

Chapter 2: Environmental

Management System

The Savannah River Site (SRS) Environmental Management System (EMS) implements the U.S. Department of Energy (DOE) commitment to sound environmental stewardship policy and practices. These safeguards protect air, water, land, and natural resources, as well as archaeological and cultural resources that SRS potentially affects.

The EMS plans and evaluates SRS construction, operations, maintenance, and decommissioning activities to protect public health and the environment, prevent pollution, and comply with applicable environmental and cultural resource protection requirements. The way SRS conducts its actions demonstrates the Site's commitment to minimize waste, manage water, foster renewable energy, reduce greenhouse gases, acquire sustainable services, remediate with a focus on sustainability, and observe best management practices. All of these attributes are vital components of environmental management. The "SRS Site Sustainability Plan" contains more information on DOE and SRS goals and the progress the Site has made toward achieving these goals.

2021 Highlights

DOE sets objectives for carrying out its mission in an environmentally sustainable manner that supports a policy of national energy security and addresses global environmental challenges. SRS continues to make substantial progress in meeting the goals for the Site. Below are the highlights of the EMS program:

- **Pollution Prevention and Waste Minimization**—SRS recycled 51% (242 metric tons) of nonhazardous solid waste.
- **Greenhouse Gas Reduction**—SRS continued to reduce greenhouse gas emissions, exceeding federal goals. The Site has reduced emissions by more than 84.4% since 2008.
- **Transportation and Fleet Management**—SRS continued to exceed its fleet management goals. More than 87% of the current fleet of light-duty vehicles are hybrid, electric, or vehicles that use E-85 (85% ethanol, 15% unleaded gasoline) fuel.
- **Awards**—SRS received recognition as part of the DOE agency-wide Sustainability Awards, under the Innovative Approach to Sustainability Category for the P-Area Permeable Reactive Barrier Wall Project.

2.1 SRS ENVIRONMENTAL MANAGEMENT SYSTEM

DOE Order 436.1, *Departmental Sustainability*, requires federal facilities to use environmental management systems. SRS implements an EMS conforming to the International Organization for Standardization (ISO) 14001:2015 standard to fulfill compliance obligations and address risks and opportunities. By design, the “Plan-Do-Check-Act” approach of the ISO 14001:2015 standard continually improves environmental performance.

The SRS EMS has two areas of focus: environmental compliance and environmental sustainability. Environmental compliance consists of regulatory compliance and monitoring programs that implement federal, state and local requirements, agreements, and permits. Environmental sustainability promotes and integrates initiatives such as energy and natural resource conservation, waste minimization, green remediation, and using sustainable products and services.

2.1.1 SRS Environmental Policy

The goal of the [SRS Environmental Policy](#) is to protect the public and future generations from any impacts from Site operations. SRS commits to this by doing the following:

- Promoting sound environmental stewardship
- Preventing pollution onsite and in surrounding communities
- Conducting science and energy research
- Continuing the national security mission

SRS accomplishes this through:

- Complying with environmental laws and regulations
- Continuing process improvements
- Conducting safe operations
- Communicating with the workforce, public, and stakeholders

2.1.2 Integration with Integrated Safety Management System

SRS incorporates the Integrated Safety Management System (ISMS) with an EMS to provide a comprehensive framework under which it manages the environmental, safety, and health programs. This makes it possible for the Site to accomplish all work while protecting the public, workers, and the environment. The integration confirms that SRS can evaluate work and associated hazards, and that the Site adapts standards, practices, and controls in a DOE-approved safety management system. Figure 2-1 depicts the relationship between the ISMS and EMS and how both management systems integrate.

Chapter 2—Key Terms

Environmental impacts are any positive or negative changes to the environment caused by an organization’s activities, products, or services.

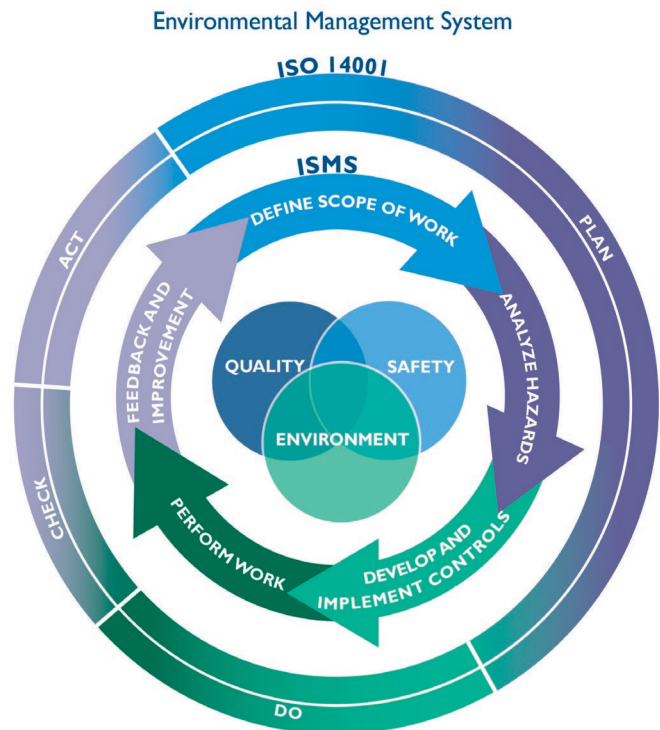
Environmental objectives define the organization’s environmental goals.

Environmental sustainability is interacting responsibly with the environment to conserve natural resources and promote long-term environmental quality. It includes reducing the amount of waste produced, using less energy, and developing processes that maintain the long-term quality of the environment.

ISMS execution involves five functions: 1) defining scope of work, 2) analyzing hazards, 3) developing and implementing controls, 4) performing work, and 5) providing feedback and improvement.

Likewise, SRS accomplishes the EMS goals using the **Plan-Do-Check-Act** approach, where:

- **Plan**—encompasses defining work scope and objectives, identifying environmental aspects and analyzing hazards, and developing controls
- **Do**—encompasses implementing these controls and performing the work (operations)
- **Check**—involves evaluating performance (feedback) and management reviews
- **Act**—embodies corrective actions, improvements, and incorporating lessons learned into practices



**Figure 2-1 Integrated Safety Management System
Continual Improvement Framework within the ISO 14001
Environmental Management System**

2.2 EMS IMPLEMENTATION

The Plan-Do-Check-Act approach is interactive and iterative through the various work activities and functions, including policies, programs, and processes. It also is an integral part of the overall management of the Site's environmental compliance and performance.

2.2.1 Plan

The Site establishes environmental goals, objectives, and targets for each project and activity. Before SRS undertakes any actions or projects, it evaluates associated environmental aspects and their impacts (or potential environmental hazards) to ensure that SRS can control or mitigate the hazard or risk to reduce or eliminate impacts to the environment. The Site performs these evaluations against all applicable federal and state regulations, state permits, and local laws. These regulations and permits are the foundation for internal manuals, standard operating procedures, and standard requirement-implementing documents. SRS uses the Environmental Evaluation Checklist (EEC) for all federally proposed actions to take place onsite. The EEC evaluates all activities and projects to ensure what is presented considers and mitigates environmental aspects as necessary.

Another aspect of planning involves sitewide training for personnel, as well as training to perform specific tasks and activities within a project's scope. SRS trains all employees on various policies and job-related requirements. The Site requires General Employee Training or Consolidated Annual Training at a minimum, annually, for every employee so they will be aware of the potential hazards and risks associated with work onsite. Task- and project-specific training includes skills development and safe-work practices.

Incorporating training and evaluating environmental aspects and their impacts into work planning ensures SRS will perform activities in a manner that protects the public, workers, and the environment. Additionally, the Site generates regular and routine employee written and multimedia communications as a reminder of the SRS commitment to sustainability and the environment.

2.2.2 Do

Environmental Compliance Authorities (ECAs) and Environmental Subject Matter Experts (SMEs) support the facilities and programs in identifying and carrying out their environmental responsibilities. The SMEs communicate environmental regulatory requirements and required document submittals to the United States Environmental Protection Agency (EPA), the South Carolina Department of Health and Environmental Control (SCDHEC), and other stakeholders. The ECAs work with the facilities to ensure that they implement the regulatory requirements.

The Site develops the annual *SRS Environmental Report* for the public to summarize in a single document the Site's environmental performance against various applicable federal and state regulations, state permits, and local laws. Chapter 3, *Compliance Summary*, of this report describes SRS's environmental compliance and provides the number of National Environmental Policy Act (NEPA) reviews, the number of SRS construction and operating permits, and the status of key federal environmental laws. Chapter 7, *Groundwater Management Program*, identifies SRS efforts to monitor, conserve and protect groundwater, and to restore contaminated SRS groundwater to the EPA drinking-water quality standards while conforming to state and federal laws.

The Site plans and conducts emergency drills and exercises by implementing the EMS and ISMS principles and tools. Some of these drills include local, state, and federal emergency response organizations. Throughout the year, the Site performs safety drills for employees to ensure maximum participation through various weather, nuclear incident, environmental release, and fire scenarios.

2.2.3 Check

SRS assesses and evaluates internal work to make certain that personnel are performing it as planned, and that Site operations are not adversely impacting worker and public health and the environment. The environmental monitoring and environmental surveillance programs at SRS follow applicable requirements to collect and analyze samples across SRS and within a 25-mile radius extending from the center of the Site. This ensures the radiation dose to members of the public and radioactive releases to the environment are kept as low as reasonably achievable. Chapters 4, 5, and 6 of this report document the nonradiological environmental monitoring program, radiological environmental monitoring program, and the radiological dose assessment, respectively.

Every three years, as required by the ISO 14001 standard, a qualified party outside the control or scope of the EMS must perform a formal EMS audit. The Savannah River Nuclear Solutions, LLC (SRNS) EMS (which covers Savannah River Remediation [SRR]) conforms to ISO 14001, while Centerra-SRS (SRS's protective force services contractor) is registered to the ISO 14001 standard and has yearly audits. The next formal EMS compliance audit for SRNS will be conducted in 2024.

The Site also performs management field observations and program assessments to detect potential issues early to prevent performance shortfalls and to identify processes, practices, behaviors, roles,

responsibilities, and organizational expectations that SRS needs to improve. Chapter 8, *Quality Assurance*, documents how SRS ensures the accuracy of its environmental data.

Various regulators also perform external assessments. SCDHEC conducts several inspections and audits annually to verify that the Site is complying with state permits. The EPA and SCDHEC participate in Federal Facility Act (FFA)-driven inspections. The EPA may participate alongside SCDHEC in compliance evaluation inspections for waste management. Chapter 3, *Compliance Summary*, lists and gives results of the annual external agency audits and inspections of the SRS Environmental Program.

An external recertification audit of the Centerra EMS program was conducted in 2021, and a conformity audit of the SRNS program was executed in 2021.

In 1995, SCDHEC enrolled in an Agreement in Principle (AIP) program with the Department of Energy at SRS. As a result, SCDHEC created the Environmental Surveillance Oversight Program (ESOP). Through the AIP grant, ESOP evaluates the adequacy of DOE activities related to environmental monitoring and reporting and confirms that DOE's activities have not adversely impacted public health and safety and the environment.

2.2.4 Act

SRS enhances environmental performance and the health of the EMS through corrective actions and continual improvement. The Site establishes, implements, and maintains the corrective action program in accordance with an internal manual for contractor assurance. It deals with actual or potential conditions of nonconformity, such as Notices of Violation or findings and opportunities for improvement from internal assessments and audits. Chapter 8, *Quality Assurance*, summarizes annual improvements to the Site's Environmental Monitoring Program and laboratory performance in various proficiency and certification programs.

Communication is vital throughout all programs and activities in order to facilitate feedback and to incorporate lessons learned for improvement. This report and the accompanying *SRS Environmental Report Summary* also serve as communication tools with stakeholders (such as the public, academia, SRS Citizen's Advisory Board, regulators, and other DOE sites) and to communicate with the public.

2.3 SUSTAINABILITY AND STEWARDSHIP GOALS AND IMPLEMENTATION

DOE Order 436.1, *Departmental Sustainability*, defines DOE Sites' requirements and responsibilities to manage operations and activities necessary for sustainability and ensure that they are carrying out the DOE mission in a manner that addresses energy efficiency goals, greenhouse gas reductions, waste minimization, and pollution prevention. SRS has integrated environmental stewardship projects into many remediation and closure activities, addressing requirements for resource conservation, pollution reduction, and environmental surveillance.

Executive Order No. 13834, *Efficient Federal Operation*, signed in May 2018, sets forth energy and environmental performance goals—based on statutory requirements—for agencies with respect to managing facilities, vehicles, and operations. Sustainability reporting in this chapter is in accordance with this executive order.

SRS uses the Site Sustainability Plan to document the sustainability goals SRS plans to achieve, providing a roadmap, strategies, and essential activities. The goals, which DOE sets annually for all sites, include the following:

- Reducing total energy use
- Increasing renewable energy use
- Reducing water use
- Purchasing environment-friendly, or “green,” products and services
- Generating less solid waste
- Increasing the number of sustainable buildings
- Reducing fleet and petroleum use
- Using energy-compliant electronic devices



ISO 14001:2015 requires SRS to establish and document measurable environmental objectives consistent with SRS’s

Environmental Policy and SRS’s strategic direction. Appendix A presents these objectives in the fiscal FY 2021 EMS Goals and Objectives flowchart. This chart names sustainability goals as well as environmental compliance goals for 2021, identifies the related environmental objectives and strategies for implementation, and provides the status of SRS’s progress toward achieving them. This chapter contains additional information on how SRS is making progress in supporting DOE objectives.

The following topics summarize the major accomplishments the SSP discusses. Updated annually, the SRS SSP outlines the strategies in place and identifies the Site’s contributions toward meeting DOE’s sustainability targets outlined in the Sustainability Report and Implementation Plan. DOE maintains an online graphical dashboard that tracks the progress of facilities in the complex in meeting their sustainability goals. The DOE’s Sustainability Dashboard is the source of the goal performance information in Table 2-1. This table summarizes specific metrics and SRS’s FY 2021 performance against the sustainability goals to complement the more general discussion in the text that follows.

Table 2-1 FY 2021 Sustainability Goals, Metrics, and SRS Performance

Energy Management	
Goal: 25% energy intensity reduction by FY 2025 from FY 2015 baseline	<p>Goal on Track—Energy intensity dropped 31.9%. The increase in telework due to the COVID-19 pandemic contributed to this reduction.</p> <p>SRS conducted Energy Independence and Security Act of 2007 (EISA) energy and water audits on 16 buildings and identified 32 Energy Conservation Measures (ECMs).</p> <p>SRS implemented 30 ECMs, including 12 light-emitting diode (LED) lighting upgrades, 25 heating and cooling unit replacements with higher Seasonal Energy Efficiency Ratio (SEER) units, 1 electrical meter installation, and 3 rightsizing projects.</p>
Interim Target (FY 2021): 15% reduction from FY 2015 baseline	Interim Target Met
Renewable Energy	
Goal: 30% renewable energy as a percentage of total agency electric use by FY 2025	Goal Met —31.9% of electric consumption in FY 2021 is from renewable resources (Biomass Cogeneration Facility).
Interim Target (FY 2021): 20%	Interim Target Met
Water Management	
Goal: 36% reduction in potable water intensity by FY 2025 from FY 2007 baseline	Goal on Track —29.7% potable water intensity from FY 2007. Continued reducing nonpotable water intensity by using the Biomass Cogeneration Facility and WaterSense® products
Interim Target (FY 2021): 28% reduction from FY 2007 baseline	Interim Target Met
Performance Contracting	
Goal: Evaluate performance contracting with energy provider for utility scale solar panel farm.	Goal Met —An evaluation on the feasibility of solar power generation on a large (utility size) scale is in process. SRS, with Dominion Energy, will evaluate the potential for a Utility Energy Service Contract to implement a 75-100 megawatt (MW) solar panel farm that will utilize hydrogen technology for storage. SRS has ongoing Energy Saving Performance Contracting projects with Ameresco to provide steam and electricity through biomass facilities.
Sustainable Buildings	
Goal: 17% of owned existing buildings comply with Guiding Principles for Sustainable Buildings by FY 2025.	Goal at Risk —1.4% of SRS's buildings (two buildings) qualify as sustainable.
Interim Target (FY 2021): 16%	Interim Target Not Met

Waste Management	
Goal for Solid Waste: Divert at least 50% of nonhazardous solid waste (excluding construction and demolition [C&D] debris)	Goal for Solid Waste Met —475 metric tons of office and municipal type waste generated, 242 metric tons (51%) recycled.
Interim Target (FY 2021): 50%	Interim Target Met
Goal for C&D Waste: Divert at least 50% of C&D material and debris	Goal for C&D Waste Not Met —SRS diverted 3% of waste from the 632-G Construction and Demolition Debris Landfill by recycling items such as metals and office furniture identified in Table 2-2.
Interim Target (FY 2021): 50%	Interim Target Not Met
Fleet Management	
Goal for Petroleum Reduction: 20% reduction in petroleum use by FY 2015 and thereafter relative to FY 2005 baseline	Goal for Petroleum Reduction Exceeded —SRS reduced petroleum consumption by 32.7%.
Interim Target (FY 2021): 20%	Interim Target Met
Goal for Alternative Fuel Use: 10% increase in alternative fuel use by FY 2015 and thereafter relative to FY 2005 baseline	Goal for Alternative Fuel Use Exceeded —SRS's alternative fuel usage increased by 35.5% relative to the FY 2005 baseline.
Interim Target (FY 2021): 10%	Interim Target Met
Goal for Fleet Greenhouse Gas Emissions Per Mile: 30% reduction in per-mile greenhouse gas emissions from FY 2014 baseline	Goal for Greenhouse Gas Emissions Exceeded —SRS reduced per-mile greenhouse gas emissions by 89.5%.
Acquisition and Procurement	
Goal: 95% of new contract actions for products and services meet sustainable acquisition requirements.	Goal Met —SRS reviewed 100% purchase-order line descriptions of eligible contract actions to determine whether the products met the BioPreferred® definition.
Interim Target (FY 2021): 95%	Interim Target Exceeded
Electronics Stewardship	
Goal for Environmentally Sustainable Electronics Acquisition: 100% of eligible electronics procurements must be environmentally sustainable (for example, Electronic Product Environmental Assessment Tool [EPEAT]).	Goal for Environmentally Sustainable Electronics Acquisition Met —100% of eligible electronics procured (including 1,360 computers purchased and 1,144 iPhones) are environmentally sustainable, meeting EPEAT standards
Interim Target (FY 2021): 95%	Interim Target Met
Goal for Disposal of Electronics: 100% of electronics disposed through government programs and certified recyclers	Goal for Disposal of Electronics Met —100% of used electronics reused (through donations to schools or nonprofit organizations) or recycled using authorized recycling companies.
Interim Target (FY 2021): 100%	Interim Target Met Note: SRS recycled 131,086 pounds of scrap electronics in calendar year 2021.

Electronics Stewardship (continued)	
Goal for Power Management: 100% of eligible computers (desktops and laptops) and monitors implement and actively use power management features.	Goal for Power Management Met —100% of eligible desktops, laptops, and monitors have power management enabled.
Interim Target (FY 2021): 100%	Interim Target Met
Goal for Duplex Printing: 100% of eligible printers implement and actively use duplex printing features.	Goal for Duplex Printing Met —All eligible computers and imaging equipment are set up to automatically print on both sides of paper.
Interim Target (FY 2021): 100%	Interim Target Met
Data Center Efficiency	
Goal: Implement practices that promote energy efficient management of servers and federal data centers.	Goal on Track —SRS utilizes power usage effectiveness (PUE) for data centers that have meters to obtain a baseline of energy-use effectiveness.
Resiliency	
Goal: Enhance the resilience of the federal infrastructure and operations and enable more effective accomplishment of its mission.	Goal Met —SRS utilized an Active Risk Manager tool to prioritize risks and opportunities so that strategies and executable plans could be established. In response to the COVID-19 pandemic, SRS also established the SRS Infectious Disease Response Team to update and guide Site employees during the pandemic.
Greenhouse Gas Management	
Goal for Direct GHG Emissions: 50% reduction in direct greenhouse gas (GHG) emissions by FY 2025 from FY 2008 baseline	Goal for Direct GHG Emissions Exceeded —SRS reduced direct GHG emissions by 84.1%.
Interim Target (FY 2021): 37%	Interim Target Met
Goal for Indirect GHG Emissions: 25% reduction in indirect GHG emissions by FY 2025 from FY 2008 baseline	Goal for Indirect GHG Emissions Exceeded —SRS reduced indirect GHG emissions by 92%.
Interim Target (FY 2021): 17%	Interim Target Met

2.3.1 Energy Management

Executive Order No. 13834, *Efficient Federal Operations*, directs agencies to meet statutory requirements regarding reducing the amount of energy per square foot (energy intensity) used in an identified class of buildings and to establish an agency target for decreasing energy intensity annually.

In order to reduce energy intensity, SRS has implemented a wide variety of energy-efficient strategies. These include upgrading utility systems; minimizing boiler water use for winter heating; operating the Biomass Cogeneration Facility and the biomass steam plants in A Area, K Area, and L Area; using more energy-efficient equipment in facilities (for example, lighting timers, lighting sensors, and programmable thermostats); and upgrading various small-scale light fixtures to light-emitting diodes (LEDs). SRS has also reduced the overall square footage of the Site by deactivating and decommissioning many facilities,

including entire areas (such as TNX), multiple buildings, land, and associated waste disposal areas. Additionally, SRS has consolidated employee-occupied office space into fewer buildings.

Conducting energy audits of buildings under Section 432 of the Energy Independence and Security Act of 2007 (EISA) is another effective strategy SRS uses to improve energy intensity. Under this program, SRS has identified 63 Site buildings that are responsible for 76.3% of the Site's energy consumption. Focusing on these buildings allows EISA audits, which identify energy conservation measures (ECMs), to be most effective.

During 2021, SRS implemented a review in the contract bidding process for each new planned roof installation to determine whether a cool roof may be cost effective to install. No cool roofs were installed in 2021.

By the end of FY 2021, SRS reduced energy intensity by 31.9% from FY 2015, thereby meeting the interim target for reducing energy intensity by 1% year-over-year. While the strategies discussed—such as timers, sensors and programmable thermostats, and cool roof installations—contribute to reducing energy intensity, these actions did not play a major role reducing energy use in 2021. SRS's response to the COVID-19 pandemic played a significant role in meeting the interim energy intensity reduction goal. Many Site employees during FY 2021 were teleworking in response to the COVID-19 pandemic, which equated to less use of energy in the buildings. This explains the major shift from the interim goal being at risk in FY 2019 to being on track in FY 2020 and FY 2021.

2.3.2 Renewable Energy

Executive Order No. 13834, *Efficient Federal Operations*, directs agencies to meet statutory requirements relating renewable energy and electricity consumption. As identified in the DOE Sustainability Dashboard, managed by DOE's Sustainability Performance Division, the goal is for SRS to increase renewable energy as a percentage of total agency electric consumption. SRS has exceeded the renewable energy goal by generating power onsite from biomass. SRS no longer uses coal to generate energy. Using renewable energy at the Site is a high-level priority. The Biomass Cogeneration Facility, which uses wood chips as its primary fuel source and fuel oil and tires as a secondary fuel source, is in its eighth year of fully operating and plays a significant role in supporting renewable goals.

2.3.3 Water Management

Executive Order No. 13834, *Efficient Federal Operations*, requires agencies to reduce potable and nonpotable water use and to comply with stormwater management requirements. The Site has been significantly decreasing its potable water use over many years. By installing a new SRS primary domestic water system and continuing to replace old and leaky piping, the Site has saved several hundred million gallons of water annually. SRS also installed water meters on the main supply lines and periodically conducts a water balance to monitor use and help detect leaks.

The water management sustainability goal does not account for potable water conservation measures such as the new primary domestic water system installed prior to 2007. It will be more difficult for SRS to decrease potable water usage in the future because it has already achieved large decreases in the programs that have the biggest impact. Potable water use fluctuates from year-to-year based on various

factors, such as the number of employees and the amount of potable water used for nonpotable purposes.

SRS has been using [WaterSense](#)[®] products and other water-conserving products, including low-flow toilet flush valves, low-flow urinal flush valves, and low-flow faucets. In recent years, the Site has substituted several hundred less-efficient faucets and flush valves with more-efficient low-flow units as they needed replacing.

Executive Order No. 13834 requires DOE as an agency to reduce nonpotable water consumption—mostly industrial, landscaping, and agricultural (ILA) water—but there are no specific targets. DOE has achieved long-term reductions in ILA water use due to the biomass facility operating, which consumes significantly less water than the previously used coal-fired power plant. For example, in FY 2010 when the coal-fired power plant was operating, SRS consumed more than 2.3 billion gallons of nonpotable or potable water, compared to only 620 million gallons in FY 2021.

As previously indicated, the number of employees onsite affects the amount of potable water used; therefore, it is logical to anticipate potable (drinking) water use to decline with the decrease of onsite population due to COVID-19 pandemic-related teleworking in FY 2021. Potable water use decreased 13.7% from FY 2020 to FY 2021. The amount of water used is also dependent on facilities such as H Canyon, F-Tank Farm and H-Tank Farm, Savannah River National Laboratory, and Salt Waste Processing Facility, which have processes that require potable water.

2.3.4 Performance Contracting

Executive Order 13834, *Efficient Federal Operations*, requires agencies to utilize performance contracting to achieve energy, water, building modernization, and infrastructure goals. The Executive Order requires agencies to set annual targets for the number of contracts they award and the investment value each fiscal year.

SRS has used Energy Saving Performance Contracting (ESPC) to engage Ameresco Federal Solutions in several projects that conserve energy and water. ESPC funds energy- and water-saving building improvements with future energy savings. Ameresco Federal Solutions operates the Biomass Cogeneration Facility at SRS. This facility produces steam and electricity on a 24-hour, full-time basis. Through an ESPC project, Ameresco also operates steam-only biomass plants for heating buildings in two areas at SRS.

2.3.5 Sustainable Buildings

Executive Order 13834, *Efficient Federal Operations*, requires agencies to ensure that new construction and major renovations conform to applicable building energy-efficiency requirements and sustainable design principles, consider building efficiency when renewing or entering into leases, implement space utilization and optimization practices, and assess and report annually on building conformance to sustainable metrics.

The Executive Order requires SRS to prioritize actions that reduce waste, cut costs, enhance the resilience of federal infrastructure and operations, and enable more effective accomplishment of its mission. In general, SRS's aging buildings are not cost-effective to upgrade. However, the SRS emphasis

on maintenance, repairs, and energy conservation measures identified in EISA audits (for example, LED lighting upgrades and more efficient heating ventilation, and air conditioning [HVAC] systems) supports the goals detailed in the directive.

2.3.6 Waste Management

Executive Order 13834, *Efficient Federal Operations*, requires agencies to implement waste prevention and recycling and comply with all federal requirements for solid, hazardous, and toxic waste management and disposal.

Pollution prevention is a commitment in the SRS Environmental Policy as required under the ISO 14001:2015 standard. Environmentally safe and cost-effective reuse or recycling diverts pollutants and wastes from the waste stream. Pollution prevention at SRS reduces wastes, mitigates health risks, and protects the environment.



SRS uses the North Augusta Material Recovery Facility (NA-MRF) to recycle office paper and municipal-type waste. In addition, SRS contracts with a vendor to shred and recycle sensitive office paper. SRS continues to work with the NA-MRF to enhance the process to attain and improve upon a 50% recovery rate. SRS continues to monitor this waste stream for opportunities to recycle materials. Overall, waste generation was down in FY 2021 relative to FY 2020 (475 metric tons versus 579 metric tons, respectively), likely due to employee teleworking in response to the COVID-19 pandemic. Similarly, with more teleworking, the Site generated only 4 metric tons of sensitive office paper in FY 2021, the same amount as in FY 2020.

Other waste streams at SRS include construction and demolition (C&D) debris and universal waste. C&D debris includes waste generated from constructing, remodeling, repairing and deconstructing buildings, roads, bridges, and drainage and sewage systems. This debris is often concrete, asphalt, glass, metal, plastic, and land-clearing scrap. SRS has improved the diversion rate of waste streams from the C&D landfill by initiatives such as recycling nonradioactive scrap metal, scrap furniture, and used storage drums. Universal waste includes batteries, mercury-containing equipment, and light bulbs. It must be recycled when generated by businesses, otherwise the waste must be sent to a Resource Conservation and Recovery Act-permitted facility. Table 2-2 breaks down the recycled waste amounts for FY 2021.

Table 2-2 SRS Recycling and Sustainability in FY 2021 by Amount

Items Recycled in FY 2021	Amount Recycled
Silver Fixative	40 gallons
Rechargeable Batteries	3,547 pounds
Lead Salvage	0 pounds
Fluorescent Tubes	17,060 pounds
Batteries (lead acid)	59,948 pounds
Furniture and Cabinets	284,360 pounds
Mixed Metal	1,183,230 pounds
Mixed Paper	533,519 pounds
Used Tires	20,260 pounds
Used Motor Oil	0 gallons
Consumer Electronics (including cell phones)	131,086 pounds
Toner Cartridges	15,820 pounds
Industrial Sludge (land applied)	0 cubic yards
Universal Waste Mercury Containing Devices	19 pounds

2.3.7 Fleet Management

Executive Order 13834, *Efficient Federal Operations*, instructs agencies to meet statutory requirements related to energy and environmental performance of vehicles in a manner that increases efficiency, optimizes performance, and reduces waste and costs.

The primary goal for DOE fleet management is to use less petroleum and more alternative fuel, as Figure 2-2 illustrates. SRS has met and exceeded these goals since FY 2000. Figure 2-3 shows SRS FY 2021 performance in meeting key fleet-management goals.

SRS installed two 85% ethanol (E-85) fueling stations in October 1999 and added a third in FY 2015. In FY 1999, the year prior to installing the fueling stations, the Site consumed more than 700,000 gallons of unleaded gasoline and no E-85 alternative fuel. As Figure 2-2 shows, over time SRS has continued to reverse this trend and consume more E-85 while decreasing unleaded gasoline and diesel use. Overall gallons consumed (for all three fuel types) is less than that of the FY 1999 unleaded gasoline consumption.

SRS continues to implement the Site Vehicle Allocation Methodology Plan completed in 2016. This plan helps organizations eliminate fleet vehicles that are unnecessary, oversized, or not fuel-efficient. SRS updates its plan at least every five years. Each year, SRS emphasizes leasing alternative fuel vehicles in the light-duty fleet. In FY 2021, more than 87% of the light-duty fleet ordered used E-85. At the end of FY 2021, SRS managed an inventory of 950 vehicles for DOE, SRNS, and SRR; 827 (87% of the fleet) are

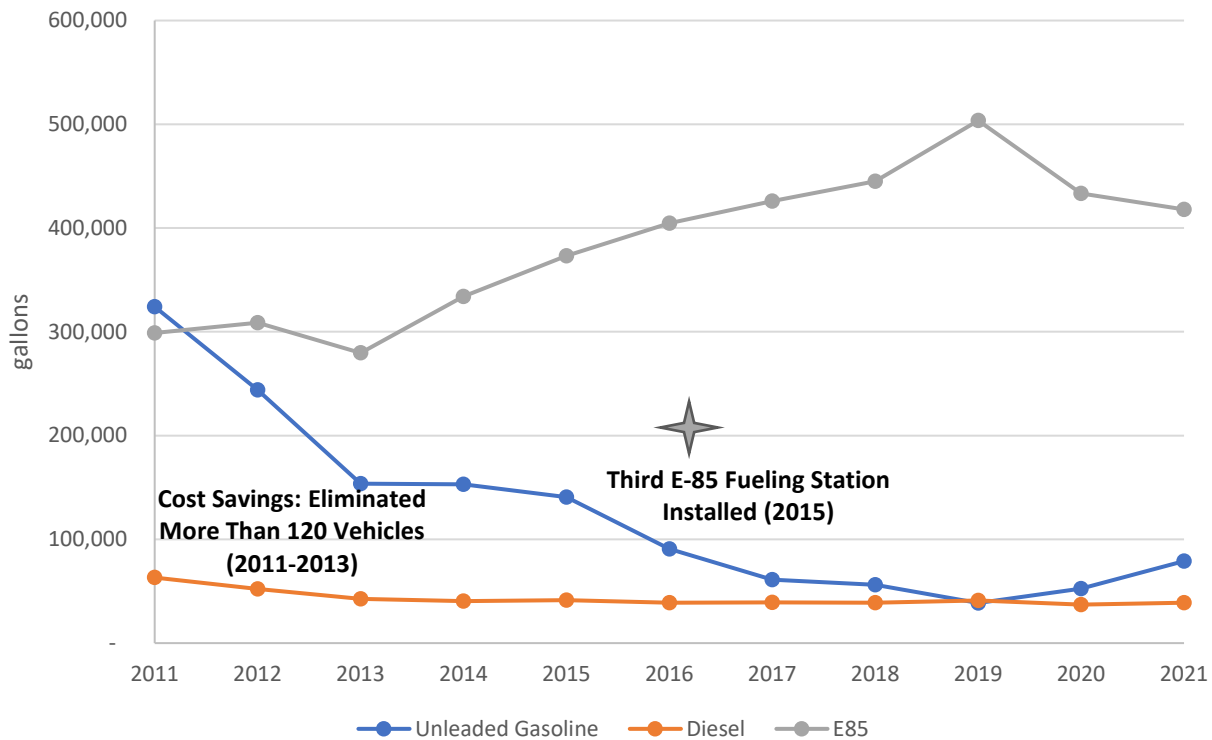


Figure 2-2 GSA Fuel Consumption by Type, FY 2011 to FY 2021

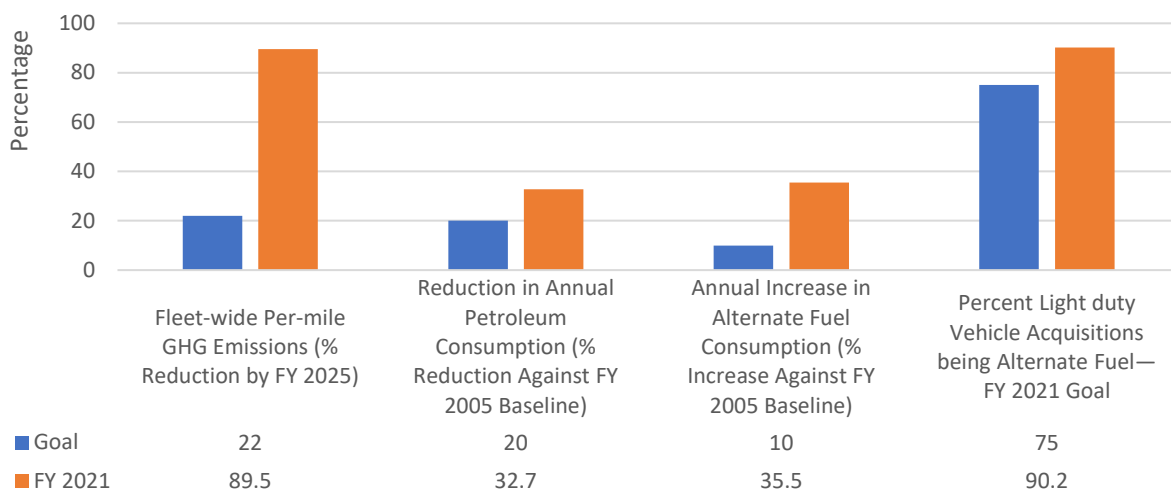


Figure 2-3 SRS Performance in Meeting Fleet Management and Transportation Goals

either E-85, hybrid, or electric. In FY 2021, SRS ordered 119 vehicles; however, due to the COVID-19 pandemic and impacts to global logistics, the vehicle orders were delayed and only 6 vehicles arrived onsite. Of those ordered, one ethanol and five unleaded vehicles have been received. Of the 113 remaining vehicles, 110 are ethanol and 3 are diesel.

2.3.8 Acquisition and Procurement

Executive Order 13834, *Efficient Federal Operations*, requires agencies to acquire, use, and dispose of products and services (including electronics) according to statutory mandates for purchasing preference, federal acquisition regulation requirements, and other applicable federal procurement policies. DOE's goal is to track and make improvements with targets to be determined. These statutory mandates require purchases to include:

- Products that meet minimum requirements for recycled content as the EPA identifies
- Products that the United States Department of Agriculture (USDA) designates as biobased or BioPreferred®
- Products that the U.S. EPA'S ENERGY STAR® program or the Federal Energy Management Program designate as having the potential to generate significant energy savings



Agencies must also maximize substituting alternatives to ozone-depleting substances identified under the EPA's Significant New Alternatives Policy (SNAP).

SRS procurement personnel review purchase-order line descriptions of eligible contract actions to determine whether the product meets the USDA's definition of BioPreferred®.

Procurement has established sustainable practices related to purchasing environmentally preferable products (EPP) to meet sustainable acquisition requirements. The EPP purchases have led to practices, as outlined below:

- The SRS Chemical Management Center reviews and approves chemical acquisitions. This review monitors hazardous chemicals use and, where appropriate, recommends EPPs.
- SRS has procured EPP substitutions under various new and existing contracts, including bulk janitorial supplies (cleaners, paper products) and safety items (earplugs, filters).

2.3.9 Electronics Stewardship

Executive Order 13834, *Efficient Federal Operations*, instructs agencies to manage electronics to reduce energy and environmental impacts.

SRS implements many strategies to reduce energy use, waste, and costs associated with electronics by:

- Purchasing computers rather than leasing
- Procuring desktops, laptops, and monitors that meet Electronic Product Environmental Assessment Tool (EPEAT) standards and copiers that are ENERGY STAR®-compliant
- Setting up all eligible computers and imaging equipment to automatically print on both sides of paper (duplex printing)
- Programming all eligible desktops, laptops, and monitors to default to power-save mode when in standby



The Site either recycles or reuses electronics in an environmentally sound manner by donating to schools and nonprofit organizations or by recycling through authorized vendors. SRS recently extended the “workstation refresh cycle” from three to five years. This is the timeframe for replacing a computer. A longer timeframe reduces the number of computers being retired and the amount of generated scrap electronics.

2.3.10 Data Center Efficiency

Data centers are energy-intensive operations that contribute to agency energy and water use and costs. Executive Order 13834, *Efficient Federal Operations*, encourages implementing practices that promote managing servers and federal data centers in an energy-efficient manner.

One measure of energy efficiency for data centers is power-usage effectiveness (PUE), which is the ratio of total energy used by a computer data center facility to the energy delivered to the computing equipment. While no specific target PUEs have been set, agencies are collecting data. Of the nine data centers at SRS, two have established the PUEs. Other data centers do not have electrical meters, so determining the PUE is not yet possible.

2.3.11 Resiliency

Executive Order 13834 directs agencies to prioritize actions that enhance the resilience of federal infrastructure and operations. Resilience is the ability of an agency to adapt to changing conditions and withstand or recover from disruptions. SRS ensures that federal operations and facilities can continue to protect and serve citizens in a changing climate. SRS uses global climate model projections and data as the starting point to assess the impact of climate change to Site buildings and outdoor workers and has developed studies that describe its specific threat to Site operations. The SRS Emergency Response Organization also has regularly scheduled facility and sitewide drills and exercises involving accidents, spills, and natural disaster scenarios to better respond and recover from such disruptions should they occur.

2.3.12 Greenhouse Gas Management

Executive Order 13834, *Efficient Federal Operations*, directs agencies to track and report on a variety of performance measures, including greenhouse gas (GHG) emissions. The DOE goal is to continue to track and reduce GHG.

SRS reduces GHG as reported in previous years' *SRS Environmental Reports*. Scope 1 GHG emissions consist of direct emissions from sources that DOE owns or controls, such as onsite combustion of fossil fuels and fleet fuel consumption. Scope 2 GHG emissions consist of indirect emissions from sources that DOE owns or controls, such as emissions from generating electricity, heat, or steam DOE purchases from a utility provider. Scope 3 GHG emissions are from sources DOE does not own or directly control but are related to DOE activities, such as employee travel and commuting.

The following inventoried sources at SRS currently generate Scope 1 and 2 emissions:

- Purchased electricity
- Wood (biomass)
- Fuel oil
- Propane
- Gasoline
- Diesel
- E-85 (ethanol)
- Jet fuel
- Fugitive emissions



Biomass Cogeneration Facility

SRS continues to substantially reduce Scope 1 and 2 GHGs due to [Biomass Cogeneration Facility](#) and three additional biomass facilities, one each in A Area, L Area, and K Area. DOE tracks GHG data from various impact sources (such as Site energy use, alternative workplace arrangements and space optimization, as well as vehicle and equipment use). SRS continues to reduce Scope 3 GHG emissions by such efforts as using webinars and conference calls to reduce business travel and by promoting employee carpooling. Increased employee teleworking due to the COVID-19 pandemic also contributed to reducing Scope 3 GHG emissions.

2.4 EMS BEST PRACTICES

2.4.1 2021 DOE Sustainability Awards: The P-Area Permeable Reactive Barrier Wall Project Receives Recognition

The P-Area Permeable Reactive Barrier (PRB) project received a [DOE Sustainability Award Recognition](#) in the Innovative Approach to Sustainability Category. This project is one of only three DOE Environmental Management (DOE-EM) projects that DOE Headquarters recognized during a Sustainability Awards Ceremony that was part of the Energy Facility's Contractors Group's (EFCOG's) Sustainability and Environmental Subgroup annual (virtual) meeting on August 19, 2021.

SRS uses an innovative remedial technology known as a permeable reactive barrier (PRB) to treat contaminated groundwater. The PRB is constructed of zero-valent iron (ZVI) from recycled engine blocks and injected into the subsurface to intercept and destroy solvent contamination in the groundwater as it passes through the barrier. The groundwater contamination that is being remediated is associated with the closed P-Area Reactor facility. The PRB works passively for decades in the subsurface with no moving parts. It is anticipated that the PRB will provide energy and project cost savings of more than \$35 million over three decades of operation.

Regulators included SCDHEC's FFA personnel out of the Aiken and Columbia Offices and U.S. EPA-Region IV.

2.4.2 Sustainability Campaign

SRS continues to implement its “One Simple Act of Green” environmental awareness campaign. The program empowers SRS employees with the information, tools, and programs needed to reduce the Site’s footprint on the environment. Employees practice simple acts, such as turning off lights when leaving a room or workspace, which promote environmental stewardship.

2.4.3 Earth Day

For 2021, SRS chose the Earth Day theme “Restore our Earth.” Due to the COVID-19 pandemic, SRS was unable to hold an onsite Earth Day celebration. However, an [SRS video](#) featured interviews with DOE-EM, National Nuclear Security Administration (NNSA), and SCDHEC personnel, who shared what each employee could do as their responsibility at work and at home to help restore and maintain the plan.



2.4.4 Reuse or Recycling of Equipment and Materials

SRS is partnering with Savannah River Site Community Reuse Organization (SRSCRO) to turn excess equipment and material into money to benefit the Aiken, Allendale, and Barnwell counties in South Carolina and Richmond and Columbia counties in Georgia. Surplus material includes the following:

- Small items such as office equipment, valves, and glassware for laboratory experiments
- Large items of potentially much greater value such as electrical turbines, diesel-powered pumps, and fire engines
- Hundreds of thousands of tons of metal

The SRSCRO is the interface organization that takes in items that the Site no longer needs through the Asset Transition Program and Asset Removal Projects. The SRSCRO sells these items and uses the proceeds for the economic good of numerous businesses throughout the large region surrounding SRS. In FY 2021, SRS dispositioned to the SRSCRO more than \$14.6 million in usable assets for reuse and recovery. Based on the SRSCRO’s 2021 annual report, this partnership’s program and projects generated approximately \$472,154 during the organization’s fiscal year (July 1, 2020—June 30, 2021).

2.4.5 Sustainable Environmental Compliance and Environmental Remediation

SRS continues to excel in sustainable remediation. Of the 40 remediation systems currently operating, 21 are completely passive, requiring no energy to implement, and 14 are low-energy systems. These low-energy systems use sustainable technologies (such as solar-powered MicroBlowers and barometric pressure-driven BaroBalls™) to pump volatile organic contaminants from the subsurface, thus reducing contamination. SRS is also using the HydraSleeve sampling methodology for more than 251 wells, which significantly reduces the volume of purge water managed as waste.

In 2021, SRS continued monitoring to ensure the effectiveness of the lower-energy, innovative methods to address groundwater cleanup implemented in 2019. These included:

- Injecting a vegetable-oil microbe mixture into the subsurface to intercept a groundwater plume and break down trichlorethylene (TCE)
- Injecting recycled iron into a series of wells to form a permeable reactive barrier that intercepts the groundwater plume and breaks down TCE

Both examples use the natural flow of the groundwater plume, so the systems are low energy and do not require pumps or equipment to move groundwater. SRS anticipates the vegetable oil to be effective for three to five years before it needs to reinject into the subsurface, and the iron by design is effective for decades with little maintenance.



A Subcontractor Loads Zero-Valent Iron Filings during Injections to Support Installation of the P-Area Reactive Barrier

SRS deploys innovative methods to address compliance efforts. Initiated in 2018, SRS continues to implement a commercially available Comprehensive Environmental Permits Linking Tool (CEPLT) to ensure SRS meets regulatory and DOE commitments. Features of the CEPLT include tracking permit requirements and conditions and associated regulatory commitments, notification of upcoming regulatory documents and reports due, and display of permit requirements and tasks on a map at the associated compliance point (for example, outfall, landfill). SRS expanded the CEPLT in 2021 to include other Site tenants.

SRS continues to use remotely operated devices (drones and wireless stormwater sampling equipment) discussed in *SRS Environmental Reports* from previous years. Not only do these devices address environmental compliance, improve worker safety, and increase productivity, but they also decrease vehicle and fuel use, thereby supporting fleet management goals.

SRS provided input on all seven focus areas in DOE's "*Conservation Action Plan*" and its driver, Executive Order 14008, "*Tackling the Climate Crisis at Home and Abroad*." The plan's focus areas are:

- Create more parks and safe outdoor opportunities in nature-deprived communities
- Support tribally led conservation and restoration priorities
- Expand collaborative conservation of fish and wildlife habitats and corridors
- Increase access for outdoor recreation
- Create jobs by investing in restoration and resilience
- Incentivize and reward the voluntary conservation efforts of fishers, ranchers, farmers, and forest owners
- Other action supportive of the "America the Beautiful" campaign

The “America the Beautiful” plan is a national collaborative with a goal to conserve and restore lands, waters, and wildlife that support and sustain the nation. It covers environmental, natural, and cultural resources highlighting objectives, planning, actions taken, collaborations and partnerships, and metrics used to track progress.

2.4.6 Challenges and Barriers to Implementation

In 2021, SRS continued to conserve and manage resources to meet the sustainability goals in the Site Sustainability Plan. However, infrastructure continually presents challenges to initiating sustainable projects. Achieving new goals is becoming significantly difficult with the high cost of implementing sustainability upgrades at SRS’s many aging facilities (administrative, shops, laboratories, warehouses). SRS reduces potable water use by continuing to install water-efficient toilet systems when repairs indicate the need. However, sitewide retrofitting with low-flow flush valves and faucets is not cost-effective. Likewise, SRS reduces energy intensity when possible in maintenance and repair situations through such actions as replacing fluorescent lighting with more efficient LED lighting, replacing HVAC systems with higher Seasonal Energy Efficiency Ratio (SEER) units, and rightsizing pumps. Retrofitting entire buildings or systems is not typically cost-effective. Sustainability efforts related to energy management will require additional guidance as SRS conducts EISA audits for Site infrastructure and performs feasibility studies on possible energy projects with limited resources and competing priorities. While the interim energy intensity goal was met in FY 2021, this is likely due to the impacts of the COVID-19 pandemic and teleworking. Following the return of the workforce onsite after COVID-19, it is expected that meeting reduction of energy intensity goals will continue to be a challenge as before the COVID-19 pandemic.

In 2021, SRS identified the following program challenges while implementing the latest version (2015) of the ISO 14001 standard:

- SRNS and SRR ISO 14001:2015 environmental scope and policy
- The criteria for determining significant environmental aspects could be more rigorously defined
- Sustainability could be more systematically integrated in the EMS and should be more organizationally focused in the EMS(s)
- Conformance to ISO 14001:2015 programmatic requirements could be enhanced by increasing the number of responsible personnel trained for ISO 14001:2015 implementation.

This work continued in 2021 as SRS integrated and promoted awareness of the EMS principles in daily work practices.

The Site will continue to study, track, and discuss the sustainability requirements to ensure implementation. For example, as discussed previously, while SRS is inserting sustainable acquisition clauses in all applicable solicitations, there is work to be done tracking sustainable acquisition purchases (BioBased, SNAP, and others). SRS continues to determine and implement ways to increase end-user awareness of sustainable acquisitions.