading existing HVAC systems and incorporating innovative energy-efficient and renewable technologies where feasible. In addition, the Agency is pursuing opportunities to purchase renewable energy whenever economically viable to further improve its environmental performance. These objectives are driven jointly by federal energy and water management regulations and EPA's commitment to its mission.

To meet its goal of reducing energy consumption 30 percent by 2005, based on the 1985 baseline, EPA will rely on aggressive energy-efficiency projects financed through ESPCs. In 2000, EPA will see the actual energy-efficiency gains of its ESPC-financed project at Ann Arbor, Michigan, which guarantees a 66 percent reduction in energy use. These same engineering concepts are being replicated in four other EPA laboratories, which will soon award ESPCs.

Past Performance—Meeting the 10 Percent Goal

In 1985, EPA was responsible for the energy bills of 12 facilities, as shown in Exhibit 1 (page 21). The Agency's annual energy consumption that year was 399,992 British thermal units (Btus) per square foot. By 1995, several EPA facilities had achieved reductions in energy consumption of 20 percent or more, allowing the Agency to reach the EPACT and EO 12902 goal of a 10 percent reduction in energy use from the 1985 baseline. As shown in Exhibit 2 (page 22), the overall Agency energy consumption in FY95 was 10.1 percent below the 1985 baseline.

EPA achieved this overall reduction by using a progressive approach at each of its owned and operated facilities, including:

Implementing an energy-efficient lighting retrofit program consistent with the Agency's Green Lights® Program goals.

Incorporating updated energy-efficiency standards for building systems into Agency leases and construction projects.

Pursuing a general awareness and education campaign for Agency employees and managers on the environmental advantages of improving energy efficiency.

Managing equipment and technologies more efficiently.

Green Riders—Energy Management in Leased Buildings

Federal agencies are not required to report energy and water consumption data for buildings they do not own or operate. EPA does not own or operate any of its office buildings. As part of its mission to protect and improve the environment, however, EPA decided to exert some control over the energy and water management of its office buildings and recently began requiring "green riders" as part of its leases for newly constructed leased buildings. The green rider, which includes environmentally preferable criteria such as energy and water efficiency measures, is an amendment to the Agency's solicitation for offers (SFO) for constructing or retrofitting EPA facilities. EPA used green riders for its new Region 3 and Region 7 office buildings and the Region 7 laboratory currently under construction. When potential contractors submit bids to build a new facility for EPA's use, they are required to address the green rider as part of the proposal process. The green rider for Region 7's office building provided environmentally preferable specifications and guidelines for the HVAC systems to improve the facility's energy efficiency. A copy of Region 7's green rider will be available at <www.epa.gov/region7> this fall.

III. IMPLEMENTATION—TOWARD A MORE ENERGY-EFFICIENT EPA

Federal agencies have the capacity and responsibility to provide leadership in energy-efficient management practices and to encourage the expanded use of environmentally beneficial products and technologies. EPA is committed to this ideal and is reducing its facility energy consumption through Agency-wide energy management training, an energy-efficiency technical support team, ESPCs, green power purchases, and renewable technologies.

Energy Management Training

In 1997, EPA, in cooperation with Lawrence Berkeley Laboratories (LBL) and DOE's National Renewable Energy Laboratory (NREL), instituted an annual conference for agencies pursuing energy upgrades in federal laboratories. The conference, "Laboratories for the 21st Century," provides information on energy-efficient technology alternatives for laboratory applications and creates a forum for federal laboratories to obtain up-to-date information and support for implementing energy efficiency programs.

The conference is organized into two sessions—a formal training component and an informal open discussion. The training is provided by a host of speakers from EPA, DOE, LBL, NREL, academia, and the private sector who present views and technical information on subjects as varied as utility deregulation; passive solar design; and laboratory design, construction, and operation issues. The informal sessions enable attendees to present their agency's or industry's current issues and projects and exchange views and experiences with their peers.

The third annual "Laboratories for the 21st Century" conference took place September 8 to 10, 1999, in Cambridge, Massachusetts. Almost 200 participants attended the conference, which was open to both federal and nonfederal participants for the first time. The conference agenda, presentations, and speaker biographies are posted on the conference Web site at <www.epa.gov/labs21century>.

Energy-Efficiency Technical Support Team

EO 13123 requires each federal agency to assemble a technical support team to encourage the use of appropriations, ESPCs, and other alternative financing mechanisms necessary to meet the energy-efficiency goals and requirements of the order. EPA has designated John C. Chamberlin as its senior energy official. The Agency's national energy coordinator and team manager is Phil Wirdzek. The core members of the energy team are Doris Ellis, Bucky Green, and Bill Wise. The team is supplemented with architects and engineers from the EPA's Architecture, Engineering, and Real Estate Branch (and from the appropriate DOE laboratory for ESPC support) on a project basis. EPA previously designated site energy managers for each of the Agency's 19 facilities. Phil Wirdzek maintains the current list of site energy managers.

Energy Savings Performance Contracts

EPA is pursuing ESPCs to finance the significant initial cost of comprehensive energy upgrades. ESPCs are a form of third-party financing that fund energy-saving upgrades using the savings from future utility bills. This funding mechanism allows federal agencies to obtain energy-efficient technologies without having to commit capital funds. The table on the next page shows the baseline and expected consumption rates in 2005 for each facility and the method of achieving each reduction (ESPC or funded projects). The table shows that if each ESPC project results in an expected 30 to 50 percent energy reduction per facility, and funded projects result in an anticipated 10 to 30 percent energy reduction per facility, Agency energy consumption will be reduced 32 percent from the 1985 baseline by 2005.

ESPCs allow facilities to undertake large-scale energy-efficiency upgrades without incurring capital costs. Through this financing mechanism, the Agency can implement upgrades by signing a contract with an energy services company (ESCO). The ESCO funds, installs, operates, and maintains the energy-efficient upgrade project. Based on the contractual agreement, EPA pays a portion of its annual energy cost savings to the ESCO for the life of the contract.

DOE's Super ESPC program makes the ESPC process easier by streamlining the selection and award process. With Super ESPC awards, five or six ESCOs in each of the four regions (northwest, southwest, midwest, and west) win the right to bid for ESPC upgrades in federal facilities. EPA can approach any of the ESCOs for assistance and the ESCOs can submit unsolicited proposals for upgrade projects to the Agency.

In October 1997, the Office of Administration and Resources Management (OARM) and NREL offered training for EPA's engineers and laboratory managers on ESPCs. The course provided details on bundling energy-efficient components to improve the investment potential for a project, on the step-by-step approach to be used in developing an ESPC contract or delivery order, and on the regional delivery order for ESPC contracts that DOE has established with NREL for all federal users. EPA awarded an ESPC to fund energy upgrades for its Ann Arbor, Michigan, facility in 1998 and currently is installing and overhauling the facility's energy infrastructure. In addition, in FY00 the Agency will award ESPCs to finance comprehensive energy upgrades at the following facilities: Narragansett, Rhode Island; Gulf Breeze, Florida; and Ada, Oklahoma. Other facilities slated to award ESPCs include Athens ORD, Georgia; Duluth, Minnesota; Las Vegas, Nevada; and Richmond, California. EPA expects to achieve a greater than 50 percent reduction from current energy consumption levels for each facility undergoing a comprehensive upgrade paid through an ESPC. Energy reduction goals for each facility are provided in the table on the following page. EPA's three new facilities (Athens ESD, Georgia; Fort Meade, Maryland; and Golden, Colorado) are not included in this table because construction had not been completed when the goals were made.

2005 Projected EPA Facilities Consumption and Comparison

Location	1985 Baseline Btu/ft^2	Project Type	Expected Reduction Levels From 1997		Projected 2005 Consumption Btu/ft^2	Difference from Baseline (%)
			Percent	Year		
Athens, GA	339,756	ESPC	-50	2004	151,049	-56
Ann Arbor, MI	713,864	ESPC	-50	2000	248,361	-65
Duluth, MN	257,368	ESPC	-30	2003	206,618	-20
Ada, OK	379,587	ESPC	-50	2000	136,371	-64
RTP, NC	459,305	FP	-10	2002	476,216	4
Las Vegas, NV	278,634	ESPC	-25	2002	198,182	-29
Gulf Breeze, FL	307,643	ESPC	-50	2000	106,732	-65
Corvallis, OR	293,938	FP	-30	2002	133,011	-55
Edison, NJ	145,087	LEED	-30	2004	52,212	-64
Cincinnati, OH	401,312	FP	-30	2005	211,919	-47
Narragansett, RI	436,867	ESPC	-50	2000	247,196	-43
Manchester, WA	370,630	FP	-50	2005	143,429	-61
Houston, TX	572,433	✦	✦	✦	524,775	-8
Newport, OR	174,433	FP	-30	2004	126,466	-27
Montgomery, AL	287,811	✦	✦	✦	278,182	-3
Richmond, CA	660,518	ESPC	-50	2002	267,031	-60
TOTAL	**399,992**				**272,226**	**-32**

✦ No Current Energy Efficiency Improvements
ESPC (energy savings performance contract)
FP (funded project)
LEED (leadership in energy and environmental design)

Green Power Purchases

Renewable or green power includes energy generated from any of the following sources:

> **Biomass** generates electricity by burning waste wood and other plant materials. EPA's definition of biomass also includes generating electricity from **landfill gas**, which is emitted as waste decomposes in landfills.
>
> **Geothermal** energy produces electricity using the heat of the earth's core.
>
> **Small hydroelectric projects (30 megawatts or less)** generate electricity from running water without requiring large dams that adversely affect wildlife or local communities.
>
> **Solar** power produces electricity from the sun.
>
> **Wind** generates electricity by powering windmills.
>
> **Ocean-based** power derives electricity from the constant motion of waves or variations in ocean temperature.

In response to the deregulation of electric utilities, it will be difficult for renewable energy production generators to compete with cheaper, but more polluting, electricity generation sources such as coal and natural gas. The federal government can help accelerate the growth of renewable energy sources by requiring the purchase of green power for a percentage of its overall energy requirements. Since one of the motivations for improving energy efficiency is reducing greenhouse gas emissions, EO 13123 creates renewable energy "credits" for energy derived from renewable resources. Therefore, EPA does not include its renewable energy in its Btu per square foot calculations since the ultimate goal of reducing Btus per square foot is to reduce greenhouse gas emissions. This assumption is noted again on page 20 and reflected in the tables appearing in Appendix A.

EPA is committed to accelerating the acceptance of this cleaner alternative power and established a pilot for its use at its Region 9 facility in Richmond, California. In May 1999, EPA and its partners, NREL and the General Services Administration, awarded EPA's first renewable electricity contract to the Sacramento Municipal Utility District (SMUD). SMUD now provides the laboratory with 100 percent renewable electricity from a landfill gas plant. Purchasing renewable electricity at the Region 9 lab reduces greenhouse gas emissions associated with fossil fuel-based power by more than 2.3 million pounds per year. This is equivalent to reducing the number of automobile miles driven annually in California by 2 million miles. The project also makes EPA the first federal government entity to implement the use of green power at one of its facilities.

The Agency also plans to implement green power purchasing at its Chelmsford, Massachusetts (currently under construction), and Golden, Colorado, facilities. When these transactions are completed, the Chelmsford facility will purchase 100 percent of its electricity from

renewable power sources and the Golden facility will purchase close to 20 percent. In addition, EPA is supporting a biomass combined heat and power system at the U.S. Department of Agriculture (USDA) field station in Athens, Georgia. This project could reduce EPA's Athens-ORD facility's reliance on traditional electric energy sources by 100 percent as well. The Agency is planning other green power purchases as deregulation occurs across the country.

Other efforts to obtain power from renewable sources include the installation of a solid oxide fuel cell (SOFC) at the Ft. Meade, Maryland, laboratory; a 100 kilowatt (kW) photovoltaic system at the Research Triangle Park laboratory; and a 500 kW wind power electric generator at the Narragansett, Rhode Island, laboratory. (For more information on the SOFC, see the bullet on Ft. Meade on page 14.)

Renewable Technologies

In 1997, through an interagency agreement, EPA and DOE tasked NREL with assessing the potential for implementing renewable energy technologies and energy and resource efficiency measures at the 16 EPA laboratories where EPA paid the utility bills. (EPA has built three new facilities since the report was completed.) NREL identified seven renewable technologies in its *Renewable Energy Opportunity Assessment* report: solar water heating, solar ventilation preheating, photovoltaics, ground source heat pumps, solar cooling, skylights, and daylight controls. Pages 13 to 15 provide specific information on the renewable energy projects planned or under way at EPA facilities.

EPA recognizes that incorporating renewable energy sources and technologies combined with increased energy efficiency is the most environmentally beneficial method to reduce greenhouse gas emissions. In all ESPCs, EPA requires the installation of renewable technologies as part of the overall upgrade.

A summary of EPA's energy-efficiency improvements for each facility is provided in the table on the following page.

Summary of EPA's FY97 to FY00 Energy-Efficiency and Renewable Energy Improvements

LOCATION	FY97	FY98	FY99	FY00
Golden, CO	N/A	N/A	✦	20 percent green electricity will be purchased
Richmond, CA	✦	✦	100 percent green electricity purchased	Third party financing contract will be awarded
Athens (ORD), GA	✦	✦	DDC installed, biomass boilers designed	EPA will purchase power from USDA biomass generator
Athens (ESD), GA	✦	✦	✦	✦
Ft. Meade, MD	N/A	N/A	SOFC planning	SOFC will be awarded
Ann Arbor, MI	Photovoltaic lighting	ESPC awarded and started	ESPC underway	ESPC completed; 66 percent efficiency
Duluth, MN	✦	Energy-efficient windows installed	✦	ESPC will be considered
Ada, OK	✦	✦	✦	ESPC will be awarded
RTP, NC	✦	✦	✦	Photovoltaic installation
Las Vegas, NV	✦	✦	✦	Third party financing contract will be awarded
Gulf Breeze, FL	Heat pipe installed	NDDC system designed	NDDC installed photovoltaic dock lighting installed	ESPC will be awarded
Cincinnati, OH	✦	Chiller replacement completed	✦	Exhaust heat reclaim installed
Corvallis, OR	✦	✦	✦	✦
Edison, NJ	✦	Energy-efficient windows installed; solar hot water heaters designed	Solar hot water heaters installed	Green power purchase
Narragansett, RI	✦	✦	✦	ESPC will be awarded; green power purchase
Manchester, WA	✦	✦	✦	✦
Houston, TX	Energy Management System (EMS) completed	✦	✦	✦
Newport, OR	✦	✦	✦	✦
Montgomery, AL	✦	✦	✦	✦

✦ No current energy-efficiency improvements underway.

N/A = Not applicable because the facility had not yet been constructed.

IV. ENERGY AND WATER REPORTING

Though it was not required in previous years, EPA has been reporting its energy and water consumption data since 1993 using a quarterly report form that is completed by each facility's energy manager. The quarterly report includes consumption and cost information for all forms of energy, including electricity, natural gas, propane, fuel oil, and purchased steam, as well as square footage information.

EPA's energy consumption database shows that the Agency's facilities consumed the following energy in FY99:

148.1 million kilowatt hours (kWh) of electricity

5.8 million ccf natural gas

118,997 gallons (gal) of fuel oil

5,332 gal of propane

50.7 million pounds (lb) of purchased steam

Conversion Factors

Electricity = 3,412 Btu/kWh
Natural Gas = 103,100 Btu/ccf
(ccf=therms/1.03)
Fuel Oil = 138,700 Btu/gal
Propane = 95,500 Btu/gal
Purchased Steam = 933 Btu/lb

Annual energy consumption for FY99 at each facility is summarized in Btus in Exhibit 3 (page 23). In facilities covering approximately 3.1 million square feet of space, EPA consumed 375,263 Btus per square foot during FY99.

Carbon Dioxide Production

Through its efforts to reduce energy consumption, EPA has eliminated the production of approximately 4,309 tons of carbon dioxide (CO_2) emissions associated with energy production since 1995. EPA projects that by 2005, its facilities will have reduced carbon emissions by more than 11,023 tons of carbon. This is equivalent to more than 8,300 cars removed from the road per year and more than 11,000 forested acres planted each year.

Water Consumption

During the past 5 years, EPA has required its facilities to monitor and report water consumption and costs on a quarterly basis along with the energy consumption data. Since 1994, EPA has required the use of water conserving equipment in all newly leased and built facilities. Assessments of water efficiency opportunities are part of EPA's facility site visit program and have led to operational and management measures that have reduced water consumption.

EPA's total water consumption increased 4.5 percent between 1997 and 1999, but most of this increase was due to the addition of three new facilities. Excluding the new facilities, EPA's water consumption actually decreased 6.3 percent. Several facilities reduced water consumption by more than 20 percent including Narragansett, Rhode Island; Gulf Breeze, Florida; Duluth, Minnesota; Las Vegas, Nevada; and Manchester, Washington. (See Exhibits 12 and 13 on pages 32 and 33 for facility-specific water consumption data.) EPA expects significant reductions in the water consumption at its facilities by installing ground source heat pumps. The heat pumps, which require no water usage, will replace cooling towers, which require significant volumes of water.

Facility Energy and Water Reduction Activities

Following are synopses of the energy- and water-efficiency activities for 15 of EPA's 19 laboratories. Efficiency improvement opportunities are still being assessed for the remaining four facilities.

Ada, Oklahoma. The Ada facility decreased energy consumption by 12 percent from FY97 to FY99. To further streamline its energy usage, the laboratory will soon undergo a comprehensive energy-efficiency upgrade of its HVAC system. The upgrade will include installation of a ground-source heat pump system, complete variable air volume system for air supply and fume hood air exhaust, and an integrated direct digital control (DDC) system for HVAC, energy, fire, and security management. All of these efforts will be funded by an ESPC to be awarded in 2000 and will make Ada an energy-efficient showcase facility. Johnson Controls Inc., the energy services company, is expected to guarantee a 60 percent reduction in energy consumption.

Ann Arbor, Michigan. In 1998, an ESPC was awarded at EPA's Ann Arbor facility, National Vehicle and Fuel Emissions Laboratory (NVFEL). The new energy system currently being installed through the ESPC will guarantee at least a 66 percent reduction in energy consumption. The planned energy upgrade will establish NVFEL as an energy and environmental showcase facility by reducing source emissions, energy consumption, energy costs, and incorporating renewable technologies. Installation of a real-time demand meter will help the facility reduce its electrical demand peak. The project was awarded to NORESCO of Framingham, Massachusetts, and its energy-efficiency benefits will begin in 2000.

Athens, Georgia (ORD and ESD). Results of a recent feasibility study for the Athens laboratories indicate that large quantities of biofuel are available locally. Though EPA was unable to utilize this technology in the design of its new Athens laboratories, EPA is working with USDA and DOE to have the technology incorporated into USDA's campus renovation program. The next phase of this project will determine the size, type, cost, and potential funding options for the plant equipment best suited for the Athens federal laboratory facilities. A strong partnership between EPA, DOE, USDA, and state agencies will be the foundation for making this project a success. The facility also has a solar hot water heater at the onsite day-care center, which contributed to the 17 percent decrease in energy consumption at the Athens (ORD) facility from 1997 to 1999.

Cincinnati, Ohio. Energy-efficient projects for this facility included installing a closed-loop glycol cooling tower, energy-efficient elevator motors, boiler controls, a revolving door to help maintain temperature and building pressure, a new HVAC system, improved windows and insulation, a new energy-efficient boiler, enthalpy recovery from boiler exhaust, and adopting the Green Lights® program.

Duluth, Minnesota. At the Duluth facility, EPA installed an energy and environmental management system to minimize energy waste through improved equipment controls. This system has helped the facility decrease its energy consumption by 18 percent from FY97 to FY99. In FY00, EPA will replace two large boilers with 10 smaller boilers to improve the heating system's efficiency. EPA is in the process of determining the Duluth facility's energy baseline and is considering upgrading the facility's energy system through a Super ESPC. Several energy savings measures were investigated, including geothermal heat pumps, wind turbines, and photovoltaics but have not been pursued.

Edison, New Jersey. EPA recently installed three solar energy water-heating systems that are now the primary source of hot water in their respective facility areas. All three solar heating systems consist of a preheat tank (between 66 and 120 gallons) and various numbers of roof-mounted, single glazed, liquid evacuated tube collectors. Because the building relies on the electrical systems only for auxiliary heating when necessary, the solar heaters allow the facility to conserve electricity and fossil fuel. So far, Edison's solar technology has registered energy savings results significantly higher than expected.

Ft. Meade, Maryland. EPA completed occupancy of its new laboratory facility at the Ft. Meade Maryland, Army base in the spring of 1999. The facility was designed with a variety of advanced energy components including variable air volume technology. Thus far, little data is available on its energy use, but EPA hopes to see some improvement over previous designs with constant or 2-stage air volume systems. Additionally, EPA, DOE, Siemens-Westinghouse Power Corporation, U.S. Army Corps of Engineers, and others have assembled a public/private partnership to demonstrate the first successful operation of a mega-watt solid oxide fuel cell module integrated with a small gas turbine. This hybrid power system will demonstrate the highest electrical efficiency (60 percent) and lowest emissions of any power plant fueled by natural gas. The electrical power produced will supply some of the laboratory's load, and any excess power will be fed into the local power grid. The SOFC technology also has the potential to virtually eliminate NO_x and SO_x emissions and drastically reduce greenhouse gases. Initiation of this project is expected in mid-2000. The green design of the facility, in addition to the planned SOFC demonstration makes Ft. Meade an EPA showcase facility.

Golden, Colorado. In the summer of 1999, EPA began occupying its new Region 8 laboratory. This leased laboratory facility incorporated a variety of energy-efficiency components including a DDC system to monitor operating conditions of HVAC. By monitoring equipment in this way, the facility saves time, money, and energy by fixing problems immediately. Further, EPA applied for a DOE renewable energy project grant to build a transpired solar collector panel for the south wall of the facility's hazardous materials building. The solar panel

will save energy by preheating ventilation air during heating conditions. In addition, EPA is currently negotiating with NREL to purchase wind power to serve 20 percent of its electricity needs.

Gulf Breeze, Florida. EPA recently installed timers on approximately 20 electric water heaters and is installing nodal direct digital controls (NDDCs). The NDDCs will improve building controls to minimize energy waste and monitor building security, fire protection, and indoor environmental quality. Also in FY98, EPA installed a photovoltaic system to generate onsite electricity to light the facility's piers. Plans are being set for a facility energy upgrade through the southeast Super ESPC. EPA negotiated an interagency agreement with DOE to provide a no-cost energy audit, which will be used to create the energy baseline model. EPA received a contractor-identified ESPC project from Duke Solutions, a subsidiary of Duke Power, which it hopes to award in 2001.

Houston, Texas. The facility conducted air system modifications and upgraded an existing DDC system. It incorporated a cooling tower condensate return system to reduce water consumption and operating costs and enhance environmental conditions. Without this system, large volumes of water would have to be supplied by the local water utility. EPA is incorporating the use of a night setback system to control exhaust fans, laboratory fume hoods, and supply air. In addition, EPA is evaluating technology and operational options to reduce the levels of cooling and reheating required to reach temperature set-points.

Las Vegas, Nevada. This leased laboratory facility is being reviewed for an energy-efficiency upgrade through a third party financing agreement with the owner, University of Nevada at Las Vegas.

Narragansett, Rhode Island. To improve on the 17 percent decrease in energy consumption over the past 3 years, the Agency is designing an HVAC system upgrade that will use geothermal heat pumping and latent energy recovery technologies. The design of this system will be determined by the readily available heating and cooling potential of circulated bay water used for salt water testing in the laboratory. This project will be pursued through an ESPC; the request for proposal (RFP) will require renewables. DOE has awarded its Super ESPC contract with which EPA expects to upgrade this facility. EPA will awards its ESPC in 2000. In addition, EPA is researching the purchase of green power for this facility as well as a wind powered electric generator for the site.

Research Triangle Park, North Carolina. When construction on the National Computer Center and its host facility in RTP is completed, it will mark the opening of one of the largest photovoltaic (PV) installations on the east coast. The 100-kilowatt, integrated roof power system will convert the sun's light into energy, feeding it directly to the building and supplementing the main power utility. PV technology for the computer center is produced by Solarex Corporation. The system incorporates PV cells backed with insulating polystyrene foam, turning solar energy into usable power while increasing the building's thermal insulation. EPA expects to complete the building and solar installation by December 2000.

Richmond, California. This leased laboratory facility is in the planning stages of a third party financing agreement for energy efficiency improvements provided by the owner. EPA is working with DOE, NREL, LBL, and the building owner to negotiate the agreement. In addition, as discussed on page 9, 100 percent of the electricity for the Region 9 laboratory is green power provided by landfill methane gas.

V. NEW CONSTRUCTION—ENERGY EFFICIENT FROM THE START

With new facilities, EPA has the opportunity to make its buildings energy and water efficient from the start. For new construction projects, EPA is attempting the following:

Going beyond the applicable codes and regulations (e.g., 10 CFR Part 435 Subpart A) to pursue DOE design initiatives encouraged by EPACT and EO 13123. These include passive energy design strategies, use of waste energy and reclaimable resources, and the use of solar and renewable energy.

Maintaining among staff, site managers, site designers, and contractors a high level of technological awareness, particularly concerning renewable energy technologies, and committing to use those technologies whenever possible and cost-effective.

Ensuring that all new environmental control systems are highly automated by continuously monitoring the expected energy-efficiency and pollution prevention levels.

Amending the Program of Requirements for new facilities to include requirements for renewable technology applications.

VI. PARTNERSHIPS

For the past several years, EPA has pursued public/private partnerships to encourage the use of innovative technologies for environmental efficiency measures. These partnerships are proving to be fundamental for implementing state-of-the-art energy-efficient technologies in EPA's own facilities or in projects being carried out by others. The following are representative of the range of partnership activities in which the Agency is involved.

Carnegie-Mellon University

EPA is a member and sponsor of the Industry/University Cooperative Research Consortium (IUCRC) at the Carnegie-Mellon University Center for Building Performance and Diagnostics. With

the National Science Foundation (NSF) as an additional sponsor, the IUCRC includes government representatives to help determine research priorities and encourage information transfer among groups. EPA's funding and participation in the IUCRC is used by the NSF to support research projects that explore the integration of building design, materials, construction, lifecycle uses, and operations. These activities are undertaken to improve occupant health, satisfaction, productivity, and to prevent detrimental impacts to the environment and natural resources.

The research of the IUCRC deals directly with the environmental, economic, and industrial issues involved with the building industry. EPA is interested in advancing the research and development of building concepts, technologies, and systems. Also, EPA is interested in understanding and demonstrating the environmental benefits of these advancements, including their applications and instrumentation, whenever possible, in its own buildings and facilities.

Energy Star® Buildings Program

In 1997, EPA signed a letter of commitment to partner with DOE in support of the Federal Energy Star® Buildings Program, demonstrating its commitment to being a leader in energy efficiency. Both parties recognize that widespread use of cost-effective, energy-efficient building design and technologies in consideration with other energy-efficiency measures can improve personnel productivity, reduce emissions of many pollutants, reduce needless expenses, and improve the nation's energy security and economic competitiveness.

This letter of commitment addresses two objectives. First, it reaffirms EPA's responsibility to install, at a minimum, all cost-effective energy efficiency measures with a payback within 10 years or less by 2005. Second, as the co-administrator of the Energy Star® Building program and a partner under this agreement, EPA recognizes its responsibility to serve as an example of excellence and leadership for program implementation.

The other main points of the letter, which reinforce EPA's existing program fundamentals, are listed below:

> Aggressively pursue all cost-effective, energy-efficient, and environmentally friendly building technologies and procedures in EPA facilities through public/private partnerships and ESPCs to facilitate implementation of these measures and promote short- and long-term cost and energy savings.
>
> Evaluate the feasibility of cost-effective implementation of the full range of commercially available energy-efficient and sustainable building technologies, designs, and maintenance options.
>
> Integrate and combine energy-efficient building upgrade measures to maximize energy efficiency and pollution prevention, while increasing the net present value of the investment.

Create an integrated environmental efficiency program that encompasses initiatives such as pollution prevention, sustainable building practices, use of renewable resources, awareness, and green purchasing.

Photovoltaic Installation at RTP

By partnering with Virginia Alliance Solar Electricity (VASE), Solarex, PowerLight, and the Department of Energy (DOE), EPA successfully arranged for $500,000 in financial assistance for a partially solar-powered computer center at EPA's RTP facility. When construction on the National Computer Center is completed, it will mark the opening of one of the largest photovoltaic (PV) installations on the east coast. The 100-kilowatt, integrated roof power system will convert the sun's light into energy, feeding it directly to the building and supplementing the main power utility. Among one of the largest single PV installations in a federal facility, the RTP computer center not only gives EPA the opportunity to demonstrate the effectiveness and marketability of an alternative technology, but it also serves as a powerful example of the Agency's commitment to sustainable energy principles. In addition, the PV system supports the Million Solar Roofs initiative, which challenges American businesses and communities to install solar systems on one million roof tops by 2010. More specifically, the RTP installation supports President Clinton's 1997 commitment that the federal government alone will install 20,000 solar rooftop systems by 2010.

VII. INCENTIVE AWARDS

The DOE-sponsored "You Have the Power" campaign was initiated to increase awareness of energy efficiency throughout the federal government. EPA is an active participant and has identified and awarded 17 EPA employees as energy champions. Criteria for selection is based on an individual's effort and success in striving to conserve energy through building design and operation, real estate transactions, and overall promotion of energy efficiency awareness. Several promotional materials were developed for the campaign, including energy champion posters that highlighted the selected EPA individuals and their environmentally commendable work. For more information on this campaign, visit the Web site at <www.eren.doe.gov/femp/yhtp/epa.html>.

VIII. CONCLUSION

EPA will strive to reduce energy consumption 30 percent by 2005 based on its 1985 baseline, which is the goal established in EPACT and EO 13123 for nonindustrial facilities. EPA previously committed to meeting this energy reduction goal and will continue to do so even though the EO 13123 reduction goals for industrial facilities are less stringent. (Under EO 13123, laboratories must reduce energy consumption 20 percent based on a 1990 baseline by 2005.) EPA plans to accomplish this goal using ESPCs to upgrade the majority of its owned facilities. EPA also plans to use renewable and cutting-edge energy-efficient technologies, and purchase green power

whenever financially feasible to further the goals of pollution prevention through increased energy efficiency. The Agency's mission to protect the environment make meeting the EPACT and EO 13123 2005 and 2010 goals of 30 and 35 percent reductions natural commitments. EPA intends to turn its environmental commitments into success stories. If successful, EPA will virtually eliminate its reliance on polluting energy in its laboratories.

Appendix A: Consumption Data

EPA Facilities and Baseline Energy Consumption FY85

EPA Facilities and Energy Consumption Comparison FY95

EPA Energy Consumption Totals FY99

EPA Energy Consumption Totals FY97 Through FY99

EPA Energy Consumption Totals FY85 and FY99

EPA Energy Consumption Totals FY95 and FY99

EPA Electric Consumption Totals FY99

EPA Gas Consumption Totals FY99

EPA Fuel Oil Consumption Totals FY99

EPA Propane Consumption Totals FY99

EPA Steam Consumption Totals FY99

EPA Water Consumption Totals FY99

EPA Water Consumption Totals FY97 Through FY99

Assumptions and Estimates for Facility Consumption Data

Please note that the assumptions listed below were used to develop the information presented in the following tables because some facility information was unavailable. To calculate Agency-wide totals, estimates and assumptions were made for the following facilities:

Edison, New Jersey

Electricity and gas costs were provided for the fourth quarter, but not the actual consumption data. As a result, EPA estimated the fourth quarter consumption data by multiplying the fourth quarter cost data by the average cost per unit from the first three quarters.

Fort Meade, Maryland

This facility did not come on line until the third quarter of 1999. Since the facility was only operational half of the year, EPA multiplied its third and fourth quarter consumption data by two to estimate its consumption for an entire year. EPA used this figure to avoid artificially reducing EPA's annual consumption data, which would have occurred if EPA had only used information from the 5 months the facility was in operation.

Montgomery, Alabama

Because the Montgomery EPA facility is located on a military base that does not separately meter individual facilities, exact consumption data for this facility is unavailable. The data used was calculated using an estimated dollars per kilowatt or ccf rate and the actual dollar amount billed. This information was unavailable in previous years. As a result of this more reliable estimate, EPA adjusted its 1995 energy consummption data to more accurately reflect EPA's actual energy and water consumption.

Richmond, California

Richmond's Btus per square foot number does not include electricity consumption for half of the third quarter and all of the fourth quarter because the electricity came from renewable sources during that time. As implied by EO 13123's reference to renewable energy credits, energy derived from renewable resources should not be included in Btus per square foot calculations since the ultimate goal of reducing Btus per square foot is to reduce greenhouse gas emissions. Substituting renewable energy for traditional energy sources eliminates greenhouse gas emissions.

Exhibit 1—EPA Facilities and Baseline Energy Consumption for FY85

FACILITIES	SQUARE FEET	1985 BTUS	BASELINE BTU/SQ FT
REGION 1			
Narragansett, RI	65,726	28,713,520,422	436,867
REGION 2			
Edison, NJ	131,500	19,078,940,500	145,087
REGION 4			
Athens ORD, GA	71,409	24,261,636,204	339,756
Gulf Breeze, FL	48,073	14,789,321,939	307,643
RTP, NC	677,687	311,265,027,535	459,305
REGION 5			
Ann Arbor, MI	133,631	95,394,360,184	713,864
Duluth, MN	137,992	35,514,725,056	257,368
Cincinnati, OH	383,817	154,030,367,904	401,312
REGION 6			
Ada, OK	57,133	21,686,944,071	379,587
REGION 9			
Las Vegas, NV	84,195	23,459,589,630	278,634
REGION 10			
Manchester, WA	40,560	15,032,752,800	370,630
Corvallis, OR	99,502	29,247,418,876	293,938
TOTAL	**1,931,225**	**772,474,605,141**	**399,992**

Exhibit 2—EPA Facilities Energy Consumption Comparison FY95

FACILITIES	SQUARE FEET	BASELINE* BTU/SQ FT	1995 BTU/SQ FT	DIFFERENCE (%)
REGION 1				
Narragansett, RI	69,182	436,867	396,457	13
REGION 2				
Edison, NJ	407,860	145,097	58,359	-49
REGION 4				
Athens ORD, GA	87,437	339,756	255,387	-25
Gulf Breeze, FL	78,687	307,643	255,435	-31
Montgomery, AL	54,590	389,710	350,739	-10
RTP, NC	913,236	459,305	492,011	7
REGION 5				
Ann Arbor, MI	158,507	713,864	569,409	-20
Duluth, MN	129,946	257,368	316,286	23
Cincinnati, OH	510,726	401,312	370,019	-25
REGION 6				
Ada, OK	71,441	379,587	310,105	-18
Houston, TX	42,600	572,433	540,606	-6
REGION 9				
Las Vegas, NV	84,195	278,634	287,793	-5
Richmond, CA	30,100	660,518	633,874	-4
REGION 10				
Manchester, WA	49,881	370,630	261,018	-23
Newport, OR	46,040	174,433	194,688	12
Corvallis, OR	115,702	293,938	273,549	-9
TOTAL	**2,850,130**	**399,992****	**359,489**	**-10.1**

* Baseline year is 1985 except for Houston (1991), Newport (1991), Montgomery (1993), and Richmond (1994)
** This is the 1985 Btu/ft^2 baseline. It does not include facilities built after 1985.

Exhibit 3—EPA Energy Consumption Totals FY99*

FACILITIES	TOTAL COST	SQUARE FEET	$/ SQ FT	BTUS	BTU/SQ FT
REGION 1					
Narragansett, RI	$310,663	69,182	$4.491	28,473,800,776	411,578
REGION 2					
Edison, NJ	$557,898	407,860	$1.368	29,892,426,833	73,291
REGION 3					
Fort Meade, MD	$812,878	140,500	$5.786	80,165,934,280	570,576
REGION 4					
Athens ORD, GA	$275,755	87,437	$3.154	21,731,673,492	248,541
Athens ESD, GA	$260,429	65,000	$4.007	32,733,651,818	503,595
Gulf Breeze, FL	$225,407	78,687	$2.865	18,602,496,960	236,411
Montgomery, AL	$167,746	54,590	$3.073	19,146,846,900	350,739
RTP, NC	$4,360,469	913,236	$4.775	484,044,904,652	530,033
REGION 5					
Ann Arbor, MI	$664,191	158,507	$4.190	85,684,593,360	540,573
Duluth, MN	$180,182	129,946	$1.387	31,424,123,688	241,824
Cincinnati, OH	$1,3418,870	510,726	$2.582	177,816,375,308	348,164
REGION 6					
Ada, OK	$194,315	71,441	$2.720	17,092,960,380	239,260
Houston, TX	$238,723	42,600	$5.604	23,317,221,528	547,353
REGION 8					
Golden, CO	$165,180	47,800	$3.456	23,146,020,480	484,226
REGION 9					
Las Vegas, NV	$329,097	84,195	$3.909	25,969,382,280	308,443
Richmond, CA	$211,372	30,100	$7.022	14,874,001,856	415,803
REGION 10					
Manchester, WA	$168,120	49,881	$3.370	14,776,447,764	296,234
Newport, OR	$94,295	46,040	$2.048	8,720,901,400	189,420
Corvallis, OR	$255,627	115,702	$2.209	29,348,482,860	253,656
TOTAL	**$10,791,217**	**3,103,430**	**$3.477**	**1,166,962,246,615**	**375,263**

***NOTE:** Please see list of assumptions on page 21.

Exhibit 4—EPA Energy Consumption Totals FY97 Through FY99*

FACILITIES	FY97		FY98		FY99		DIFFERENCE FY97 TO FY99 (%)	
	BTU/SQ FT	BTUS	BTU/SQ FT	BTUS	BTU/SQ FT	BTUS	BTU/SQ FT	BTUS
REGION 1								
Narragansett, RI	494,392	34,203,052,356	445,362	30,811,067,052	411,578	28,473,800,776	-16.75	-16.75
REGION 2								
Edison, NJ	74,588	30,421,541,585	70,575	28,784,828,913	73,291	29,892,426,833	-1.74	-1.74
REGION 3								
Fort Meade, MD	N/A	N/A	N/A	N/A	570,576	80,165,934,280	N/A	N/A
REGION 4								
Athens ORD, GA	302,097	26,414,461,583	253,407	22,157,168,340	248,541	21,731,673,492	-17.73	-17.73
Athens ESD, GA	N/A	N/A	N/A	N/A	503,595	32,733,651,818	N/A	N/A
Gulf Breeze, FL	213,464	16,796,818,792	204,081	16,058,496,112	236,411	18,602,496,960	10.75	10.75
Montgomery, AL	350,739	19,146,846,900	350,739	19,146,846,900	350,739	19,146,846,900	0	0
RTP, NC	540,340	483,219,394,908	515,643	470,903,457,108	530,033	484,044,904,652	-1.91	0.17
REGION 5								
Ann Arbor, MI	496,721	78,733,820,860	509,608	80,776,359,100	540,573	85,684,593,360	8.83	8.83
Duluth, MN	295,169	38,356,023,420	306,330	39,806,359,252	241,824	31,424,123,688	-18.07	-18.07
Cincinnati, OH	302,741	154,617,892,640	368,206	188,052,137,068	348,164	177,816,375,308	15.00	15.00
REGION 6								
Ada, OK	272,743	19,485,026,992	279,912	19,997,160,854	239,260	17,092,960,380	-12.28	-12.28
Houston, TX	524,775	22,355,403,664	309,660	22,122,697,568	547,353	23,317,221,528	4.30	4.30
REGION 8								
Golden, CO	N/A	N/A	N/A	N/A	484,226	23,146,020,480	N/A	N/A
REGION 9								
Las Vegas, NV	264,242	22,247,856,611	268,242	22,584,645,238	308,443	25,969,382,280	16.73	16.73
Richmond, CA	534,061	16,075,249,300	601,343	18,100,410,520	415,803	14,874,001,856	-22.14	-7.47
REGION 10								
Manchester, WA	286,857	14,308,717,924	247,898	11,412,962,664	296,234	14,776,447,764	3.27	3.27
Newport, OR	180,666	8,317,875,960	176,874	8,143,297,568	189,420	8,720,901,400	4.85	4.85
Corvallis, OR	266,022	30,779,319,300	216,263	25,022,110,820	253,656	29,348,482,860	-4.65	-4.65
TOTAL	**358,677**	**1,015,479,302,795**	**356,116**	**1,023,880,005,077**	**375,263**	**1,166,962,246,615**	**4.62**	**14.92**

***NOTE:** Please see list of assumptions on page 21.

Exhibit 5—EPA Energy Consumption Totals FY85 and FY99*

FACILITIES	FY85		FY99		DIFFERENCE FY85 TO FY99 (%)	
	BTU/SQ FT	BTUS	BTU/SQ FT	BTUS	BTU/SQ FT	BTUS
REGION 1						
Narragansett, RI	436,867	28,713,499,029	411,578	28,473,800,776	-5.79	-0.83
REGION 2						
Edison, NJ	145,087	19,078,950,117	73,291	29,892,426,833	-49.48	56.68
REGION 3						
Fort Meade, MA	N/A	N/A	570,576	80,165,934,280	N/A	N/A
REGION 4						
Athens ORD, GA	339,756	24,261,631,680	248,541	21,731,673,492	-26.85	-10.43
Athens ESD, GA	N/A	N/A	503,595	32,488,480,018	N/A	N/A
Gulf Breeze, FL	307,643	14,789,319,545	236,411	18,602,496,960	-23.15	25.78
Montgomery, AL	N/A	N/A	350,739	19,146,846,900	N/A	N/A
RTP, NC	459,305	311,265,245,313	530,033	484,044,904,652	15.40	55.51
REGION 5						
Ann Arbor, MI	713,864	95,394,306,640	540,573	85,684,593,360	-24.28	-10.18
Duluth, MN	257,368	35,514,792,617	241,824	31,424,123,688	-6.04	-11.52
Cincinnati, OH	401,312	154,030,489,307	348,164	177,816,375,308	-13.24	15.44
REGION 6						
Ada, OK	379,587	21,686,923,688	239,260	17,092,960,380	-36.97	-21.18
Houston, TX	N/A	N/A	547,353	23,317,221,528	N/A	N/A
REGION 8						
Golden, CO	N/A	N/A	484,226	23,146,020,480	N/A	N/A
REGION 9						
Las Vegas, NV	278,634	23,459,585,938	308,443	25,969,382,280	10.70	10.70
Richmond, CA	N/A	N/A	415,803	14,874,001,856	N/A	N/A
REGION 10						
Manchester, WA	370,630	15,032,754,030	296,234	14,776,447,764	-20.07	-1.70
Newport, OR	N/A	N/A	189,420	8,720,901,400	N/A	N/A
Corvallis, OR	293,938	29,247,403,717	253,656	29,348,482,860	-13.70	0.35
TOTAL	**399,992**	**772,474,901,621**	**375,263**	**1,166,962,246,615**	**-6.18**	**51.07**

***NOTE:** Please see list of assumptions on page 21.

Exhibit 6—EPA Energy Consumption Totals FY95 and FY99*

FACILITIES	FY95		FY99		DIFFERENCE FY95 TO FY99 (%)	
	BTU/SQ FT	BTUS	BTU/SQ FT	BTUS	BTU/SQ FT	BTUS
REGION 1						
Narragansett, RI	396,457	27,427,712,056	411,578	28,473,800,776	3.81	3.81
REGION 2						
Edison, NJ	58,359	23,802,324,799	73,291	29,892,426,833	25.59	25.59
REGION 3						
Fort Meade, MD	N/A	N/A	570,576	80,165,934,280	N/A	N/A
REGION 4						
Athens ORD, GA	255,387	22,330,233,745	248,541	21,731,673,492	-2.68	-2.68
Athens ESD, GA	N/A	N/A	503,595	32,733,651,818	N/A	N/A
Gulf Breeze, FL	255,435	20,099,399,364	236,411	18,602,496,960	-7.45	-7.45
Montgomery, AL	350,739	19,146,846,900	350,739	19,146,846,900	0	0
RTP, NC	492,011	449,321,820,412	530,033	484,044,904,652	7.73	7.73
REGION 5						
Ann Arbor, MI	569,409	90,255,362,720	540,573	85,684,593,360	-5.06	-5.06
Duluth, MN	316,286	41,100,049,260	241,824	31,424,123,688	-23.54	-23.54
Cincinnati, OH	370,019	188,978,546,924	348,164	177,816,375,308	-5.91	-5.91
REGION 6						
Ada, OK	310,105	22,154,188,396	239,260	17,092,960,380	-22.85	-22.85
Houston, TX	540,606	23,029,800,824	547,353	23,317,221,528	1.25	1.25
REGION 8						
Golden, CO	N/A	N/A	484,226	23,146,020,480	N/A	N/A
REGION 9						
Las Vegas, NV	287,793	24,230,751,284	308,443	25,969,382,280	7.18	7.18
Richmond, CA	633,874	19,079,594,700	415,803	14,874,001,856	-34.40	-22.04
REGION 10						
Manchester, WA	261,018	13,019,829,360	296,234	14,776,447,764	13.49	13.49
Newport, OR	194,688	8,963,426,360	189,420	8,720,901,400	-2.71	-2.71
Corvallis, OR	273,549	31,650,112,020	253,656	29,348,482,860	-7.27	-7.27
TOTAL	**359,489**	**1,024,589,999,124**	**375,263**	**1,166,962,246,615**	**4.39**	**13.90**

***NOTE:** Please see list of assumptions on page 21.

Exhibit 7—EPA Electric Consumption Totals FY99*

FACILITIES	ELECTRIC (kWh)	COST	$/kWh
REGION 1			
Narragansett, RI	3,367,998	$247,149	$0.073
REGION 2			
Edison, NJ	4,997,855	$489,454	$0.098
REGION 3			
Fort Meade, MD	9,093,140	$666,058	$0.073
REGION 4			
Athens ORD, GA	4,096,366	$233,186	$0.057
Athens ESD, GA	4,596,039	$208,413	$0.045
Gulf Breeze, FL	5,452,080	$225,407	$0.041
Montgomery, AL	2,341,700	$117,100	$0.050
RTP, NC	63,223,421	$2,844,900	$0.045
REGION 5			
Ann Arbor, MI	7,098,380	$493,798	$0.070
Duluth, MN	2,628,224	$114,588	$0.044
Cincinnati, OH	16,924,809	$981,136	$0.058
REGION 6			
Ada, OK	3,071,640	$160,555	$0.052
Houston, TX	3,567,744	$176,923	$0.050
REGION 8			
Golden, CO	2,204,040	$100,402	$0.050
REGION 9			
Las Vegas, NV	4,784,915	$274,979	$0.057
Richmond, CA	1,754,988	$164,409	$0.094
REGION 10			
Manchester, WA	2,022,472	$128,447	$0.064
Newport, OR	2,555,950	$94,295	$0.037
Corvallis, OR	4,313,380	$180,114	$0.042
TOTAL	**148,095,141**	**$7,901,314**	**$0.053**

***NOTE:** Please see list of assumptions on page 21.

Exhibit 8—EPA Gas Consumption Totals FY99*

FACILITIES	GAS (ccf)	COST	$/ccf
REGION 1			
Narragansett, RI	144,691	$54,990	$0.380
REGION 2			
Edison, NJ	105,838	$58,732	$0.555
REGION 3			
Fort Meade, MD	323,288	$146,820	$0.454
REGION 4			
Athens ORD, GA	75,217	$42,569	$0.566
Athens ESD, GA	165,393	$52,016	$0.315
Gulf Breeze, FL	**	**	**
Montgomery, AL	108,215	$50,646	$0.468
RTP, NC	2,103,455	$935,707	$0.445
REGION 5			
Ann Arbor, MI	596,168	$170,393	$0.286
Duluth, MN	217,814	$65,594	$0.301
Cincinnati, OH	1,155,170	$335,221	$0.290
REGION 6			
Ada, OK	64,137	$33,760	$0.526
Houston, TX	108,090	$61,800	$0.572
REGION 8			
Golden, CO	151,560	$64,778	$0.427
REGION 9			
Las Vegas, NV	93,533	$54,118	$0.579
Richmond, CA	86,188	$46,963	$0.545
REGION 10			
Manchester, WA	**	**	**
Newport, OR	**	**	**
Corvallis, OR	141,913	$75,513	$0.532
TOTAL	**5,794,007**	**$2,249,619**	**$0.388**

***NOTE:** Please see list of assumptions on page 21.

** No natural gas consumption.

Exhibit 9—EPA Fuel Oil Consumption Totals FY99*

FACILITIES	FUEL OIL (gal)	COST	$/gal
REGION 1			
Narragansett, RI	14,885	$8,524	$0.573
REGION 2			
Edison, NJ	11,502	$4,976	$0.433
REGION 3			
Fort Meade, MD	**	**	**
REGION 4			
Athens ORD, GA	**	**	**
Athens ESD, GA	**	**	**
Gulf Breeze, FL	**	**	**
Montgomery, AL	**	**	**
RTP, NC	30,101	$13,010	$0.432
REGION 5			
Ann Arbor, MI	**	**	**
Duluth, MN	**	**	**
Cincinnati, OH	7,000	$2,513	$0.359
REGION 6			
Ada, OK	**	**	**
Houston, TX	**	**	**
REGION 8			
Golden, CO	**	**	**
REGION 9			
Las Vegas, NV	**	**	**
Richmond, CA	**	**	**
REGION 10			
Manchester, WA	55,509	$37,232	$0.671
Newport, OR	**	**	**
Corvallis, OR	**	**	**
TOTAL	**118,997**	**$66,255**	**$0.557**

***NOTE:** Please see list of assumptions on page 21.

**No fuel oil consumption

Exhibit 10—EPA Propane Consumption Totals FY99*

FACILITIES	PROPANE (gal)	COST	$/gal
REGION 1			
Narragansett, RI	**	**	**
REGION 2			
Edison, NJ	3,482	$4,736	$1.360
REGION 3			
Fort Meade, MD	**	**	**
REGION 4			
Athens ORD, GA	**	**	**
Athens ESD, GA	**	**	**
Gulf Breeze, FL	**	**	**
Montgomery, AL	**	**	**
RTP, NC	**	**	**
REGION 5			
Ann Arbor, MI	**	**	**
Duluth, MN	**	**	**
Cincinnati, OH	**	**	**
REGION 6			
Ada, OK	**	**	**
Houston, TX	**	**	**
REGION 8			
Golden, CO	**	**	**
REGION 9			
Las Vegas, NV	**	**	**
Richmond, CA	**	**	**
REGION 10			
Manchester, WA	1,850	$2,441	$1.319
Newport, OR	**	**	**
Corvallis, OR	**	**	**
TOTAL	**5,332**	**$7,177**	**$1.346**

***NOTE:** Please see list of assumptions on page 21.

** No propane consumption.

Exhibit 11—EPA Steam Consumption Totals FY99*

FACILITIES	STEAM (lbs)	COST	$/lbs
REGION 1			
Narragansett, RI	**	**	**
REGION 2			
Edison, NJ	**	**	**
REGION 3			
Fort Meade, MD	**	**	**
REGION 4			
Athens ORD, GA	**	**	**
Athens ESD, GA	**	**	**
Gulf Breeze, FL	**	**	**
Montgomery, AL	**	**	**
RTP, NC	50,681,000	$566,852	$0.011
REGION 5			
Ann Arbor, MI	**	**	**
Duluth, MN	**	**	**
Cincinnati, OH	**	**	**
REGION 6			
Ada, OK	**	**	**
Houston, TX	**	**	**
REGION 8			
Golden, CO	**	**	**
REGION 9			
Las Vegas, NV	**	**	**
Richmond, CA	**	**	**
REGION 10			
Manchester, WA	**	**	**
Newport, OR	**	**	**
Corvallis, OR	**	**	**
TOTAL	**50,681,000**	**$566,852**	**$0.011**

***NOTE:** Please see list of assumptions on page 21.

**** No steam consumption

Exhibit 12—EPA Water Consumption Totals FY99*

FACILITIES	H_2O (gal)	COST	$/gal
REGION 1			
Narragansett, RI	4,276,556	$11,629	$0.003
REGION 2			
Edison, NJ	5,911,444	$21,079	$0.004
REGION 3			
Fort Meade, MD	12,132,300	$57,650	$0.005
REGION 4			
Athens ORD, GA	4,311,461	$18,613	$0.004
Athens ESD, GA	5,358,964	$18,030	$0.003
Gulf Breeze, FL	5,920,509	$19,408	$0.003
Montgomery, AL	1,315,440	$1,769	$0.002
RTP, NC	57,596,535	$278,455	$0.005
REGION 5			
Ann Arbor, MI	16,662,856	$77,070	$0.005
Duluth, MN	1,566,265	$3,279	$0.002
Cincinnati, OH	39,998,289	$103,768	$0.003
REGION 6			
Ada, OK	5,672,232	$11,207	$0.002
Houston, TX	5,797,000	$34,621	$0.006
REGION 8			
Golden, CO	1,497,281	$4,167	$0.003
REGION 9			
Las Vegas, NV	6,914,240	$12,484	$0.002
Richmond, CA	258,094	$9,251	$0.036
REGION 10			
Manchester, WA	2,429,370	$7,168	$0.003
Newport, OR	827,000	$3,207	$0.004
Corvallis, OR	6,147,491	$32,440	$0.005
TOTAL	**184,593,327**	**$725,012**	**$0.004**

***NOTE:** Please see list of assumptions on page 21.

Exhibit 13—EPA Water Consumption Totals FY97 Through FY99*

FACILITIES	FY97 H_20 (GAL)	FY98 H_20 (GAL)	FY99 H_20 (GAL)	DIFFERENCE FY97 TO FY99 (%)
REGION 1				
Narragansett, RI	5,421,881	5,702,240	4,276,556	-21.12
REGION 2				
Edison, NJ	4,819,364	6,408,860	5,911,444	22.66
REGION 3				
Fort Meade, MD	N/A	N/A	12,132,300	N/A
REGION 4				
Athens ORD, GA	4,728,362	4,167,692	4,311,461	-8.82
Athens ESD, GA	N/A	N/A	5,358,964	N/A
Gulf Breeze, FL	8,029,125	6,358,500	5,920,509	-26.26
Montgomery, AL	1,315,440	1,315,440	1,315,440	0
RTP, NC	52,462,383	41,341,212	57,596,535	9.79
REGION 5				
Ann Arbor, MI	17,255,315	17,064,783	16,662,856	-3.43
Duluth, MN	6,106,112	3,139,920	1,566,265	-74.35
Cincinnati, OH	46,377,755	23,047,748	39,998,289	-13.76
REGION 6				
Ada, OK	2,021,379	5,242,548	5,672,232	180.61
Houston, TX	5,270,253	5,805,000	5,797,000	9.99
REGION 8				
Golden, CO	N/A	N/A	1,497,281	N/A
REGION 9				
Las Vegas, NV	10,061,000	7,716,000	6,914,240	-31.28
Richmond, CA[1]	56,100	293,778	258,094	N/A
REGION 10				
Manchester, WA	7,406,695	2,543,755	2,429,370	-67.20
Newport, OR	1,019,000	814,000	827,000	-18.84
Corvallis, OR	4,183,107	5,383,157	6,147,491	46.96
TOTAL	**176,477,171**	**136,344,633**	**184,335,233**	**4.45**

NOTE: Excluding the new facilities (Fort Meade, MD; Athens (ESD), GA; and Golden, CO), EPA's water consumption actually decreased 6.31 percent.

***NOTE:** Please see list of assumptions on page 21.

Appendix B: AFV Data

EPA's Alternative Fuel Vehicles Acquisition Report for Fiscal Year 1999

1. Richmond's FY97 water consumption figure only includes the first and second quarters and can not be fairly compared to FY99 data. Since this data is incomplete, Richmond's data is not included in the totals for FY97 or FY99.