

SAVANNAH RIVER SITE

FY 2015

Site Sustainability Plan



December 9, 2014

Rev. 1

Concurrence and Approval

Prepared by:

Susan Shouse
Susan Shouse, Senior Environmental Engineer
Support Services
SRNS

12/9/2014
Date

Concurred by:

James DeMass
James DeMass, Federal Program Manager
Infrastructure Services Division
DOE-SR

12/9/14
Date

Approved by:

Arthur B. Gould
Arthur B. Gould, Director
Environmental Quality Management Division
DOE-SR

12/9/14
Date

Contents

	Page
I. Executive Summary	5
Goal Summary Table of	9
II. Goal Performance Review and Plans	16
1.0 Greenhouse Gas (GHG) Reduction	
1.1 Scope 1 & 2 GHG Reduction	16
1.2 Scope 3 GHG Reduction	17
2.0 Sustainable Buildings	
2.1 Energy Intensity Reduction	19
2.2 EISA Energy/Water Evaluations	22
2.3 Metering	22
2.4 Cool Roofs	24
2.5 High Performance Sustainable Buildings – Existing Buildings	25
2.6 New Construction – Guiding Principles	28
2.8 Regional & Local Planning	28
3.0 Fleet Management	
3.1 Alternative Fuel Use	30
3.2 Petroleum Reduction	31
3.3 Light Duty Fleet Vehicle Leases/Purchases	32
4.0 Water Use Efficiency & Management	
4.1 Potable Water	33
4.2 Industrial Water	33

5.0	Pollution Prevention & Waste Reduction	35
5.1	Non-Hazardous Solid Waste Diversion	36
5.2	Construction & Demolition (C&D) Materials Diversion	36
6.0	Sustainable Acquisition	38
7.0	Electronic Stewardship & Data Centers	
7.1	Data Centers	39
7.2	Data Center Power Utilization Effectiveness (PUE)	41
7.3	Power Management	41
7.4	Electronic Stewardship	42
8.0	Renewable Energy	42
9.0	Climate Change Resilience	46
10.0	Energy Performance Contracts	52
11.0	Sustainable Remediation	53

SUMMARY OF REVISIONS

REV. 0 – NOVEMBER 20, 2014 – SUBMITTAL TO DOE-HQ

REV. 1 – DECEMBER 9, 2014 – MAJOR REVISIONS BASED ON DOE-HQ COMMENTS

Executive Summary

The purpose of this Plan is to outline strategies for managing and implementing various activities associated with sustainability at the Savannah River Site (SRS) in FY 2015. This Site Sustainability Plan reflects strategies in place or to be established for accomplishing the goals and requirements included in:

- Executive Order (E.O.) 13514, “Federal Leadership in Environmental, Energy, and Economic Performance”, October 9, 2009
- Executive Order (E.O.) 13653, “Preparing the United States for the Impacts of Climate Change”, November 6, 2013
- U.S. Department of Energy (DOE) Order 436.1, “Departmental Sustainability”, May 2, 2011
- The Energy Policy Act of 2005 (Public Law 109-58)
- Energy Independence and Security Act (EISA) of 2007, and
- DOE Federal Leadership in High Performance and Sustainable Buildings Memorandum, February 29, 2008, Sec. Bodman to all Department Heads

During FY2013 and FY2014, the Savannah River Site was challenged in meeting the sustainability goals as required by the DOE order and the executive orders. SRS experienced a severe budget shortfall in FY2013 and FY2014. Initially, funding for the Sustainability Program was not approved for FY 2014. However, an Indirect Baseline Change Proposal, with minimal funding, was approved in May 2014 to support the SRS Sustainability Program for the remainder of fiscal year 2014. Although FY2015 also has limited funding to support the Sustainability Program, SRS will continue to work toward meeting established goals by adhering to existing sustainability and conservation policies and practices across the site. SRS will also strive for sustainability improvements as funding allows.

There are presently four primary missions at SRS:

1. Mitigation and environmental management of Cold War legacy materials
2. Stabilization, treatment, and disposition of nuclear materials, spent nuclear fuel, and radioactive waste
3. Maintaining the nation’s tritium supply
4. Non-proliferation of weapons grade nuclear material

The SRS cleanup program involves completing the removal of waste from all liquid radioactive waste tanks and closing all the tanks; completing nuclear materials stabilization, processing and packaging in the canyons and separations facilities; consolidating and dispositioning spent nuclear fuel and non-irradiated special nuclear material; treating and disposing of solid wastes; remediation of contaminated soil and groundwater; and

deactivating and decommissioning EM facilities. As stated, these activities will be ongoing over many years into the future. In addition, SRS has been designated to continue as DOE's center for the tritium supply to the enduring nuclear weapons stockpile in support of defense missions. In support of nuclear non-proliferation missions, SRS is to blend down weapons-usable, highly enriched uranium fuel (irradiated and non-irradiated) to low-enriched uranium. This requires the addition of major new process facilities which are currently being designed and constructed and also includes the re-start of some facilities which were placed in stand-by condition. EM and NNSA missions will continue for many decades at SRS, with the addition of major new site missions and the continuation of existing site missions such as Tritium.

SRS has been tremendously successful in the past in a multitude of sustainability-related endeavors, including the following examples:

- Major energy intensity reductions
- Significant water consumption reductions
- Pursuing mandatory use of alternative fuel (E85) in site transportation programs dating back to the 1990's
- Advancing renewable energy through the large-scale use of biomass in steam and electricity generating stations, including 4 biomass plants
- Establishing highly successful and beneficial waste minimization and pollution prevention programs.

SRS has reduced its energy intensity by 71.1% in comparison to a FY2003 baseline. This reduction is, in part, due to the implementation of DOE Energy Management and utility and infrastructure projects at SRS including multiple Energy Savings Performance Contracts (ESPCs). The greatest energy intensity reductions are directly related to the impact of the Biomass Cogeneration Facility (BCF) which was brought into service during FY2012.

Metrics are developed to track greenhouse gas (GHG) emission reductions, which will be compared annually by source versus the established baseline of FY 2008. Through FY 2014, SRS reduced the Scope 1 and 2 emissions by 70.2% against the 2008 baseline. Also, SRS has continued the use of Citrix Open Internet. This allows employees to utilize personal computers to participate in meetings or live webinars versus having to travel to locations on site which previously had been established for this purpose. This is a tremendous asset for the employees and reduces energy use and greenhouse gas emissions.

The site currently has four operating biomass steam plants with one each located in the following areas: A-Area, K-Area, L-Area, and G-Area. The Biomass Cogeneration Facility (BCF), which is located in G-Area, was brought on-line in FY 2012 and continues to demonstrate extremely positive impacts on GHG emissions due to the utilization of primarily wood products, instead of coal, to generate steam and electricity. Renewable energy goals are also positively impacted for both the site and the DOE complex as a result.

Potable water consumption has been reduced by 35% (FY2014) compared to the prior baseline year of FY2000, and by 16% compared to the current baseline year of FY2007.

The intensity reduction (gallons per gross square foot) is 23% since FY2007, meeting the interim goal of a 14% reduction by FY2014. Industrial/Landscape/Agricultural (ILA) water consumption has decreased by 65.4% from the FY2010 baseline through FY2014; far exceeding the 20% reduction goal.

Alternative fuel use accounted for over one-half of the site fuel usage in FY 2014. As of the close of FY2014, all of the site's light-duty fleet consists of alternative fueled vehicles, i.e., E85-ethanol, hybrid, electric.

SRS encourages its employees to adopt green behavior on and off site by sending electronic messages through the Site Employee Communications. Below is one example of the messages sent during FY 2014:

"One Simple Act of Green: 'I'll Have a Green Christmas'"

It may be the most wonderful time of the year, but it also can be the most wasteful. For example, did you know that Americans will generate an extra one million tons of trash per week from Thanksgiving to New Year's Day, send nearly two billion holiday cards and use more than 38,000 miles of ribbon?

Here's how you can be kind to the environment and still celebrate in style.

- Use reusable bags for holiday shopping and use them as gift bags
- Send electronic greeting cards
- Use eco-friendly LED lights

Use recyclable newspaper and magazines as gift wrap “

Another example was encouraging employees to save water and provided a list of 50 simple acts that could save thousands of gallons of water use at home and at work.

In many areas and for multiple applications, hand-held electronic devices are replacing paper forms. The Site Trucking department has equipped drivers with a hand-held device that computes real-time fuel inventory, displays scheduled routes, and notifies the driver of any delivery changes. The Savannah River National Laboratory has managed to overcome some of their stringent security challenges to replace “round sheets” with electronic hand-held devices for operators to use during their routine operation verifications.

SRS has implemented successful energy management, pollution prevention / waste minimization, and transportation programs for many years. Both DOE-SR and site support personnel associated with contractors have worked directly with DOE-Headquarters and used the Federal Energy Management Program (FEMP) to identify, design, and implement sustainability-related projects and establish site-wide policies and procedures to ensure adherence to directives. These projects and policies have contributed to the reduction in the overall building energy reduction per gross square foot cited above and to the minimization of waste streams and the use of alternative fuels.

In addition, SRS has made some progress in areas such as high performance sustainable buildings, data center management, electronic stewardship, waste diversion, and other areas. Performance in these areas is discussed in this plan.

The site has been recognized as a leader in conservation activities and management of resources and has accomplished much in this regard over many years. SRS has many nuclear production facilities to accomplish DOE missions, and these facilities, along with the vast array of facilities (administrative, shops, laboratories, warehouses, etc.) that support them, have a direct correlation to sustainability-related interests.

To summarize, SRS has realized above-average results in strategies and efforts to meet sustainability-related goals over many years but may have difficulty achieving some goals in the FY 2015 to FY 2020 timeframe due to:

- Significant accomplishments in past years to greatly reduce energy intensity, water consumption, and petroleum use
- Impacts from the multitude of process facilities and support facilities associated with these processes
- Difficulties with future economic viability of many projects due to the degree of progress made to date and the generally long paybacks resulting from low energy costs and high implementation costs
- Limited approved FY2015 funding for the M&O contractor to support the Sustainability Program

SRS no longer has a full-time Sustainability / Energy Management Program Manager assigned to sustainability oversight. The Sustainability Program will be supported as funding and resources allow.

Goal Summary Table

The following table is provided to summarize key activities associated with this program.

SSPP Goal #	DOE Goal	Performance Status	Planned Actions and Contributions	Risk of Non-attainment*
Goal 1: Greenhouse Gas Reduction				
1.1	28% Scope 1 & 2 GHG reduction by FY 2020 from a FY 2008 baseline (2014 target: 19%)	SRS has achieved a 70.2% reduction, due, primarily, to the new Biomass Cogeneration Facility(BCF).	SRS will continue to utilize the new Biomass Cogeneration Facility in FY 2015.	Low
1.2	13% Scope 3 GHG reduction by FY 2020 from a FY 2008 baseline (2014 target: 5%)	SRS has achieved a 19.4% reduction in Scope 3 Green House Gas emissions.	SRS has decreased the amount of travel partly due to budget restraints and mostly due to best management practices, e.g. increase use of web-based meetings and teleconferencing; approved travel on an as needed basis; carpool promotion; etc.	Low
Goal 2: Sustainable Buildings				
2.1	30% energy intensity (BTU per gross square foot) reduction by FY 2015 from a FY 2003 baseline (2014 target: 27%)	SRS has reached an energy intensity reduction of 71.1% from a FY 2003 baseline. This reduction is based on October 2014 FIMS square footage. (FY 2014 vs. FY 2003 baseline)	SRS will continue best management practices during preventive maintenance activities as well as facility repairs and necessary equipment replacements; work with Ameresco to reduce electricity costs by mitigation of electrical peaks on the purchased power contract, and continue peak alerts to reduce electrical demands.	Low
2.2	EISA Section 432 energy and water evaluations	SRS completed the review of the summary report on the assessed 2.8 million square feet of EISA covered facilities for energy and water conservation opportunities conducted in FY 2012. FY2014, Tritium/NNSA office conducted audits in 247-H, 249-H, 264-H and 264-1H. EISA audits and associated efforts were not conducted in the remaining SRS facilities in the required cycle due to lack of resources.	Other than the Tritium Facilities, EISA audits and associated efforts are not expected to be conducted in the near future due to budgetary restraints.	High (Financial)

SSPP Goal #	DOE Goal	Performance Status	Planned Actions and Contributions	Risk of Non-attainment*
2.3	Individual buildings metering for 90% of electricity (by October 1, 2012); for 90% of steam, natural gas, and chilled water (by October 1, 2015) (2014 target: 90% and 75%, respectively)	It has been determined from the metering guidance and previous discussion with DOE-HQ personnel that SRS meets the metering objectives due to the existing metering program utilizing data associated with processes / multi-building applications versus individual buildings. The metering program is defined in the SRS Metering Plan.	SRS will focus on installation of new meters in facilities associated with High Performance Sustainable Building (HPSB) efforts and in Data Centers, as shown in this Plan SRS ensures that new buildings have meters installed during construction.	Low
2.4	Cool roofs, unless uneconomical, for roof replacements unless project already has CD-2 approval. New roofs must have thermal resistance of at least R-30	SRS currently has a total of eleven facilities which have incorporated cool roof technology. The following five facilities incorporated cool roof technology during FY 2014: 730-2B, 720-H, 707-C, 241-102H, 717-11F.	SRS will continue to incorporate cool roof technology into annual roof replacements. Per FY14 FIMS data the following buildings are scheduled for cool roof technology application during FY15: 776-1A, 716-2A, 703-4A, 730-1B, 730-4B, 249-2F, 249-H, 701-2K.	Low
2.5	15% of existing buildings larger than 5,000 gross square feet (GSF) to be compliant with the Guiding Principles of HPSB by FY 2015	SRS has achieved 0.625% of the required 15% of existing buildings to be compliant with the Guiding Principles of HPSB by FY2015. 10.625% are in progress and have reached 46% of the GP. 3.75% are in progress and have reached 42% of the GP.	The SRS Sustainability Program, and, therefore SRS will not achieve Guiding Principles goals in 15% of square footage in FY 2015 The performance of the following actions will be based on available funding: 1. Re-establish the management-sanctioned team, which was formed in 2013 2..Work towards the implementation of plans developed in FY2013 3.Update HPSB-EB facilities in EPA Portfolio Manager database in FY 2015 as needed 4. Pursue HPSB status for 246-1H and 246-2H	High (Financial)
2.6	New construction, major renovations, and alterations of buildings greater than 5,000 gross square feet must comply with the Guiding Principles	There were no new facilities completed in FY14.		Low

SSPP Goal #	DOE Goal	Performance Status	Planned Actions and Contributions	Risk of Non-attainment*
2.7	Efforts to increase regional and local planning coordination and involvement	SRS has established relationships with various agencies that are focused on climate change in the region and developing climate response plans. These include the Carolinas Integrated Sciences and Assessments (CISA) situated within the University of South Carolina, Department of Geography, and the State Climatology Office of the South Carolina Department of Natural Resources.	SRS will continue to work with regional and local planning coordinators to effectively and safely execute SRS missions while maintaining a healthy relationship with the surrounding communities.	Low

Goal 3: Fleet Management

3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to a FY 2005 baseline (2014 target: 136% cumulative since 2005)	SRS has maintained an average of 9% annual increase in fleet alternative fuel consumption since 2005. SRS has cumulatively consumed 205% more alternative fuel since 2005.	Sustaining annual increases in E85 fuel consumption is at risk due to: 1 The DOE mandated use of hybrid vehicles; which are alternately fueled by gasoline and a battery charge 2 . Future use of electric cars on site 3. Exceptional increases in E85 fuel from 1999 – 2005.	Low
3.2	2% annual reduction in fleet petroleum consumption by FY 2020 relative to a FY 2005 baseline. (2014 target: 18% cumulative since 2005)	SRS has maintained an average 2.03% annual reduction in fleet petroleum consumption based on a 2005 baseline SRS has reduced its cumulative petroleum consumption by 27%, based on a 2005 baseline.	SRS will continue to right size the fleet, maximize E85 Alternative Fuel Vehicle leases, and mandate E85 use in all E85 vehicles.	Low
3.3	100% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by FY 2015 and thereafter (75% FY 2000 – FY 2015)	All FY 2014 new light duty vehicle purchases were alternative fuel vehicles and unleaded fueled vehicles are being phased out. SRS light duty fleet consists of: 16% unleaded vehicles and 84% alternative fuel vehicles. SRS is participating in the GSA Electric Vehicle Pilot Program with one electric vehicle and charging station.	The SRS Fleet management is focused on incorporating into the SRS Fleet alternate fuel vehicles only.	Low

SSPP Goal #	DOE Goal	Performance Status	Planned Actions and Contributions	Risk of Non-attainment*
-------------	----------	--------------------	-----------------------------------	-------------------------

Goal 4: Water Use Efficiency and Management

4.1	26% potable water intensity (gal per gross square foot) reduction by FY 2020 from a FY 2007 baseline	SRS has realized a 22.15% decrease in potable water intensity (FY 2014 vs. FY 2007) (based on October 2014 FIMS square footage). SRS has realized a 36.2% decrease in potable water consumption since FY2004 and a 16.3% reduction since 2007.	No appreciable percentage change in potable water intensity is projected for FY 2015 The site will install low-flow devices as needed during routine maintenance repairs and major renovations.	Low
4.2	20% water consumption (gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline	SRS ILA water (process water) consumption has been reduced by 65.4%. (FY14 vs. FY10)	The new Biomass Cogeneration Facility will allow continued ILA water conservation during FY15. SRS will complete a design for a new level control system for the 782-A water storage tank to reduce ILA water consumption. Installation will follow, provided funding is made available.	Low

Goal 5: Pollution Prevention and Waste Reduction

5.1	Divert at least 50% of non-hazardous solid waste, excluding construction and demolition debris, by FY 2015	In FY 2014, diverted ~ 40% of non-hazardous solid waste for recycling.	SRS will continue to divert materials using a subcontracted Material Recovery Facility (MRF) and will continue to explore viable product markets for recovered materials. It is projected that SRS will achieve > 40% cumulative recycle rate in FY15 and will find it difficult to cost-effectively exceed a 50% recycle rate for this waste stream by the end of FY15.	Medium (Financial)
5.2	Divert at least 50% of construction and demolition materials and debris by FY 2015	SRS recovered about 561 metric tons of materials in FY 2014, about 3% of this waste stream.	Trend C&D waste stream composition and emerging options to increase recycle rates for these materials. Work with State regulators for non-permit options to store debris for periods to accumulate quantities for cost-effective processing. Without this regulatory relief, SRS will not significantly increase recycle rates for these wastes by the end of FY15.	High (Financial)

SSPP Goal #	DOE Goal	Performance Status	Planned Actions and Contributions	Risk of Non-attainment*
-------------	----------	--------------------	-----------------------------------	-------------------------

Goal 6: Sustainable Acquisition

6.1	Procurements meet requirements by including necessary provisions and clauses (Sustainable Procurements / Biobased Procurements)	New business system implemented, providing a mechanism to track requisitions.	SRS will continue to ensure procurements meet sustainability requirements by including EPP clause in at least 95% of applicable solicitations.	Low
-----	---	---	--	-----

Goal 7: Electronic Stewardship and Data Centers

7.1	All core data centers are metered to measure a monthly Power Usage Effectiveness (PUE) of 100% by FY2015 (2014 target: 90%)	Power meters were installed in the Central Computing Facility main feeds in December 2013. Site Electrical Engineering is currently developing a procedure to convert the meter readings to PUE. I recommend DOE accept SRS has met the FY 2014 target goal of 90%.	SRNS Information Technology Facilities Engineers will work with Site Electrical Engineering to document the correct procedure for reading the Power meters and calculating the PUE for the Central Computing Facility. PUE calculations will be run monthly and documented.	Low
7.2	Core data centers maximum annual weighted average PUE of 1.4 by FY2015 (2014 target: 1.5)	The Central Computing Facility PUE is 2.12. This has been achieved through the implementation of best practices in air handling, air flow, and rack utilization. Racks are either fully populated or blanking panels are used. The use of hot aisles and cold aisles keep cooling air flow efficient.	The Central Computing Facility used two Freon-based water chillers that currently work independently. Information Technology Facility Engineers will interconnect the chiller controllers to allow the chillers to communicate and load balance more efficiently. SRS will continue to enforce rules on physical servers in the Central Computing Facility that will push users to virtualization.	Low
7.3	Power management – 100% of eligible PCs, Laptops, and monitors with power management actively implemented and in use by FY2012	100% of all eligible PCs, Laptops, and monitors have active power management. 98.82% of all PCs, Laptops, and monitors have active power management and the remaining 1.18% are mission critical.	SRS will continue leasing and purchasing eligible PCs, Laptops, and monitors with active power management.	

SSPP Goal #	DOE Goal	Performance Status	Planned Actions and Contributions	Risk of Non-attainment*
7.4	Electronic Stewardship – 95% of eligible electronics acquisitions meet EPEAT standards	SRS purchased 6694 eligible electronics in FY2014 and 99.76% met EPEAT standards.	SRS will continue leasing and purchasing eligible PCs, Laptops, and monitors which meet EPEAT standards.	

Goal 8: Renewable Energy

8.1	7.5% of annual electricity consumption from renewable sources by FY 2013 and thereafter	48.0% of annual electricity consumption at SRS was from renewable sources due to the on-site Biomass Cogeneration Facility (BCF) being fully operational.	SRS expects FY15 will show another exceedance of this requirement due to the full operation of the on-site Biomass Cogeneration Facility.	Low
-----	---	---	---	-----

Goal 9: Climate Change Resilience

9.1	Address DOE Climate Change Adaptation Plan goals	Savannah River National Laboratory, Atmospheric Technology Center has completed the online assessment. ATC is also working on a global climate modeling program which is intended to provide information for climate predictions.	The SRNL ATC will continue its research and development of a one-of-a-kind global climate modeling program. SRS Site Services is enhancing its contingency plan for inclement weather conditions.	Low
-----	--	---	---	-----

Goal 10: Energy Performance Contracts

10.1	Utilization of Energy Performance Contracts	SRS is currently obliged to four ESPC contracts.	SRS is considering another ESPC in support of Climate Change Adaptation.	Medium
------	---	--	--	--------

Goal 11: Sustainable Remediation

11.1 (a)	Verify the implementation into any contracts the clauses described in the <i>Green & Sustainable Remediation and Innovative Technology Contracting Language Template</i> .	Contract language implementing <i>Green and Sustainable Remediation and Innovative Technology</i> has not been incorporated into the contract for SRNS.		
----------	--	---	--	--

SSPP Goal #	DOE Goal	Performance Status	Planned Actions and Contributions	Risk of Non-attainment*
11.1 (b)	Describe the implementation of any sustainable practices, technologies, and/or approaches in remediation/clean-up activities across the site	The Savannah River Site, through implementation of the Federal Facility Agreement (FFA), uses cost effective and sustainable remediation practices where possible.	In 2015 SRS will continue to evaluate remedies and install green and sustainable systems where practical. Two groundwater remediation units in the administration area are approved to move towards more passive remediation activities and selected waste units as defined in the FFA will begin evaluation for remediation during the year.	Low

*The following are risk definitions cited in the September 16, 2014 SSP guidance document:

The risk of non-attainment is based on the site's assessment as to whether there is a high, medium, or low risk that the goal will not be attained by considering:

1. Technical risks: Technology is available/not available in current facilities and systems to attain the goal.
2. Management risks: Management systems and/or policies may require changes for which approval authority is outside the Department or requires an internal DOE policy or procedural change.
3. Financial risks: Funds are not identified in current or out year targets to achieve the goal.

The following are definitions for high, medium, and low risk:

High Risk (H): Risk in at least one of the three categories is so significant that non-attainment of the goal is likely or expected.

Medium Risk (M): Risk in at least one of the categories above is so significant that it is moderately likely that the goal may not be attained.

Low Risk (L): Any risks associated with this goal are being satisfactorily mitigated such that attainment of the goal is likely.

Goal Performance Review and Plans

1.0 Greenhouse Gas (GHG) Reduction

The Savannah River Site is committed to reducing GHG Scope 1 & 2 emissions. Scope 1 consists of direct emissions such as on-site combustion of fossil fuels or fugitive GHG emissions, whereas Scope 2 consists of indirect emissions associated with the consumption of electricity, heat, or steam. DOE has established a reduction goal of 28% in Scope 1 & 2 GHG by FY 2020 from a FY 2008 baseline and a 2014 target goal of a 19% reduction. SRS has achieved a 70.2% reduction thus far in Scope 1 & 2 greenhouse gas emissions.

1.1 Scope 1 & 2 Greenhouse Gas Reduction

Performance Status

The site continued to make great progress in Scope 1 and 2 greenhouse gas emission reductions during FY2013 and 2014 due to the start-up of the Biomass Cogeneration Facility (BCF) in FY2012 and the operation of the three biomass facilities located in A-Area, L-Area, and K-Area. The combining of GHG data associated with the various impact sources, such as site energy use and vehicle/equipment use, is organized via excellent tracking mechanisms at the HQ level, thus allowing for development and subsequent management of a comprehensive inventory.

Scope 1 and 2 GHG emissions are currently generated from the following source types at SRS which are inventoried:

- Purchased electricity
- Wood (biomass)
- Fuel Oil
- Propane
- Gasoline
- Diesel
- E85 (ethanol)
- Jet fuel
- Fugitive emissions

Plans and Projected Performance

SRS is greatly reducing GHG emissions via the four biomass projects located on site. The new reduction of 70.2% for FY 2014 is due, primarily, to the operation of the Biomass Cogeneration Facility. This is a continuing benefit of transferring to a biomass-based energy supply versus the previous coal-based supply.

1.2 Scope 3 Greenhouse Gas Reduction

Scope 3 Greenhouse Gas emissions include indirect GHG emissions from sources not owned or directly controlled by SRS but related to SRS activities. Scope 3 GHG emission sources currently required for federal GHG reporting include transmission and distribution losses associated with purchased electricity, employee travel and commuting, contracted solid waste disposal, and contracted wastewater treatment.

The various components of Scope 3 GHGs are included below. As stated in the DOE Strategic Sustainability Performance Plan, prime contractors are included in Scope 3 GHG emission calculations. The quantitative information provided in the Consolidated Energy Data Report (CEDR) for *Employee Commuting* will include only DOE-SR and the two primary SRS contractors, SRNS and SRR. The information provided in the CEDR for *Ground Travel* will include only SRNS and SRR as the federal employees will be captured as part of HQ efforts.

DOE has established a reduction goal of 13% of Scope 3 GHG by FY 2020 from a FY 2008 baseline and a 2014 target goal of a 5% reduction. SRS has achieved a 19.4% reduction thus far in Scope 3 greenhouse gas emissions.

Performance Status

A comprehensive inventory of Scope 3 greenhouse gas emissions has been developed at DOE-HQ. The inventory denotes contributions for each GHG Scope category by type/source associated with each category.

The Information Technology Department at SRS has an enhanced audio conferencing system for use when conducting non-sensitive conference telephone calls. This system is part of an IT mobility strategy to lessen travel requirements (whether on or off site) to accomplish business needs. The audio conferencing is provided through Global Crossing-Level 3 communications.

DOE-SR has partnered with GSA and SRNS and successfully installed the first electrical vehicle charging station on Savannah River Site to fuel the acquired electrical car used at SRS.

Employee Commuting

SRS has worked with South Carolina Department of Health and Environmental Control (SCDHEC) Bureau Air Chief, other local industry, and the City of North Augusta, SC to develop a Park and Ride Facility. This facility has been completed and was opened in

August 2014. The intent of the Park and Ride is to encourage and facilitate additional carpools for SRS as well as other local industry employees. The site has partnered with the “Georgia Clean Air” and South Carolina “Take a Break from the Exhaust” campaigns. Employees can utilize these campaigns to form and join carpools through an available website. Carpool information is also available through the SRS e-mail based “Employee Communications” program and is encouraged at the SRS annual site safety conferences.

Business Air and Ground Travel

SRS considers the availability of webinars, conference calls, etc., when possible to effectively conduct business. Pending funding, SRS continues to evaluate options to install additional video conference (VC) facilities at the site.

Transmission and Distribution (T&D) Associated from Purchased Electricity

The Transmission and Distribution component of Scope 3 emissions will be automatically calculated from the total site electrical consumption (in megawatt-hours). There are currently no specific plans to reduce T&D losses other than what is currently being accomplished with the operation of the new Biomass Cogeneration Facility that relocates the cogeneration process closer to F-Area. This objective seeks to increase on-site generation of renewable electricity and to increase purchase of green energy. The biomass ESPC with Ameresco is accomplishing these goals.

Off-site wastewater treatment

SRS does not contract with any outside wastewater treatment facilities. There is no Scope 3 contribution from this activity.

Off-site municipal waste disposal

SRS utilizes the City of North Augusta Material Recovery Facility (NAMRF) to segregate recyclables from its non-industrial and non-construction debris waste stream. In FY 2014, 547 metric tons of materials were recovered for recycle, representing 39.55% of this stream. Materials that cannot be recycled at the NAMRF are shipped from the NAMRF to the Three Rivers Landfill for disposal. The site also ships sanitary waste and wood directly to Three Rivers Landfill. The Three Rivers Landfill is not an SRS facility, but it is noteworthy that it does collect and sell the resultant landfill methane gas.

Plans and Projected Performance

SRS will strive to continue the reduction of Scope 3 GHG emissions. Long term actions taken will likely include items such as:

- Reduction of business travel by utilizing more teleconference services
- Continued promotion of carpooling/vanpooling opportunities
- Exploring potential telecommuting opportunities

- Potential installation of commercial charging stations for electric vehicles at key locations to encourage employees to purchase EVs to commute to and from the site.

2.0 Sustainable Buildings

2.1 Energy Intensity Reduction

DOE as an agency is required to reduce its energy intensity by 30 percent by FY 2015 from a FY 2003 baseline. FY 2014 has a target goal of 27% energy intensity reduction. Sites are expected to aggressively strive toward the overall Departmental goal of a 30 percent reduction, particularly when cost-effective and prudent to do so. SRS has been well-ahead of the curve in energy intensity reduction and has reached an energy intensity reduction of 71.1% from a FY 2003 baseline. This reduction is based on October 2014 FIMS square footage.

Performance Status

SRS has made significant strides in energy reduction per square foot over the years. Some of this contribution was from shutdown of various operations following the end of the cold war. However, efficiency improvements have been ongoing at the site for many years and additional benefits have been gained from wide variety of energy reduction and utility management strategies, including:

- A new site-wide domestic water system, resulting in the shutdown of electrical pumping in many areas across the site
- A new central sanitary treatment and wastewater facility, resulting in the shutdown of multiple sanitary plants across the site
- The shutdown of large river water pumps, along with revised operating strategies for remaining pumps
- Minimizing operation of boilers used for winter heating
- New chillers across the site, along with centralized chill water plants in various locations
- A new Biomass Cogeneration Facility which has been in operation for over 2 years
- New biomass steam plants in A-Area, K-Area and L-Area
- Completion of two building-specific Energy Savings Performance Contract projects (ESPCs) in nearly 150 facilities
- Retrofitting of over 30,000 lighting fixtures
- Deactivation and decommissioning of many facilities, including entire Areas

- Consolidation/utilization of building space and employees
- Increased utilization of setback equipment in facilities (lighting timers, lighting sensors, thermostats, etc.)
- Various small-scale lighting upgrades

Considerable amounts of energy are used in SRS production facilities as part of site missions. Changes to total site energy on a fiscal year basis are common, whether increases or decreases, and these changes are a significant contributor to the site energy totals.

SRS conducted many activities in FY 2014 that impacted energy intensity. The following are some of the notable accomplishments:

- The new Biomass Cogeneration Facility was in its second year of full operation. This had the most impact on the energy intensity reduction since steam and electricity output from the plant are not included in the intensity metric because the plant is a renewable energy source.
- Completed the installation of several HVAC units with new, higher SEER (Seasonal Energy Efficiency Ratio) units
- Utilized cool roofs on five roof replacements
- Called multiple peak alerts during summer months and posted in all occupied buildings the *Peak Alert Check List*

A Peak Alert is issued when the BCF reaches its optimum output. This site wide voice announcement notifies SRS employees to implement the *Peak Alert Check List* which instructs employees to:

1. Continue working safely and efficiently
2. Raise thermostat settings by 3 degrees
3. Postpone non-urgent work which uses PCs, copiers, and other heat producing equipment
4. Turn off other nonessential electrical equipment
5. Turn off lights and equipment in unoccupied offices, conference rooms, and other work spaces
6. Where safe practices allow, reduce lighting
7. Close outside doors, windows, and blinds

By adhering to the *Peak Alert Check List*, when it is announced, cooling demand is reduced by more than 25%; thus, reducing energy consumption and consequently energy costs. The peak alert motto is “PEAK ALERT = PEAK PERFORMANCE”.

Plans and Projected Performance

Efforts to be pursued in FY 2015 to reduce energy intensity at the Savannah River Site include:

- Replacement of HVAC units with higher SEER units
- Work with DOE and Ameresco Federal Solutions to collaboratively determine how to maximize Biomass Cogeneration Facility steam and electricity outputs
- Operation of the new K-Area and L-Area biomass plants will be monitored to ensure efficient operation
- Continue chill water metering of relevant facilities targeted for HPSB-EB program
- Continue Site Peak Alerts when applicable and as necessary

During FY2015, Tritium will continue its efforts in supporting the Savannah River Site with energy and water savings through the following actions:

1. Conduct a required energy and water audit for 233-H, 234-H, and 234-7H. These buildings are EISA Section 432 "covered" facilities within Tritium and must have an audit performed every 4 years.
2. Complete CD-0 for the Tritium Centric Operations Project (TCOP) line item in support of the Tritium Responsive Infrastructure Modifications (TRIM) Program objectives. Collectively, these objectives will reduce energy consumption among other future benefits (e.g. footprint reduction, deferred maintenance reduction).
3. Disposition trailer 235-13H. This measure is in support of the NNSA Facility Disposition Program and will reduce overall gross square footage, deferred maintenance, and energy consumption.
4. Continue progress with the new 234-7H ice storage system project, including completion of HVAC site preparation for TRIM utilities and progress with vendor equipment skid fabrication. In addition to being an integral part of TRIM, this system is a pilot application of using ice storage to support a process facility.
5. Repair electrical meters in 218-1H, 252-55H, and 252-81H to ensure accurate billing of electricity consumption.

SRS incorporates sustainability into various aspects of maintenance associated with infrastructure and site processes. The following are some of the beneficial programs employed by the site:

- New HVAC units have higher SEER ratings and employ environmentally friendly refrigerants

- Low-flow water use devices (flush valves, aerators, etc.) are stocked in site stores for use in maintenance replacements
- Thermography is used in predictive maintenance programs to determine hot spots in electrical equipment
- Vibration analysis and lube oil analysis are used in predictive maintenance programs across the site
- HVAC cleaning, filter replacements, etc., have been optimized

2.2 EISA Energy/Water Evaluations

EISA (Energy Independence & Security Act of 2007) Section 432 describes a comprehensive approach for deploying energy and water efficiency and conservation measures (ECMs) in federal buildings and monitoring project and building performance.

Performance Status

EISA required an initial, comprehensive energy and water audit evaluation of covered facilities by June 2012. To meet this requirement, the DOE-HQ Sustainability Performance Office (SPO) utilized an existing Federal Energy Management Program (FEMP) subcontract with EMR, Inc., of Virginia to conduct energy audits in 2.4 million square feet at SRS in 2012.

During FY2014 SRS completed energy and water audits, per EISA, Section 432, of the following buildings: 247-H, 249-H, 264-H, and 264-1H.

Plans and Projected Performance

SRS plans to conduct required energy and water audits, per EISA Section 432, for the following Tritium facilities: 233-H, 234-H, 234-7H,

Many energy audits have been conducted at SRS over the past 15 years, and the preponderance of the findings has been relatively similar. Routinely conducting energy audits in site facilities may not prove to be a cost-effective strategy. This is particularly true when energy service companies can conduct energy audits to determine ESPC (Energy Savings Performance Contract) potential at no cost or limited cost. If ESPC projects can no longer be generated due to limited savings potential, this would validate that conducting additional audits simply to comply with this objective would not be cost-effective.

2.3 Metering

In support of Executive Order 13514, “Federal Leadership in Environmental, Energy, and Economic Performance”, DOE has added to its Sustainability Goals a requirement that individual buildings be metered for 90% of electricity by October 1, 2012 as well as 90% of steam, natural gas, and chilled water by October 1, 2015. FY2014 has a targeted goal of 90% for electricity and 75% for steam, natural gas, and chilled water.

Most buildings located at SRS are not metered individually. However, all energy use is metered for proper billing purposes. This is accomplished through the use of a few individually metered buildings in addition to meters that capture the energy consumption of entire areas, e.g. L-Area, K-Area, etc. as well as meters that are designated for specific processes. The metering process at SRS is identified and explained the *Savannah River Site Metering Plan*, which has recently been updated.

The following is a summary of information included in the SRS Metering Plan:

- SRS has in place an existing extensive metering program, including over 230 electrical meters and 16 steam meters providing energy use data
- SRS uses meter data as part of a comprehensive billing / cost allocation system
- Meter data is directly correlated with various multi-building processes / programs across the site
- Not all buildings are individually metered but individual processes / programs are as part of costing efforts
- It has been determined from the metering guidance and previous discussion with DOE-HQ personnel that SRS meets the metering objectives due to the existing metering program utilizing data associated with processes / multi-building applications versus individual buildings
- SRS will focus on installation of new meters in facilities associated with High Performance Sustainable Building (HPSB) efforts and in Data Centers
- SRS ensures that new buildings have meters installed during construction
- SRS maintains a Critical Infrastructure Priority List of immediate needs requiring funding and has difficulty funding the most critical items due to limited funding. In addition, the site also maintains an Integrated Project List of hundreds of projects which remain unfunded. Garnering funding priority for additional major metering infrastructure will not be possible with these site constraints. Direct funding from another source would be required to implement any metering installations not included in this Plan. Proceeding would not be cost-effective or necessary, however, as documented in this Plan.
- A rough order of magnitude cost of \$7M to \$12M would be anticipated to replace existing metering infrastructure with new advanced metering.

Note: SRS does not use natural gas and therefore this energy source is not metered. Also, although chill water is used at SRS most chill water units are not metered.

Performance Status

The “SRS Metering Plan” written in 2011 was updated during October 2014. Between FY2012 and the end of FY2014 SRS installed the following meters:

- Twelve electrical meters
- Six chill water meters
- Two data center meters
- Two steam meters

SRS will continue to use its existing metering plan in FY 2015 to collect data for utilities consumption at SRS.

Plans and Projected Performance

In an effort to ensure accurate billing of electricity consumption, SRS plans to repair, or place as needed, the following electrical meters:

1. 218-1H electrical meters #12H40 and 12H41 serving 234-H
2. 252-55H (T1) electrical meter #12H78 serving 233-H
3. 252-81H electrical meter #12H129 serving 246-1H

SRS has limited plans for replacement of any additional existing metering infrastructure or add additional meters because, as stated in the current SRS Metering Plan, the site meets the intent of the metering objectives due to the existing metering program utilizing data associated with processes / multi-building applications versus individual buildings. It has also been determined that implementing a site-wide metering enhancement is not cost-effective.

The Site will continue with an extensive and thorough cost distribution system whereby customers/organizations are billed for their electricity and steam use. The primary purpose of the meters is to provide the needed data for the site-wide billing. The site system is referred to as the Power Quantity & Cost Distribution System, or PQCD. The meter data is collected in a central location where it is evaluated by a financial analyst who validates both the incoming purchased power utility contract figures as well as using the cost allocation system (PQCD) to ensure the various organizations across the site are billed appropriately for their consumption.

2.4 Cool Roofs

Cool roofs reject solar heat instead of absorbing it. Installing a cool roof reduces heat gain, thereby reducing the amount of air conditioning required in a building. Cool roofs also lower roof membrane temperatures and reduce heat island effect, which improves roof top air conditioner heat rejection.

Performance Status

SRS currently has a total of nine facilities which have incorporated cool roof technology. The following facilities incorporated cool roof technology during FY 2014: 730-2B, 720-H, 707-C, 241-102H, and 717-11F.

Many buildings have had roofs replaced using LSFR (low slope fire retardant) EPDM (ethylene propylene diene monomer) or SBS (Styrene-Butadiene-Styrene) Modified Bitumen Membrane System white membranes. These applications reduce heat transfer and increase reflectivity. They also provide the site with additional warranties as these materials aid in providing longer life.

The site received the Secretary of Energy's June 2010 memo related to proceeding with installation of cool roofs on Department buildings unless determined to be uneconomical by a life-cycle cost analysis. This memo included the "Guidelines for Selecting Cool Roofs" document, and the membranes used at SRS as cited above are included in this guidance (pages 7-8). A group of Subcontractor Technical Representatives are responsible for managing roof replacements on-site, and these personnel have been provided the new directives. Design Engineering personnel have also been provided this direction.

Plans and Projected Performance

SRS will continue to incorporate cool roof technology into annual roof replacements in FY 2015, similar to what has been done in recent years. According to the current FIMS database the following buildings are scheduled for cool roof technology application during FY15: 776-1A, 716-2A, 703-4A, 730-1B, 730-4B, 249-2F, 249-H, and 701-2K. Of course, the roof replacements will be done as funding allows and on an as needed basis.

2.5 High Performance Sustainable Buildings (HPSB) – Existing Building

All programs that own or lease real property must develop and implement a plan to ensure that at least 15 percent of their enduring buildings are compliant with the Guiding Principles of Executive Order 13423. Executive Order 13514 and the SSPP clarify the goal to be 15 percent of the *number of buildings*, not square footage, although both may be tracked. Buildings that fall under this requirement are limited to those greater than 5,000 square feet. Additionally, E.O. 13514 and the SSPP require 15 percent by FY 2015 while stipulating continued progress towards 100 percent.

Performance Status

SRS has identified twenty-four existing buildings for the HPSB-EB program. These buildings are identified in the EnergyStar® PortFolio Manager® data base and in the below table.

Facility	Guiding Principle Status
703-43A	46%
703-45A	46%
730-B	46%
730-1B	46%
730-2B	46%
730-4B	46%
735-2B	46%
735-3B	46%
705-C	46%
705-3C	42%
707-C	46%
246-H	100%
246-1H	46%
246-2H	46%
766-H	46%
704-N	46%
704-1N	46%
731-N	42%
731-1N	42%
731-2N	42%
731-3N	42%
731-4N	42%

Note: Building 735-1B is included in the HPSB-EB scope. However, it is not listed in the Port Folio Manager database and therefore not included in the above table.

In September 2014, a NNSA received recognition for the first existing building at SRS and one of the first within the Nuclear Security Enterprise (NSE) to achieve the HPSB-GP status. With this accomplishment SRS has achieved 0.62% of the required 15% of enduring buildings to be compliant with the Guiding Principles. The remaining 14.38% of the required 15% are in progress. Seventeen of the remaining buildings in the HPSB-EB scope have reached 46% of the Guiding Principles and six of the remaining buildings have reached 42% of the Guiding Principles.

There is no documented progress in the HPSB-EB program during FY2014 due to non-funding of this program for FY2014. The following information is what was accomplished through FY2013 at SRS with regard to HPSB-EB (Existing Buildings). SRS established a HPSB Oversight Team from various departments. A representative from DOE-SR and the National Nuclear Security Administration (NNSA) served on the team.

The team responsibilities as stated in the charter were as following:

- Provide a forum for site Subject Matter Experts to jointly discuss recommendations for achieving Guiding Principle objectives in a cost-effective manner
- Ensure HPSB-related policies developed at the site meet program objectives, or ensure that existing policies achieve HPSB program objectives if already in place
- Develop plans of action for HPSB Guiding Principles

Team consideration is as following:

- Team strived to make recommendations which limit funding requirements
- Team strived to utilize existing site approaches as much as possible for compliance
- Team determined that compliance will be claimed for objectives that have been analyzed & generally show a lack of cost-effectiveness (20% energy & water reductions, ozone-depleting substances, etc.)

The team addressed 26 program objectives associated with HPSB at SRS. Eleven objectives are already achieved or no other action is to be taken to demonstrate compliance. Eleven objectives are achievable with a relatively limited level of action required to demonstrate compliance. Four objectives are more difficult to achieve and demonstrating compliance will require higher levels of funding.

The team was able to develop a plan of action and identify the level of funding required to move forward in FY 2014. The following table identifies the status of the SRS buildings which are in the scope of the HPSB-EB program:

Plans and Projected Performance

SRS plans to gain NNSA-HQ subject matter expert support to review HPSB status of Buildings 246-1H and 246-2H, pending funding support from NNSA-HQ.

The Guiding Principles are incorporated into the SRS Conduct of Engineering Manual (E7 Procedure 1.41, "Sustainability Pollution Prevention in Design"). Therefore, Site Services

will make every reasonable effort to record any progress through existing programs, routine maintenance and repairs, and major renovations. Also, Building 735-1B will be added to the Port Folio Manager database.

2.6 New Construction – Guiding Principles

All new buildings and major renovations at CD-1 or lower (i.e., not yet having obtained CD-2 approval before October 1, 2008) and with a value exceeding \$5 million must achieve the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) Gold certification and, to the extent possible and life-cycle cost effective, meet the Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings ("Guiding Principles"). Any buildings below or equal to the \$5 million threshold are still required to meet the Guiding Principles.

Performance Status

Although two major construction projects are underway at SRS, there were no new building construction projects completed in FY 2014. Additionally, the Waste Solidification Building (WSB), which is currently under construction, is scheduled for an early completion during the later months of FY 2015. This facility was not designed to meet LEED criteria because the WSB was at CD-1 prior to the implementation of the new standards. A Memorandum of Understanding (MOU) was written to clarify why the WSB was not designed and subsequently constructed to meet LEED standards. SRS document number SRNS-E9000-2009-00007-WSB provides specifics on how the WSB design, construction, and ultimate operation exhibit due diligence with regard to environmental stewardship and sustainable buildings.

Plans and Projected Performance

SRS will continue to work towards achievement of the Guiding Principles, and LEED certification, as funding is provided.

2.7 Regional & Local Planning

Executive Order 13514 instructs federal agencies (including DOE) to meet the following regional and local planning goals.

- Participating in regional transportation planning and recognizing existing community transportation infrastructure;
- Aligning federal policies to increase the effectiveness of local planning for energy choices such as locally generated renewable energy;
- Ensuring that planning for new federal facilities or new leases includes consideration of sites that are pedestrian friendly, near existing employment centers, and accessible to public transit, and emphasize existing central cities and, in rural communities, existing or planned town centers;

- Identifying and analyzing impacts from energy usage and alternative energy sources in all Environmental Impact Statements and Environmental Assessments for proposals for new or expanded federal facilities under the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.); and
- Coordinating with regional programs for federal, state, tribal, and local ecosystem, watershed, and environmental management.

Performance Status

The most recent example of how SRS works with and becomes involved with regional and local planners is discussed further into this document in Section 9, Climate Change resilience. Also, a Park and Ride Facility was recently opened as a result of SRS actively working with the South Carolina Department of Health and Environmental Control (SCDHEC) Bureau Air Chief, other local industry, and the North Augusta Chamber of Commerce Director of Economic and Community Development to support the construction of this facility. The park and ride was officially opened in August 2014 and facilitates the formation of additional carpools for SRS personnel as well as commuters to surrounding work sites.

Additionally, SRS continues their involvement with the various off-site entities listed below:

- Staffs from the Nuclear Regulatory Commission, the Defense Nuclear Facilities Safety Board, the Environmental Protection Agency and the South Carolina Department of Health and Environmental Control are either resident on Site or regular visitors to fulfill their regulatory and advisory duties.
- Representatives on the South Carolina Energy Users Committee (SCEUC). The function of this committee is to monitor actions by area utilities, specifically as they relate to rate changes and Public Service Commission interactions.
- Ameresco Federal Solutions, as discussed in this plan, for use of biomass to produce steam and electricity. Ameresco works with local industry to obtain wood products and other fuel streams.
- SRNL provides technical innovations and solutions for SRS missions and serves diverse national interests at other DOE sites and for other federal agencies.
- SRS is the first National Environmental Research Park, an independent outdoor laboratory managed by the Savannah River Ecology Laboratory (SREL).
- Seeks to be proactive in increasing the site's impact in the environmental stewardship, clean energy and national security business segments through a vision referred to as Enterprise SRS.
- Work closely with the Savannah River Community Reuse Organization and local economic development boards.
- Partnered with the Georgia Clean Air Campaign (GCAC). The GCAC works under contract with the Georgia Department of Transportation (GDOT) to provide a range of programs to improve traffic and air quality throughout Georgia, with special emphasis on areas with current or future air quality challenges. Approximately 30%

of SRS employees live in Georgia. SRS has the highest number of active participants in the area for the GCAC Commuter Rewards Program.

- SRS has been designated as a National Environmental Research Park, or NERP. The Savannah River Ecology Lab (SREL), with University of Georgia affiliation, provides oversight and leadership in efforts associated with the SRS NERP. The objective is to investigate how the natural environment interacts with man-made environments. This is one example of how SRS is involved with off-site regional entities in sustainability-related efforts. One of the objectives in the NERP charter is to “educate the public on environmental issues.” National Environmental Research Parks are actually field laboratories set aside for ecological research, for study of the environmental impacts of energy developments, and for informing the public of the environmental and land-use options open to them. SREL provides key support by managing and monitoring DOE Research Set-Aside Areas.

Plans and Projected Performance

SRS will continue in FY 2015 with activities listed in the previous section.

3.0 Fleet Management

The primary DOE transportation and fleet management goals are a 30% reduction of fleet petroleum consumption by FY 2020 compared to a FY 2005 baseline and a 10% increase of alternative fuel consumption by FY 2015 compared to a FY 2005 baseline.

SRS has been successfully implementing multiple fleet management fuel reduction and inventory strategies since the 1990's. Various approaches have been undertaken to reduce petroleum consumption and increase alternative fuel use. One approach to save on fuel consumption is the discouragement of excessive idling of vehicles through the safety culture of the site. No government vehicle is allowed to remain running if the driver is not behind the wheel and in control of the vehicle. Additionally, before loading and unloading government vehicles, said vehicles are required to be stopped, engine placed in off position, emergency brake engaged, and tires chocked. (This does not apply to dump trucks)

3.1 Alternative Fuel Use

The primary DOE transportation and fleet management goals are to decrease fleet petroleum consumption 30% by FY 2020 from a FY 2005 baseline and increase alternative fuel consumption by 10% by FY 2015 relative to a FY 2005 baseline

SRS has been successfully implementing multiple fleet management fuel reduction and inventory strategies since the 1990's. SRS has far surpassed goals from previous baselines, making it increasingly difficult to meet current objectives. Various approaches have been undertaken to reduce petroleum consumption and increase alternative fuel use and will continue in FY 2015.

Performance Status

- SRS plans to open its third 10K gallon E85 tank on site. Each of these tanks can accommodate two vehicles simultaneously with their two dispensing stations.
- SRS ethanol use has increased over 300% since FY 2000.
- Sustained annual increases are no longer realistic due to exceptional increases in past years.
- SRS is participating in the GSA Electric Vehicle Pilot Program with one active electric vehicle and one active charging station.
- SRS will continue to maximize E85 Alternative Fuel Vehicle (AFV) leases, right size the fleet and mandate E85 use in all E85 vehicles.

The use of alternative fuels at SRS has increased dramatically in recent years. Most of the light duty fleet is currently fueled by E85 or are gasoline hybrids. The site works to ensure the use of alternative fuels remains high by replacing gasoline fueled vehicles with alternative fuel vehicles. This replacement is conducted when the gasoline vehicles' are due for replacement.

In the initial year of alternative fuel use (FY 2000), SRS consumed about 80,000 gallons of E85. During FY 2014, this consumption total rose to over 334,000 gallons. The result is an increase of nearly 318% since initiation of this fuel choice. Increasing fleet alternative fuel use by 10% annually is becoming more challenging due to these great strides compounded by the DOE mandated use of hybrid vehicles. The 83 hybrid vehicles on site, mandated by DOE, work against the site meeting this goal because Hybrids use gasoline.

Plans and Projected Performance

SRS will continue to maximize the use of alternative fueled vehicles, as successfully done in over the past fifteen years. The site does not expect an appreciable percentage increase in use of alternative fuels during FY2015 due to past successes as well as the recent 35% vehicle inventory reduction. All efforts to meet this goal are in effect such as all vehicle replacements for the light duty fleet will continue to be those which consume an alternative fuel.

3.2 Petroleum Reduction

The current goal for petroleum reduction is a 2% annual reduction in fleet petroleum consumption by FY2020 relative to a FY2005 baseline. SRS has a 2014 target goal of an 18% cumulative reduction since 2005

Performance Status

Through FY 2014 SRS has achieved a 2.03% annual reduction of petroleum. Furthermore, SRS has exceeded its 2014 target goal of an 18% cumulative reduction since 2005 by achieving a 27% cumulative reduction

Plans and Projected Performance

Under current conditions the site is on-track to meet the overall goal requirement of 30% by FY 2020. However, this goal may be compromised by the use of hybrid vehicles in the current fleet inventory and certainly with an inventory increase of hybrid vehicles.

3.3 Light Duty Fleet Vehicle Leases/Purchases

DOE is to annually meet the EPACT 1992 AFV acquisition requirement, whereby 75 percent of light duty vehicles acquired must be AFVs. This increases to 100% by FY 2015 and thereafter.

Performance Status

The SRS fleet is provided by the General Services Administration (GSA). The site and GSA work in concert to maximize acquisition of alternative fuel vehicles (AFVs) and minimize vehicles operating solely on petroleum. GSA is under the same federal legislation regarding fleet efficiency that SRS is required to meet. Acquisitions in the fleet are often impacted by the vehicle limitations that GSA has based on availability and manufacturing by the automakers.

SRS received the first AFV on-site in FY 1997 and expanded to hundreds of E85 (ethanol) AFVs or gasoline hybrids in the light duty fleet in FY 2014. Currently, 84% of the existing light duty fleet at SRS consists of alternate fuel vehicles to include hybrids and one electric car. The remaining 16% of the light duty fleet are fueled by unleaded gasoline. These vehicles are being systematically phased out and replaced with alternative fuel vehicles.

Plans and Projected Performance

Fleet sizing is determined by the number of vehicles required to accomplish site missions and corresponds directly to the demand as much as possible.

SRS has successfully reduced its fleet inventory of non-mission critical vehicles by 35% relative to a FY2005 baseline. The site will continue to monitor vehicle utilization and effectiveness and strive to maintain a minimum fleet inventory without sacrificing critical mission elements or a commitment to operate in a safe, secure, and environmentally sound manner.

The site will prioritize replacement of E85 vehicles with vehicles using E85 fuel versus use of hybrids since these increase petroleum use which is counter to the petroleum reduction goal. Use of AFVs is the primary consideration when making decisions regarding the fleet.

SRS and GSA have successfully completed the acquisition of a Plug-in hybrid electric vehicle. This acquisition project included the installation of a charging station on SRS property to power the vehicle.

4.0 Water Use Efficiency and Management

4.1 Potable Water

Legislation stipulates that DOE as an agency will reduce potable water intensity by 26% by FY 2020 relative to a FY 2007 baseline. SRS has a FY2014 target goal of 14%.

Performance Status

The site has been significantly decreasing water consumption over many years. A new SRS primary domestic water system was installed as part of a large Line Item project in 1996. Several hundred million gallons of annual water savings were realized following this right-sizing effort and resultant replacement of old piping which had substantial leaks.

As compared to the current baseline (FY 2007), SRS has reduced potable water intensity through FY 2014 by 22.15%. Over a longer timeframe, potable water consumption has been reduced by ~36.2% since FY2004 and a 16% reduction since 2007. More recently, there was a 6.7% reduction from FY2012 to FY2013, and a 1% reduction from FY2013 to FY2014. Further reductions will be more difficult due to the large decreases already achieved. Usage fluctuates from year to year based on various factors such as the number of employees and the amount of potable water used for non-potable uses.

During FY 2014, SRNS incorporated into an existing Statement of Work (G-SOW-G-00218) “Energy & Water Reductions and Efficiency” requirements to include use of WaterSense® products or other water conserving products such as: low-flow toilet flush valves, low-flow urinal flush valves, and low-flow faucets for all routine maintenance practices. In recent years, several hundred faucets and flush valves have been replaced with reducers or low-flow units.

Plans and Projected Performance

No appreciable percentage change in potable water intensity is projected for FY 2015. This is due to previous large decreases, the fact that water fixture retrofits are not cost effective (unless the retrofit is in response to a repair), and budget limitations.

SRS will continue to install low-flow toilet flush valves, low-flow urinal flush valves, and low-flow faucets as part of routine maintenance practices as fixtures require replacement.

4.2 Industrial Water

Legislation requires DOE as an agency to realize a 20% water consumption reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 as compared to a FY 2010 baseline. SRS has a 2014 target goal of 8% reduction.

SRS has several large process wells in A-Area, F-Area, and H-Area which supply water for industrial/process applications. Required flow demands for these process applications varies substantially from year to year and can significantly impact the annual amount of well-water pumped. Operating pressures of the various wells are noted by water operators on a

round-sheet, and this, along with hours of operation using run-hour meters in some cases, is used with pump performance testing results to determine estimated gallons produced by each well. Data associated with the wells is obtained monthly and is managed accordingly, including use of the data to bill various customers that utilize the water.

The site pumps a large quantity of river water from the Savannah River via one pump house, 681-3G. The 681-3G river water pump house provides water used as boiler feed-water for the new Biomass Cogeneration Facility. The pump house also provides L Area with fire protection water and feed water for the L Area Biomass Facility. NPDES permit requirements for maintaining a flow of 1,800 gpm into the L7 outfall at L Lake are met with river water pumped from 681-3G. This pumping station was used for decades to provide cooling water for site reactor operations but no longer serves that purpose due to the reactors being decommissioned.

Performance Status

As in FY 2013, FY2014 saw significant reductions related to ILA water consumption. The primary change is due to the operation of the new Biomass Cogeneration Facility. This facility is more water efficient than the prior 484-D steam plant, thus ensuring large reductions in ILA water consumption will continue for many years to come.

Process (ILA) water consumption in FY 2014 was decreased by 65.4% as compared to the baseline of FY 2010. As noted above, water usage has decreased because the new BCF is right-sized for the load, is more efficient, and has lower steam line losses due to shorter runs. There was a 10.2% reduction in ILA water consumption from FY2013 to FY2014. However, this reduction will fluctuate from year to year in response to changing process water needs.

For example, process well water pumpage (a subset of ILA water consumption) increased by 9.7% from FY2013 to FY2014, primarily due to a need for supplemental flow to support proper operation of the A-01 wetlands.

In FY2014 actions were taken to reduce well water consumption, including the installation of a new water supply inlet valve for the 782-A water storage tank. This new inlet valve replaced an older model which vibrated excessively when it was throttled to reduce flow.

Plans and Projected Performance

Recent large scale reductions in ILA water consumption are expected to continue in FY2015, primarily due to operation of the BCF.

During FY2015, SRS will complete the design for a fully automatic level control system for the 782-A water storage tank; which is expected to further reduce A-Area well water pumpage.

5.0 Pollution Prevention (P2) and Waste Reduction

In accordance with the hierarchy established in the Pollution Prevention Act of 1990, the Savannah River Site's primary objective is to prevent or reduce pollution at the source whenever feasible. Pollutants and wastes that cannot be prevented through source reduction will be diverted from entering the waste stream through environmentally safe and cost-effective reuse or recycling to the greatest extent practicable. Pollution Prevention (P2) is the SRS preferred approach to reducing waste, mitigating health risks, and protecting the environment. The Pollution Prevention Program provides SRS a safe, effective, and environmentally responsible strategy to implement specific waste reduction techniques based on current and projected information on waste generation, waste characterization, and ultimate waste disposal costs. Pollution prevention is a key component of the SRS Environmental Management System (EMS).

The SRS Pollution Prevention Program scope includes both in-field waste generator programs and a site-wide coordination program. The SRS P2 Program implementation requirements are documented in SRS Environmental Compliance Manual 3Q, Procedure 6.11; *Pollution Prevention Program*. The waste generators' programs are funded through each generator's operating budget to coordinate facility-specific program initiatives and to implement process modifications and new technologies. Site-wide program coordination, which is managed by the Solid Waste Management organization, is separately funded to provide the following:

- Management support of Pollution Prevention Program
- Technical assistance for facility walk-downs, lifecycle waste cost analyses, and pollution prevention opportunity assessments
- Forums for waste minimization and P2 information and technology exchanges
- Employee P2 awareness and training programs
- Mechanisms to increase waste generator accountability through the Solid Waste Management Committee (SWMC)
- Completion of required annual plans and reports
- Implementations of site-wide initiatives such as sanitary waste recycle, Green-Is-Clean (GIC) programs
- Establishing a P2 component into the Site's Communication Plan to increase public awareness and support

There are two parts to current goals. The first is to divert greater than 50% of the non-hazardous and non-C&D sanitary waste by the end of FY 2015. This consists of typical waste considered part of municipal waste streams. The second part of this goal is to divert

at least 50% of construction and demolition (C&D) materials and debris from disposal by the end of fiscal year 2015.

5.1 Non-Hazardous Solid Waste Diversion

Performance Goal

Divert at least 50 percent of non-hazardous solid waste, excluding construction and demolition debris, by the end of fiscal year 2015

Performance Status

SRS uses the North Augusta Material Recovery Facility (NA-MRF) for routine waste (typical office and municipal-type waste) recycle services. For FY2014, NA-MRF recovered about 40% of this stream, 547 metric tons from 1,383 shipped. The SRS NA-MRF subcontract includes provisions to support attainment of the 50% recovery rate to the extent practical.

Plans and Projected Performance

The NA-MRF has recently added new front-end processing equipment that may improve their recovery rates. SRS, utilizing various recycle contractors, has historically experienced difficulties in exceeding greater than 45% recycle rates for the routine waste stream. SRS will continue to work with both the MRF and the on-site commercial Three Rivers Landfill to identify opportunities to increase recycle rates. It is projected that SRS will be challenged to cost-effectively achieve a recycle rate greater than 45% for this stream by the end of 2015.

SRS has no significant mission changes projected for the next few years that will impact Site populations. While SRS will continue to emphasize paper-less operations, no significant impacts to typical generation rates for this waste stream are expected. Composting services for the putrescible waste portion of this stream is not available locally and deemed not practical.

5.2 Construction & Demolition Materials Diversion

Performance Goal

Divert at least 50 percent of construction and demolition materials and debris by the end of fiscal year 2015

Performance Status

SRS utilizes various services to recover debris-type materials for scrap value. In FY2014 Site Salvage Operations has recovered about 533 metric tons of materials, including all non-radioactive scrap metals, scrap furniture, and used drums. In addition, 28 metric tons of scrap wood that was diverted to Three Rivers landfill was shredded for re-use. These efforts represent recovery of less than 3% of the SRS debris stream. Low cost of on-site

C&D Landfill services and limited cost-effective reuse options for scrap debris significantly challenge cost-effective recycle options for this debris waste stream. Viable candidate materials, e.g. – recoverable property and scrap metals that are recyclable through the Site’s Asset Management Excess and Salvage Programs are removed from the C&D stream by generators. The two potential remaining stream components for recovery, scrap wood and concrete/asphalt, were offered to Site Operations and the US Forestry Service located on-site. No reuse option was identified for the wood stream, including burning for energy recovery due to our boiler permits. There is potential use for the concrete/asphalt stream as crush and run. Based on projected generation rates, SRS would need to accumulate these materials for time periods requiring a State solid waste processing facility permit to obtain sufficient quantities to justify the cost to bring in a subcontract to process for recovery. Meeting permitting requirements is currently deemed impractical. SRS will petition the State to allow extended accumulation periods in lieu permitting.

SRS also shipped \$18 million in usable assets (equipment and supplies) through Site Excess Operations for reuse and recovery. Asset recovery is based on property acquisition values and not included as a SRS waste diversion operation although if this service was unavailable significant increase in waste management cost would be incurred.

Plans and Projected Performance

SRNS has not identified cost-effective, viable options to significantly increase recycle/recovery rates for the C&D waste stream. C&D waste quantities are expected to significantly diminish in the next few years due to the construction status of two major projects, Mixed Oxide Fuel Facility and Salt Waste Processing Facility. Also, Site Area Closure Operations forecast only the generation of debris from D&D of a few office trailers and few miscellaneous other facilities in the FY15 to FY17 period.

Additional plans and expected performance:

- Continue to trend C&D waste stream composition.
- Continue to track emerging options for C&D waste recycle.
- Continue using a graded approach to divert those C&D materials evaluated as cost effective to the project.
- Follow-up with SCDHEC on regulatory approval, in lieu of obtaining a solid waste processing permit, to accumulate materials (i.e. – concrete and asphalt debris) for periods exceeding one year for purpose of obtaining sufficient quantities to justify cost to process for recovery.

SRS will continue to implement strategies and operations to increase sanitary waste recycle rates using a long-term graded approach in accordance with SRNS-DOE436.1-IP-3. A long-term graded approach provides a cost-effective methodology for addressing these associated goals and allows SRS the ability to reshape selected business practices and

incorporate costs into annual budgets as necessary. No significant increase in SRS recovery rate performance is expected for this waste stream in FY15.

6.0 Sustainable Acquisition

Performance Status

SRNS Procurement has established sustainable acquisition practices related to the acquisition of environmentally preferable products. At least 95% of applicable solicitations included an EPP (Environmentally Preferable Purchasing) clause in FY 2014. Through this initiative, the department has worked with other Savannah River Site (SRS) entities (e.g., maintenance, engineering, and infrastructure organizations) as facility modifications are performed to procure EPP alternatives as recommended and approved for site utilization. Several practices, as outlined, have evolved relative to EPP procurements:

- a. Chemical acquisitions are reviewed and approved by the SRNS Chemical Management Center (CMC). This review monitors usage of hazardous chemicals and, where appropriate, recommends EPP's.
- b. Electronic stewardship has yielded the procurement/leasing of desktops, laptops and monitors that meet Electronic Product Environmental Assessment Tool (EPEAT) standards (as stated in section 7.3) and copiers that are Energy Star compliant.
- c. EPP substitutions have been procured under various new and existing contracts, including bulk janitorial supplies (e.g., cleaners, paper products) and safety items (e.g., ear plugs, filters).
- d. Development and incorporation of an "Environmentally Preferred Products" clause is invoked on all new applicable solicitations.

Relative to assessment and monitoring, on October 1, 2011, Procurement implemented a new business system to track procurements. This new system provides a mechanism for monitoring or tracking acquisitions relative to the procurement of EPP or green related requirements. This new business system will enable the development of an EPP baseline and track spending of EPP items and materials.

Plans and Projected Performance

Procurement will continue to ensure that procurements meet sustainability requirements by including the Environmentally Preferred Products clause in at least 95% of applicable solicitations. Procurement will continue to support the subsequent actions and initiatives of other SRS entities (i.e., engineering, maintenance and infrastructure organizations) by procuring EPP alternatives as recommended for site utilization.

Due to the diversity of products and services that SRNS Procurement purchases, there is no single "green" product or service definition used. Rather, the sustainable procurement program will strive to customize sustainability criteria according to the policies, goals and best practices per product.

Procurement will continue, as applicable, to review policies and procedures to ensure appropriate contract language requirements imposed by Executive Order 13514 are incorporated relative to the Sustainability Plan and the three associated focus areas: low emitting materials, recycled content, and bio-based content. Based on funding availability, Procurement will continue to support activities associated with High Performance Sustainable Buildings. This input will be included for low-emitting materials, recycled content, and bio-based content.

Procurement plans to apply for the FY 2015 Green Buy Award with the confidence of winning in the Gold category.

7.0 Electronic Stewardship and Data Centers

7.1 Data Centers

SRS is working to optimize energy management associated with data centers and electronic computing equipment used by employees at the site. Data centers are defined as those facilities that primarily contain electronic equipment used to process, store, and/or transmit digital information. These can be free-standing structures or a facility within a larger facility that uses environmental control equipment to maintain proper conditions for operation of electronic equipment.

DOE is requesting all core data centers to be metered for accurate measurement of a monthly Power Usage Effectiveness (PUE) of 100% by FY2015 with a 2014 target goal of 90%.

Note: SRS has two data centers which are considered Core Data Centers. The primary, or Central Computing Facility is located in 703-44A and its back-up, the Back-up Computing Facility is located in 707-C. The Central Computing Facility supports all of SRS and is protected by back-up generators in the event of a power failure. However, if the back-up generators fail, the Back-up Data Center is used for site essential data support only. Additionally, the NNSA has three data centers located in the Tritium Facility (building 248-H). Although these data centers are mission critical to NNSA Tritium Operations they are not Savannah River Site Core Data Centers. SRS has no plans to close any of these data centers because they are all mission essential.

Performance Status

During FY 2014, Central Computing Facility data center efforts included the following:

- Continued ensuring new server requests and lease refreshes are first considered for virtual servers before new hardware is leased
- Evaluated new host hardware as refreshes in order to accommodate more virtuals per host

- Currently, 449 of 841 (53%) systems managed by IT are virtual servers.

Note: When SRNL *High Performance Computing* servers are included, the virtualization percentage is 42%

- Weighted average CPU utilization for IT managed physical servers is 11%
- Worked with other site organizations to encourage server room consolidation
- WSI (Wackenhut security) relocated backup computing capabilities to the Back-up Computing Facility
- Installed Synapsense Temperature and Humidity monitoring system in the Back-up Computing Facility

SRS continues to focus on objectives to reduce the total resources required by Information Technology services. In FY 2014, the site continued this priority by evaluating focus areas such as:

- Equipment Virtualization
- Data Center Consolidation
- Efficiency & greenhouse gas reduction through various collaborative tools
- Unnecessary service eliminations and other improvements

Evaluation and analyses are being conducted regarding equipment virtualization, with the end result being a reduction of the number of physical servers. The intent is to employ increased numbers of virtual servers as a service which results in consolidation, footprint reduction, and server farm growth. This will yield reduced hardware costs and delivery time, along with allowing host server maintenance to be accomplished with no downtime to the virtual servers. Multiple methods of virtualization are being explored, but a key item of note within this SSP is that all new and leased servers are reviewed as candidates for virtuals first. The intent is to reduce the amount of hardware and associated energy use (and resultant greenhouse gas emissions). Use of server virtualizations is intended to result in less equipment racks, with the benefit of lower cooling loads and associated power use.

SRS continues to support data center energy reduction objectives by specifying the acquisition of energy efficient electronic equipment and in operating the equipment to improve load management and server innovation. Cooling operations are configured in such a way as to attempt to maximize energy efficiency opportunities. SRS will continue to work to optimize data centers using cost-effective strategies when possible.

Plans and Projected Performance

During FY 2015, the following path forward is projected for virtualization:

- Continue ensuring new server requests and lease refreshes are considered for virtuals first before new hardware is leased
- All requests for new physical servers will be process IT Governance for approval
- Evaluate new host hardware as refreshes in order to accommodate more virtuals per host
- Increase utilization of existing virtual environment

The site will also continue with additional activities in FY 2015 which focus on data center consolidation.

Power Meters were installed in the Central Computing Facility switch gear electrical feed in December 2013. SRS personnel will document the procedure for calculating the Central Computing Facility PUE. This will be done on a monthly basis.

7.2 Data Center Power Utilization Effectiveness (PUE)

DOE has assigned core data centers with achieving a goal of maximum annual weighted average PUE of 1.4 by FY2015 and a 2014 target of 1.5 PUE

Performance Status

The power utilization effectiveness at the Central Computing Facility is currently estimated to be 2.12. This is significantly less than the 3.75 value determined in recent years following the major changes that have been made, but it is higher than the target/goal of 1.4.

Plans and Projected Performance

SRS will begin monitoring the PUE of the Central Computing Facility on a monthly basis. To help improve the Central Computing Facility, SRS will interconnect the two Freon-based water chillers so they can cooperatively manager the heat load in the facility.

7.3 Data Center Power Utilization Effectiveness (PUE)

Performance Status

The power utilization effectiveness at the Central Computing Facility is currently estimated to be 2.12. This is significantly less than the 3.75 value determined in recent years following the major changes that have been made, but it is higher than the target/goal of 1.4.

Plans and Projected Performance

Due to the age of the central facility (CCF), the goal of achieving a PUE of 1.4 in existing spaces is currently a concern at the site without compromising redundancy and reliability.

7.4 Power Management

DOE has set a goal for 100% of eligible PCs, laptops, and monitors to have active power management implemented and in use by FY 2012.

Performance Status

All eligible PCs, laptops, and monitors are equipped with active power management. 98.82% of all PCs, laptops, and monitors acquired on site during FY 2014 are equipped with active power management and the remaining 1.18% without active power management are mission critical. Energy efficient computer products continue to be purchased at Savannah River Site.

Most site computers are provided to site employees via a lease agreement. This lease contract is leveraged for the needs of multiple site companies and specifically states that all computers must be Energy Star compliant and must meet low standby power requirements. All models being leased comply with EPEAT. The pre-EPEAT models have been removed from the Site as their leasing cycle has expired and have been replaced with EPEAT-compliant models. The power reduction features of the personal computers and monitors are set to efficient levels upon receipt of the equipment. If these settings are changed, they are reset to the power efficient levels upon the user's next login unless they have submitted a justification and have been exempted from this reset.

Plans and Projected Performance

Computer leases for the site will continue to meet Energy Star, EPEAT, and low-stand-by power requirements.

SRS will also continue utilization of technologies such as “Sametime Meeting”, which uses the site’s Lotus Notes application to reduce travel and other energy use, as well as expanding video teleconference opportunities.

7.5 Electronic Stewardship

The DOE goal for electronic stewardship requires 95% of eligible electronic acquisitions meet EPEAT standards.

Performance Status

During FY 2014, SRS purchased 6694 eligible electronics; 99.76 of which met EPEAT standards.

Plans and Projected Performance

SRS will continue leasing and purchasing eligible electronics which meet EPEAT standards.

8.0 Renewable Energy

The Department of Energy is required to have 7.5 percent of its electricity consumption supplied by renewable energy sources by FY 2013, per Section 203 of EPACT 2005. The statute provides for a double bonus if the renewable energy is produced on-site (i.e., only 3.75 percent would be needed if all of it were produced on-site) and if the RECs (Renewable Energy Credits) are retained. Sites are encouraged to increase their total annual thermal energy consumption from on-site renewable sources to the maximum extent possible. Each site has been required to install a renewable energy project or show that renewable energy is not feasible at the site because of economic or renewable resource barriers.” The renewable energy goals are based on the total energy consumption at all facilities, including those excluded from the energy intensity reduction requirements.

Performance Status

Use of renewable energy at the Savannah River Site has been prioritized at the highest levels. In October 2008, the design and construction of a new steam plant for A-Area and the Savannah River National Laboratory were completed and the facility placed on-line. The new thermal-only steam plant utilizes biomass as the primary fuel source. Early 1950’s vintage coal-fired boilers were replaced with new state-of-the-art boilers and emission controls while maintaining steam availability around-the-clock at minimum cost. This new plant was installed utilizing the existing Energy Savings Performance Contract (ESPC) in place at the site. The total cost of the project was \$13.8 million and the annual savings average over \$1.5 million. The facility will be paid for (term of the contract) in 9 years.

The renewable and environmental aspects of the project are plentiful:

- Utilization of biomass is being increased by nearly 27,000 tons annually
- Particulate emissions are being reduced (PM from 411 tons/year to 7.36 tons/year, and PM-10 from 300 tons/year to 4.38 tons/year)
- SO₂ emissions are being reduced from 1,836 tons/year to 4.38 tons/year
- NO_x emissions are being reduced from 256.7 tons/year to 35 tons/year
- CO emissions are being reduced from 120.8 tons/year to 105.1 tons/year
- Ash generation and disposal are reduced
- Compliance with Clean Air and Water Act standards

The picture included below is of the A-Area Biomass Steam Plant.



SRS has been well-ahead of the curve in implementation of Energy Savings Performance Contract (ESPC). The site awarded a site-specific ESPC with Sempra Energy Services before Super-regional or Technology-specific ESPCs were in place. The site successfully implemented three ESPC task orders via the site-specific contract with Honeywell Building Solutions (formerly Sempra Energy Services), two of which received awards at DOE-HQ. This third ESPC project (A-Area biomass plant) was specifically related to renewable energy and was the first major step taken by the site to move toward elimination of coal and utilization of biomass for steam and electricity production.

With a continued emphasis on renewable energy, DOE followed the A-Area biomass plant with a new ESPC for additional biomass utilization. In FY 2007, the site embarked upon the largest ESPC task to date at SRS: the replacement of the 484-D powerhouse steam and electrical generation facility with a new biomass cogeneration plant. The coal-fired plant was built in 1953 to provide steam to nuclear and industrial activities in F-, H-, and S-Areas. A cogeneration facility, it produced just less than one-half of the site's electrical consumption requirements. DOE tasked Ameresco Federal Solutions, Inc. (Ameresco) of Knoxville, Tennessee, with the department's largest ever Energy Savings Performance Contract (ESPC) to construct one of the largest biomass facilities in the country at the site.

Ameresco Federal Solutions prepared an Initial Proposal to evaluate replacement of this facility, along with fuel oil boilers which supply steam to K-Area and L-Area. The final recommendation from Ameresco was for installation of two biomass-fired boilers to replace the D-Area plant, along with a 21 megawatt electrical generator, and a new biomass-fired boiler in both K-Area and L-Area. The \$795 million project to design, construct, and operate the plant, including the purchase of biomass, for 19 years replaces a deteriorating, inefficient coal powerhouse and oil-fired boilers at a savings of over \$34 million a year in

energy and operation and maintenance costs and reduces air emissions, including well over 100,000 tons per year of greenhouse gas emissions.

Ameresco completed construction and start-up of this biomass plant (the Biomass Cogeneration Facility) in FY 2012 and will be reimbursed from actual cost savings generated during the 15-year debt service payback period. The energy savings result from replacement of the old and inefficient coal-fired plant with a high-tech biomass facility, switching from coal to biomass as the fuel source, locating the new facility closer to the end-users, and improved operational efficiencies with new equipment better matched to site load requirements. The community also receives the health and environmental benefits associated with the reduction in greenhouse gas emissions.



Some of the benefits of this major renewable energy project include:

- Exceeding the 7.5% electricity consumption requirement at SRS from renewable sources
- Reduction of over 161,000 tons of annual coal consumption and 300,000 gallons of fuel oil consumption
- Utilization of 322,000 tons of biomass and bio-derived fuels
- Emission Reductions:
 - 400 tons/yr - Particulate Matter
 - 3,500 tons/yr - SO_x
 - 2,500 tons/yr - NO_x
- Reduction of greenhouse gas emissions by well over 100,000 tons per year, significantly decreasing the carbon footprint of SRS (due to coal, a major contributor to greenhouse gases, being completely eliminated while maximizing the burning of wood)
- Reduction of over 1 billion gallons of water from the Savannah River annually
- Meeting and exceeding all SRS renewable energy goals in federal directives, and is a key project for assisting DOE with achieving complex-wide renewable goals

- Helps South Carolina’s Department of Health & Environmental Control to continue with local “Attainment Status”
- Supports DOE Initiative to be the Lead Federal Agency in Renewable Energy Goals

Plans and Projected Performance

SRS will continue operation of the four biomass steam plants in operation at the site in FY 2015. The site no longer uses coal. This is a significant accomplishment and demonstrates how SRS has worked to advance clean energy, environmental stewardship, and sustainability. The four biomass plants at SRS are:

- Biomass Cogeneration Facility (electricity and steam output)
- A-Area/SRNL Biomass Plant (steam only)
- K-Area Biomass Plant (steam only)
- L-Area Biomass Plant (steam only)

The site will work collaboratively with Ameresco Federal Solutions to determine how to maximize Biomass Cogeneration Facility steam and electricity outputs and optimize current and future electrical purchased power contract execution through development of sound business models and effective strategic methodologies that reduce associated energy costs.

9.0 Climate Change Resilience

Executive Order 13514 directs DOE facilities to prepare for climate change on their respective sites (DOE, 2014; Interagency Climate Change Adaptation Task Force, 2011), and DOE-issued guidelines list ‘Climate Change Resilience’ as the 9th on a list of 10 goals. Within this goal are listed 7 objectives, which each site must address in its Site Sustainability Plan.

To meet this obligation, the Atmospheric Technology Group (ATG) at the Savannah River National Laboratory (SRNL) has developed a climate projection for SRS. Numerous operational activities at the site (energy and water resource requirements, fire and forest ecology, and facility and worker safety) are strongly dependent on weather and climate conditions, and long-term mitigation strategies are needed to maintain these operations in the face of climate change.

Objective 1: DOE Climate Change Adaptation Screening Assessment

- The online assessment has been completed.

Objective 2: Determining Risk

To estimate risk at SRS, a detailed local climate projection for the 2040s is currently under development, as follows: Climate predictions usually start with global climate models (GCMs) run into the future with various assumptions about levels of greenhouse gas emissions and other environmental drivers. Several research organizations have produced collections of GCM results, both recreating 20th century climate and predicting 21st century climate under a range of climate forcing scenarios. Because of their coarse resolution, however, the output from these models cannot reliably be used to predict climate change over relatively small geographic areas. Instead, a ‘downscaling’ process is needed to convert the GCM projections to a specific climate forecast for SRS. ‘Statistical’ downscaling involves the establishment of a relationship between GCM simulations for the past and concurrent observations at the site in question, and this same relationship is then used to ‘correct’ the GCM simulations of the future.

The downscaling methodology used to develop the SRS projected climate depends on the meteorological variable of interest. GCM datasets from the CMIP-5 (Climate Model Intercomparison Project, version 5) (Taylor, 2012) downscaled to produce monthly averages of temperature and precipitation at a spatial scale of 1/8th degree were generated as part of a joint project as described in Reclamation (2013). This was produced using over 60 GCM simulations (comprising multiple runs of each of several GCMs) for several forcing scenarios. This data can be ‘disaggregated’ to produce daily or hourly averages by assigning to each downscaled future month a historical month as its ‘analog’ (as described in Salathe (2005)). The observed precipitation and temperature hourly time series from the analog month are adjusted so that their respective monthly means matched those of the *downscaled* month. This results in hourly time series for the future that have both the desired downscaled future means and a realistic variability.

Disaggregation was applied to the existing downscaled monthly GCM data (Reclamation, 2013) using the SRS observations to produce a daily time series for each of the GCM simulations for precipitation and temperature. For other variables (e.g., specific humidity and wind speed), a monthly quantile mapping is applied (Wood et al., 2002) to GCM data from the CMIP-5 repository for 6 GCMs: NCAR’s CCSM4, Environment Canada’s Can-ESM2, GISS’s E2-H, the MPI model developed by the Max Planck Institute, Australia’s CSIRO model, and the CESM model developed jointly by the DOE and NCAR.

GCM simulations of the future are run assuming one of several predefined ‘scenarios’ that represent possible changes in radiative forcing for the 21st century. These are currently expressed as the additional radiative forcing due to all greenhouse gasses present in the atmosphere in the year 2100. Two scenarios are selected for the SRS downscaling – RCP4.5 (for an additional 4.5 W/m²) and RCP8.5 (for an additional 8.5 W/m²).

The downscaled values for all the model runs (68 for RCP4.5, 66 for RCP8.5) are used to determine an ensemble average and a variability of 2 standard deviations (2 σ), which approximates a 95% likelihood of lying between the two curves. Predicted monthly average temperature at SRS over the ten year period, 2040-2049, for the two greenhouse forcing scenarios are plotted in Fig. 1.

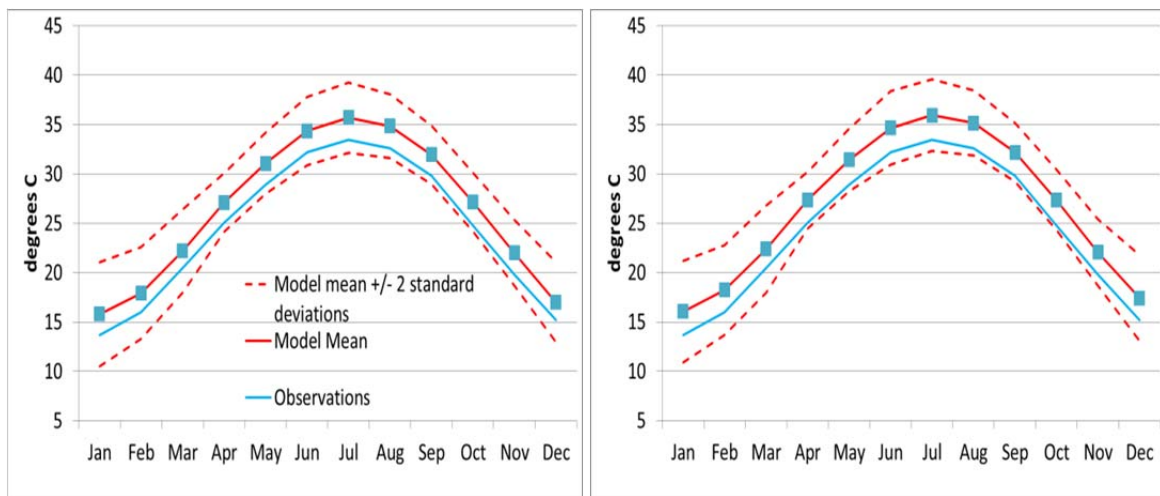


Figure 1: Maximum temperature annual cycle at SRS averaged over 2040-2049 for a) the RCP4.5 scenario, and b) the RCP8.5 scenario. Points marked with a square are different from the observed mean at the 95% significance level. Both make use of the data from Reclamation, 2013.

Fig. 2 shows predicted monthly average precipitation for 2040-2049. Some ensemble members predict reduced monthly precipitation, while others predict increased rainfall for SRS. Therefore, the ensemble means for both scenarios predict only a slight increase in monthly average rainfall above current values.

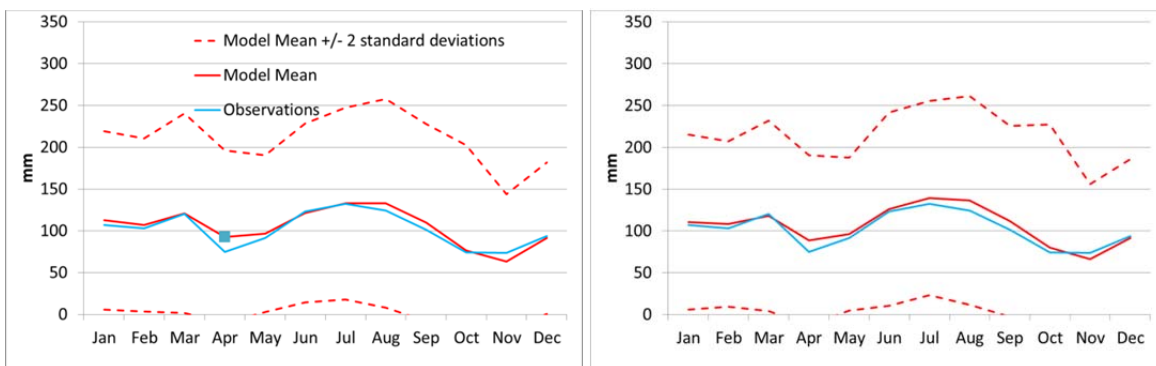


Figure 2: As in Fig. 1, but for precipitation

Fig. 3 shows a plot of all the 2040 (68 models x 30 years each (2020-2049)) SRNL downscaled annual precipitation totals for the RCP4.5 scenario, along with their overall mean (the red line). For comparison, the observed mean $\pm 2\sigma$ values are shown as black lines. The future mean is slightly greater than the observed mean, but the majority of years lie within the 2σ range of normal variability. About 4% of the years lie above this range, not much more than the 2.3% expected by chance.

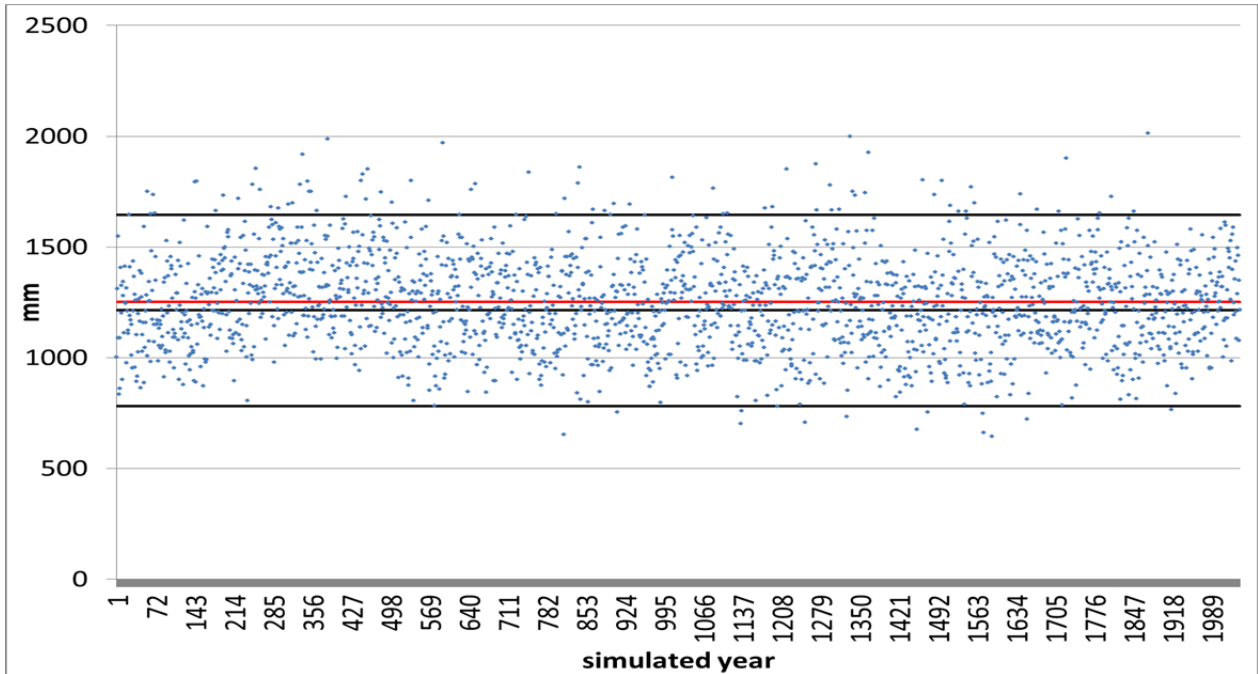


Figure 3: Annual total precipitation for all 2040 (68 models x 30 years [2020-2049] each) RCP4.5 model years, along with the mean (red line) and the observed mean \pm 2 standard deviations (black lines). This makes use of the data from Reclamation, 2013.

As with temperature, the SRNL-downscaled monthly average values of specific humidity, plotted in Fig. 4, are much greater than current values (Fig. 4), with the 2σ ensemble range lying mostly above the observed values. Unlike temperature, however, the increase is much greater for RCP8.5, with even more humid July conditions. Monthly average wind speed values (not shown), however, do not show strong changes into the 2040s, with the ensemble mean of the downscaled monthly average values closely approximating the observed mean.

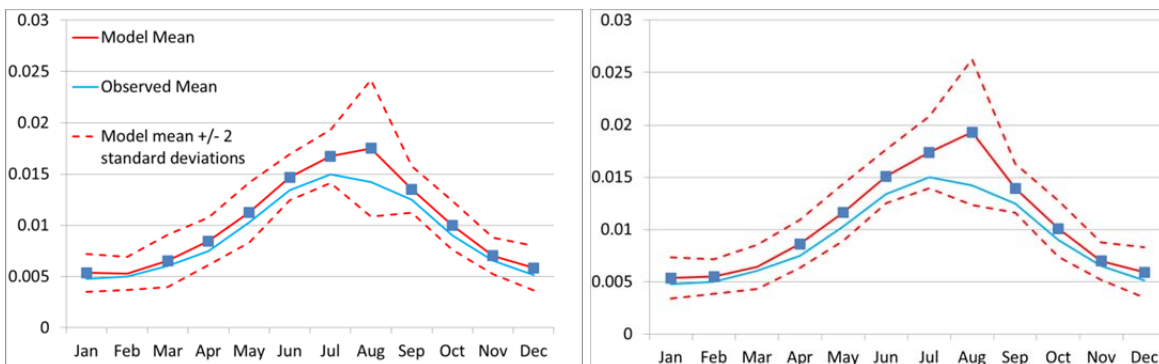


Figure 4: Specific humidity annual cycle at SRS averaged over 2040-2049 for a) the RCP4.5 scenario, and b) the RCP8.5 scenario. Points marked with a square are different from the observed mean at the 95% significance level. Both make use of the CMIP-5 data, downscaled with data at SRS.

The major concern with climate change is how extremes will change – as the mean changes, the probability of experiencing values far beyond the mean changes as well. Heretofore observed changes to extremes in surface temperature have been primarily attributed to a shift in the mean, with each percentile of temperature exceedance rising by the same amount (Weaver et al., 2014). Projected future increases in extreme temperature, however, have been characterized by increases in the width of the temperature distribution, with the 95th percentile value rising faster than the lower parts of the distribution (Kodra and Ganguly, 2014). This could lead to an increase in the frequency of high temperature events that are now considered rare at SRS.

This behavior can be examined in the downscaled SRS data through the calculation of daily percentiles of temperature and precipitation. The observed 95th percentile daily maximum temperature at SRS is currently 96^o F, a value that can be defined as a ‘very hot day’. By counting the number of days this threshold is exceeded in each of the downscaled ensemble members, the frequency with which ‘very hot’ days will occur in the future is determined. The resulting SRS ensemble predictions for the 2040s range from as many as 25% of all days to 5% (i.e., the current frequency), suggesting many more very hot days than today, as shown in Fig. 5a. (A similar result for SRS can be found in Fig. 17.4 of the 3rd National Climate Assessment; <http://nca2014.globalchange.gov/>.) Extremely cold days (maximum temperature < 49^oF, representing the bottom 5th percentile) are rarer in the SRNL data, ranging from slightly less to less than one-third as often (Fig. 5b). For precipitation, the probability of exceeding the current SRS 95th percentile daily total of 0.8” ranges from 4% to 7% (Fig. 5c), with the majority of simulations experiencing an increase in frequency.

More frequent hot days have a large potential to restrict outdoor work on site, and lead to increased stress on water availability if precipitation changes little. Work towards determining a comprehensive characterization of risk at SRS will proceed in FY 2015 by meeting with other onsite groups to determine their climate-sensitive activities, and work with them to ‘integrate climate assessments in future site wide planning efforts’ as required by Objective 2.

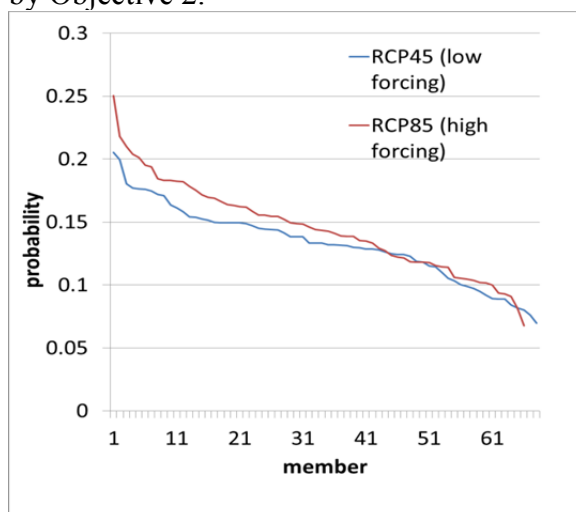


Figure: 5a

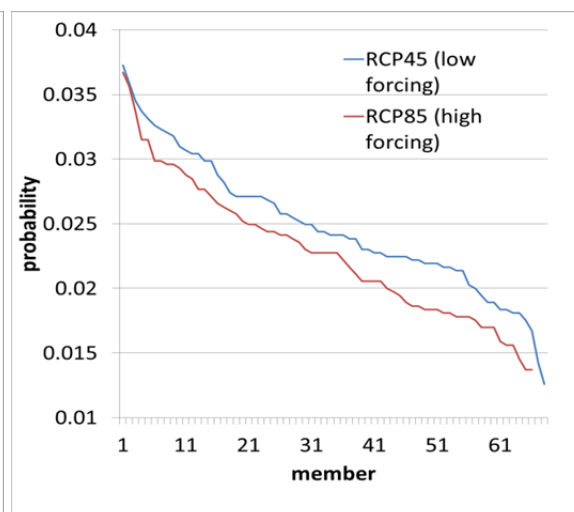


Figure: 5b

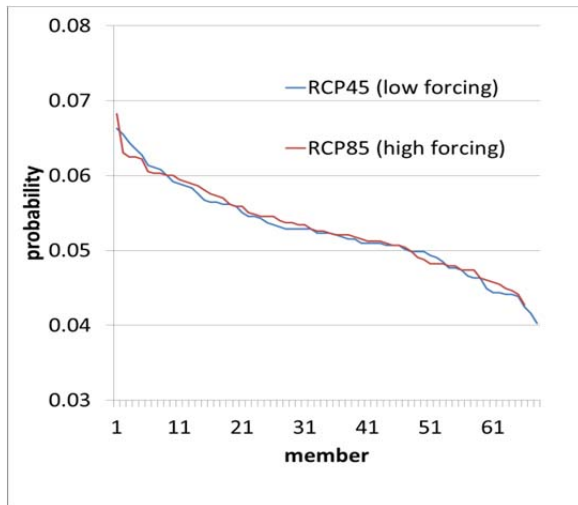


Figure: 5c

Fig. 5 a) Fraction of days from 2040-2049 with daily maximum temperature above the 95th percentile for the SRNL downscaled data,
 Fig.5 b) as 5a), but for the fraction of days from 2040-2049 with daily maximum temperature below the lowest 5th percentile,
 Fig. 5 c) as 5a), but for the fraction of days from 2040-2049 with precipitation above the 95th Percentile.

Objective 3: Current Activities

We are working to use the downscaled GCM data to project the annual number of heating degree days and cooling degree days on site, as well as to project changes in the magnitudes of various flood magnitudes (e.g., 10, 100 and 1000 year floods). We are also working with the onsite office of the U.S. Forest Service to project the energy release component (ERC), a measure of wildfire danger, using downscaled data.

Objective 6: Regional and Local Coordination

We have established relationships with various agencies that are focused on climate change in the region and developing climate response plans. These include the Carolinas Integrated Sciences and Assessments (CISA) situated within the University of South Carolina, Department of Geography, and the State Climatology Office of the South Carolina Department of Natural Resources.

Department of Energy, Guidance for FY 2015 DOE Site Sustainability

Plans:<https://doegrit.energy.gov/SustainabilityDashboard/PDF/2015%20SSP%20Guidance.pdf>

Interagency Climate Change Adaptation Task Force, 2011: Federal Agency Climate Change Adaptation Planning Support Document:

- http://www.whitehouse.gov/sites/default/files/microsites/ceq/adaptation_support_document_3_3.pdf
- Kodra, E., and R. Ganguly, 2012: Asymmetry of projected increases in extreme temperature distributions, *Scientific Reports, Nature*, **4**, Article number: 5884 doi:10.1038/srep05884
- Reclamation, 2013. Downscaled CMIP3 and CMIP5 Climate Projections: Release of Downscaled CMIP5 Climate Projections, Comparison with Preceding Information, and Summary of User Needs. U.S. Department of the Interior, Bureau of Reclamation, Technical Service Center, Denver, Colorado, 116 p., available at: http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/techmemo/downscaled_climate.pdf
- Salathé E, 2005: Downscaling simulations of future global climate with application to hydrologic modelling. *International Journal of Climatology* **25**:419-436
- Taylor, K.E., R.J. Stouffer, G.A. Meehl, 2012: An Overview of CMIP5 and the experiment design. *Bull. Amer. Meteor. Soc.*, **93**, 485-498, doi:10.1175/BAMS-D-11-00094.1
- Weaver, S. J., A. Kumar, and M. Chen, 2014: Recent increases in extreme temperature occurrence over land, *Geophys. Res. Lett.*, **41**, doi:[10.1002/2014GL060300](https://doi.org/10.1002/2014GL060300).
- Wood AW, Maurer EP, Kumar A, Lettenmaier DP, 2002: Long range experimental hydrologic forecasting for the eastern United States. *J. Geophys. Res.* 107 (D20) 4429 doi:10.1029/2001JD000659.

“We acknowledge the World Climate Research Programme's Working Group on Coupled Modelling, which is responsible for CMIP, and we thank the climate modeling groups for producing and making available their model output. For CMIP the U.S. Department of Energy's Program for Climate Model Diagnosis and Intercomparison provides coordinating support and led development of software infrastructure in partnership with the Global Organization for Earth System Science

10.0 Energy Performance Contracts

Performance

SRS has utilized Energy Saving Performance Contracts (ESPC) for several energy and water conservation projects through two separate contractors, Honeywell Building Solutions and Ameresco Federal Solutions.

Honeywell Building Solutions provided three separate Task Orders which included the installation of more efficient lighting in several A-Area buildings as well as a steam producing biomass facility located in A-Area. One of these three Task Order contracts is on schedule to be completed by the end of calendar year 2014. The other two are scheduled to be completed by the end of calendar year 2017.

DOE tasked Ameresco Federal Solutions with the department's largest ever Energy Savings Performance Contract (ESPC). This contract was to construct on Savannah River Site property, one of the largest biomass facilities in the country. The Biomass Cogeneration

Facility (BCF), located on Burma Road, is operated on a twenty-four hour, full time basis and this large scale facility produces steam and electricity. This task was completed in FY2012 and experienced its first full year of operation during FY2013.

The Ameresco Federal Solutions ESPC also included the construction of two additional and smaller biomass facilities. The L-Area and K-Area biomass facilities produce steam and are operated primarily during winter months. This ESPC has all three biomass facilities covered by one ESPC Task Order contract which is scheduled through the end of calendar 2026.

With four ESPC projects either having been completed at SRS, along with energy savings project completions prior to ESPC and significant consolidation and right-sizing of utility systems as noted above, most all efficient energy conservation measures have been identified and implemented. This has resulted in difficulties in derivation of additional major projects and has specifically been a concern if projects do not have major ancillary (non-energy) savings such as reductions in maintenance and/or operating costs. With the relative cost of energy and water at SRS, coupled with high costs for making improvements (including ESCO markups), developing additional energy savings projects is proving to be a difficult proposition.

Plans and Projected Performance

In spite of the challenges mentioned above, DOE-SR is considering contracting with Ameresco Federal Solutions to add an additional boiler to the BCF.

11.0 Sustainable Remediation

11.1 Integrating Sustainability Into Remediation Activities

a). Contract language implementing *Green and Sustainable Remediation and Innovative Technology* has not been incorporated into the contract for SRNS.

b.) The Savannah River Site, through implementation of the Federal Facility Agreement (FFA), uses cost effective and sustainable remediation practices where possible. SRS currently has 515 identified waste sites with 400 either remediation complete or in various stages of characterization and remediation. SRNS frequently collaborates with the Savannah River National Laboratory and other sources to identify appropriate remedies and those remedies which are considered sustainable where appropriate. These sustainable remedies include solar powered vapor extraction, barometric pressure powered soil vapor extraction, subsurface barrier walls, injection of material that allow for in situ remediation, phytoremediation, and monitored natural attenuation.

SRNS utilizes the Core Team process when negotiating with the Region IV Environmental Protection Agency and the South Carolina Department of Health and

Environmental Control in the evaluation and implementation of innovative and sustainable environmental practices.

SRNS currently had thirty seven remediation systems in place during the year. Eleven such systems are classified as low energy/enhanced natural systems with an additional eighteen that are passive systems requiring no energy to implement. Fourteen active systems have successfully transitioned from aggressive, high energy remediation activities to more sustainable monitored natural attenuation or low energy remedies.

As an example of the SRNS approach to implementing sustainable remediation, groundwater at T Area, a former research and development area at SRS, is contaminated with a small persistent plume of organic solvents (TCE and PCE). The plume was originally treated by pumping water from the ground and treating it by air stripping. The pump and treat technology was successful in removing contaminants from the groundwater. After the bulk of contaminants were removed a transition to a lower cost, lower-energy-utilization, technology was needed.



An edible oil emulsion was injected into the groundwater and the vadose zone above the water table. The oil emulsion promotes microbial activity and creates conditions in the subsurface that enhances the natural degradation of the organic solvents. The estimated mass of contaminant in the plume has decreased by 90% and the expected time to meet remedial clean-up goals has been reduced.

In 2015 SRS will continue to evaluate remedies and install green and sustainable systems where practical. Two groundwater remediation units in the administration area are approved to move towards more passive remediation activities and selected waste units as defined in the FFA will begin evaluation for remediation during the year.