

Ames Laboratory FY 2013 Site Sustainability Plan

12/21/2012

TABLE OF CONTENTS

1. Executive Summary	1
2. Goal Performance Review and Plans	
1.1 Energy Intensity Reduction.....	3
1.2 Renewable Electricity	8
1.3 SF6 Reduction.....	9
1.4 Metering.....	10
1.5 Cool Roofs	11
1.6 Training.....	12
1.7 Net Zero Energy.....	13
1.8 Evaluate 25% of facilities using 75% of Facility Energy.....	14
1.9 Scope 3 GHG Reduction.....	15
1.10 Scope 1 & 2 GHG Reduction.....	16
2.1.a HPSB Existing Buildings.....	17
2.1.b HPSB New Buildings	18
2.3 Regional and Local Planning	19
3.1 Increase Fleet Alternative Fuel Use.....	20
3.2 Reduce Fleet Petroleum Use.....	21
3.3 Light Duty AFV Purchases	22
3.4 Submit Right-Sizing the Fleet Management Plan.....	23
4.1 Water Intensity Reduction	24
4.2 ILA Water Reduction.....	26
5.1 Diverting Non-Hazardous Solid Waste	27
5.2 Diverting Construction/Demolition Waste	28
6.1 Sustainable Acquisition	29
7.1 Data Center Metering.....	30
7.2 Data Center PUE.....	31
7.3 Electronic Stewardship	32
8.1 Site Innovation and Government-Wide Support.....	33
3. Climate Change Adaptation	34
4. High Energy Mission Specific Facilities	36
5. Budget/Funding	37

1. Executive Summary

INTRODUCTION

The Ames Laboratory is a government-owned, contractor operated, facility located at and operated by Iowa State University, Ames, Iowa. Ames Laboratory conducts basic research in the physical, chemical, and material sciences. Ames' mission focus is on materials science, engineering, analytical instrumentation and chemical sciences that provides expertise to the Department of Energy (DOE) laboratory system in the areas of energy and environmental improvement. Ames operates the Materials Preparation Center (MPC) which provides capabilities in preparation, purification, fabrication and characterization of materials in support of R&D programs throughout the world. Ames also collaborates with the DOE's applied energy technology and nonproliferation programs and supports the National Institutes of Justice, Department of Defense, various law enforcement agencies, and corporate entities.

This plan articulates the Ames Laboratory's commitment to meet the DOE sustainability goals through the projects, tasks, and activities described in the plan. The age of the facilities makes it very challenging to achieve energy efficiency and sustainability in the existing facilities. Four energy conservation projects and a combined energy and water conservation project provide the core strategy to achieve the goals.

The energy conservation projects are estimated to achieve an additional 4% savings through improved energy efficiency while the water conservation project is projected to save 16% compared to baseline data. Ames Laboratory will work to identify and implement additional conservation measures in order to meet goals.

Since the beginning of FY 2009 the Ames Laboratory has successfully retro commissioned approximately 62% of Laboratory spaces.

Renewable energy goals have been achieved primarily through the purchase of wind-generated electricity from our local utility and accounting for that power through Renewable Energy Credits. A waiver for the on-site generation of renewable energy has been granted based on the results of a review done by the Energy Service Company (ESCO) which indicated that they were not able to identify any viable on-site generation retrofit projects.

Ames Laboratory has met the Fleet Reduction Goal of 35% and, of the remaining fleet vehicles, 25% are Alternative Fuel Vehicles (AFV). Additionally the Ames Laboratory has increased its usage of AF by 85% from FY 2009 to FY 2012.

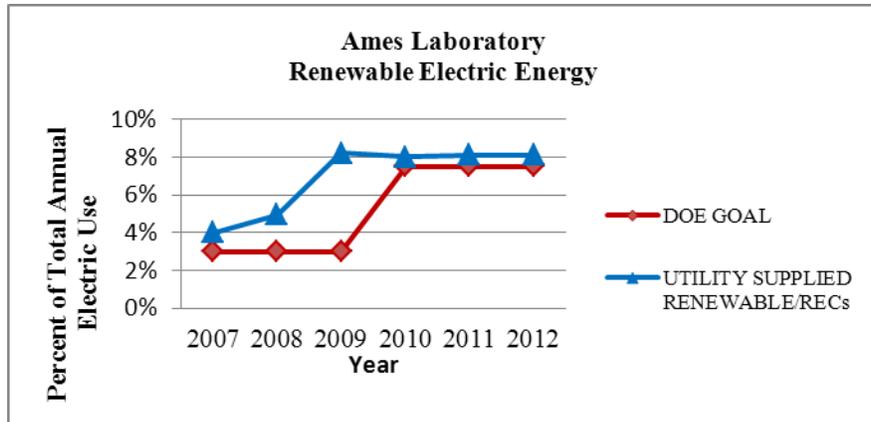
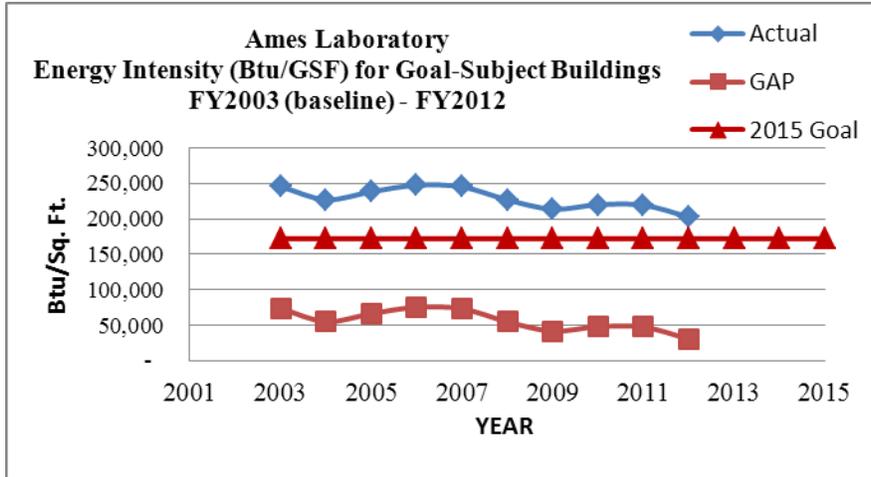
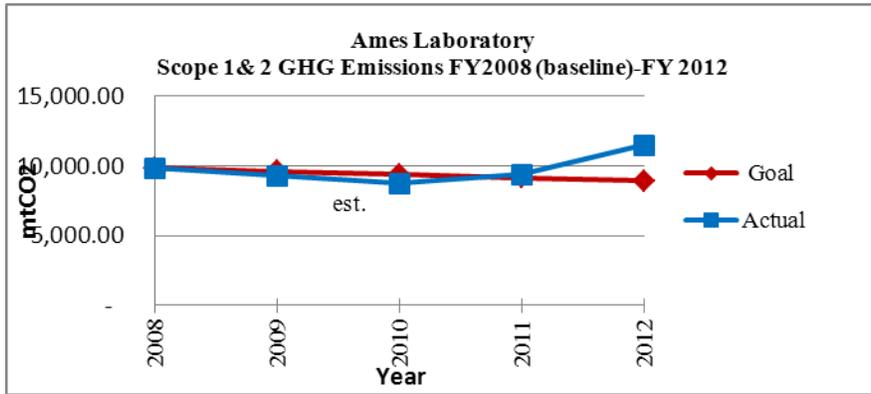
The Ames Laboratory completed installation of required advanced electric meters in FY 2010.

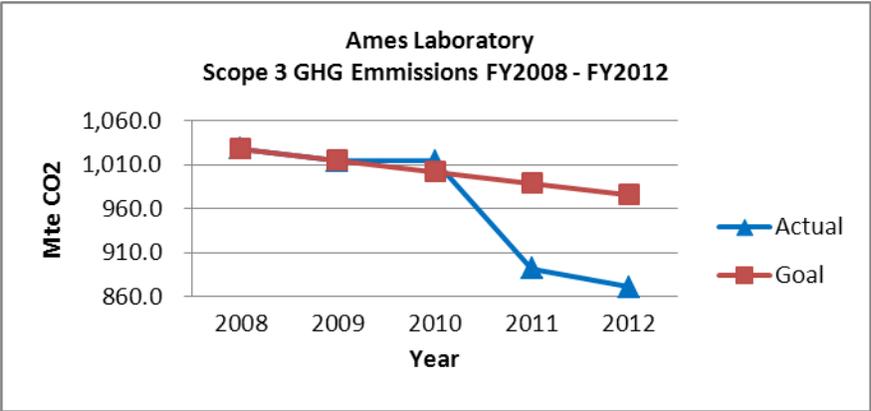
Currently 13% of the Ames Laboratory total roof area qualifies as cool roofs.

The sustainability plan outlines the Laboratory's commitment to High Performance and Sustainable Buildings. It describes the steps that will be taken to evaluate and achieve compliance with the guiding principles in 15% of the existing enduring buildings at the site. Ames will also develop a plan to implement the guiding principles in all of the major buildings where it is economically justified. The Laboratory recognizes the requirement for new construction to achieve certification to the LEED Gold Standard and will make that a central requirement in the design and construction of new line-item facilities.

Goal Summary Table

See Appendix C





2. Performance Review and Plan Narrative

Goal 1.1: 30% energy intensity reduction by FY 2015 from a FY 2003 baseline

Performance Status.

Energy Intensity

The Bench Mark energy usage established for FY 2003 at the Ames Laboratory is 245,717 Btu/sq. ft. In FY 2011, the Ames Laboratory consumed 219,405 Btu/sq. ft. In FY 2012 the Ames Laboratory consumed 202,528 Btu/sq. ft., a DECREASE of 17.6% compared to FY 2003 consumption and a DECREASE of 7.6% compared to FY 2011 consumption.

Numerous factors influence the level of energy use at the Laboratory, many of these such as weather and utility outages are random, unquantifiable, and beyond the control of the Laboratory. As a significant portion of the energy use at the Ames Laboratory is for environmental control, annual variations in weather can significantly impact energy usage.

Retro Commissioning of Existing Buildings

Since the beginning of FY 2009 the Ames Laboratory has successfully retro commissioned 3 existing buildings totaling 62% of the site.

Fume Hood Monitoring

Ames Laboratory will continue its hood surveillance program with a goal to further reduce fume hood operational discrepancies in FY 2013.

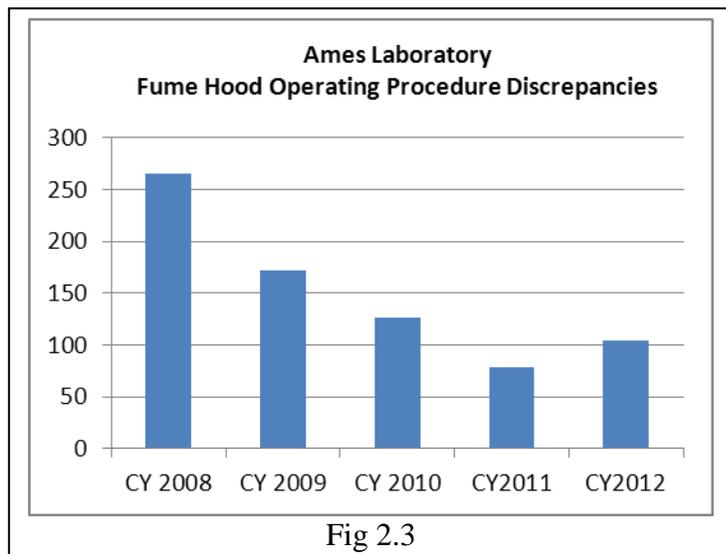
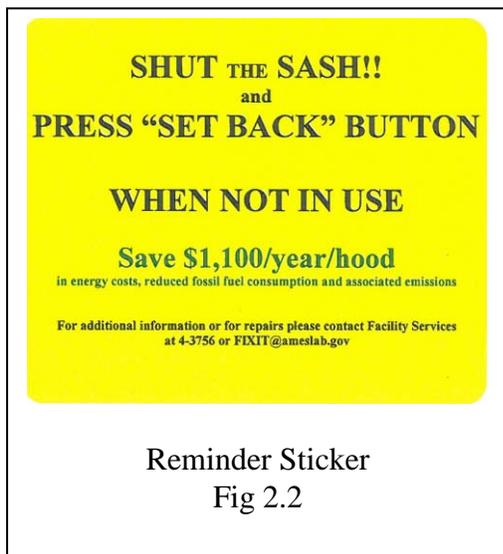
The Ames Laboratory utilizes a variable volume fume hood exhaust system that can provide for significant energy savings when operated properly. New employees are trained in proper operation of the fume hood controllers in General Employee Training and during program specific training. In addition, operating instructions are posted on each hood. (Fig 2.1)

Ames Laboratory Security personnel observe hood status as they perform patrols during the evenings and on weekends. Fume hoods found not being operated in an energy efficient manner are marked with a sticker (Fig 2.2):

Once the hood is marked, the responsible Program Director and Group leader are notified via Daily Discrepancy report, emailed by the Plant Protection personnel each morning and noted again in the Monthly Discrepancy report emailed at the end of each month.

Since starting the hood surveillance program, procedural violations related to hood operation have been reduced by approximately 61%. (Fig 2.3)





Projected Performance.

Energy Saving Performance Contract

No ESPC is currently being developed at the Ames Laboratory.

Upgrade Spedding Hall Windows

Spedding Hall has 136 windows on the ground, first, second, third, and penthouse floors. They are metal frame, single pane, and fixed type. Such window systems are energy inefficient, with low thermal resistance and poor shading characteristics, meaning that they do not effectively inhibit the transfer of heat and direct sunlight. This project considers replacing the existing windows with new double pane “low emissivity” windows, which have almost double the thermal resistance and shading performance, as well as a greatly reduced air infiltration rate around the frame. The new windows will save energy and money expended to heat and to cool the Hall. This project is scheduled for FY2016.

Energy Conservation Project - Lighting Upgrades

Ames Laboratory has approximately 3,300 lighting fixtures that contain older lighting technology, fluorescent or incandescent light sources. These fixtures use magnetic ballasts and T12 fluorescent lamps or screw-in type incandescent lamps. While functional, such lamps are less efficient than current technology lighting systems and consume more electricity than current technology fixtures. In addition, the less efficient fixtures generate a larger cooling load during summer months. Ames Laboratory will retro fit the existing lighting fixtures with current technology lighting sources. At the end of FY 2012, approximately 40% of the candidate light fixtures had been upgraded.

The lighting retro fits will focus on the following strategies to reduce energy consumption and operating and maintenance (O&M) costs, and improve the quality of light:

- Reducing the number of lamps and ballasts and different types of lamps.
- Electronic ballasts and 28-watt fluorescent lamps will be used to reduce existing lighting wattage per square foot.

Construction of Facilities

Partial funding has been received for the design of a new building to house sensitive scientific instruments. The design criteria for the site selection and facility design will include the requirement for LEED Gold certification. References indicate that LEED Gold Certification typically results in energy savings of 50-60% as compared to existing buildings. Adding high performance facilities to our inventory will significantly improve energy efficiency metrics. It will enable the Laboratory to implement technologies and practices that cannot be effectively and efficiently incorporated into our existing building inventory.

Retro Fit Building HVAC

Ames Laboratory is currently in the process of retro fitting the entire HVAC system of a building nearly 60 years old. The project, funded through GPP funds is expected to continue, in phases, through FY 2015. The retro fit will convert the system from a zoned constant-volume reheat system to a variable-volume system with climate control in each lab or office space. In addition to the improved control, the project will eliminate the energy waste from unnecessary use of reheat and will save fan energy.

Operations and Maintenance

Exhaust Stack Repair (Laboratory Fume Hoods)

In Spedding Hall, the existing laboratory exhaust hood system suffers from leaking exhaust stacks. This leaking stack condition consumes maximum fan energy and limits the effectiveness of the system to remove exhaust stream air contaminants, which consumes more energy than that of a properly operating sealed system. During FY 2012 the Ames Laboratory embarked on a project to repair the existing laboratory fume hood exhaust stack system to improve the exhaust systems' effectiveness, reduce excess exhausted building air, and reduce required fan horsepower. By the end of FY 2012 a total of 78 stacks were either repaired or capped reducing measured leakage by approximately 15,000 cfm.

Retro Commissioning of Existing Buildings

A recommissioning of the HVAC system serving the Spedding Hall is planned for FY 2013.

Vacuum Pump Modernization Study

Review the number, types, age, and power requirements of vacuum pumps utilized at the Ames Laboratory. The results of the study will be used to determine if a general upgrade of Laboratory vacuum pumps would improve energy efficiency and reduce O&M costs associated with maintaining older pumps.

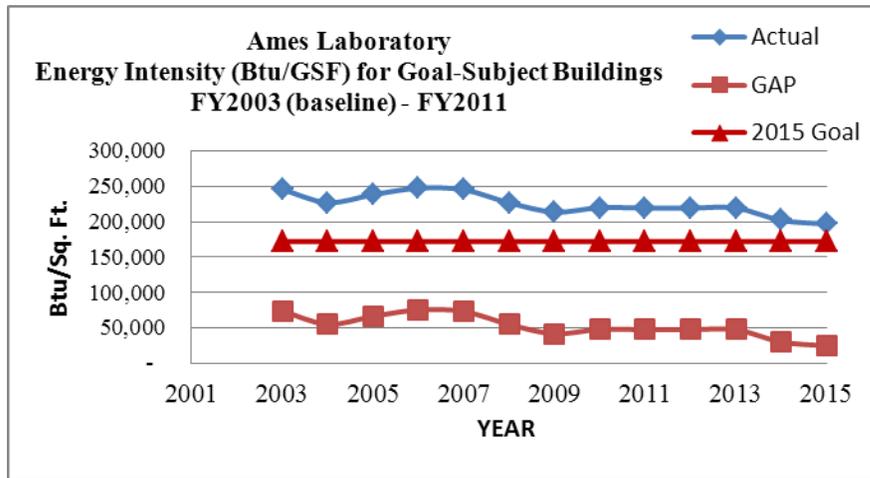
Fume Hood Monitoring

Ames Laboratory will continue its hood surveillance program with a goal to reduce fume hood operational discrepancies again in FY 2013.

Energy Efficiency Metrics Table

			2003	2012		
Gross Square Feet			324,501	327,664		
Total Buildings Energy Use (MBtu)			79,827	66,368		
ESPC Project or separate Energy Conservation Measure *	Actual or Estimated Energy Saved MBtu/yr	Percent of Base Energy Use/Square Foot	Actual or Estimated Implementation Cost	Expected Year of Implementation	Funding Source (ESPC, UESC, Overhead, GPP, Other)	
Energy and Water Conservation Project (lighting and plumbing fixture upgrades)	667	1%	\$500K	2016	GPP	
Spedding Hall HVAC Upgrade	1,718	2%	\$3,235K	2015	GPP	
Retro commissioning	1,300	1%	\$97K	2013	Overhead	
Exhaust Stack Repair	5,434	6%	\$155K	2013	Overhead	
Upgrade Spedding Hall Windows	1,124	1%	\$500K	2016	GPP	

Gap Analysis



2015 GOAL = 172,025 Btu/Sq. Ft.

Data table follows on next page.

YEAR	USE Btu/Sq. Ft.	GAP Btu/Sq. Ft.	Conservation project	Energy savings Btu/Sq Ft	Funding source
2007	245,245	73,220			
2008	226,886	54,861			
2009	213,768	41,743			
2010	219,963	47,938			
2011	219,405	47,380			
2012	202,717	30,715	Retro commissioning	3,967	M&R Indirect
2013	180,890 (Est)	8,888	Spedding Hall HVAC Upgrade Exhaust stack repair.	21,827 (5243+16,584)	GPP
2014	175,422 (Est)	3,422	Upgrade Windows Energy & Watery cons. Projects	5466	GPP
2015	175,422 (Est)	3,422			

Goal = 172,000 Btu/Sq.Ft.

Note that the Retro-Commissioning and the Spedding Hall HVAC upgrade are multi-year projects and the majority of the energy savings should already be accounted for in the actual use numbers through FY2012.

As can be seen, in 2015 Ames Laboratory will still have a gap of at least 3,422 Btu/Sq. Ft. which will need to be addressed.

Barriers to Achieving the Goal

Currently identified ECMs do not provide sufficient energy savings to achieve the 30% reduction in energy intensity by 2015.

Goal 1.2: 7.5% of annual electricity consumption from renewable sources by FY2013 and thereafter (5% FY 2010 – FY 2012)

Performance Status.

To comply with renewable energy goals, in FY2012 the Ames Laboratory purchased 545 MWh of renewable wind generated electrical power and the associated Renewable Energy Certificates (RECs) at a cost premium of \$1,908 to cover the cost of processing the RECs. 545 MWh is approximately 8% of the Laboratory’s FY 2012 electric energy consumption and exceeds the 7.5% requirement.

Projected Performance

The Ames Laboratory will continue to meet renewable energy goals through the purchase of renewable wind energy (bundled with the associated RECs) from our supplying utility.

Waiver

The Ames Laboratory has been granted a waiver for the on-site renewable energy generation requirement.

Renewable Energy Metrics Table

Renewable Energy/Thermal Energy Technology including RECs	System Size (capacity)	Total MWh/yr	Renewable Energy Initial Project Capital Cost	Funding Source (ESPC, UESC, PPA, Other)	Expected Year of Implementation
RECs		300		Overhead	FY2009
WIND W/RECs		570		Overhead	FY2010 – FY2011
WIND W/RECs		545		Overhead	FY2012
WIND W/RECs		700		Overhead	FY2013 and Beyond

Goal 1.3: SF6 Reduction.

Performance Status.

The Laboratory's usage/storage is mainly for research equipment (electron microscopes). Maintenance procedures on the microscopes will typically release 1-2 lbs. of SF6 each year.

In addition the Laboratory has two pieces of underground switchgear each with a capacity of 19.5 pounds of SF6 each. One of the switchgear has a small leak which releases approximately 2.7 pounds of SF6 over a year's time. Due to the location of the switchgear and the small amount of SF6 being released it is more cost effective to service and re-charge the switch with SF6 every other year than trying to find and repair the leak.

Based on the amount of SF6 it is not cost effective to purchase recovery equipment.

Projected Performance.

The Laboratory does not have any plans to purchase SF6 recovery equipment.

Waiver

The Laboratory is requesting a waiver from the SF6 recovery requirement based on volumes verse cost.

Goal 1.4: Individual buildings or processes metering for 90% of electricity (by October 1, 2012); for 90% of steam, natural gas, and chilled water (by October 1, 2015) Metering

Performance Status.

The Ames Laboratory completed installation of the required electricity meters by the 2012 target. The metering plan called for the installation of advanced electrical metering in the four buildings that meet the criteria for advanced meters. This includes the three research buildings and the administrative services building. The smaller support and service buildings do not meet the criteria. The installation of the advanced electrical metering began in and was completed in FY 2010.

All utilities used at the Ames Laboratory are 100% metered, either by advanced meters or standard meters. Gaps do exist in the area of sub-metering, especially for chilled water where a single meter serves 5 buildings.

Projected Performance.

The Ames Laboratory is developing a project to sub-meter Chilled Water for TASF as a path toward meeting the requirements of the HPSB program for existing buildings.

Goal 1.5: 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.

Performance Status.

Currently the Ames Laboratory has two roofs, totaling approximately 16,000 square feet that qualify as cool roofs. This is approximately 13% of the Laboratory's total roof area.

Projected Performance.

Unless determined uneconomical by a life-cycle cost analysis, future roof replacements shall be cool roofs. Moreover, new roofs shall have a thermal resistance of at least R-30.

Goal 1.6: Training.

Performance Status.

In FY 2012 the Ames Laboratory trained one individual which resulted in that individual becoming a Certified Energy Manager through the Association of Energy Engineers. Additional training was received in the implementation of the High Performance Sustainable Buildings program and achieving compliance with the Guiding Principles for existing buildings.

Projected Performance.

Take advantage of continuing education opportunities to maintain existing certifications.

Goal 1.7: Net Zero energy in new or major renovation facilities.

Beginning in 2020 and thereafter, ensure that all new Federal buildings that enter the planning process are designed to achieve zero-net-energy by 2030;

Performance Status.

Currently the Ames Laboratory has no plans for new facilities or major renovations planned beyond the Sensitive Instrument Facility scheduled to open in 2014.

Projected Performance.

Unless determined uneconomical by a life-cycle cost analysis, future facilities and major renovations will be designed to achieve zero-net-energy by 2030.

Goal 1.8: Evaluate 25% of 75% of Facility Energy Use over a 4-Year cycle.

Performance Status.

Ames Laboratory successfully evaluated 100% of covered facilities for energy and water use during the first 4 year EISA Section 432 review cycle which concluded in June, 2012. The covered facilities which were reviewed accounted for 100% of the energy use at The Ames Laboratory. Of the covered facilities 3 buildings, representing 53% of the covered square feet and 64% of the energy use, were re-commissioned.

All buildings have been benchmarked with either Portfolio Manager or Labs 21.

Projected Performance.

Ames Laboratory plans to continue re-commissioning efforts until all buildings have been re-commissioned. Ames Laboratory will comply with EISA Section 432 energy and water review cycle requirements by June, 2016.

Goal 1.9: 13% Scope 3 GHG reduction by FY 2020 from a FY 2008 baseline

Performance Status.

Scope 3 Green House Gases (GHG) computed for FY 2008 were 1,186 mte CO₂

The 2012 inventory of Scope 3 GHG attributable to activities at the Ames Laboratory show a decrease in output to 852 mte CO₂ or a decrease of 28% compared to the FY 2008 baseline.

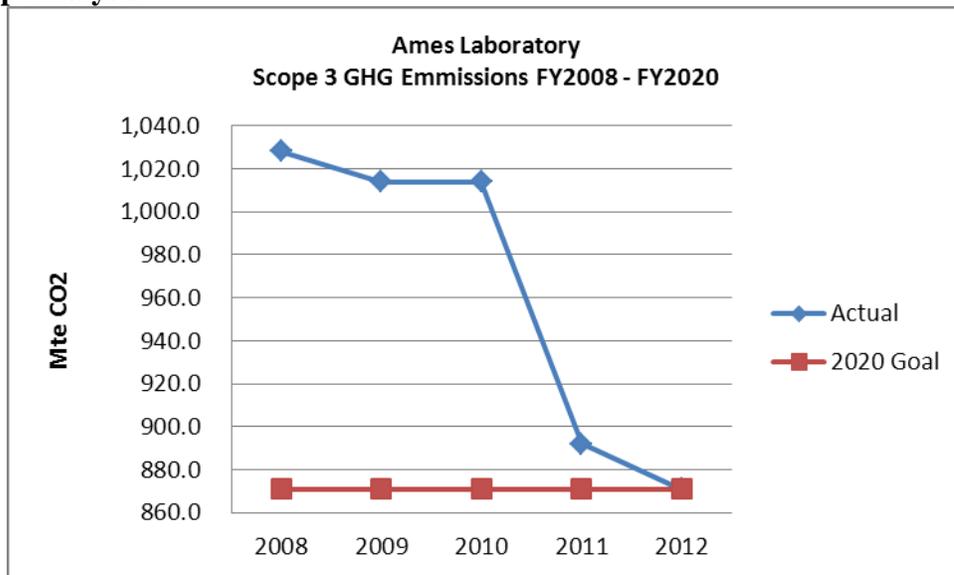
Projected Performance.

Continue to utilize wind generated electricity to avoid Scope 3 GHG emissions associated with Transmission and Distribution losses.

The Ames Laboratory has completed renovation of the main auditorium and established a distance learning center which is available to the entire Laboratory. This project will provide opportunities to attend meetings and training events remotely, reducing employee travel and the associated energy consumption and Scope 3 GHG emissions.

The Laboratory is developing programs to encourage more carpooling and use of public transportation to reduce the GHGs produced during employee commuting as well as encouraging the rental of hybrid vehicles for business travel.

Gap Analysis



YEAR	Scope 3 Emissions (mteCO ₂)	GAP to 2020 Goal
2008	1028	157
2009	1014 (Est.)	144
2010	1014	144
2011	892	23
2012	871	0

Goal 1.10: 28% Scope 1 & 2 GHG Reduction by FY 2020 from a FY 2008 baseline.

Performance Status.

The FY2012 GHG emissions for Ames Laboratory were 17.5% lower than they were in FY 2008. The reduction was primarily due to increased energy efficiency and replacing 545 Mwh of coal-fired electric power with wind power.

Projected Performance.

Continue to address energy efficiency, focusing extra efforts on those areas that produce the most GHG. As we reduce site energy usage, the amount of GHG produced will also be decreased. One method of reducing GHG production is by replacing the coal generated electricity currently utilized by the Laboratory with a larger percentage of wind energy which would be accounted for by receiving the retired REC's. Ames Laboratory has the potential of purchasing up to 100% of its electricity from wind generating sources..

On-Site Power Production.

The Ames Laboratory does not have on-site generating capacity nor the sufficient space to install any.

Purchasing Off-Site dedicated renewable or carbon-free electrical energy

The Ames Laboratory is purchasing off-site wind power through the Midwest grid at a premium to obtain the associated RECs to ensure the renewable, carbon free energy purchased by the Laboratory is dedicated to the Laboratory alone.

Purchasing RECs

It is assumed that beginning in FY2012 REC prices will rise by 2.5% per year.

	Actual FY11	Actual FY 12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Renewable Energy(MWHs) Plan	570	545	700	700	700	700	700	700	700	700
Actual/Planned/ Estimated Premium Cost	\$1,995	\$1,908	\$2,576	\$2,639	\$2,702	\$2,772	\$2,842	\$2,912	\$2,982	\$3,059
Unit Costs (\$/MWHs)	\$3.50	\$3.50	\$3.68	\$3.77	\$3.86	\$3.96	\$4.06	\$4.16	\$4.26	\$4.37

Gap Analysis:

Please refer to the gap analysis for the energy reduction goals. Meeting the reduction goals for Scope 1 and 2 GHG at the Ames Laboratory depends directly on the ability of the Laboratory to meet the energy intensity reduction goals.

Barriers to Achieving the Goal.

Please refer to the Barriers statement for the energy reduction goals. Meeting the reduction goals for Scope 1 and 2 GHG at the Ames Laboratory depends directly on the ability of the Laboratory to meet the energy intensity reduction goals.

Goal 2.1.a: 15% of existing buildings greater than 5,000 gross square feet (GSF) are compliant with the Guiding Principles (GPs) of HPSB by FY 2015

Performance Status.

In FY 2012 Ames Laboratory continued evaluation of existing buildings for compliance with the guiding principles of E.O. 13423. The following elements will contribute to the process:

- Utilizing the services of a third party consultant, performed initial screening and initiated data entry into Portfolio Manager.
- Results of the initial screening were used to perform a gap analysis.
- Using the gap analysis, the Laboratory established the most cost-effective way to reach the 15% goal by FY2015.

Projected Performance.

The following tasks are scheduled for completion in FY 2013:

- Develop a project and budget to meet the 15% goal.
- Develop a plan for exceeding the goal and implementing the guiding principles in all buildings where it is economically justified.

The status and progress toward these goals will be tracked. Data on sustainability status of each building asset has been entered in FIMS. This data will be updated as evaluations are completed and the status changes.

By 2015, 15% of the Ames Laboratory building inventory will meet the guiding principles as required by E.O. 13423.

Barriers to Achieving the Goal.

A lack of building-dedicated sub-metering will make it difficult to certify several of our buildings.

Goal 2.1.b: All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs and where the work exceeds \$5 million, each are LEED® – NC Gold certification or equivalent

Performance Status.

Funding has been received for the design of a new building to house sensitive scientific instruments. The design criteria for the site selection and facility includes the requirement for LEED Gold certification. References indicate that LEED Gold Certification typically results in energy savings of 50-60% as compared to existing buildings.

Projected Performance.

Adding high performance facilities to our inventory will significantly improve energy efficiency metrics. It will enable the Laboratory to implement technologies and practices that cannot be effectively and efficiently incorporated into our existing building inventory.

Goal 2.3: Regional and Local Planning

The EO 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.

Ames Laboratory facilities personnel have regular interaction with City of Ames Electric Department personnel regarding utility supply issues including locally-generated renewable power, REC's, pricing, incentive programs, and other topics.

The contractor has significant interaction with state and local officials regarding transportation issues. The contractor participates in the Ames Area Metropolitan Planning Organization. This organization includes state, county, and city officials.

The contractor supports Cy-Ride, the local city bus system. It is a collaboration between the city of Ames, Iowa State University, and ISU's Government of the Student Body. The contractor has representation on the Cy-Ride transit board.

Contractor leadership has been instrumental in attracting funding for a regional transit intermodal facility. The grant application was a collaboration between the contractor, the City of Ames, and Cy-Ride.

The Laboratory is represented on various planning and advisory groups with the contractor and local officials. The Manager of the Facilities Services Group represents the Laboratory on the Traffic Advisory Council which provides input to contractor management on traffic issues. Another example is participating in a planning group working to improve traffic flow near the Laboratory and safety, especially for pedestrians and bicyclists.

Projected Performance.

Assess opportunities for additional participation and input into local and regional planning through the structures of the contractor.

Goal 3.1: Increase Alternative Fuel by 10 Percent Annually over the Previous Year

Performance Status.

Ames Laboratory increased its usage of alternative fuel from 0 gallons in FY2005 to 240 gallons in FY2012, down from the 286 gallons used in FY2011.

Projected Performance.

Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as vehicles become available to lease.

Goal 3.2: Reduce Departmental Fleet Petroleum Use by 2 Percent Annually

Performance Status.

The Laboratory will pursue the goal as much as possible within what can be done with a limited fleet. Gasoline powered vehicles currently use an E-10 ethanol blend while the AFVs use E-85 ethanol blend.

Ames Laboratory has decreased the use of petroleum fuel (gasoline and diesel) by 15.8% since 2005, meeting the goal.

Projected Performance.

Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as vehicles become available to lease.

Goal 3.3: 75% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV)

Performance Status.

25% of the vehicles in Ames Laboratory's fleet are AFVs.

Projected Performance.

Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet.

Goal 3.4: Submit Right-Sizing the Fleet Management Plan for approval by Dec 31, 2012. Identify mission critical/non-mission critical vehicles by Dec 31, 2012

Performance Status.

This is a revised goal. Report preparation is complete and being submitted concurrently with this plan..

Projected Performance.

N/A

Goal 4.1 26% water intensity reduction by FY 2020 from a FY 2007 baseline

Performance Status.

The Ames Laboratory has meter data for all domestic water usage for the base year of FY 2007. Total consumption in the base year is 4,792 kgal or 14.6 gal./sq.ft. Water consumption for FY 2012 was 4,355 kgal or 13.3 gal./sq.ft. a decrease of 9.1% compared to the base year water use intensity. The water use intensity at the Ames Laboratory increased slightly over last fiscal year (FY 2011) due to an extended power outage that forced the use of tap water for cooling critical loads.

Projected Performance.

Energy Conservation Projects - Water and Sewer Conservation Component

This component of the Energy Conservation Projects applies to domestic water fixtures located in buildings at Ames Laboratory. The current plumbing fixtures result in wasted water by using more flow than is required. For fixtures that deliver hot water, the excess flow also wastes the energy required to heat the water, although no water heating savings were claimed for this project. New, low-flow fixtures have improved to the point where they are very reliable. Only plumbing fixtures that are currently inefficient high water users will be retro fitted. All others will remain as they are now. The project will include:

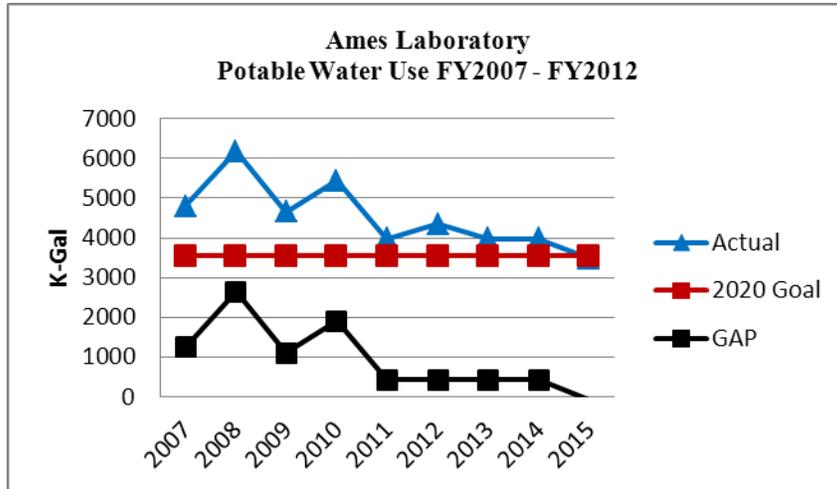
- a. Replacing water closets and flush valves.
- b. Retro fit of urinal flush valves.

Fixture	Upgrade Quantity
New Toilets	54
Urinal Flush Valve Retro fits	16

Construction of Facilities

Funding has been received for the design of a new building to house sensitive scientific instruments. The design criteria for the site selection and facility design will include the requirement for LEED Gold certification. References indicate that LEED Gold Certification typically results in energy savings of 50-60% as compared to existing buildings. Adding high performance facilities to our inventory will significantly improve energy efficiency metrics. It will enable the Laboratory to implement technologies and practices that cannot be effectively and efficiently incorporated into our existing building inventory.

Gap Analysis



2020 Goal = 3,540 Kgal.

YEAR	USE Kgal	GAP Kgal	Conservation project	Water savings	Funding source
2007	4,792	1,252			
2008	6,184	2,643			
2009	4,647	1,107			
2010	5,446	1,906			
2011	3,971	431			
2012	4,355	815			
2013	3,971 (Est.)	431			
2014	3,971 (Est.)	431			
2015	3,476 (Est)	0	Energy & Water Conservation Project	495	GPP

Barriers to Achieving the Goal.

Performance against this goal can vary greatly from year-to-year. On those occasions when the campus Chilled Water System is out of service, tap water is used to cool critical loads. The Laboratory is more likely to meet or exceed the goal reduction during years when there are fewer outage situations that are of short duration compared to those years that may have multiple outages or an outage of long duration such as occurred in FY2012.

Goal 4.2: 20% water consumption reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline

Ames Laboratory does not utilize water for industrial, landscaping or agricultural purposes. The goal does not apply.

Goal 5.1: Diverting at least 50 percent of non-hazardous solid waste, excluding construction and demolition debris, by the end of FY 2015;

Performance Status.

75% of the non-hazardous solid waste from the Ames Laboratory is recycled and diverted from landfilling. The Laboratory's non-hazardous solid waste is processed at the City of Ames resource recovery plant which diverts 75% of the material from landfill through various forms of recycling.

The Laboratory has a robust recycling program that keeps the Laboratory's solid waste generation low. The Ames Laboratory recycling program includes, but is not limited to, paper, cardboard, metal, fluorescent tubes and used oil.

The Laboratory participates in the U. S. Government excess system to allow usable equipment and materials to be utilized by other agencies.

Projected Performance.

Ames Laboratory continually tries to find ways to reduce its environmental footprint. The Laboratory's Environmental Management System Steering Committee (EMSSC) meets quarterly to consider new practices, activities and programs that will reduce the Laboratory's environmental footprint. The committee makes recommendations to the Executive Council that will help meet DOE goals.

Goal 5.2: Diverting at least 50 percent of construction and demolition materials and debris by the end of FY 2015

Performance Status.

Most construction and demolition materials are currently landfilled.

In FY 2012 the Laboratory diverted 6.8 metric tons of steel from being landfilled.

Projected Performance.

During FY2013 develop methods to track amount of construction and demolition material is generated each year.

Ames Laboratory continually tries to find ways to reduce its environmental footprint. The Laboratory's Environmental Management System Steering Committee (EMSSC) meets quarterly to consider new practices, activities and programs that will reduce the Laboratory's environmental footprint. The committee makes recommendations to the Executive Council that will help meet DOE goals.

Barriers to Achieving the Goal.

Due to a limited number of local recycling paths for construction and demolition debris, diversion costs can be higher than sending the debris to the landfill..

Goal 6.1: Procurements meet sustainability requirements and include sustainable acquisition clause (95% each year)

Performance Status.

100% of the construction contract issued by the Ames Laboratory in FY 2011 met the requirements for specifying sustainable products or services.

The Purchasing and Property Services Group reviews acquisitions for sustainability requirements.

The Laboratory is currently tracking EPEAT-registered products and EPA designated products. Data is annually entered into DOE's PPTRS a web based data collection system. Reports are available on the PPTRS website (<http://www.hss.doe.gov/pp/dataentry.html>).

Projected Performance.

Continue to develop and implement sustainable acquisition guidelines.

Determine which commodities to track, and then implement a tracking mechanism to measure contract compliance.

Continue to update Ames Laboratory Purchasing website to provide a convenient resource and to educate Ames Laboratory employees on sustainable acquisitions.

Goal 7.1: All data centers are metered to measure a monthly PUE (100% by FY 2015)

Performance Status.

The Ames Laboratory data center is 100% metered to measure a monthly PUE.

Projected Performance.

The Ames Laboratory will continue to evaluate meter placement and loads measured to ensure an accurate PUE as well as identify ECMs to improve the PUE.

Goal 7.2: Maximum annual weighted average Power Utilization Effectiveness (PUE) of 1.4 by FY 2015

Performance Status.

The Ames Laboratory data center has a PUE of approximately 1.55.

Projected Performance.

The Ames Laboratory will continue to evaluate meter placement and loads measured to ensure an accurate PUE as well as identify ECMs to improve the PUE to 1.4 by the end of FY 2015.

Barriers to Achieving the Goal.

Limited flexibility in the arrangement of the data center and a lack of cost-effective ECMs will hinder the early achieving of this goal.

Goal 7.3: Electronic Stewardship - 100% of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY 2012

Performance Status.

The implementation of power management and energy efficiency parameters for Windows systems is an ongoing process. The settings are distributed via Group Policy on Windows systems. Some power management and energy efficiency parameters are controlled in the BIOS settings and are set when standard baseline configurations are applied.

A print server was implemented to provide centralized print management. Duplex printing is enabled for all duplex capable printers.

Projected Performance.

Effort to implement power management and energy efficiency settings for Linux and MacIntosh systems will be evaluated.

Goal 8.1: Site Innovation and Government-Wide Support

Describe innovative ways in which research and development (R&D) technologies are being deployed at the site level to support sustainability goals (e.g. enhancing efficiency, expanding clean energy, sustainable campuses, employee engagement, behavior change • Describe green and sustainable remediation practices employed to minimize environmental impacts of remediation, waste management, and cleanup activities • Government-wide support that has assisted other agencies in meeting or working towards their sustainability goals, including work for others • Effort promoting sustainability not addressed in other goals that the Department should highlight in the next SSPP

Performance Status.

Environmental management steering committee provides a mechanism for the R&D groups to interface and exchange information, ideas, and observations concerning sustainability, energy conservation, pollution control, etc. with the Operations groups tasked with over site of the Laboratory physical assets.

Additionally, the relatively small size of the Laboratory and the relationship with Iowa State University contribute to extensive networking within the Laboratory and extending into the University community of scientists and researchers. This extended network increases the number of influencing disciplines and adds significant diversity to the range of ideas and observations that can be drawn upon to support the site-sustainability goals.

The Ames Laboratory has partnered with a WFO sponsor to fund the renovation of the main auditorium and establish a distance learning center which is available to the entire Laboratory. This project will provide opportunities to attend more meeting and training events remotely, reducing employee travel and associated energy consumption and GHG generation.

Projected Performance.

Continue to encourage the dialog between the various scientists, researchers, and operations staff. Evaluate those ideas and innovations that present themselves and implement those that support the site- sustainability effort where economically feasible and appropriate.

Consider implementing technology demonstration projects whether for “proof-of-concept” or for education/awareness.

3 Climate Change Adaptation

Per EO 13514, Sections 8(i) and 16, and subsequent CEQ Implementing Instructions, DOE developed and submitted a Climate Change Adaptation Plan with its 2012 SSPP. The DOE Climate Change Adaptation Plan directs DOE Programs to ensure that all facilities address climate change adaptation in their 2013 SSPs, and establishes the following goals and objectives applicable to DOE sites:

Performance Status.

- Goal 1: Improve Understanding of Climate Change Effects and Impacts
 - o Objective 1.1: Work with other agencies to improve our understanding of climate change.

The contractor for the Ames Laboratory, Iowa State University, has established the Climate Science Program to study the cause, effects and impacts of climate change globally and locally. The program draws from the diverse areas of expertise available at Iowa State including, but not limited to, Agronomy, Chemistry, Engineering, Geological and Atmospheric Sciences, Statistics, and Natural Resource Ecology and Management.

- o Objective 1.2: Work with other Federal agencies and local jurisdictions (as appropriate) to develop regional partnerships for climate change information sharing and collaboration.....and
- o Objective 4.2: Identify or establish and participate in regional climate change adaptation partnerships, as appropriate, for all DOE facilities

Ames Laboratory actively collaborates with other DOE laboratories and government agencies through participation in the World Energy Engineering Congress, Energy Efficiency Working Groups, and other such activities.

- Goal 2: Improve Understanding of Climate Change Vulnerabilities and Risk
 - o Objective 2.2: Conduct detailed risk or vulnerability assessments, as appropriate, for specific DOE programs or facilities

Ames Laboratory has reviewed the April 2012 DOE High Level Analysis of Vulnerability to Climate Change, and will conduct a preliminary high-level assessment/analysis of potential major vulnerabilities to climate change by 2014. Ames Laboratory will review a climate change vulnerability/risk assessment by the ISU Climate Sciences Department to understand possible local climate change effects.

Near term challenges could include exposure to more frequent severe storm events, heat waves, flooding, drought, and related power disruptions. Longer term challenges may include exposure to sustained water shortages, increased water and energy costs as well as more frequent flooding events.

Ames Laboratory is planning to undertake specific efforts by 2015 to better understand and/or begin preparing for local climate change effects at its facilities.

- Goal 4: Improve the Climate Resiliency of all DOE Sites
 - o Objective 4.1: Update all appropriate DOE site plans to address climate change resiliency

In addition to this SSP, the Laboratory will update related plans and procedures affected by the results of climate change contingency planning.

Projected Performance.

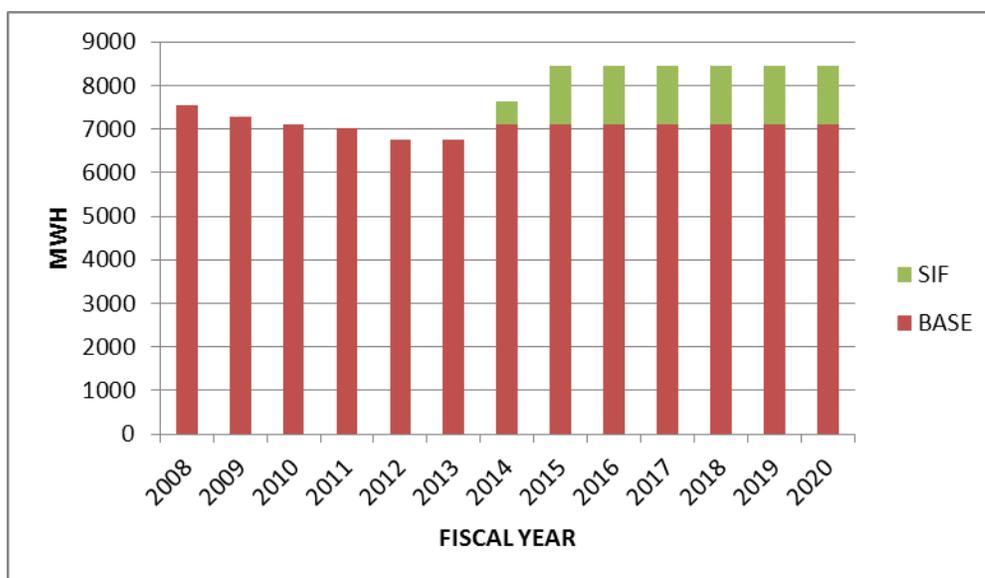
Review the publications of ISUs Climate Science Program for potential local vulnerabilities to climate change.

4 Projected Electrical Energy Use & High Energy Mission Specific Facilities (HEMSF)

Performance Status.

The Ames Laboratory does not currently have High Energy Mission Specific Facilities (HEMSF).

Projected Performance.



FY	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SIF*	0	0	0	0	0	0	538	1,345	1,345	1,345	1,345	1,345	1,345
SITE BASE	7,554	7,291	7,102	7,010	6,742	6,742	7,102	7,102	7,102	7,102	7,102	7,102	7,102

*NOTE:SIF is the Sensitive Instrument Facility, currently in CD2 status which does NOT meet the criteria for a HEMSF; however, when it becomes operational in mid-2014 (projected) will have an impact to the base load of the Laboratory. See CEDR Tab 3.4 for additional details.

5 Budget/Funding

Characterize and provide examples of efforts to integrate long-term sustainability goals into the budget process along with overall funding strategy such as return on investment analysis, prioritization methodology (e.g. reduction of deferred maintenance, meeting a specific goal, environmental and climate considerations), the use of overhead funds, cost savings reinvestment, leveraging of alternative finance, e.g. ESPC including the combining of appropriated funds with private funding.

Performance Status.

In 2008 the Ames Laboratory initiated a Preliminary Proposal and Detailed Engineering Study in preparation for participation in an ESPC. No viable projects were identified and the ESPC was not executed. Currently the Laboratory is not participating in an ESPC.

As Energy Conservation Measures (ECM) are identified through energy and water use evaluations and audits they are evaluated for efficacy primarily through simple pay back analysis. If the pay back is 10 years or less, the Laboratory prioritizes the project based on various factors including, but not limited to, ES&H risk analysis, deferred maintenance, progress toward Laboratory and DOE Sustainability and energy conservation goals. Once prioritized the project is evaluated for the appropriate source of funding whether GPP, Overhead or other and then submitted for budgetary prioritization and approval.

Energy use is the largest single factor affecting sustainability at the Laboratory. As such, the wise use and conservation of energy is considered in the development of all projects at the Ames Laboratory whether the project is primarily for enhanced energy conservation or not. Those measures deemed cost effective are incorporated in the projects to help improve the sustainability of the Laboratory.

Projected Performance.

Ames Laboratory will continue efforts to integrate long-term sustainability goals into the budget process along with continued use of an overall funding strategy including return on investment analysis, prioritization methodology, the use of overhead and GPP funds. The conservation of energy and sustainability will be considered in the development of all projects at the Ames Laboratory whether the project is primarily for enhanced energy conservation or not.

Please refer to CEDR Tab 3.3 Conservation and RE Measures for specific budgeting details for currently identified ECMs.

APPENDIX C
GOAL SUMMARY TABLE

SC/SSPP /OMB Goal		DOE Goal	Performance Status	Planned Actions & Contribution	Risk of Non-attainment
Goal #1		Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory			
	1.1	Energy Intensity Reduction 30% by FY 2015 from FY 2003 baseline	Decreased from 219,405 Btu/gsf in FY 11 to 202,528 Btu/gsf in FY 12. Cumulative reduction at the end of- FY 12: 17.6% FY 03 Baseline: 245,734 Btu/gsf. FY 15 Goal: 172,014 Btu/gsf.	Implement energy conservation projects described in the SSP that are estimated to achieve an additional 4% reduction compared to baseline. AL will work to identify and implement additional ECMs to meet goals.	H
	1.2	7.5% of annual electricity consumption from renewable sources by FY 2013 and thereafter (5% FY 2010 – 2012)	COMPLETE	Continue to purchase wind generated electricity to meet requirements. REC's retired to AL to account for renewable energy purchased.	L
	1.3	SF ₆ Reduction	Approximately 336 pounds of SF ₆ is in use or in storage.	Approximately 300 pounds stored for research (electron microscopes). 36 pounds for electrical switchgear.	
	1.4	Individual buildings metering for 90% of electricity (by October 1, 2012); for 90% of steam, natural gas, and chilled water (recommended) (by October 1, 2015.)	All utilities metered, electrical with advanced metering.	Evaluate need for Chilled Water sub-meters to meet requirements of HPSB program requirements.	L
	1.5	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.	13% of the roofs at Ames Laboratory are Cool Roofs.	As roofs are replaced, use cool roofs unless economically unjustified. Insure R30.	L
	1.6	Training			L
	1.7	Net Zero energy in new or major renovation facilities by 2020.			L
	1.8	Evaluate 25% of 75% of Facility Energy Use over 4-Year Cycle	New cycle started in June, 2012.		L
	1.9	13% Scope 3 GHG energy intensity reduction by FY 2020 from a FY 2008 baseline	<u>Decreased from 892 MTCO₂e in FY 11 to 853 MTCO₂e in FY 12.</u>	<u>Continue to utilize wind generated electricity to lower emissions.</u> <u>New distance learning capability will help</u>	L

SC/SSPP /OMB Goal		DOE Goal	Performance Status	Planned Actions & Contribution	Risk of Non-attainment
			<u>Cumulative percent decrease at the end of FY 12: 28.1%</u> <u>FY 08 Baseline: 1,186 MTCO₂e</u> <u>FY 20 Goal: 1032 MTCO₂e</u>	<u>reduce business travel and reduce Scope 3 GHG emissions.</u> <u>Promotion of National Bike Challenge to encourage alternatives to motorized vehicle transportation.</u>	
	1.10	28% Scope 1 & 2 GHG Reduction by FY 2010 from a FY 2008 baseline	Decreased from 13,937 MTCO ₂ e baseline to 11,497 MTCO ₂ e in FY 12. Cumulative percent reduction at the end of FY 12: 17.5% FY 08 Baseline: 13,937MTCO ₂ e FY 20 Goal: 10,034 MTCO ₂ e	Focus on energy conservation, particularly the energy sources associated with Scope 2 GHG emissions.	L
Goal #2		Buildings HPSB, ESPC Initiative, Regional and Local Planning			
	2.1.a	15% of existing buildings greater than 5,000 gross square feet (gsf) are compliant with the Guiding Principles (GPs) for HPSB by FY 2015	Criterion requires one (1) building at the Ames Laboratory must meet the guiding principles by FY 2015	During FY 2012 Ames Laboratory plans to secure the services of a third party consultant to review existing building compliance with HPSB requirements.	L
	2.1.b	All new construction, major renovations, and alterations of buildings greater than 5,000 gsf must comply with GPs		Planning for any new construction will include LEED Gold certification or HPSB Guiding principles in the design criteria.	L
	2.2	ESPC Initiative			
	2.3	Regional & Local Planning			L
Goal #3		Fleet Management			
	3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to a FY 2005 baseline	Increased from 0 gal. in FY 05 to 240 gal. in FY 12. Goal is met. Cumulative % increase at the end of FY 12 is undefined FY 05 Baseline: 0 gallons	Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as models become available.	L

SC/SSPP /OMB Goal		DOE Goal	Performance Status	Planned Actions & Contribution	Risk of Non-attainment
			FY 15 Goal: 711 Gallons		
	3.2	2% annual reduction in fleet petroleum consumption by FY 2020 relative to a FY 2005 baseline	Decreased from 772 gal. in FY 10 to 750 gal. in FY 12. Cumulative percent reduction at the end of FY 12: 15.6% FY 05 Baseline: 889 gallons FY 15 Goal: 711 Gallons	Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as models become available.	L
	3.3	75% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by FY 2000 and thereafter	Currently 25% of the Ames Laboratory fleet consists of AFVs.	Ames Laboratory will continue to work with GSA to integrate AFVs, hybrid, and plug-in electric vehicles into its fleet as models become available.	L
	3.4	Submit Right-Sizing the Fleet Management Plan for approval by Dec 31, 2012 .Identify mission critical/non-mission critical vehicles by Dec 31, 2012	Complete		L
Goal #4		Water Use Efficiency and Management			
	4.1	26% water intensity reduction by FY 2020 from a FY 2007 baseline	Cumulative percent decrease at the end of- FY 12: 9%. FY 07 Baseline: 14.6 gallons per sf FY 20 Goal: 10.8 gallons per sf	Identify and implement additional water conservation measures to meet FY2020 goals.	M
	4.2	20% water consumption reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline	Ames Laboratory does not consume any water for industrial, landscaping, or agricultural use.		L
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	75% of the non-hazardous solid waste from the Ames Laboratory is recycled and diverted from landfilling.	The Laboratory continues to divert non-hazardous solid waste through added recycling streams.	L

SC/SSPP /OMB Goal		DOE Goal	Performance Status	Planned Actions & Contribution	Risk of Non-attainment
	5.2	Divert at least 50% of construction and demolition materials and debris by FY 2015	All construction and demolition materials are currently landfilled.	6.8 mt of steel was sent offsite for recycling.	H
Goal #6		Sustainable Acquisition			
	6.1	Procurements meet sustainability requirements and include sustainable acquisition clause (95% each year)	The ESH&A Environmentally-Preferred Purchasing (EPP) coordinator reviews acquisitions for sustainability requirements.	Continue to develop formal lab-wide policies requiring procurement of products and/or services which support sustainability. Provide end users listings of environmentally preferred products for furniture, printing and office supplies by the end of 2013. There were 5 construction contracts and all (100%) contained sustainability language.	L
Goal #7		Electronic Stewardship and Data Centers			
	7.1	All data centers are metered to measure a monthly PUE (100% by FY 2015)	Existing data center is sub-metered to allow calculation of PUE	Reviewing use of additional metering to provide additional detail of energy use and conservation opportunities.	L
	7.2	Maximum annual weighted average Power Utilization Effectiveness (PUE) of 1.4 by FY 2015	Current PUE is 1.55	Identify and implement ECMs for existing data center.	M
	7.3	Electronic Stewardship - 100% of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY 2012	The energy savings settings on new administrative computers are set to by the Laboratory's Information Systems (IS) department as outlined in IS-baseline setup procedures. The setting are locked and can only be changed by IS personnel or a departmental	Formal policies are under development which will define the power management settings for administrative computers and the process to request variations to support telecommuting or other unique situations. These policies are targeted for release and implementation in FY 2012.	L

SC/SSPP /OMB Goal		DOE Goal	Performance Status	Planned Actions & Contribution	Risk of Non- attainment
			Assistant Computer Security Manager.		
Goal #8	8.1	Agency Innovation & Government-Wide Support			L