

Sustainability Report and Implementation Plan

2020

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2020 Sustainability Report and Implementation Plan

Table of Contents

Execut	tive Summary	1
Impler	mentation Summary: Facility Management	3
1.	FACILITY ENERGY EFFICIENCY	3
2.	EFFICIENCY MEASURES, INVESTMENT, AND PERFORMANCE CONTRACTING	4
3.	RENEWABLE ENERGY	5
4.	WATER EFFICIENCY	6
5.	HIGH PERFORMANCE SUSTAINABLE BUILDINGS	7
6.	WASTE MANAGEMENT AND DIVERSION	8
Implementation Summary: Fleet Management		
1.	TRANSPORTATION / FLEET MANAGEMENT	10
Impler	mentation Summary: Cross-Cutting Operations	12
1.	SUSTAINABLE ACQUISITION / PROCUREMENT	12
2.	ELECTRONICS STEWARDSHIP	13
3.	GREENHOUSE GAS EMISSIONS	14

Executive Summary

Founded in 1846 the Smithsonian Institution is the world's largest museum and research complex containing 19 museums and galleries, numerous research centers and supporting facilities, and the National Zoological Park. We are active in over 80 countries around the world with permanent locations in eight states plus Washington, D.C. and Panama.

James Smithson established the Smithsonian Institution as "an Establishment for the increase and diffusion of knowledge..." with a sweeping public mission for learning and teaching. The Smithsonian has been, and must be, sustainable for generations to come. The Smithsonian is the steward of the nation's treasures in perpetuity and is much more than a collection of facilities. Through scientific research, education, and access to the visiting public the Smithsonian is uniquely positioned to study, test, implement, and educate the world on actions that will lead us into a sustainable future.

As a trust instrumentality of the United States, the Smithsonian is committed to the goals which Executive Order 13834, Efficient Federal Operations, and remains focused on making improvements in environmental, energy, and economic performance. As stated in the current Smithsonian Strategic Plan, One Smithsonian, Goal 6 – "Preserve natural and cultural heritage while optimizing our assets" underscores our mission and values. Smithsonian Institution is poised to leverage our scholarly intellect to "balance preservation and sustainability."

In response to the Executive Order the Smithsonian is meeting goals to decrease potable water use per square foot and use of renewable energy as a percentage of total energy use. Deployment of energy efficient, electric, hybrid, and biofuel vehicles is reducing petroleum use for our diverse portfolio of 460 vehicles. A growing recycling program diverts increasing quantities of solid waste from landfill disposal, and cuts Smithsonian greenhouse gas emissions. Smithsonian is making progress but has not yet reached the goal for reduced energy intensity. Fulfilling goals for energy and sustainability performance of the buildings is a challenge. While our renovation progress of old and outdated buildings and systems continues, energy use often increases to meet strict collection requirements. Demands on our 12 million square foot building footprint, much of which are historic, include maintaining environments suitable for conservation of: 155 million collection objects; 2.1 million library volumes; 162,300 cubic feet of archival material; caring for more than 2,000 live animals and tens of thousands of live plants; accommodating 7,000 staff members and 30 million visitors each year; and hosting hundreds of special events. While continuing to meet these demands, the Smithsonian has attained 3rd party sustainability certifications for building construction and revitalization projects, and operation and maintenance practices.

This 2020 Smithsonian Institution Sustainability Report and Implementation Plan reports sustainability successes and challenges of the past year. It describes the Smithsonian today. More importantly it identifies the sustainability strategies we will pursue in the year ahead, how we will measure progress, and the milestones we intend to reach. It is a map the Smithsonian can follow towards a sustainable future. For more information on sustainability-related programs please visit our website at: www.si.edu. Charts illustrating Smithsonian Institution progress relative to baseline can be accessed at www.sustainability.gov. In Fiscal Years 2020 and 2021 the Smithsonian Institution plans to advance sustainability in agency operations, meet annual energy and environmental performance targets and requirements including priorities such as:

- Investigate and develop a plan to implement a UESC/ESPC targeting high energy intense museum facilities.
- Newly appoint an Agency Fleet Manager to further develop strategies and plans to continue improving fleet efficiencies

2020 Sustainability Report and Implementation Plan

 Increase facility energy efficiency by implementing low/no cost HVAC control measure changes, small scale LED lighting retrofits, and steam trap audits and replacements.

Implementation Summary: Facility Management

1. FACILITY ENERGY EFFICIENCY

FY 2019 Energy Intensity Progress (Btu/GSF):

15.0% reduction from FY03 0.7% increase from FY18

FY 2020-FY 2021 Plan:

1.5% reduction in FY20 from FY19

1.5% reduction in FY21 from FY20

SI plans to increase facility energy efficiency by identifying and implementing low/no cost energy conservation measures relating to HVAC controls, lighting retrofits and comprehensive steam trap maintenance.

Implementation Status

- Started comprehensive energy and water audits to identify energy conservation measures at the National Museum of Natural History in Washington, DC and Museum Support Center in Suitland Maryland.
- Participated in electric demand side management programs through GSA resulting in rebate money that can be used to expand our energy conservation budget.
- Performed existing building commissioning and mechanical equipment Re-Tuning and implement low-cost control measures such as reducing the amount of simultaneous heating and cooling and demand driven fan speed reductions. Implemented fan speed reductions at the Freer Museum resulting in \$30,000 savings annually.
- Performed steam trap maintenance program including annual surveys and trap replacements utilizing utility incentives from local providers. Total annual savings is estimated to be \$458,107 when complete.
- Expanded continuous commissioning software connectivity allowing for advanced metering monitoring of energy and water sub-meters.
- Installed variable frequency drives on all air handling unit supply and return fans at the Quadrangle resulting in annual cost savings of \$104,000.
- Updated details on energy audit evaluations of facilities in federal databases.
- Used revenue generated from incentive programs to fund projects that reduce energy and water intensity and corresponding GHG emissions. For example, we implemented small scale lighting retrofits in back of house museum areas.
- Collaborated with division offices to promote formation of a commissioning team to optimize local facility operations.
- Upgraded EnergyCAP allowing advanced energy reporting capability and advanced benchmarking capabilities for easy building manager access. This allows building operators to stay on top of museum energy use.
- Reductions in energy use remains slow going due to mission requirements increases.

- Continue to participate in GSA Areawide energy supply contracts with planned implementation in FY2021.
- Identify and implement Energy Conservation Measures via building audits to implement low cost control measures and lighting retrofits to the extent practical. Planning LED lighting retrofits at National Museum of Natural History libraries and Museum Support Center offices and storage areas.
- Evaluate available contract vehicles for implementation of energy conservation measures and while upgrading existing infrastructure.
- Continue piloting energy conservation programs and incorporate successful programs into business processes.
- Implement phased Advanced Metering projects and remote monitoring software.
- Partner with local utility incentive provider for ISO 50001 investigation to hone our energy management program.
- Continue conversation with museum conservators about temperature and humidity requirements and possible seasonal adjustments.

2. EFFICIENCY MEASURES, INVESTMENT, AND PERFORMANCE CONTRACTING

FY 2019 Performance Contracting – Investment value and number of new projects awarded: \$0.0M / 0 projects in FY19

FY 2020-FY 2021 Plan: \$0.0M / 0 projects in FY20 \$0.0M / 0 projects in FY21

SI plans to continue pipeline planning utilizing performance contracting and current budget to meet energy and water efficiency reduction goals. However, nothing is currently planned for FY21

Implementation Status

The following activities were completed to reach this goal:

- Manage to ensure energy performance of the following ESPC contracts:
 - o Award: July 2007, Natural History & American History, \$20.5M
 - o Award: July 2013, Suitland Collection Center, \$12.2M
 - o Award: May 2014, Smithsonian National Zoo and Conservation Biology Institute, \$23.5M
- Use Energy Management Branch funding of \$300,000 to implement low cost energy conservation measures. Any
 amounts in excess of \$300,000 are dependent on rebates and other incentive programs available through local
 utilities and GSA contracts.
- Coordinate energy conservation measures, investment, and performance contracting with major facility revitalization and master planning to ensure pipeline success.
- Capital projects and master plans are reviewed for deep energy retrofit opportunities that can utilize ESPC or UESC projects.

- Smithsonian forecasts \$0.0M performance contracting through FY 2021, as nothing is being planned at this time.
 Smithsonian is currently evaluating our ESPC pipeline plans for future projects where applicable.
- Energy Management Branch will continue to identify potential Energy Conservation Measures (ECMs) and infrastructure needs for potential project development and utilize performance contracting or Federal appropriations to the extent practical.
- Smithsonian plans to investigate, develop, and award an ESPC/UESC in FY 2022.

3. RENEWABLE ENERGY

FY 2019 Renewable Electricity Use:

17.9% of total electricity in FY19

FY 2020-FY 2021 Plan: 20.0% of total electricity in FY20 20.0% of total electricity in FY21

SI meets renewable energy goals by installing onsite solar arrays and purchasing renewable energy credits. Most of our renewable use is via REC purchases due to limited land availability for solar installs and large upfront cost of onsite solar generation.

Implementation Status

The following strategies were deployed this fiscal year:

- SI included goal-level renewable energy percentages in new electricity supply contracts, and purchased additional renewable energy certificates, as needed, when funding allowed.
- Planned actions in the next 12 months include advocacy for inclusion of on-site renewable energy in new construction & major facility revitalization, and continuing work with other agencies on renewable energy purchases and projects when advertised such as the Capital Solar Challenge.
- Renewable Energy Credits (RECs) are purchased as funding permits, typically for a two-year delivery period.
- REC purchases not only offset GHG but also supported green power credits in projects pursuing LEED certification including Hazy Collections Storage Building, SCBI Bio Repository Lab Building, and Zoo Pavilion.
- Projected progress for FY 2020: 20% renewable electricity.

- Screen facilities for cost effective renewable energy development including onsite solar generation using power purchase agreements.
- Incorporate requirements for electric generated from renewable sources in long-term electric supply contracts to support goal-level renewable electric requirement.
- Purchase RECs as funding permits to support SI's renewable energy and sustainable building requirements.
 Agency target for FY 2020 and 2021: 20% renewable electricity.

4. WATER EFFICIENCY

FY 2019 Water Intensity Progress (Gal/GSF):

- 33.9% reduction from FY07
- 32.5% increase from FY18

FY 2020-FY 2021 Plan:

2.0% reduction in FY20 from FY19 2.0% reduction in FY21 from FY20

SI plans to continuously monitor water usage using building level water meters and advanced metering techniques to determine high water use areas and implement reduction measures.

Implementation Status

- Smithsonian water efficiency successes included application of sub-meters and leak detectors to discover water waste and water-efficient management of gardens and landscapes through smart irrigation systems.
- ESPC contracting installed sub-meters, smart irrigation systems, and updated filtration infrastructure reducing water and chemical use at the National Zoological Park and Smithsonian Conservation Biology Institute. The National Zoological Park is the most water intensive campus in SI's portfolio.
- Continued to do continuous commissioning via advanced metering infrastructure to utilize real time data to assess water usage characteristics. This data led us to complete a filtration project at the National Zoo's beaver pool resulting in \$50,000 annual savings.
- Water intensive operations are a challenge. Heavy water use can occur in museum air-conditioning systems, National Zoo exhibit pools, irrigation and museum water features.
- Water measurement and verification remains a challenge due to estimated billing practices by local utilities. We
 expect this practice to continue with no changes in the immediate future.

- Monitor sub-meters recently installed to improve existing processes and place controls on those processes where cost effective.
- Purchase and install water efficient filtration technologies at the National Zoo to decrease water and chemical use.
- Designing, installing, and maintaining landscapes for reduced water use.
- Pilot enhanced water treatment chemistry on cooling tower systems to reduce water use at facilities with chiller plant operations.
- Pilot remote condenser water monitoring and metering system to reduce water waste. Update existing
 mechanical cooling equipment controls to ensure water is used efficiently and ongoing maintenance practices are
 eased.

5. HIGH PERFORMANCE SUSTAINABLE BUILDINGS

FY 2019 Sustainable Buildings Progress:

0 sustainable Federal buildings

0.0% of buildings / 0.0 of gross square footage (GSF)

FY 2020-FY 2021 Plan:

4.0% of GSF in FY20 7.5% of GSF in FY21

The Smithsonian strives to advance high performance sustainable buildings within its portfolio, including new construction, renovations, and existing buildings. We adhere to internal policies/directives to ensure all actions have a material impact on our sustainable buildings progress.

Implementation Status

- In FY2019 Smithsonian determined, on a square foot basis, LEED project certification conforming to the Guiding Principles and will continues to pursue and achieve LEED[®] green building certifications as our primary focus.
- During FY2019, LEED certified buildings were evaluated relative to Guiding Principle cross-walk(s) to substantiate compliance.
- The Smithsonian obtaining LEED certifications for several newly constructed facilities including Hazy Collections Storage Building, SCBI Bio Repository Lab Building, and Zoo Pavilion.
- The Smithsonian received an existing building LEED certification for our Anacostia Museum.

- Review LEED projects and cross-walk applicable points to appropriate Guiding Principles.
- On a GSF basis, buildings will be evaluated for Guiding Principle compliance, starting with facilities under phased renovation that are less than 100% compliant.
- The Smithsonian is planning to receive LEED Gold for our multi-year renovation of the National Air and Space Museum.
- The Smithsonian will continue to expand our existing building LEED program to include or Suitland Maryland campus.
- We are in the process of revising and updating our renovation and new construction policy to advance our sustainability goals for the future. We are researching and analyzing our ability to include new third-party sustainability initiatives such as: Living Building Challenge, Well Building Certification, and Net Zero.

6. WASTE MANAGEMENT AND DIVERSION

FY 2019 Non-hazardous Waste Management and Diversion:

3767.35 metric tons of non-hazardous solid waste generated* **46.0%** diverted and **54.0%** sent to treatment and disposal facilities

FY 2020-FY 2021 Plan:

0.0% in non-hazardous solid waste generated in FY20 from FY19 46.0% diverted and 54.0% sent to treatment and disposal facilities in FY20

4.0% in non-hazardous solid waste generated in FY21 from FY20 50.0% diverted and 50.0% sent to treatment and disposal facilities in FY21 *not including construction and demolition waste

The Smithsonian Institution is solidly engaged in activities aimed at waste reduction and, when not practical, waste diversion. The Secretary's One Smithsonian Plastics Reduction Initiative targeting the reduction of single use plastics, an increased focus on green purchasing and increased publication of items available for reuse is anticipated to have a possible negative effect on diversion rates yet is the greater achievement in the quest for sustainability. The on-going global shutdown is expected to have a significant impact on diversion success due to museum closures and total landfill quantities not forecastable in the 2020-2021 plan. SI works to reduce and capture all waste streams to maximize diversion rates by completing waste audits, installing recycling bins that are easily accessible, increasing outreach to employees, increasing composting operations and working with the restaurants to ensure compliance.

Implementation Status

- In FY 2019, the Smithsonian diverted 46% of solid waste from landfill/incinerator disposal, a slight decrease from 47.05% in 2018. The Smithsonian Recycling Task Force continues work to identify opportunities to increase waste diversion.
- Compositing operations are continuing at the NMAI, NMAH and NMAAHC. Composit operations restarted at NMNH with the addition of ware wash stations greatly reducing the compositable plates and dinnerware.
- SI continued operation of a staff operated in-vessel compost machine with a long-range goal of a larger machine located on National Zoological Park grounds in Washington, DC. SI is in the process of being gifted a second invessel compost machine from another federal agency that will be located at the Smithsonian Environmental Research Center in Edge Water, Maryland.
- Construction waste diversion is commonly reported for LEED buildings but difficult to track across the building
 portfolio other than by the honor system.

- Smithsonian is focusing on efforts to reduce waste and educate staff on alternative choices. The result will be less
 waste and less divertible material generated.
- Smithsonian is working to maximize waste diversion and recycling content and has implemented strategies to
 optimize collection procedures and assure compost input from the restaurants meets the minimum acceptable
 criteria set by regional composting facilities.
- FY 2020 and 2021 Smithsonian diversion target is 50%. Actions planned for the next 12 months include single use plastics reduction, reducing waste generation, increasing composting participation, conducting facility waste audits, and improving tracking/reporting of construction and demolition waste. Staff and public education on waste reduction and diversion strategies that can be employed at work and at home are a top priority.
- Increasing diverse participation in the Recycling Task Force and a centralization of the data collection and reporting may prove beneficial in evaluation for reduction and diversion improvement. Evaluation of progress is based on metrics including diversion rate, based on the weight of materials disposed in thirteen discrete streams

2020 Sustainability Report and Implementation Plan

of non-hazardous solid waste. Increase in participation was assisted by increasing SI and commercial communication on importance of waste diversion.

 Key challenges remain a diverse waste stream with inadequate space at most museums for sorting, storing and shipping solid waste, and lackluster participation by restaurant contractors. SI plans to continue to tackle these issues as ongoing action items in FY2020 and 2021.

Implementation Summary: Fleet Management

1. TRANSPORTATION / FLEET MANAGEMENT

FY 2019 Petroleum Reduction Progress (Gal):*

69.0% reduction in petroleum fuel since 2005 75.2% reduction in petroleum fuel since FY18

FY 2020-FY 2021 Plan:

2.0% reduction in FY20 from FY19 2.0% reduction in FY21 from FY20

FY 2019 Alternative Fuel Use Progress (Gal):*

773.18% increase in alt fuel since 2005 83.45% decrease in alt fuel since FY18

FY 2020-FY 2021 Plan:

2.0% increase in FY20 from FY19 2.0% increase in FY21 from FY20

SI plans to reduce petroleum fuel use by introducing alternative fueled vehicles into the fleet, reinstituting telematics, optimizing and right-sizing composition of the fleet and acquiring only highly fuel-efficient vehicles.

Implementation Status

- The Smithsonian presently has a fleet size of (460) vehicles that are primarily operated in a campus setting supporting; facilities operations, horticultural activities, animal care and conservation, and security. Additionally, the vehicle fleet supports off-campus scientific research and artifact collection activities. The vehicle fleet consist of a variety types of vehicles such as; passenger and cargo vans, sedans, pickup trucks, heavy to light duty trucks, SUVs, buses and LE sedans/SUVs. Within this vehicle fleet we currently have vehicles utilizing the following alternative fuel types; electric, biodiesel, CNG and E-85.
- The overall Smithsonian FY 2019 plan to improve fleet efficiency by introducing more alternative fueled vehicles into the fleet, reinstituting telematics, optimizing and right sizing the composition of the fleet, and acquiring only highly fuel-efficient vehicles stalled due to funding challenges and the loss of Agency Fleet Manager in August 2019.
- Although studies were completed to identify location(s) of electric charging stations at Smithsonian's Udvar Hazy Center, Smithsonian Conservation Biological Institute, and National Zoo, the electric charging stations were never installed in 2019 as anticipated due to scheduling conflicts. Smithsonian is projecting completion of these charging station installations between September 2020 and March 2021. Additionally, at least three fully electric or plugin electric hybrid vehicles will be acquired to compliment the new charging stations and replace conventional vehicles.
- *Fleet data remains inconsistent and SI does not think reduction progress is and accurate depiction of performance. SI continues to work on this issue to ensure future data is accurate and shows our acutal performance year over year.

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Priority Strategies & Planned Actions

Although we will be looking for our newly appointed Agency Fleet Manager to further develop strategies and plans to continue improving fleet efficiencies, in his/her absence, the Smithsonian, contingent upon funds availability, will move forward with the following actions in FY 2020:

- Complete installation of three charging station installations between September 2020 and March 2021 at SCBI, National Zoo and Udvar Hazy locations. Additionally, at least three fully electric or plugin electric hybrid vehicles will be acquired to compliment the new charging stations and replace conventional vehicles.
- In FY 20, acquiring only highly fuel-efficient or alternative fueled vehicles when feasible. Estimated completion date 30 Sep 2020.
- Continue working with IT department to improve automated integration of fuel usage data from collateral resources into our internal Fleet Management Information System. Estimated completion date 31 Aug 2020.

2020 Sustainability Report and Implementation Plan

- By 30 Sep 2020, hire Fleet Data Analyst to specifically manage all systems that produces fleet data and strengthen data reporting.
- Develop data reporting standard operating procedures for annual reporting requirements by November 2020. This initiative along with initiative #3 will strengthen reporting integrity avoiding reporting challenges experienced in FY 18 & 19.
- Continue efforts to secure funding for annual funding vehicle replacement or GSA Vehicle Leasing.

Implementation Summary: Cross-Cutting Operations

1. SUSTAINABLE ACQUISITION / PROCUREMENT

FY 2019 Sustainable Acquisition Progress:

1.5% of contract actions and 32.0% of obligations (in dollars), for a total of \$186.0M in contract actions with statutory environmental requirements

FY 2020-FY 2021 Plan:

1.5% of contract actions and 25.0% of obligations (in dollars)

1.5% of contract actions and 25.0% of obligations (in dollars)

SI's overall strategy for sustainable acquisition and procurement is to look for practical ways to increase sustainable purchases through contract management.

Implementation Status

- The Smithsonian Institution continues to provide central paper supplies to all offices with recommended recovered fiber content levels for uncoated printing and writing papers which ensures nearly 100% usage of EPA recommended printing and writing papers.
- The Smithsonian Institution includes statutory environmental requirements in all its design and construction contracts.
- The Smithsonian Institution has engaged three contractors on an Open Term Contract basis to provide the Institution with only cleaning supplies that meet or exceed EPA recommendations for buying "green" cleaning products.

- Smithsonian Institution is working with two contractors to create pre-negotiated catalogs for the supply of non-paper office products that meet recycled content requirements under the Comprehensive Procurement Guideline (CPG). Buyers throughout the Institution will be directed to these catalogs for all Office Supplies which will strongly increase assurances that procurement of these items meets the requirements of the CPG. Further, the Institution will be able to track these purchases and those that deviate.
- Smithsonian Institution will strive to ensure that 100% of all applicable contract spend contains statutory environmental requirements.

2. ELECTRONICS STEWARDSHIP

FY 2019 Electronics Stewardship Progress:

100% of newly purchased or leased equipment met energy efficiency requirements 100% of electronic equipment disposed using environmentally sound methods* **Reuse, donation, recycling, transfer, sale, or demanufacturing.*

SI includes sustainable requirements as part of our contract vehicles for both goods and services acquisitions and uses sustainability as a factor in choosing cloud-computing services, and ensure all equipment is disposed of in a capacity that promotes reuse and/or recycling.

Implementation Status

- 100% of covered electronic products purchased by the SI Office of the Chief Information Officer (OCIO) are EPEAT (Electronic Product Environmental Assessment Tool) registered. OCIO will continue to research and publish recommendations for sustainable IT products for SI procurement staff. OCIO also continues to include sustainable requirements as part of contract vehicles managed by OCIO.
- In FY2020, native Windows utilities are managing the power usage of 97.5% of Windows computers. These settings turn off monitors and peripherals, and place CPUs in a very low power state when not in use. Beginning in March of 2020, a change was made to these settings which leave CPUs in a medium power state to facilitate remote desktop access for the thousands of staff required to teleworking during the SARS-CoV-2 quarantine. The FY2021 goal is to return power-management settings for most Windows computers to the lowest-possible power state.
- In FY2020, the displays/monitors for Apple systems are turned off and the CPUs placed in a medium power state when not in use. This configuration is specific to Apple computers as there is no way to remotely wake Apple computers for maintenance or telework needs.
- All excess IT components and non-working electronics are disposed of through either an R2/eSteward recycler to include USPS Blue Earth. Working electronics are disposed of through GSA and/or the GSA Computers for Learning (CFL) program for repurposing in schools and other Federal Agencies.

- Continue Personal Property Management Office launched Reutilization website "freestuff" to promote the reuse of excess property. This webpage allows staff from Smithsonian offices, museums and research centers to display their excess property so that staff that are interested in acquiring property from the webpage can select it.
- Priorities for the next 12 months include ensuring that all feasible power management options are enabled; monitor compliance with equipment disposal procedures; and ensure Si standards include purchasing EPEAT-compliant equipment.
- Sustainable features of electronic devices will be promoted to SI staff.
- Agency target for FY 2021 and 2022 is 100% equipment acquisition meeting EPEAT and energy efficiency requirements; 97.5% equipment with power management; & 100% compliance with disposal guidelines.

2020 Sustainability Report and Implementation Plan

3. GREENHOUSE GAS EMISSIONS

FY 2019 Scope 1&2 Greenhouse Gas (GHG) Emissions:

28.6% reduction from FY 2008

1.0% reduction from FY 2018

SI plans to decrease scope 1 and 2 greenhouse gas emissions by implementing energy conservations measures that reduce energy use and purchasing renewable energy credits to increase our renewable energy portfolio.

Implementation Status

- GHG reduction is typically a direct result of increased facility energy efficiency and renewable energy profile.

- Priorities for the year ahead include reducing on-site use of fossil fuel, reducing use of grid-supplied electricity, and employing operations and maintenance best practices.
- Fluorinated gas inventory accuracy needs to be enhanced with transition to an internet-based refrigerant tracking and accounting system.