

Annual Energy Management Report

FY 2018

U.S. Environmental Protection Agency

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Cover photo: The EPA's Main Laboratory in Research Triangle Park (RTP), North Carolina, initiated an energy savings performance contract in fiscal year 2018.

TABLE OF CONTENTS

Fiscal Year (FY) 2018 Highlights	3
Introduction.....	5
Management and Administration Summary.....	5
Energy Management Infrastructure	5
Management Tools.....	5
EISA Section 432 Implementation	5
Energy Intensity Reduction Performance.....	6
Non-Fleet Vehicle and Equipment Fuel Use	7
Renewable Energy Use and Other Requirements	7
Onsite Generated Renewable Energy/Distributed Generation	7
Purchased Renewable Energy	7
Water Conservation.....	8
Metering of Energy Use.....	8
Federal Building Energy Efficiency Standards	9
Implementation Highlights During FY 2018	9
Life Cycle Cost Analysis	9
Retrofits and Capital Improvement Projects.....	9
Use of Performance Contracts	9
Use of ENERGY STAR® and Other Energy-Efficient Products.....	10
Sustainable Building Design and High-Performance Buildings.....	10
Energy Efficiency/Sustainable Design in Lease Provisions.....	12
Solid Waste Diversion Rate.....	12

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FISCAL YEAR (FY) 2018 HIGHLIGHTS

In FY 2018, the U.S. Environmental Protection Agency (EPA) continued to strive to reduce its energy and environmental footprint. The EPA met or exceeded the requirements of the Energy Independence and Security Act of 2007 (EISA) and the Energy Policy Act of 2005 (EPAct) for renewable energy and fleet performance, as well as energy, water and recommissioning assessments. In FY 2018, the EPA also commissioned one completed energy savings performance contract (ESPC) and initiated work on another.

In September 2018, in accordance with the requirements of Executive Order (EO) 13834, the EPA submitted a Sustainability Report and Implementation Plan (SRIP) to the Office of Management and Budget (OMB) and the Council on Environmental Quality (CEQ). The EPA's SRIP outlines the agency's plans to reduce energy intensity, water intensity, solid waste and other resource use and to incorporate sustainable design and operations across its facilities on an annual basis.

Energy Intensity Decreased 3.5 Percent From FY 2015

The EPA's FY 2018 reported energy intensity was 260,186 British thermal units (Btu) per gross square foot (GSF), a decrease in energy intensity of 3.5 percent from FY 2015, and 34.9 percent lower than the agency's energy intensity in FY 2003. To address the goals of EO 13834 to reduce energy use each year, the agency also initiated an effort to identify and address fluctuations in facility energy performance on a quarterly basis in FY 2018 and beyond.

Through a blanket purchase agreement (BPA) of renewable energy certificates (RECs) and existing green power contracts, the EPA exceeded the EPAct goal of meeting at least 7.5 percent of agencywide electricity use with renewable electric energy, purchasing 13.4 million kilowatt hours (kWh) of direct green power or renewable energy certificates, which is 13.4 percent of its electricity use.

In FY 2018, the EPA completed required energy and recommissioning assessments for its EISA-covered facilities, conducting "desk audits" or in-person assessments at seven facilities to ensure the EPA is on track to complete assessments at all the EISA-covered facilities during this four-year cycle.

As of FY 2018, the EPA has installed electric, natural gas and steam meters at 100 percent of its reporting facilities, meeting the requirements of EPAct and EISA. Advanced metering hardware, which the EPA is required to install to the maximum extent practicable, is now in place, under design or under construction to capture 77.0 percent of agencywide reportable energy consumption.

Water Intensity Down 37.7 Percent From FY 2007

In FY 2018, the EPA reduced its water intensity by 37.7 percent compared to FY 2007. The EPA's water intensity in reporting laboratories was 22.3 gallons per GSF in FY 2018 (79.6 million total gallons), compared to its FY 2007 water intensity of 35.7 gallons per GSF (136.5 million total gallons). The EPA also estimates that it used 3.0 million gallons of nonpotable water for industrial, landscaping and agricultural (ILA) applications in FY 2018, which is 97.8 percent lower than its FY 2010 ILA water use of 135.2 million gallons.

A Total of 26.2 Percent of EPA-Owned Buildings Meet the *Guiding Principles for Sustainable Federal Buildings*

In FY 2018, eight of the EPA's owned buildings greater than 10,000 square feet—or 26.2 percent (by square feet)—met the *Guiding Principles*. In addition to internally certifying buildings under the *Guiding Principles*, the EPA uses other systems to benchmark the environmental performance of its real property portfolio.

Solid Waste Diversion Rate Was 60 Percent in FY 2018

The EPA has set its own internal waste diversion goal of 60 percent. The agency met that target by diverting 60 percent of its solid waste through recycling and composting in FY 2018.

INTRODUCTION

In September 2018, the EPA, in accordance with the requirements of EO 13834, EISA and EPAct, submitted to the OMB and the CEQ its SRIP. This plan details key agency priorities and strategies for achieving its sustainability goals, including: energy efficiency, renewable energy, water conservation, fleet management, sustainable acquisition, waste diversion, performance contracting, electronics stewardship and greenhouse gas emissions reductions, which the EPA planned to refine once federal guidance for implementing EO 13834 is finalized.

MANAGEMENT AND ADMINISTRATION SUMMARY

Energy Management Infrastructure

The EPA's Senior Sustainability Officer for the duties and responsibilities set forth by federal sustainability laws and executive orders is Donna J. Vizian, Principal Deputy Assistant Administrator for the Office of Mission Support, who reports directly to the EPA Administrator.

Management Tools

To ensure the EPA meets the requirements of EISA and EPAct, the agency's Sustainable and Transportation Solutions Branch (STSB), under its Safety and Sustainability Division (SSD), assigns project oversight and coordination to staff with mechanical engineering, sustainable design and other relevant qualifications. Sustainability goals and assessment targets, based on federal requirements, are incorporated into these employees' roles and responsibilities. Quarterly web-based conference calls with EPA facility managers and energy reporters also ensure that facilities staff are aware of any changes to federal requirements and agency sustainability targets. The EPA is continuing the agency's commitment to using Environmental Management Systems (EMSs) as a way to set objectives, targets and metrics for achieving its energy and sustainability goals. The agency's national EMS program is managed by the SSD's Environmental, Safety and Health Programs Branch (ESHPB). The ESHPB collaborates with STSB staff on various environmental stewardship initiatives and federal reporting requirements.

EPA headquarters and facilities staff complete annual training relevant to their sustainability goals. For example, the EPA employee who manages the EISA assessments, a headquarters project engineer and several key facility staff recently attended the International Institute for Sustainable Laboratories' annual conference, since the EPA's EISA-covered facilities are laboratories.

EISA Section 432 Implementation

From July 2017 through June 2018, the EPA used a "desk audit" approach to energy and water assessments for a portion of the Main Building at its campus in RTP, North Carolina; portions of the Andrew W. Breidenbach Environmental Research Center (AWBERC) in Cincinnati, Ohio; the New England Regional Laboratory (NERL) in Chelmsford, Massachusetts; the Atlantic Ecology Division (AED) Laboratory in Narragansett, Rhode Island; the National Vehicle and Fuel Emissions Laboratory (NVFEL) in Ann Arbor, Michigan; and the National Exposure Research Laboratory in Athens, Georgia. In FY 2018, the EPA completed an in-person energy and water assessment at the

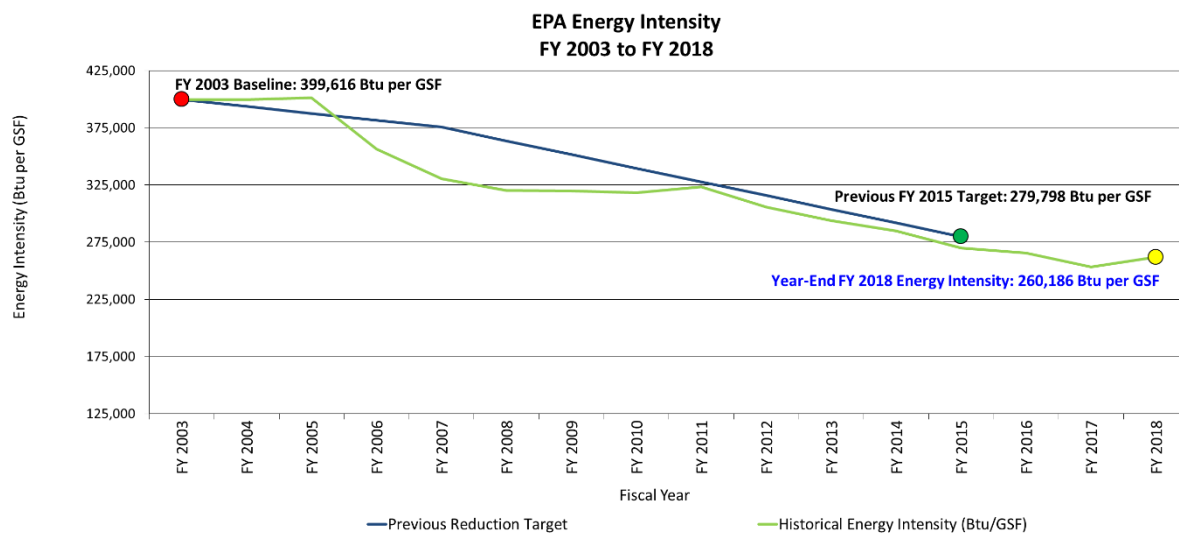
Robert S. Kerr Environmental Research Center in Ada, Oklahoma. These desk audits and onsite assessments represent the completion of EISA requirements to conduct energy, water and recommissioning assessments for 100 percent of the agency’s total energy use at covered facilities every four years.

During desk audits and onsite assessments, the agency reviews the status of and potential to implement previously identified energy and water conservation measures for each facility and estimates potential savings and payback periods. Energy conservation measures range from opportunities to reduce energy use from lighting and turn off fans, to fume hood retrofits and system optimization. Water conservation measures include fixture replacements and retrofits. The EPA is focusing on implementing key projects, as budgets allow, and will continue to re-evaluate its covered facilities per EISA requirements to identify more savings opportunities. In FY 2019, the agency is planning to conduct onsite assessments at its Gulf Ecology Division (GED) Laboratory in Gulf Breeze, Florida, and Kansas City, Kansas, Science and Technology Center (STC).

ENERGY INTENSITY REDUCTION PERFORMANCE

The EPA’s FY 2018 reported energy intensity was 260,186 Btu per GSF, which is 3.5 percent lower than its FY 2015 reported energy intensity of 269,680 Btu per GSF (FY 2015’s target was 279,798 Btu per GSF; see Figure 1). The EPA’s FY 2018 energy intensity was also 34.9 percent lower than FY 2003’s 399,616 Btu per GSF. In absolute terms, the EPA’s FY 2018 energy consumption was 930.2 billion Btu. While the agency’s overall energy intensity has decreased steadily for nearly a decade, the EPA will continue to identify more targeted opportunities for improvement in key laboratories. Furthermore, the agency is confident that the steps it is taking to monitor and address quarterly facility energy fluctuations will allow the EPA to continue to reduce energy intensity.

Figure 1. The EPA’s Annual Energy Intensity Reductions



Non-Fleet Vehicle and Equipment Fuel Use

The EPA is currently implementing a new fleet management information system (FMIS), which will allow the agency to monitor and analyze fleet vehicle use and fuel consumption. Tactical vehicles the agency employs are included in the FMIS, and the EPA will analyze their use as it works to right-size the agency's fleet.

RENEWABLE ENERGY USE AND OTHER REQUIREMENTS

Onsite Generated Renewable Energy/Distributed Generation

The EPA installs onsite renewable energy and alternative energy systems where practical and cost-effective. These systems help the agency build energy resiliency, diversify its energy supply and reduce energy losses from transmission and distribution. In FY 2018, onsite renewable resources such as wind, solar and geothermal power supplied the EPA with 6.5 billion Btu, equivalent to 0.6 percent of the agency's energy use. Among the agency's numerous onsite renewable energy and distributed generation installations are:

- A ground source heat pump at the Robert S. Kerr Environmental Research Center in Ada, Oklahoma.
- A 100-kilowatt (kW) solar roof at the National Computer Center in RTP, North Carolina.
- A 109-kW hosted photovoltaic (PV) roof array at the First Environments Early Learning Center in RTP.
- A 55-kW, thin-film solar PV system on the roof of the Main Building E and a 52.5-kW solar PV system on the roof of the Main Building B in RTP.
- A 5-kW solar PV array on the roof of the AED Laboratory in Narragansett, Rhode Island.
- A 2-kW solar PV awning system at NERL in Chelmsford, Massachusetts.
- Solar hot water heating systems at the AED Laboratory in Narragansett, Rhode Island; the Region 2 Laboratory in Edison, New Jersey; and the National Exposure Research Laboratory in Athens, Georgia.
- A 9.5-kW PV roof array at the Western Ecology Division Laboratory in Corvallis, Oregon.
- A cogeneration facility at the Region 9 Laboratory in Richmond, California.
- A 1.5-megawatt (MW) PV array at the Region 2 Laboratory in Edison, New Jersey.

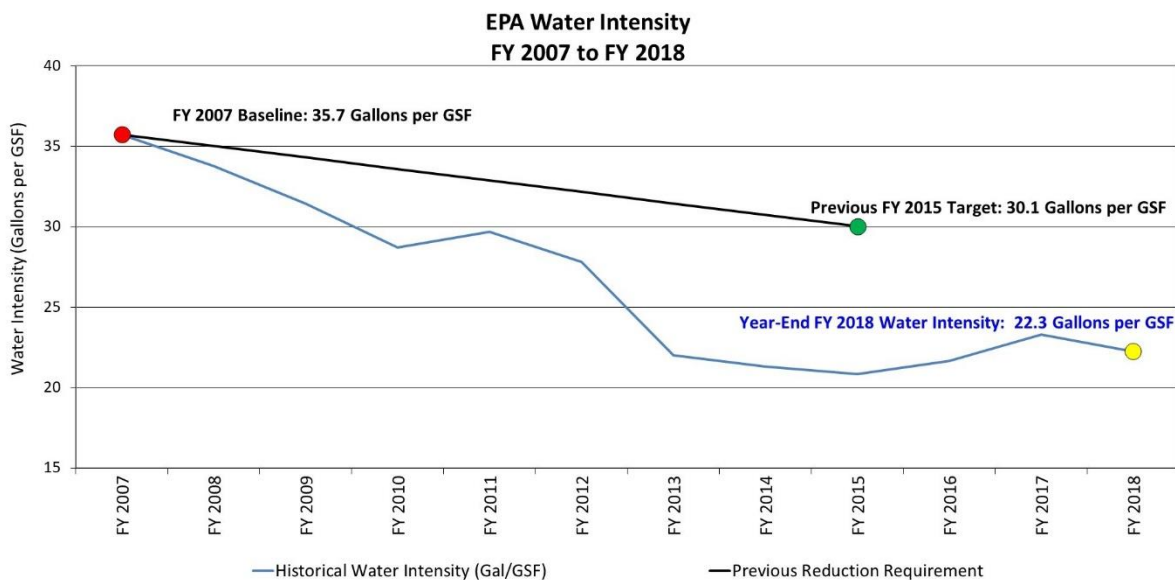
Purchased Renewable Energy

In August 2018, the EPA procured a BPA through the Defense Logistics Agency for a total of more than 13 million kWh of renewable energy certificates that supported renewable energy generation in Louisiana. Combined with two additional green power contracts, the EPA purchased 13.4 million kWh of delivered green power and RECs for FY 2018. The EPA plans to complete another BPA of RECs for FY 2019. With other small green power contracts and onsite renewable energy generation, this BPA covers 13.4 percent of the agency's FY 2018 total electricity use and ensured the agency met the EPAAct requirement that at least 7.5 percent of agencywide electricity use be from renewables.

Water Conservation

The EPA achieved a water intensity of 22.3 gallons per GSF in FY 2018, which is a decrease of 37.7 percent compared to the agency's FY 2007 water intensity of 35.7 gallons per GSF and continues the EPA's trend of reducing water use over the past decade or more (see Figure 2 and the corresponding table below). In absolute terms, EPA laboratories used a total of 79.6 million gallons of water in FY 2018 compared to 136.5 million gallons in FY 2007.

Figure 2. The EPA's Annual Water Intensity Reductions



FY 2018 water conservation efforts were guided by the agency's Water Conservation Strategy, which outlines water reduction projects and goals for facilities and is detailed in the agency's SRIP, as well as by water management plans for each facility that are updated after each water assessment. In FY 2018, the EPA used a total of 3.0 million gallons of ILA water for landscaping and research purposes, a 97.8 percent decrease from the agency's FY 2010 ILA water use of 135.2 million gallons.

Metering of Energy Use

EPAct and EISA required federal agencies to install advanced metering equipment for electricity, steam and natural gas to the maximum extent practicable, considering return on investment and other criteria. By the end of FY 2018, advanced metering hardware was in place, under design or under construction to capture 77.0 percent of the EPA's reporting laboratories' energy consumption. The EPA uses an enterprise energy management information system (EEMIS) that collects data from advanced meters across the agency's facilities and includes customizable dashboards, trend analysis reporting, data quality analysis capabilities and the ability to store historical data for reporting purposes to meet the advanced metering requirements of EPAct and EISA. In FY 2018, the EPA initiated the process of transitioning its EEMIS from a collection of third-party hosted servers to EPA-owned servers. During FY 2019, the agency will continue this

transition, including comprehensive software reconfiguration and testing, to ensure continued access to accurate and complete metered data.

Federal Building Energy Efficiency Standards

For new EPA facilities, the agency performs energy modeling to ensure compliance with the EPA Act requirement that new buildings perform at least 30 percent better than the American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) 90.1 standard, when life cycle cost-effective. During this process, the EPA weighs the cost of mechanical system and building envelope investments against the energy cost savings that will result from these investments. Since 2007, the EPA has designed and constructed one new owned building, the RTP, North Carolina, Building A Administration Wing, which achieved a 38 percent reduction from its baseline of ASHRAE Standard 90.1-2007.

IMPLEMENTATION HIGHLIGHTS DURING FY 2018

Life Cycle Cost Analysis

The EPA has established processes to evaluate the economic life cycle costs and return on investment for new facilities; major renovations; mechanical system upgrades and replacements; and other facility projects. Through the EPA's Five-Year Capital Investment Plan, Energy Conservation Plan, Water Conservation Strategy, and Buildings and Facilities (B&F) process, the agency ranks energy projects based on financial criteria, including initial investment; energy and operational cost savings; absolute Btu and/or gallons of potable water saved per dollar; and potential for reducing facility maintenance.

Retrofits and Capital Improvement Projects

The EPA has several projects underway that will contribute to the agency's future energy and water savings. In FY 2018, the EPA continued to make progress on the following projects:

- Phase 3 of an infrastructure replacement project at the National Analytical Radiation Environmental Laboratory in Montgomery, Alabama, a renovation of a physics lab.
- A boiler replacement at AWBERC in Cincinnati, Ohio.
- A sea water delivery system and air compressor replacement at the AED Laboratory in Narragansett, Rhode Island.
- Renovation at the Main Building of the Western Ecology Division in Corvallis, Oregon.
- Renovation of the National Enforcement Investigations Center in Denver, Colorado, to accommodate the Region 8 Laboratory.

Use of Performance Contracts

Like many other federal agencies, the EPA has limited capital funds to maintain existing laboratory infrastructure, replace aging infrastructure and reconfigure existing research laboratory space to meet mission-critical needs. When appropriate, the EPA considers ESPCs as a potential funding source

for energy-saving projects, as they enable the agency to reduce the burden of up-front capital costs. Although many of the EPA's energy-saving or renewable energy projects are often not viable candidates for ESPCs due to the advanced age and complexity of mechanical systems, the laboratories' remote locations and the small project sizes, the agency continues to evaluate its pipeline of future energy projects for performance contracting opportunities.

In FY 2017, the EPA completed construction of a 1.5-MW solar PV array at its laboratory in Edison, New Jersey, as part of an ESPC that was awarded in December 2016. The system is estimated to generate renewable energy equivalent to approximately 40 percent of the facility's annual electricity needs. Through a 25-year power purchase agreement, the laboratory will now receive green energy at a rate of more than 4 cents per kWh less than the current rate. The project was activated in early FY 2018 and was being commissioned in FY 2019.

The EPA is also initiating the contracting steps to conduct an ESPC at its Main Building in RTP, North Carolina, and was in the process of negotiating a contract in FY 2019. The ESPC will upgrade lighting and building controls and replace high temperature hot water piping. In addition to working on that effort in FY 2019, the EPA plans to revisit an ESPC at its NVFEL in Ann Arbor, Michigan, that was initiated in 1998 and expires in 2022.

Use of ENERGY STAR® and Other Energy-Efficient Products

For building products, the EPA specifies the use of ENERGY STAR and other energy-efficient products through its *Architecture and Engineering Guidelines*. For electronics, the EPA currently tracks and reports the purchase of ENERGY STAR qualified and FEMP-designated personal computers, notebook computers and monitors. The EPA will continue to track and report electronics stewardship data and evaluate areas for improvement across the life cycle of electronics acquisition, operations and maintenance, and end-of-life management.

Sustainable Building Design and High-Performance Buildings

The EPA occupies approximately 9.9 million square feet of space nationwide. The EPA promotes energy and resource efficiency, waste reduction, pollution prevention, indoor air quality, and other environmental factors both during new construction and in existing buildings owned by the agency or leased through the General Services Administration (GSA).

Transforming the EPA's existing buildings to facilities that meet federal high-performance sustainable building standards is complex work. The EPA uses a multi-pronged approach, including: energy and water conservation projects; lighting system controls upgrades; scheduled recommissioning; ventilation and thermal comfort testing and improvements; and stormwater management system upgrades. The agency has also developed Building Management Plan templates—a comprehensive set of sustainable building management procedures and policies that represent best practices, minimum requirements, conformance assurance processes and performance standards that help ensure high-performance sustainable building operations.

In FY 2018, eight buildings—or 26.2 percent by square feet (of EPA-owned buildings greater than 10,000 square feet)—met the *Guiding Principles*. The EPA buildings that meet the *Guiding Principles* are:

- AWBERC Main Building and Annex I, Cincinnati, Ohio
- AWBERC Annex II, Cincinnati, Ohio
- Building A Administration Wing, RTP, North Carolina
- Environmental Science Center (ESC), Fort Meade, Maryland
- First Environments Early Learning Center, RTP, North Carolina
- GED Laboratory Building 67, Gulf Breeze, Florida
- Large Lakes Research Station, Grosse Ile, Michigan
- National Computer Center, RTP, North Carolina

Green Building Certifications

In addition to using its own internal system for certifying existing buildings as meeting the *Guiding Principles*, the EPA uses other green building and energy performance rating systems as part of its toolkit for acquiring high-performance green buildings and ensuring their continued performance. Overall, the EPA occupies 12 buildings certified under the LEED for Building Design and Construction (BD+C) rating system, 18 buildings certified under the LEED for Building Operations and Maintenance (O+M) rating system, and four buildings certified under the LEED for Interior Design and Construction (ID+C) rating system.

The EPA now occupies 28 buildings with at least one LEED certification:

- AWBERC Annex II, Cincinnati, Ohio (BD+C)
- Building A Administration Wing, RTP, North Carolina (BD+C)
- ESC, Fort Meade, Maryland (O+M)
- First Environments Early Learning Center, RTP, North Carolina (BD+C)
- GED Laboratory Building 67, Gulf Breeze, Florida (BD+C)
- Five La Plaza Buildings (A, B, C, D and E), Las Vegas, Nevada (O+M)
- National Computer Center, RTP, North Carolina (BD+C)
- NERL, Chelmsford, Massachusetts (BD+C)
- Potomac Yard One, Arlington, Virginia (BD+C, O+M)
- Region 1 Office, Boston, Massachusetts (BD+C, O+M)
- Region 2 Caribbean Environmental Protection Division, Guaynabo, Puerto Rico (ID+C)
- Region 3 Office, Philadelphia, Pennsylvania (O+M)
- Region 6 Office, Dallas, Texas (O+M)
- Region 7 Office, Lenexa, Kansas (BD+C, O+M)
- Region 8 Office, Denver, Colorado (BD+C)
- Region 9 Office, San Francisco, California (ID+C, O+M)
- Region 10 Idaho Operations Office, Boise, Idaho (BD+C, ID+C)
- Region 10 Office, Seattle, Washington (ID+C, O+M)
- Region 10 Washington Operations Office, Lacey, Washington (O+M)
- Robert N Giaimo Federal Building, New Haven, Connecticut (O+M)
- Southern California Field Office, Los Angeles, California (O+M)
- STC, Kansas City, Kansas (BD+C)

- William Jefferson Clinton Federal Building (East/West), Washington, DC (O+M)
- William Jefferson Clinton Federal Building (North/South), Washington, DC (O+M)

ENERGY STAR® Building Label

Since 2003, the EPA has required all large, newly leased buildings to earn the ENERGY STAR building label prior to lease award or within 18 months of the completion date for new construction. The most recent EPA headquarters buildings and regional offices to attain the ENERGY STAR building label are listed below:

- Potomac Yard One, Arlington, Virginia (2018)
- Region 1 Office, Boston, Massachusetts (2015)
- Region 2 Office, New York City, New York (2012)
- Region 3 Office, Philadelphia, Pennsylvania (2018)
- Region 4 Office, Atlanta, Georgia (2013)
- Region 5 Office, Chicago, Illinois (2018)
- Region 6 Office, Dallas, Texas (2018)
- Region 7 Office, Lenexa, Kansas (2016)
- Region 8 Office, Denver, Colorado (2018)
- Region 9 Office, San Francisco, California (2018)
- Region 10 Office, Seattle, Washington (2013)
- William Jefferson Clinton Federal Building (East, West) (2012)
- William Jefferson Clinton Federal Building (North, South) (2011)

In addition to six headquarters and regional offices, La Plaza Buildings A, B, C, D and E and the Region 10 Idaho Operations Office renewed their labels in FY 2018.

Energy Efficiency/Sustainable Design in Lease Provisions

For new major lease acquisitions, the EPA works with the GSA to acquire high-performance sustainable buildings that exceed the environmental performance of the facilities being replaced. In FY 2018, the EPA continued to incorporate sustainable design and energy efficiency in new lease renovations for its Region 6 Office in Dallas and Region 8 Office in Denver.

Solid Waste Diversion Rate

The EPA has set its own internal waste diversion goal of 60 percent. The agency met that target by diverting 60 percent of its solid waste through recycling and composting in FY 2018.