

# U.S. Department of Agriculture 2018 Sustainability Report and Implementation Plan

## EXECUTIVE SUMMARY

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### MISSION

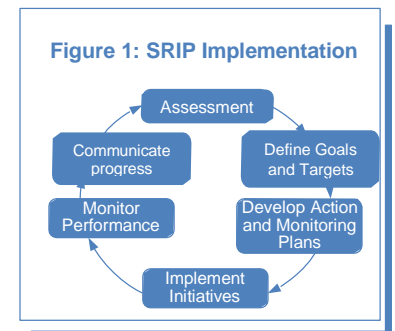
The U.S. Department of Agriculture (USDA) is committed to promoting a clean energy economy, conducting operations in a sustainable and environmentally responsible manner, and meeting or exceeding environmental statutory and regulatory requirements for its operations. USDA provides leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on public policy, the best available science, and effective management.

USDA has a vision to provide economic opportunity through innovation, helping rural America to thrive; to promote agriculture production that better nourishes Americans while also helping feed others throughout the world; and to preserve our Nation's natural resources through conservation, restored forests, improved watersheds, and healthy private working lands.

### LEADERSHIP

The USDA Deputy Assistant Secretary for Administration serves as the Department's Chief Sustainability Officer (CSO). USDA's CSO and other department senior managers provide executive leadership in developing and executing the 2018 USDA Sustainability Report and Implementation Plan (SRIP). The SRIP establishes clear goals and objectives, and through the department's agencies, USDA will work to achieve even greater results in sustainable, energy-efficient, economically-sound operations.

USDA approaches sustainability in a "plan-do-check-act" manner, as illustrated in Figure 1. This system provides for leadership involvement while creating opportunities for employee and USDA agency participation, with an overall goal of continual improvement.



### PERFORMANCE SUMMARY REVIEW

USDA's sustainability goals align with the Department's Strategic Goals of fostering sustainable use of our National Forest System Lands, and ensuring USDA programs are delivered efficiently and effectively. USDA sustainability goals provide strategies, and initiatives for achieving statutory and executive order requirements. Moreover, the goals help to integrate statutory and executive order requirements into a single implementation framework to advance sustainability practices while meeting existing mission and management objectives. In achieving sustainability goals, USDA compiles data needed to measure progress, evaluates results, and improves performance by making the best use of existing and available resources. Collaborative work groups are key to USDA's ability to achieve its goals as it leverages available resources from across the Department.

Examples of recent accomplishments and performance highlights include:

- Earning "green" scores on 10 of the 13 metrics on the White House Office of Management and Budget (OMB) Scorecard for Efficient Federal Operations/Management for fiscal year (FY) 2017;
- Purchasing and generating 156,400 megawatt-hours of renewable electricity, which is

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- equivalent to 32.5 percent of the Department’s electricity use in FY 2017;
- Investing \$8.4 million in facility efficiency improvements in FY 2017;
- Exceeding key FY 2017 mandates and the USDA goal, 22 percent of the Department’s real property portfolio sustainable buildings;
- Achieving goal to have 75 percent of covered light-duty vehicles acquired be alternatively-fueled vehicles;
- Performing Vehicle Allocation Methodology (VAM) study to identify underutilized reportable motor vehicle assets. Agencies identified over 4,000 assets for disposal without replacement for a forecasted savings of \$26 million in FY 2019 and out years, and further reductions in fleet are expected in FY 2019; and
- Attaining 60 percent waste diversion of non-hazardous solid waste generated in FY 2017.

**USDA STRATEGIC PRIORITIES**

Provided below are USDA’s top strategic priorities to facilitate compliance with energy, environmental, and sustainable statutes, and help the Department attain a net-zero environmental footprint:

- Conduct evaluations of facilities with highest energy/water use intensity;
- Utilize Energy Performance Contracts (e.g., Energy Savings Performance Contracts (ESPCs) and Utility Energy Service Contracts (UESCs)) to meet energy reduction, renewable energy and water management goals;
- In the real property portfolio, raise environmental performance levels and reduce the footprint through effective disposal and consolidation; and
- Perform annual survey of all fleet vehicles to identify opportunities to eliminate vehicles, right-size them for their mission, and deploy alternative fuel vehicles (AFVs) effectively.

**IMPLEMENTATION SUMMARY**

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**1. Facility Management:**

**FACILITY ENERGY EFFICIENCY**

FY 2017 Status: 35% reduction in British thermal units per gross square feet (BTU/GSF) compared to FY 2003

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
In FY 2017 and FY 2018, USDA continued to promote building energy conservation by implementing various strategies, including installing/monitoring energy meters and sub-meters; and	USDA reprogrammed and improved the Department’s utility invoicing system (AXIS); and successfully piloted the monthly automated transfer of data from AXIS to Portfolio	<ul style="list-style-type: none"> <li>• Conduct evaluations of facilities with highest energy use intensity;</li> <li>• Install and monitor energy meters and sub-meters;</li> <li>• Collect and utilize building and facility energy use data to improve building energy management and performance;</li> </ul>

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<p>implementing capital improvement projects.</p> <p>Additionally, USDA started and/or completed several significant initiatives, including conducting energy evaluations, benchmarking and retro-commissioning at approximately 50 percent of covered facilities.</p>	<p>Manager. When scaled up, such transfers dramatically improve data quality and reduce staff workloads. USDA dramatically increased its compliance with Section 432 of the Energy Independence and Security Act (EISA 432) by re-baselining its list of covered facilities.</p>	<ul style="list-style-type: none"> <li>• Redesign interior space to reduce energy use through daylighting, space optimization, and sensors and control systems (when life-cycle cost effective); and</li> <li>• Enter monthly project performance data into Energy Star Portfolio Manager.</li> </ul>
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**EFFICIENCY MEASURES, INVESTMENT, AND PERFORMANCE CONTRACTING**

ESPC and UESC investment / number of projects for FY 2017: \$6.3 million / 2 projects

Planned investment / number of projects for FY 2018: \$19.9 million / 3 projects

Planned investment / number of projects for FY 2019: \$4.6 million / 6 projects

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
<p>In FY 2017 and FY 2018, USDA agencies continued to realize energy and cost savings from Energy Performance Contracts (EPCs). EPCs were used to install programmable thermostats, high-efficiency furnaces, renewable energy systems, attic and foundation insulation, lighting retrofits, and other energy and water conservation measures. USDA's performance contract award targets are based on the EISA 432 evaluations, and other planning data. Specifically, USDA reviewed data from EISA 432 energy and water evaluations to determine the feasibility of employing the use of EPCs as a follow-up to facility evaluations. USDA awarded three ENABLE contracts for smaller facilities.</p>	<p>USDA facilities are typically small in size and sparsely dispersed across large geographical areas; accordingly, USDA has adopted the use of ENABLE contracts to implement energy and water conservations measures at its smaller facilities.</p>	<ul style="list-style-type: none"> <li>• Utilize Performance Contracts to meet energy reduction, renewable energy and water management goals;</li> <li>• Evaluate the most energy/water intensive facilities for use with energy performance contracts;</li> <li>• Submit proposals for technical or financial assistance to the Federal Energy Management Program (FEMP) and/or use FEMP resources to improve performance contracting program;</li> <li>• Ensure that relevant legal and procurement staff are trained by the FEMP ESPC/UESC course curriculum; and</li> <li>• Evaluate the use of ENABLE contracts for smaller facilities.</li> </ul>

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**RENEWABLE ENERGY**

FY 2017 Status: 32.5% renewable electricity

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
<p>Several USDA renewable energy projects were started or implemented in 2017 and 2018. USDA awarded contracts, completed designs, and hosted construction to install solar photovoltaic (PV) systems to enable facilities in New Mexico, California and Hawaii achieve net-zero status. The National Renewable Energy Laboratory, completed a Renewable Energy Planning and Optimization (REopt) Phase 2 analysis at 7 major USDA facilities with potential to generate renewable energy.</p> <p>Within the National Capital Region (NCR), over 50 percent of the electricity supplied to USDA facilities came from renewable energy sources. In the New England region, a contract was awarded to supply electricity containing 20 % green power to USDA facilities.</p>	<p>When planning to use or purchase renewable energy, USDA typically starts with a subset of its facilities and then expands once the benefits of renewable energy become more readily apparent.</p>	<ul style="list-style-type: none"> <li>• Install renewable electricity systems at USDA facilities and retain corresponding renewable energy certificates (RECs);</li> <li>• Install renewable thermal energy systems at USDA facilities and retain corresponding renewable attributes;</li> <li>• Purchase energy that includes installation of renewable energy on or off-site of a federal facility;</li> <li>• Utilize the REopt tool to prioritize and/or identify renewable energy potential and projects;</li> <li>• Purchase green power and corresponding RECs; and</li> <li>• Purchase RECs to supplement on-site renewable energy and green power purchases, when needed.</li> </ul>

**WATER EFFICIENCY**

FY 2017 Status: 22.6% reduction in potable water in gallon (Gal)/GSF

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
<p>USDA agencies continued to perform water audits and evaluations at its covered facilities.</p> <p>USDA continued to operate its Sustainable Landscape Partnership within the NCR, and executed a wide variety of new and ongoing water conserving practices across the Department.</p> <p>USDA continued to upgrade</p>	<p>Reductions of non-potable water consumption are challenging for USDA because its mission involves large uses of water for agricultural purposes (e.g., irrigation, aquaculture, animal watering, and research). Even so, USDA has implemented various water conservation</p>	<ul style="list-style-type: none"> <li>• Implement lifecycle cost effective water conservation measures from EISA 432 facility evaluations, including purchasing and installing water efficient technologies (e.g., WaterSense low-flow water fixtures and aeration devices);</li> <li>• Utilize EPCs to reduce water consumption and ensure all EPCs consider water reduction strategies;</li> <li>• Install and monitor advanced water meters to measure and monitor potable and</li> </ul>

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<p>potable water fixtures as facilities are maintained or replaced; and has implemented leak detection and repair and other cost effective technically feasible projects.</p> <p>USDA energy offices hosted a series of drought webinars to better prepare USDA for a future scenario of reduced water supply.</p>	<p>measures, including: conducting leak detection and repairs; installing facet sensors, low-flow flush devices, and aerators in lavatories; using treated contaminated water for irrigation; and installing rain sensors on landscape irrigation systems.</p>	<p>industrial/landscaping/agricultural (ILA) water use, and utilize data to advance water conservation and management;</p> <ul style="list-style-type: none"> <li>• Expand USDA’s Sustainable Landscape Partnership to regions outside NCR;</li> <li>• Install green infrastructure features to assist with storm and wastewater management;</li> <li>• Design and deploy water closed-loop, capture, recharge, and/or reclamation systems; and</li> <li>• Maximize use of grey-water and water reuse systems that reduce potable and ILA water consumption.</li> </ul>
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**HIGH PERFORMANCE SUSTAINABLE BUILDINGS**

FY 2017 Status: 22% buildings, 33% by GSF

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
<p>In FY 2017 and FY 2018, USDA continued to make progress in increasing the number of individual sustainable buildings and the number of sustainable by GSF by identifying levels of accomplishment.</p> <p>USDA agencies, such as Agricultural Research Service (ARS), Forest Service (FS), Animal and Plant Health Inspection Service (APHIS), and Natural Resources Conservation Service (NRCS), continue to assess and identify existing sustainable buildings, and to record progress annually in the corporate database. These USDA land-holding agencies require sustainable policies and practices in all new construction and major modernization.</p>	<p>The USDA land-holding agencies require funds, leadership support, and department-wide awareness, to achieve sustainability goals.</p> <p>Internal challenges affecting the USDA Real Property Portfolio include increasing levels of deferred maintenance and a wide geographic range, resulting in greater use of time and effort in team collaborations.</p> <p>External challenges include extreme weather events, such as drought leading to wildfire, and new legislative priorities.</p>	<ul style="list-style-type: none"> <li>• Strive towards sustainability goals, including net zero, in construction, alterations, and operation and maintenance, and measure progress annually; The projection for FY 2018 is 23% individual sustainable buildings and 33% sustainable GSF; projection for FY 2019 is 24% individual sustainable buildings and 34% sustainable GSF;</li> <li>• Collaborate, primarily through the Facilities and Sustainable Resilient Buildings workgroups, to set goals and share information, to foster occupant safety and health, and select sustainable locations;</li> <li>• Incentivize sustainable buildings achievements, for example, pilot projects and energy and water conservation technologies research;</li> <li>• Select sustainable sites, and execute new construction and</li> </ul>

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		<p>major modernization projects to meet the <i>Guiding Principles</i>;</p> <ul style="list-style-type: none"> <li>• Conserve energy and water by using performance specifications with energy and water efficiency criteria as source selection factors;</li> <li>• Incorporate sustainable building specifications into all new construction, modernization, and major renovation projects, e.g., for materials and systems selection and operations and maintenance practices; and</li> <li>• Construct with wood as the preferred material for its energy efficiency and carbon fixing characteristics.</li> </ul>
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**WASTE MANAGEMENT AND DIVERSION**

FY 2017 Status: 60% waste diverted

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
<p>USDA agencies continue implementing initiatives of reducing waste generation and increasing waste diversion through elimination of toxic or hazardous materials, source reduction, and recycling, and optimization of procurement and use policies championed by the Environmental Management System Committees and Green Teams.</p> <p>USDA is proactive in tracking recycling and focusing purchasing on materials that will be able to be recycled in the future, as well as maximizing purchase of materials with high recycling content.</p>	<p>Global economics affecting, for example, the paper industry, will affect our ability to maintain our recycling and waste diversion rate in the coming years.</p> <p>Many of USDA facilities are largely focused on laboratory operations, and therefore waste reduction or recycling initiatives are limited by other concerns (e.g., single-use items to ensure sterility similar to hospitals, inability to recycle from laboratory environments due to biosafety or chemical safety concerns).</p> <p>USDA facilities range in size from very small outhouse facilities located at campgrounds to very</p>	<ul style="list-style-type: none"> <li>• Continue to update Chemicals Inventory Plans for individual facilities, especially laboratories, in order to further reduce toxic and hazardous chemicals as they are phased out in FY 2018 and FY 2019;</li> <li>• Practice waste reduction in the following order of priority: source reduction, reuse, recycling, and composting. We will disseminate to agencies best practices for accomplishing waste reduction and measure progress through a significant sampling of facilities with contracted solid waste removal;</li> <li>• Look for novel strategies and policies to reduce waste, focusing on critical control points in processes, procedures, and materials. Changes in materials capable of being recycled and the reduction in recycling markets could</li> </ul>

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	<p>large office buildings. Some facilities have volunteer-run recycling programs with optional reporting requirement for waste diversion in FY 2017.</p>	<p>have an impact on future recycling levels;</p> <ul style="list-style-type: none"> <li>• Initiate at least three actions directed at USDA agencies and offices and their employees, contractors, and visitors that will lead to increased waste diversion rates for recycled, reused, and composted material;</li> <li>• Continue to increase awareness of integrated pest management and beneficial landscaping practices through the People's Garden; and</li> <li>• In USDA FS, the Fire and Aviation Management program will continue the “Greening Fire” effort to reduce the impact and cost of fire operations, including waste diversion, while supporting the mission.</li> </ul>
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**2. Fleet Management:**

**TRANSPORTATION / FLEET MANAGEMENT**

FY 2017 Status: 0.2% reduction in petroleum & 2% increase in alternative fuel

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
<p>USDA continued making progress to increase alternative fueling and reduce greenhouse gas (GHG) emissions in FY 2017. FY 2018 and FY 2019 targets are modeled to meet or exceed EO 13834 and EISA requirements for fueling goals.</p> <p>USDA is on target to meet goals to reduce optimal fleet inventory by 2 percent in FY 2019. FY 2018 VAM utilization study and summary identified over 4,000 vehicles for disposal without replacement.</p>	<p>USDA performed annual VAM mid 2018 with emphasis on identifying low mileage or days in use vehicles. VAM summary completed to assess each agency’s proposed vehicle acquisitions and disposals without replacement.</p>	<ul style="list-style-type: none"> <li>• Require use of alternative fuel only in alternative fueled vehicles, unless granted a waiver by the Department of Energy (DOE);</li> <li>• Perform FY 2019 annual survey of all fleet vehicles to identify opportunities to eliminate vehicles, right-size them for their mission, and deploy AFVs effectively;</li> <li>• Reduce vehicle miles traveled; increase fleet fuel efficiency via use of FleetDASH and Federal Automotive Statistical Tool (FAST) vehicle line data;</li> <li>• Improve accuracy of vehicle level data reported for FAST FY 2018;</li> <li>• Develop heat maps to analyze locational data on vehicle to employee ratios and office locations for opportunities to improve pooling and sharing; and</li> </ul>

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		<ul style="list-style-type: none"> <li>• Conduct annual VAM utilization study to assist in streamlining and consolidating underutilized vehicle assets.</li> </ul>
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**3. Cross-Cutting:**

**SUSTAINABLE ACQUISITION / PROCUREMENT**

FY 2017 Status: 12% contracts & 11% contract dollars with environmental clauses

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
<p>USDA agencies implement policies and practices to purchase U.S. Environmental Protection Agency (EPA)-identified sustainable products and services, e.g., Significant New Alternatives Policy (SNAP), WaterSense, Safer Choice, and Smart Way, USDA-designated biobased products, and DOE’s Energy Star products. USDA follows sustainable acquisition practices to meet or exceed these statutory and regulatory requirements.</p> <p>USDA has exceeded its FY 2018 target of 200 contracts and \$2.5 million in biobased products to be delivered.</p> <p>USDA expands the use of government-wide acquisition vehicles with sustainability criteria, for example, the use of Category Management Initiatives, e.g., for Lab Equipment contracts and Operations and Maintenance (O&amp;M) contracts.</p> <p>USDA requires contractors to submit annual reports of biobased product purchases, encouraging this action to take place in a timely manner.</p> <p>USDA identifies and implements corrective actions to address</p>	<p>USDA raises awareness via AgLearn online training, featuring WaterSense and SNAP. USDA agencies monitor solicitations using FedBizOpps for Safer Choice, SNAP, and WaterSense language.</p> <p>USDA raises biobased product awareness using education and outreach, via webinars, exhibitions, speaking in person, and fact sheets and publications.</p> <p>USDA is consistently increasing the use of Category Management Initiatives and government-wide acquisition vehicles with sustainability criteria.</p> <p>The department is challenged to track biobased product purchase compliance and ensure contractors’ timely reporting.</p> <p>USDA agencies are challenged with consistent and timely reporting. While significant sustainable acquisition results are achieved in recent years, there still are important</p>	<ul style="list-style-type: none"> <li>• Achieve 13% sustainable contracts and 11% contract dollars with environmental clauses in FY 2018 and 15% sustainable contracts and 13% contract dollars with environmental clauses in FY 2019;</li> <li>• Revise online training and expand training on AgLearn to include Safer Choice and SmartWay as well as SNAP and WaterSense and other sustainable acquisition;</li> <li>• Take the lead, in consultation with General Services Administration (GSA), to update the Methodologies for Establishing Biobased Product purchasing Targets as required by EO 13834;</li> <li>• Expand the use of sustainable acquisition criteria, focusing on government-wide lab equipment and O&amp;M contracts;</li> <li>• Incorporate contractor compliance with contract sustainability requirements into performance monitoring procedures and performance reviews; and</li> <li>• Develop inter-operable protocols for sustainable acquisition compliance performance monitoring and assessment based on metrics as reported in Federal</li> </ul>



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barriers to increasing sustainable acquisitions.	aspirations for improvement in practice.	Procurement Data System (FPDS). These protocols and performance evaluation are important for strategic goal-setting and tactical guidance by USDA leadership.
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**ELECTRONICS STEWARDSHIP**

FY 2017 Status: 100% equipment acquisition meeting EPEAT requirements, 100% equipment with power management, & 100% compliance with disposal guidelines

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
USDA has monitoring and reporting systems for the acquisition, usage, and disposition phases for electronics. USDA continued to use: (1) blanket purchase agreements which only provide Electronic Product Environmental Assessment Tool (EPEAT)-registered equipment and (2) the GSAXcess website to report on all excess and surplus electronics. USDA has issued and implemented policy for data center energy optimization, efficiency, and performance. All tiered data centers have advanced metering installed.	USDA tiered data centers have achieved economies of scale that have driven rate decreases for the private government cloud Infrastructure as a Service and Platform as a Service offered on FedRamp. The rate decrease is primarily due to data center virtualization and consolidation within USDA. This data center optimization equates to substantial savings, and decreases USDA's total cost of ownership.	<ul style="list-style-type: none"> <li>• Use government-wide category management vehicles to ensure procurement of equipment that meets EPEAT and sustainable electronics criteria;</li> <li>• Enable and maintain power management on all eligible electronics; and measure and report compliance;</li> <li>• Ensure environmentally sound disposition of all agency excess and surplus electronics; and measure and report compliance;</li> <li>• Install and monitor advanced energy meters in all data centers and actively manage energy and power usage effectiveness; and</li> <li>• Identify, consolidate and migrate obsolete, underutilized and inefficient data centers to more efficient data centers or cloud providers; close unneeded data centers.</li> </ul>

**GREENHOUSE GAS EMISSIONS**

FY 2017 Status: 23.2% reduction in Scope 1 & 2 emissions

<i>Implementation Status</i>	<i>Operational Context</i>	<i>Priority Strategies &amp; Planned Actions</i>
USDA continued to integrate its strategic plans and policies with the services provided by the Federal Energy Management Program (FEMP) to create effective management tools and initiatives to reduce its GHG	USDA owns and leases tens of thousands of facilities and fleet vehicles. Most USDA's leases are fully serviced leases; meaning USDA does not make separate	<ul style="list-style-type: none"> <li>• Analyze USDA's 2018 Energy/Sustainability Data Report to identify high emission sources and implement recommended actions to mitigate emissions from those sources;</li> </ul>

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<p>emissions. In addition to guidance and direction at the national level, USDA relied on the organizational structure and resources of various workgroups and green teams at the regional and field levels to promote operations that reduce USDA’s environmental footprint. USDA’s 2018 comprehensive GHG inventory will better inform the decision making and implementation process under this goal.</p>	<p>utility payments for these facilities. USDA facilities range in size from very small rural structures of less than 100 GSF such as outhouse facilities located at campgrounds to very large office buildings exceeding 2,000,000 GSF. USDA’s facilities are in all 50 states and several territories.</p>	<ul style="list-style-type: none"> <li>• Employ operations and management best practices for emission generating equipment;</li> <li>• Identify additional sources of data or analysis with the potential to support GHG reduction goals;</li> <li>• Develop and deploy GHG and sustainability training and awareness for all facility/energy managers and other employees; and</li> <li>• Establish policies and programs to facilitate workplace charging for employee electric vehicles.</li> </ul>
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**4. Agency Identified Priorities:**

USDA is working to increasing its use of EPCs. Specifically, a multi-function team is working to increase the use of ENABLE EPCs, which are well suited for smaller facilities, with a goal of awarding at least \$5 million in third-party financed projects by FY 2020. This initiative is supported by a grant (up to \$1 million) from the DOE.

**Notable Projects and Highlights**

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Efficiency Measures, Investment, and Performance Contracting:

- The Southern California ESPC ENABLE Project was formally accepted in June 2018 and has entered its second performance year. The project is projected to reduce energy use by 4,893 million BTUs (or about 80 percent) and save \$225,000 in energy costs annually. The project covers energy upgrades in 63 buildings at nine sites across the Los Padres and San Bernardino National Forests in Southern California.
- The Pacific Southwest Region Off-Grid ESPC ENABLE Project is entering the construction phase, with completion planned for spring 2019. This project, which will span five sites at five national forests throughout California, is expected to save about \$141,200 annually. Moreover, the project presents an opportunity to test lithium vs. lead-acid batteries for off-grid PV systems.

Sustainable Buildings:

- The USDA, at the Northern Great Lakes Visitor Center, raised energy and sustainability performance, and with six stakeholder organizations, including the USDA FS and the National Park Service, planned an interpretive exhibit for visitors. The exhibit educates and informs visitors about sustainability’s benefits and empowers them to implement sustainable practices at home.
- USDA FS Northern Research Station installed LED lamps and solar-powered fans in greenhouses in Wisconsin, in place of old lamps and fans, in order to solve a heating/cooling issue; the estimated project payback is 2 years. The greenhouses are operating cooler in the summer.