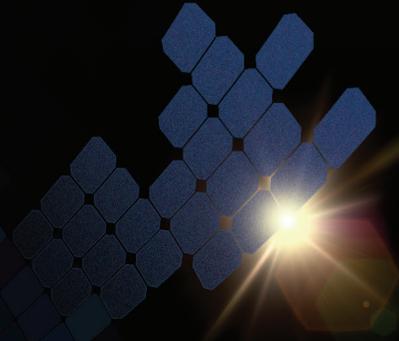
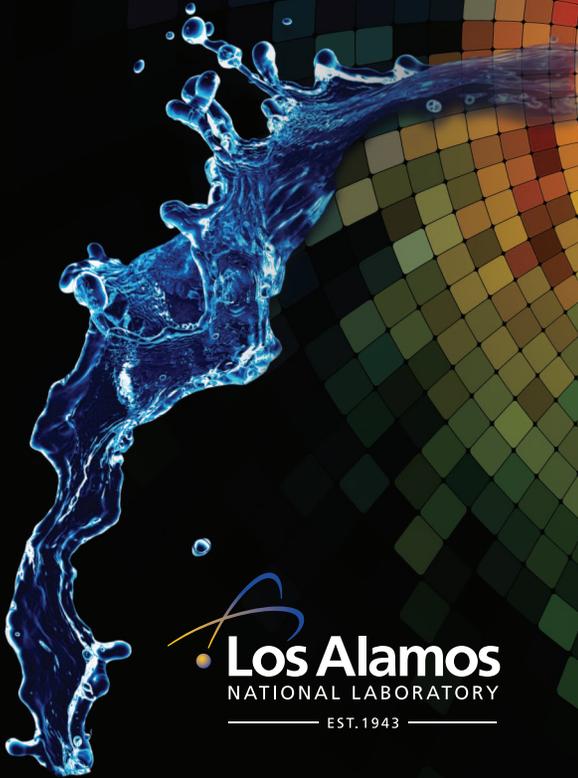


2014 **SITES** SUSTAINABILITY PLAN



 **Los Alamos**
NATIONAL LABORATORY
EST. 1943



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LANL SITE SUSTAINABILITY

Table of Contents

| | |
|---|----|
| Message from the Director | 4 |
| Executive Summary | 5 |
| Introduction..... | 5 |
| Site Sustainability Management Vision..... | 5 |
| Major Site Sustainability Planning Assumptions - Issues & Funding Strategies..... | 7 |
| Successes & Challenges | 8 |
| Site Sustainability Plan Summary Table of Goal Targets..... | 10 |
| Performance Review and Plan Narrative | 18 |
| GOAL 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory | 17 |
| GOAL 2: Buildings, ESPC Initiative Schedule, and Regional & Local Planning | 20 |
| GOAL 3: Fleet Management..... | 30 |
| GOAL 4: Water Use Efficiency and Management..... | 32 |
| GOAL 5: Pollution Prevention | 36 |
| GOAL 6: Sustainable Acquisition | 40 |
| GOAL 7: Electronic Stewardship and Data Centers..... | 43 |
| GOAL 8: Renewable Energy..... | 46 |
| GOAL 9: Climate Change Adaptation..... | 48 |
| References | 50 |
| Abbreviations and Acronyms | 51 |
| Attachments | 54 |

Message from the Director

Sustainability isn't part of our mission. It is our mission. The sustainability of the nuclear stockpile, of global security, and of our preeminent science goes hand in hand with the sustainability of energy, water resources and our environment.

I am proud of the progress we have made last year, recognized by winning four 2013 NNSA Sustainability Awards for individual and team performance in advancing sustainability objectives at the Laboratory. Last year, I challenged all Laboratory employees to reduce our environmental impact and keep us on the right path for mission growth. We made significant strides.

Through this year's plan, we will continue our commitment. In 2014 we will focus on two primary objectives:

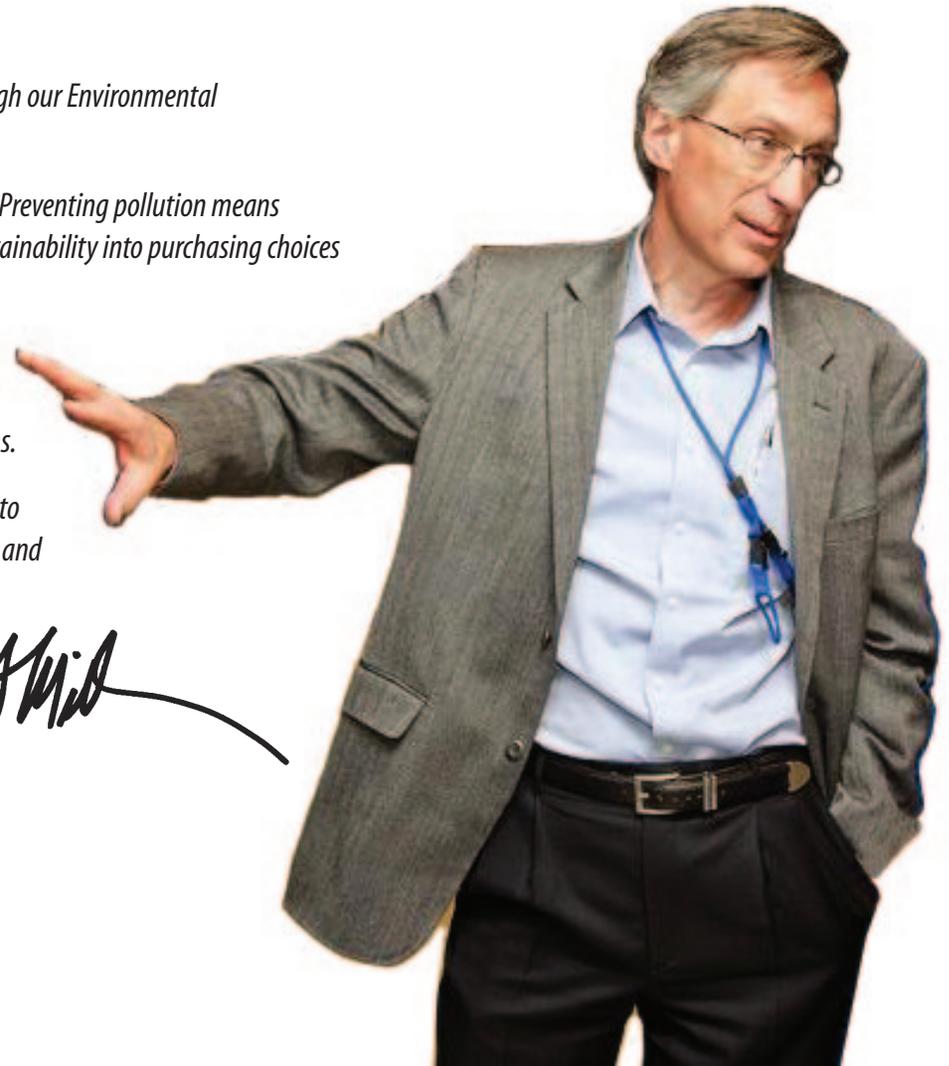
- 1. We will make targeted investments that improve our efficiency and resource utilization,*
- 2. We will continue to engage employees and programs at all levels in the organization through our Environmental Management System*

Sustainability starts with individual choices. For example, saving energy equals saving money. Preventing pollution means protecting the environment for ourselves, our fellow workers and the community. Building sustainability into purchasing choices builds a more efficient operation.

The actions within our Site Sustainability Plan are part of the Laboratory's Long Term Strategy for Environmental Stewardship and Sustainability, and complement the activities each organization at the Laboratory takes as they implement their Environmental Actions Plans.

Sustainability is part of our way of doing business. I again challenge all Laboratory employees to continue reducing our environmental impact and keep us on the right path for mission growth and service to the nation.

Charles F. McMillan
Laboratory Director





Introduction

LANL prepared the fiscal year (FY) 2014 Site Sustainability Plan to describe progress towards the goals established in the DOE Strategic Sustainability Performance Plan. Per the requirements of DOE Order 436.1 Departmental Sustainability, Los Alamos National Laboratory (LANL) uses its ISO 14001:2004 certified Environmental Management System (EMS) to establish objectives to improve compliance, reduce environmental impacts, increase operational capacity, and meet long term sustainability goals. The goals of the 2014 Site Sustainability Plan are fully integrated into LANL's institutional environmental objectives under the EMS and its Long Term Strategy for Environmental Stewardship & Sustainability.

LANL's Site Sustainability Plan is managed through the Environmental Senior Management Steering Committee, which oversees the EMS and is chaired by the Principal Associate Director for Operations and Business. The Laboratory also issued a program description document detailing the Site Sustainability Program, which was established in order to meet the sustainability goals prescribed by the DOE Strategic Sustainability Performance Plan (SSPP). The Site Sustainability Program reports to the Environmental Senior Management Steering Committee as part of the quarterly EMS management review process.

The challenges presented by the sustainability goals established in DOE Order 436.1 require innovative solutions that draw upon the many organizations, resources and talents at the Laboratory. This Plan follows DOE's Guidance for

FY 2014 DOE Site Sustainability Plans. The FY 2014 Plan builds on the FY 2013 accomplishments and outlines FY 2014 actions that enable LANL to continue progress toward DOE's sustainability reporting requirements and goals.

Site Sustainability Management Vision

The intent of the Site Sustainability Program is to incorporate energy and water conservation into everyday business practices. The program manages, implements, and tracks progress toward meeting DOE SSPP's goals. As required, the Site Sustainability Program coordinates an annual Site Sustainability Plan within the framework of DOE's SSPP and DOE's annual Site Sustainability Plan guidance to set the site's annual executable

activities. The program is responsible for reporting progress toward Site Sustainability Plan milestone implementation to the Senior Environmental Steering Committee and Los Alamos Field Office through metrics in the LANL Dashboard system, which is part of the Laboratory's Contractor Assurance System.

The Site Sustainability Program provides data within its Consolidated Energy Data Report, published with the annual Site Sustainability Plan, to the NNSA to be included in the annual NNSA Composite Sustainability Plan. The program receives funding to prioritize and execute projects to assist in meeting the Site Sustainability Plan milestones. In addition, the Site Sustainability





Program has established a longer term sustainability strategy based on compliance with the requirements and goals established in the DOE Strategic Sustainability Performance Plan and DOE O 436.1, Departmental Sustainability.

LANL's Long Term Strategy for Environmental Stewardship & Sustainability (LTSESS) articulates the Laboratory's vision for Sustainability as an integral part of our mission to meet the Nation's scientific challenges. Implementation of that vision on a tactical level is managed through a number of institutional plans. The annual Site Sustainability Plan is one of the institution's key plans to focus on three primary objectives: make targeted investments that improve our efficiency and resource utilization, transparently track our progress through metrics, and engage employees and programs at all levels in the organization through its established ISO 14001:2004-certified Environmental Management System (EMS). The Site Sustainability Program works to integrate its sustainability strategy and objectives with other related Laboratory programs and plans including the LTSESS.

LANL's EMS established goals and objectives for FY 2014 that address LANL's key environmental improvement priorities and significant environmental aspects. The EMS program engages employees and organizations across the Laboratory to ensure that sustainability is part of the program execution. Energy and water use, greenhouse gases, pollution prevention, sustainable acquisition, and storm water management are considered significant environmental aspects in the LANL EMS and each

Associate Directorate (AD) identifies actions to mitigate their impact and work toward achieving the goals in the Site Sustainability Plan.

The Laboratory EMS requires each directorate to understand how its work impacts the environment and to develop a set of improvements to reduce those impacts. These impacts are described in an annual directorate-specific Environmental Action Plan (EAP). The EAP also includes actions required to meet the Site Sustainability Plan goals as appropriate for each directorate. The EMS, through the EAP process, will support implementation of the Site Sustainability Plan goals.

LANL continually improves integration of the Site Sustainability Plan goals in the Environmental Management System. SSP-related activities are flagged in the EMS action plan database to monitor progress. Five new institutional improvement goals were developed for FY 2014 and endorsed by senior management. These goals all support some aspect of the SSP and were designed to integrate sustainability into other major institutional plans including the Long Term Strategy for Environmental

Stewardship and Sustainability (LTSESS); the Enduring Waste Management Plan, the Long Range Infrastructure Development Plan, the Forest Management Plan, the Footprint Reduction Program and the Site Wide Environmental Impact Statement/NEPA Process.





Major Site Sustainability Planning Assumptions - Issues & Funding Strategies

LANL is investing in a number of projects, including the Sanitary Effluent Reclamation Facility (SERF) operations, High Performance Sustainable Building (HPSB) implementation, HVAC re-commissioning, building automation system upgrades for night set-back capability, and footprint reduction efforts to contribute toward energy, water, and greenhouse gas reduction goals. LANL plans to achieve a 3% energy intensity reduction in FY 2014 and reduce water consumption by at least 30 Mgals. In addition, LANL is relying on broad employee engagement to site sustainability efforts through LANL's EMS to reduce energy, water, and waste generation through its programs.

In FY 2014 the Site Sustainability Program was funded at a level of \$3.5M by the Director through indirect funding. Additionally the Laboratory is investing \$3.2M per year of indirect funding in the operation of SERF to achieve its water reductions.

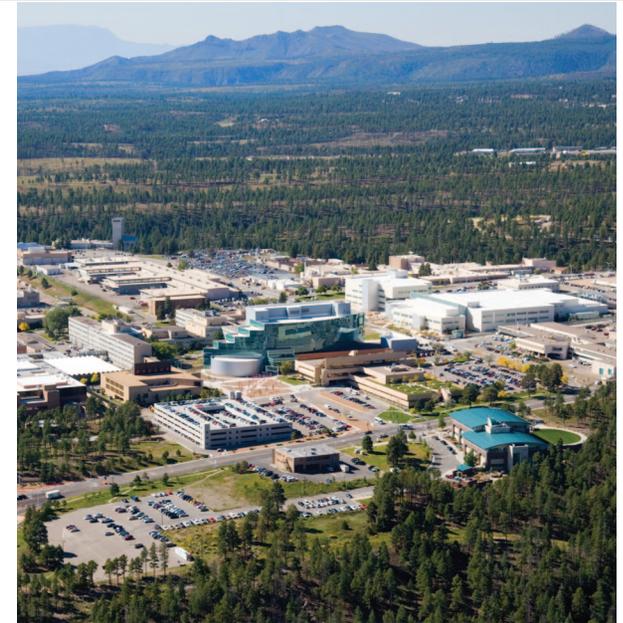
The Laboratory is also investing in facility renovation and rehabilitation to improve material condition in the facilities and consolidate operations. This effort is being conducted in conjunction with the footprint reduction efforts at the Laboratory to right-size available institutional space. Many of the facility renovation, rehabilitation, or footprint reduction efforts have a corresponding benefit to reduce energy and water consumption. LANL continues to work on

improving long-range space planning to take credit for the impacts on the sustainability goals.

Staffing levels for the program include 4 FTEs for executing measurement and verification, energy and water conservation project implementation, energy and water audits, program reporting and communication, and program management. In addition, a number of additional staff from Engineering Services, Construction Management, and UI Operations and Maintenance support project execution for the Site Sustainability Program.

LANL completes pollution prevention and waste minimization efforts in compliance with DOE O 436.1, DOE O 435.1, DOE O 458.1 and the New Mexico Environment Department (NMED) Hazardous Waste Facility Permit. LANL provides funding for pollution prevention and waste minimization projects, for core subject matter expert (SME) institutional support staff, and for pollution prevention, waste minimization, EMS and sustainable acquisition compliance reporting.

In FY 2013, the Pollution Prevention Fund, which directly funds generators to complete pollution prevention and waste minimization projects, totaled approximately \$1.3M. In FY 2014, Pollution Prevention Fund will provide approximately \$1.4M for pollution prevention and waste minimization projects, and core SME support and annual compliance reporting will



be funded at \$229,000. Institutional Support (IS) funding for implementing Site Sustainability Plan milestones (\$3.5M in FY 2014) and additional IS funding (\$6M in FY 2013) that has a significant impact on energy and water reduction, e.g. footprint reduction.

The Laboratory's Site Sustainability Program developed a long range Sustainability Funding Strategy. If funded as requested, the Program has the opportunity to meet key SSPP goals within the



next 5 years. For example, if the FY 2015 energy intensity goal project work is funded at a level of \$2-3M/year for the next 4 years, a total reduction of 30% is achievable by FY 2018. More importantly, if the Program is funded as requested, the overall return on investment will be approximately 7 years.

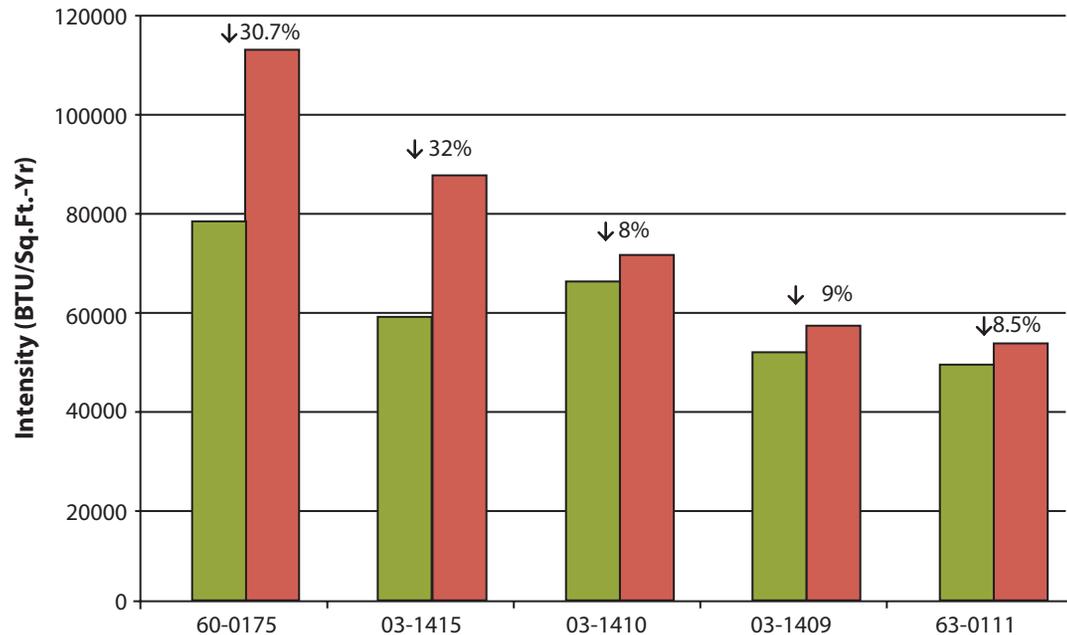
In order to make progress toward the sustainability goals, LANL will pursue a combination of additional investments in renewable energy, High Performance Sustainable Building projects, and additional facility and operational improvements for energy efficiency. LANL has developed a Return on Investment (ROI) funding strategy to work toward achieving the SSPP goals. This strategy includes investing in recommissioning, facility improvements, building automation systems, publicity and outreach, lighting retrofits, and implementing energy and water conservation measures. Currently, \$3.5M is allocated from the Laboratory's Site Support Program and dedicated directly to energy and water reduction efforts. The FY 2014 projects were selected to target facilities with a high energy intensity or consumption. LANL uses a database to track all potential conservation measures. This database compares approximately 100 conservation measures based on a simple return on investment

calculation. In addition, LANL uses this database to track savings associated with completed conservation measures. LANL's Site Sustainability Program is requesting an additional \$3.5M-\$9.8M each year to make significant progress on the SSPP goals. LANL has identified this long range Sustainability Funding Strategy that could enable the Laboratory to close the gap on energy intensity performance within the next 5 years and continue to invest in order to meet the greenhouse gas reduction targets. The funding strategy includes projects that will require a diverse set of funding mechanisms including grants, indirect, and Energy Savings Performance Contracts. The Consolidated Energy Data Report includes a list of ranked potential sustainability projects.

Successes & Challenges

LANL's sustainability successes include a leadership structure that supports and encourages efficient business best practices. Investments in local economically viable renewable energy systems, facility improvements, footprint reduction, and sound metrics form a firm foundation to advance sustainability. In addition, and just as critical to success, is the partnership between science to advance sustainability and operations responsible for implementing sustainability. The synergy between the scientific and operations staff provides a unique capability that can cultivate a new environment to bridge the gap between mission growth and increasing resource use beyond existing capacity.

Building Energy Intensity Reduction





In FY 2013 the Laboratory's significant successes include the following:

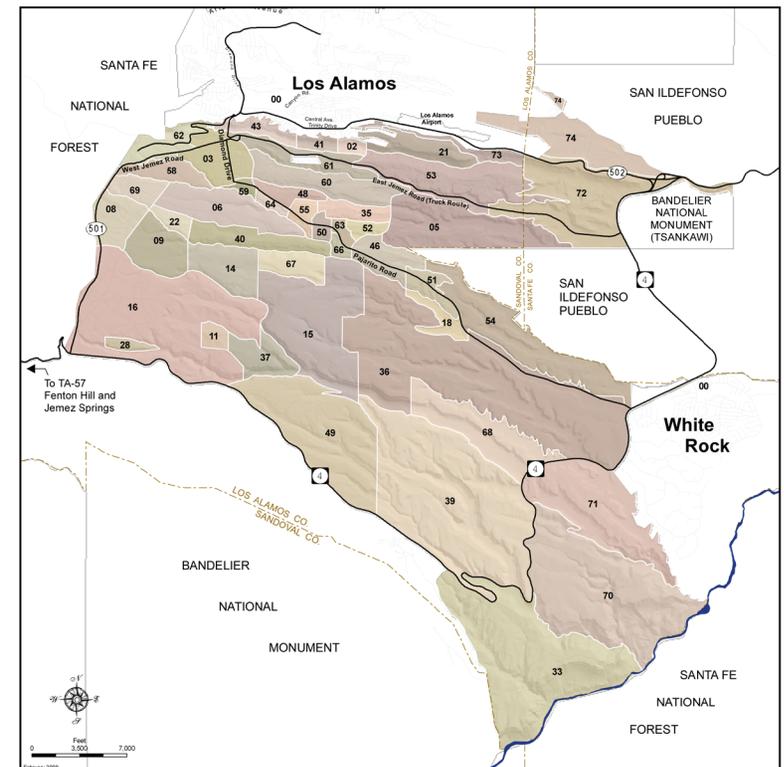
- Completed High Performance Sustainable Buildings Guiding Principles within 4 facilities and recommissioning in 8 facilities including the Los Alamos Field Office with an overall energy savings of over 30%
- Sanitary Effluent Reclamation Facility operations that sent over 20 million gallons of reuse water to the Strategic Computing Complex for use within its cooling towers
- Lighting upgrades that included: LEDs in five facilities, LEDs in two parking areas with photocells for reduced lighting at night, and solar powered mobile lighting units purchased for on-going night work
- Established a Data Center/Server Room team and evaluated 130 distributed data centers and server rooms across the site for opportunities to virtualize and consolidate servers, and required data center metering
- Completed thermal metering on all candidate High Performance Sustainable Buildings
- Completed installation of an energy management software feature on all eligible computers
- Implemented 33 P2 Projects with 31 projects completed, resulting in a total cost savings to the Laboratory of \$4,852,331
- Modified major subcontracts that represented the largest significant suppliers of products and services to include Sustainable Acquisition language

- Installed energy efficient windows in 2 large conference rooms in the candidate HPSB Otowi facility
- Evaluated the fleet to determine path-forward for alternative fuel on site and purchased 2 electric vehicles for a FY 2014 pilot study on electric vehicle use

Laboratory management acknowledges the conflict in forecast mission growth and the SSPP energy, water, and GHG reduction goals. The Laboratory will focus efficiency measures within facilities that have a potential to successfully impact energy and water reduction goals and allow the Laboratory to successfully compete for mission growth opportunities. Specifically, for progress toward the water reduction goals, the Laboratory will continue to operate SERF and implement small reduction projects but major reductions will not occur given mission path due to increases in supercomputing and LANSCE accelerator operations.

The Laboratory has also been challenged by the impact of footprint reductions on the energy intensity metric. Through FY 2013 LANL has reduced the footprint by over 700kgsf compared to the FY 2003 baseline year. The reduction in footprint and operations consolidation, which is the right thing to do, has had a greater net effect than the associated energy reductions as measured by the standard metric.

The Laboratory is working to institute cultural change to implement all DOE sustainability goals. Outreach efforts drive cultural change and studies show that this type of communication could reduce energy and water usage by as much as five percent. This change requires the use of a sustainability lens in all corporate management decisions; planning, executing, evaluating and improving operations to maximize sustainability and support sound business practices.



| SSPP Goal # | DOE Goal | Performance Status through FY 2013 | Planned Actions & Contribution | Risk of Non- attainment |
|---|---|---|---|-------------------------|
| GOAL 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory | | | | |
| 1.1 | 28% Scope 1 & 2 GHG reduction by FY 2020 from a FY 2008 baseline. | LANL has achieved a 18.8% reduction in Scope 1 & 2 GHG emissions compared to the FY 2008 baseline. | LANL will purchase RECs and continue to pursue lower carbon electricity resources, as economically practical, and energy reduction projects to reduce GHG emissions and as part of an overall strategy to reach the 28% reduction goal. | L |
| 1.2 | 13% Scope 3 GHG reduction by FY 2020 from a FY 2008 baseline. | The top 3 contributors to LANL's Scope 3 GHG emissions are travel, commuting, and losses associated with transmission and distribution lines. LANL did not take any credit for Park and Ride, vanpool or carpool activities. This metric is updated annually each November. LANL achieved a 27.3% reduction in Scope 3 GHG emissions due to decreased air and ground travel and employee commuting. | LANL recognizes that the most practical way to reduce Scope 3 GHG emissions is by reducing commuting. LANL is exploring options for reducing commuting, e.g. changing work schedules to a 4x10 work week, and larger scale telecommuting. | M |
| GOAL 2: Buildings, ESPC Initiative Schedule, and Regional & Local Planning | | | | |
| 2.1 | 30% energy intensity btu/gsf (Btu per gross square foot) reduction by FY 2015 from a FY 2003 baseline. | In FY 2013 LANL calculated and tracked a rolling 12 month energy intensity based on a FY 2003 baseline. A year-end net energy intensity reduction of 12.2% was reported. | In FY 2014 LANL plans to strategically invest \$2M to reduce energy consumption in facilities. This investment is estimated to yield an energy reduction percentage of approximately 3%. With the same level of annual investment through FY 2015, LANL anticipates achieving a cumulative energy intensity reduction of 15-17% compared to the FY 2003 baseline. | H |
| 2.2 | EISA Section 432 energy and water evaluations. | LANL completed the EISA07 "covered" facilities energy and water assessments identified in the 4 year assessment schedule for FY 2013. | LANL will continue to evaluate "covered" facilities on a 4 year cycle to identify energy and water conservation measures, prioritize and implement energy and water conservation projects. | L |
| 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). | LANL used the same evaluation methodology and justification determination designed for electric meters for thermal metering. | LANL is complete with all electric and thermal meter installations required to meet the "as economically practicable" definition. | L |

| <i>SSPP Goal #</i> | <i>DOE Goal</i> | <i>Performance Status through FY 2013</i> | <i>Planned Actions & Contribution</i> | <i>Risk of Non- attainment</i> |
|--------------------|---|---|--|--------------------------------|
| 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. | All new roofs meet cool roof requirements per engineering standards. In FY 2013 there was 61,476 square feet of cool roofing installed. | LANL plans the replacement of approx. 35,000 square feet of roof for 2014. Every roof will be replaced within the parameters established at an R-value of 30 or above and the membranes will meet the cool roof initiatives. | L |
| 2.5 | 15% of existing buildings greater than 5,000 gross square feet (GSF) are compliant with the Guiding Principles (GPs) of HPSB by FY 2015. | LANL has an average 65% Guiding Principle implementation rate within the selected 31 HPSBs. In FY13, LANL completed the Guiding Principles in 4 facilities. | LANL plans to continue implementing the Guiding Principles within selected HPSBs focusing on HVAC and BAS recommissioning. LANL is investing approximately \$1.3M in HPSBs in FY 2014 as part of the overall funding to reduce energy use in facilities. The risk of non-attainment is high because LANL will target high ROI energy reduction as the main HPSB focus in order to make progress in energy intensity reduction. | H |
| 2.6 | All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs. | The Radiological Laboratory, Utility, and Office Building (RLUOB) obtained gold certification in FY 2013. The DOE recently awarded the Laboratory and Environmental Sustainability (EStar) award for integrating sustainable practices in the RLUOB design. | Over 600,000 square feet of major new projects, currently in the planning stages are being formulated to be certified as LEED Gold projects. LANL will continue to implement and manage efforts to address the requirement for achieving LEED Gold and the 35% improvement over ASHRAE requirement for new projects using cost effective capital outlay strategies to achieve long-range operational benefits. | L |

| SSPP Goal # | DOE Goal | Performance Status through FY 2013 | Planned Actions & Contribution | Risk of Non- attainment |
|---------------------------------|--|---|--|-------------------------|
| GOAL 3: Fleet Management | | | | |
| 3.1 | 10% annual increase in fleet alternative fuel consumption by FY 2015 relative to a FY 2005 baseline. | In FY 2013, Alternative Fuel consumption was 42,657 gallons, which is a 380% increase compared to the FY 2005 baseline. | LANL will continue to purchase and increase utilization of alternative fuel for vehicles using E-85 and B-5 in FY 2014. LANL plans to increase the percentage of biodiesel within the blend over time based on operational performance and availability. | L |
| 3.2 | 2% annual reduction in fleet petroleum consumption by FY 2020 relative to a FY 2005 baseline. | LANL has reduced fleet petroleum by 12.7% compared to the FY 2005 baseline. | LANL purchased 2 Chevy Volts to pilot within its fleet. LANL will continue to right-size the fleet and expand alternative fuel use to reduce petroleum consumption. | L |

| <i>SSPP Goal #</i> | <i>DOE Goal</i> | <i>Performance Status through FY 2013</i> | <i>Planned Actions & Contribution</i> | <i>Risk of Non- attainment</i> |
|--------------------|--|---|--|--------------------------------|
| 3.3 | 100% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by FY 2015 and thereafter (75% FY 2000 – 2015) . (For MSA areas.) | LANL's total Fleet consists of 1570 vehicles. 793 or 51% of those are considered Light Duty vehicles (LDVs). Of the 793 Light Duty vehicles 497 or 63% are alternative fuel vehicles (AFVs). Los Alamos is not located in a Metropolitan Statistical Area (MSA); however, 63% percent of LANL's current Light Duty vehicles are alternative fuel vehicles. | LANL will continue to replace vehicles with AFVs as economically practicable. | L |
| 3.4 | Reduce fleet inventory of non- mission critical vehicles by 35% by FY 2013 relative to a FY 2005 baseline. | LANL reviewed and re-categorized its vehicles into two categories; Mission Support and Mission Essential. As part of this year's annual GSA Re-Order process, vehicles not meeting NNSA's utilization standards averaged over the last 24 months will not be re-ordered. LANL continues to turn in vehicles that are no longer needed to meet the Laboratory's programmatic mission or vehicles that have continually been underutilized. | LANL will continue to support the agency's reduction goal of 35% by ensuring LANL's Fleet is mission-appropriate and remains cost effective. | M |

| SSPP Goal # | DOE Goal | Performance Status through FY 2013 | Planned Actions & Contribution | 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. | In FY13 LANL's water use reduction was dependent on SERF operations and industrial water reuse at the SCC. SERF supplied 100% of SCC water demand from June to September 2013. LANL's total water use in FY 2013 was approximately 387 million gallons. Water intensity has increased by approximately 22% compared to the FY 2007 baseline due largely to cooling towers supporting increased supercomputing. However, water use has reduced by 12% compared to FY 2012. | SERF operations will avoid consumption of an additional 35-40 million gallons of water in FY14. LANL's sustainability efforts focus on a cost-effective life-cycle approach emphasizing energy efficiency to reduce LANL's regional impact on water use associated with energy generation. In addition, LANL will focus on small, targeted water conservation measures that will dovetail with site infrastructure upgrades. | H |
| 4.2 | 20% water consumption (Gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline. | Currently, all of LANL's water use is potable water, and is therefore considered part of the 26% water intensity reduction goal reporting. | LANL will not report on the ILA goal, but will focus efforts in total potable water intensity reduction as described above. | N/A |
| 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 FY13, LANL diverted 56% of solid, non-hazardous waste. | LANL will continue to identify and implement opportunities for improvement in non-hazardous solid waste recycling / diversion in FY 2014 – 2015. | L |
| 5.2 | Divert at least 50% of construction and demolition materials and debris by FY 2015. | In FY13, LANL recycled or diverted 98% of construction and demolition waste | LANL will continue diverting construction and demolition waste. | L |

| SSPP Goal # | DOE Goal | Performance Status through FY 2013 | Planned Actions & Contribution | Risk of Non- attainment |
|--|--|--|--|-------------------------|
| GOAL 6: Sustainable Acquisition | | | | |
| 6.1 | Procurements meet requirements by including necessary provisions and clauses (Sustainable Procurements/ Bio-based Procurements). | In FY13 LANS received a Gold "GreenBuy" Award for procuring products in FY12 with sustainable attributes. LANS met the DOE's leadership goals for nine product types in six product categories. | In FY14 LANL will strive to increase its procurement of environmentally preferable products while simultaneously increasing its visibility of those procurements and the associated reporting capability. | M |
| GOAL 7: Electronic Stewardship and Data Centers | | | | |
| 7.1 | All data centers are metered to measure a monthly Power Utilization Effectiveness (PUE) of 100% by FY 2015. | LANL has reliable PUE metrics for all 3 major data centers. LANL evaluated over 130 distributed server rooms and data centers to determine the extent of metering required. LANL developed and proposed a "data center" definition in order to better focus efforts on opportunities for energy savings. | LANL will develop a detailed server room and data center plan to meet the sustainability goals for PUE and metering. This plan will first focus on 1) virtualization, 2) consolidation, and 3) management of server rooms and data centers. Metering will be part of the 3rd section and will only be planned for installation in enduring data centers. | H |
| 7.2 | Maximum annual weighted average PUE of 1.4 by FY 2015. | The PUE at the SCC is currently averaging 1.32 and the PUE at the LDCC is averaging at 1.58. The CCF estimated PUE is 1.5. The FY 2013 annual weighted average PUE for all three major data centers is 1.41. | LANL is planning to upgrade the SCC with Trinity beginning in 2016. The planned PUE for Trinity will be approximately 1.2. With this upgrade, LANL will meet the PUE goal of 1.4, but most likely not until FY 2016 after Trinity comes online. | M |
| 7.3 | Electronic Stewardship - 100% of eligible PCs, laptops, and power management actively implemented and in use by FY 2012. | In FY 2013 LANL completed the implementation of the SCCM with power management of Windows desktops and laptops. | In FY 2013 LANL completed the implementation of the SCCM with power management of Windows desktops and laptops. | L |

| <i>SSPP Goal #</i> | <i>DOE Goal</i> | <i>Performance Status through FY 2013</i> | <i>Planned Actions & Contribution</i> | <i>Risk of Non- attainment</i> |
|---------------------------------|---|---|---|--------------------------------|
| GOAL 8: Renewable Energy | | | | |
| 8.0 | 20% of annual electricity consumption from renewable sources by FY 2020 and thereafter. | LANL exceeded the 7.5% renewable energy goal in FY 2013. The Laboratory used approximately 437,290 MWh of electricity in FY 2013 including on site renewable generation. The purchased amount in addition to onsite renewable energy amounts to approximately 9.7% of the annual electricity consumption. | LANL will continue to purchase RECs and utilize the on-site renewable sources, such as the Abiquiu dam low-flow turbine, to meet this goal. In addition, LANL is exploring the feasibility of working with DOE to contract with the Western Area Power Association for 1 MW of locally generated renewable power. | L |



GOAL 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory

28% Scope 1 & 2 GHG Reduction by FY 2020 from a FY 2008 Baseline

Performance Status

LANL has achieved an 18.8% reduction in Scope 1 & 2 GHG emissions compared to the FY 2008 baseline largely through Renewable Energy Credit (REC) procurements to offset electricity purchases. During FY 2013, LANL purchased 11,698 MWhr RECs. LANL's energy use is expected to steadily increase over the next 10 years as computing requires additional electricity and expanded programmatic activities at LANSCE consume greater quantities of power. LANL reduced energy use from 1,471,400 MBtu in FY 2012 to 1,443,459 in FY 2013. The funded energy reduction projects mainly contribute to Scope 2 greenhouse gas emissions reductions.

During FY 2013, LANL sent five X-ray pulsers back to the manufacturer so that they could be upgraded to use air as their internal insulating medium instead of sulfur hexafluoride. The units were successfully converted and returned to LANL. These X-ray pulsers are used for various projects in several locations, so the amount of sulfur hexafluoride that will be avoided will vary each year.

Projected Performance

In FY 2014, LANL will continue its current practice of purchasing RECs to meet its renewable energy goals and meet greenhouse gas reduction

goals. To satisfy DOE's FY 2020 28% Scope 1 & 2 GHG reduction goal, LANL plans to purchase up to 1,013,897 MWh RECs, which will be equivalent to a 76.5% reduction for the projected FY 2020 GHG emissions. Priced in FY 2012 dollars, this is projected to annually cost the Laboratory \$446,115.00 in FY 2020.

LANL is interested in exploring a number of initiatives to meet the GHG emissions reduction goals. Based on the major contributors to GHG, LANL plans on reducing GHG from heating by improving the efficiency of the on-site central heating and distribution system. The plan includes improving the overall efficiency by adding a second cycle on the combustion turbine and using cogeneration to produce heat for the TA-3 complex.

LANL has begun the planning process to upgrade a nominal 23-megawatt combustion turbine it currently uses as a backup generator resource. The upgrade would modify the turbine into a high-efficiency, dual-cycle unit with a steam turbine as the second cycle. Steam will also be extracted from the turbine when needed to power a refurbished campus heating system in a cogeneration mode. The new unit

will be operated as a base-load machine and will provide 31 megawatts on average. Planning shows this coming on-line in 2018 and its net effect will be to meet the growing demand of LANL's high-performance computing program with a lower carbon resource than currently available in the NM region rather than displacing current generation. The revitalized central heating system is tied with upgrades to several older facilities as part of the Long Range Development Plan (LRDP) that will improve the energy efficiency of the building HVAC systems. LANL is exploring the financing mechanisms to support this project, including an Energy Savings Performance Contract.

San Juan Generating Station





In addition to efficiencies, LANL plans to reduce GHG from electrical energy by either purchasing RECs to replace fossil fuel dependent energy or focusing on a power purchase agreement for lower or no carbon producing energy, in order to change its generation mix to reduce the carbon footprint of electricity supplies. LANL's projections show that these initiatives will bring its carbon emissions to approximately 70% of the FY 2008 baseline, even though in the same period electrical consumption will grow by 135%. One option under consideration is contracting for renewable power as the source of supply after those times when the generation owned by the Los Alamos Power Pool cannot meet the demand. LANL is planning to develop a request for proposal in FY 2014 for renewable power through the Western Area Power Administration. The amount of power purchased in this agreement will vary by year and the range of capacity needed will be 30 to 60 megawatts by 2020. Power generated in the NM-AZ region is 60% coal-fired and it is anticipated that this resource would displace open market purchases largely generated in regional coal-fired plants.



Site Car program allows multiple organizations to utilize government vehicles

13% Scope 3 GHG Reduction by FY 2020 From a FY 2008 Baseline

Performance Status

LANL has achieved a reduction of over 25% in Scope 3 GHG emissions due to decreased air and ground travel and employee commuting compared to the FY 2008 baseline year. In FY 2013, LANL performed its first statistical employee commuting survey and was able to report the commuting data with greater refinement than ever before, and the emissions from commuting were found to be lower than anticipated. LANL plans to focus on further reducing commuting to reduce Scope 3 GHG emissions through work schedule modification, telecommuting, or workplace relocations. In addition to GHG reductions, telecommuting may also contribute to a reduction in infrastructure operating costs, enable LANL's footprint reduction initiative, and improve employee work/life benefits.

LANL is working with its information technology and cyber security infrastructure to ensure that work-from-home policies and technologies are available and in place. LANL is considering work-from-home options since nearly all other federal sites have telecommuting or flexible workplace options available to workers, and responses to the commuting survey indicated that workers are very interested in telecommuting.

LANL maintains and allows public access to a central transit station facility within TA-3 on NNSA property. This central station allows three transit systems to converge at this point: the Laboratory taxi and bus system, the County of Los Alamos Atomic City Transit, and the State of New Mexico's Department of Transportation Park



LA Atomic City Transit trolley

and Ride that contracts with All-Aboard America to provide a regional bus service. The County's Atomic City Transit provides transportation from the community of White Rock, at the southeast edge of Los Alamos County, to the Los Alamos town-site, at the north end of the county, and within these communities.

Employee commuting contributes the largest percentage to scope 3 GHG emissions at LANL, and supporting data is located within the attached CEDR. Prior to 2008 and the establishment of the FY08 baseline, LANL implemented a 9/80 schedule, which gave employees the option to work 80 hours during nine days in a two-week period. This schedule option allowed employees to cut their commute distance and time by 10 percent. About 70% of the LANL workforce is on the 9/80 schedule.



Mass transit to LANL via bus has been expanded to include the surrounding communities of Santa Fe and Espanola and also within Los Alamos and White Rock. In addition, the Rail Runner train provides, employees from the Albuquerque area the option to connect with buses



from Santa Fe to Los Alamos instead of driving personal vehicles. LANL provides taxi service for employees to travel between sites during the day so that fewer people require their personal vehicles. For many years, LANL has organized a special section on its internal website to connect potential carpoolers with each other.

Business air travel was approximately 5% less at LANL in FY 2013 when compared with FY 2012. Business use of rental cars was slightly higher in FY 2013 when compared with FY 2012. Many Divisions within LANL restricted travel significantly during FY 2012 and FY 2013 due to budget cuts. Eliminating travel and using video or teleconferencing when possible was one of the easiest ways for Divisions to cut costs.

Employees in LANL leased space utilize a County-owned wastewater treatment plant with aerobic and denitrification treatment. LANL operates its own centralized wastewater treatment plant. The GHG emissions from the LANL plant are related to the number of employees working at LANL. Currently 40 employees reside in buildings that are served by septic tanks, and these septic tanks have a disproportionate impact to the GHG emissions in the onsite wastewater treatment category. During FY 2013, LANL moved 99 workers from buildings serviced by septic tanks to buildings that were serviced by a wastewater treatment plant.

LANL has actively participated in pollution prevention for about two decades, and one of the targets has always been to reduce the volume of municipal solid waste generated at LANL. All municipal solid waste from LANL is disposed of offsite. In FY 2013, LANL disposed of about 14% less solid waste than during FY 2012. Many kinds of unwanted materials can be recycled at LANL including toner cartridges, aluminum cans, plastic bottles, brush, paper, and cardboard.



Projected Performance

LANL is working to evaluate the cost-benefit of telecommuting and other options to reduce overall employee commuting. It's possible that more LANL employees could be given the option of working a 4/10 schedule, in which 40 hours per week are worked during just four days. Approximately 10% of the LANL workforce is currently on the 4/10 schedule. Depending on the number of additional employees who were allowed to switch to a 4/10 schedule, miles driven and GHG emissions from commuting would drop accordingly. Reducing the number of miles commuted by LANL employees would make the most significant reduction to scope 3 GHG emissions. LANL plans to conduct a statistical commuting survey annually to track changes in commuting behavior over time.

To a lesser extent, other ongoing activities will also reduce scope 3 greenhouse gas emissions. GHG emissions from municipal solid waste and offsite and onsite wastewater treatment make up a very small fraction of LANL's scope 3 emissions. LANL's recycling programs are ongoing, and the Pollution Prevention team is always looking for new ways to minimize the amount of municipal solid waste that is generated onsite. Recycling as much as possible will reduce GHG emissions related to municipal solid waste generation.

In addition, LANL is piloting a new instant messaging and desktop teleconferencing system called Lync. Using the Lync system will reduce travel on site and has the potential to avoid long-distance travel with advanced video teleconferencing and web meeting capabilities.



GOAL 2

GOAL 2: Buildings, ESPC Initiative Schedule, and Regional & Local Planning

30% Energy Intensity (btu/gsf) Reduction by FY 2015 from a FY 2003 Baseline

Performance Status

Between FY 2003 and FY 2013, LANL reduced its cumulative energy intensity by over 12 percent. In FY 2003 LANL used 227,880 BTUs/sqft and in FY 2013 LANL used 200,128 BTUs/sqft.

LANL has invested in a number of energy reduction initiatives in FY 2013 including Light Emitting Diode (LED) lighting replacements in four facilities and two parking lots, Building Automation System (BAS) repairs and upgrades including implementing night setback schedules, and recommissioning in HPSB facilities, which has reduced energy use in some facilities by up to fifty percent. LANL has reviewed the list of buildings to ensure compliance with the procedure and is investing in order to upgrade BASs to implement

night setbacks.

LANL also completed an Energy Savings Performance Contract (ESPC) in 2012 and upgraded existing HVAC and lighting at several facilities which was estimated to reduce the energy in Goal-Target facilities by about 65,000 MMBTU per year.

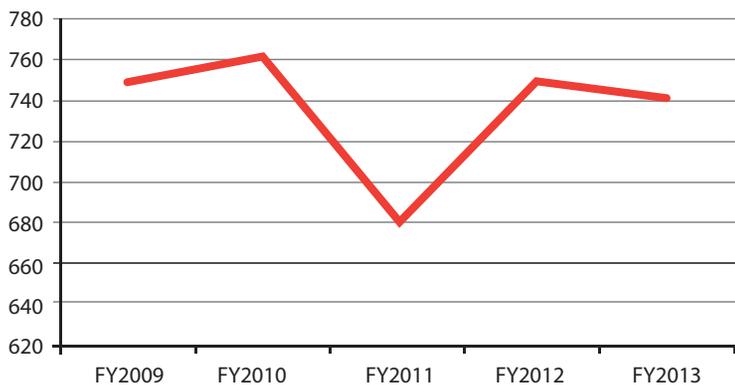
Projected Performance

Through planned investments in FY 2014 LANL estimates that the site will reduce its energy intensity by 3%. In FY 2014 LANL will invest \$1.8M in its facilities to conduct recommissioning activities in HPSB facilities, upgrade BASs in two large exhaust facilities to enable night setbacks, and repair HVAC systems. These 2 facilities were selected due to the potential impact on the energy intensity reduction target.

The table to the right displays the Laboratory's electricity projections by year with specific breakouts for the High Energy Mission Specific Facilities that are major contributors to demand growth.

Approximately 387,000 gsf of facility construction is planned to be occupied between the beginning of FY 2012 through FY 2020. A large portion of this construction includes the RLUOB and Security facilities. The reduction in space during that time period is planned to be about 1,581k gsf. Therefore net footprint reduction will be about 1,194k gsf. Approximately 507k gsf is to be exceeded between FY 2013 and FY 2020. Net energy reduction is estimated to be about 108.8 MMBTUs.

MBTU/Mission Dollar



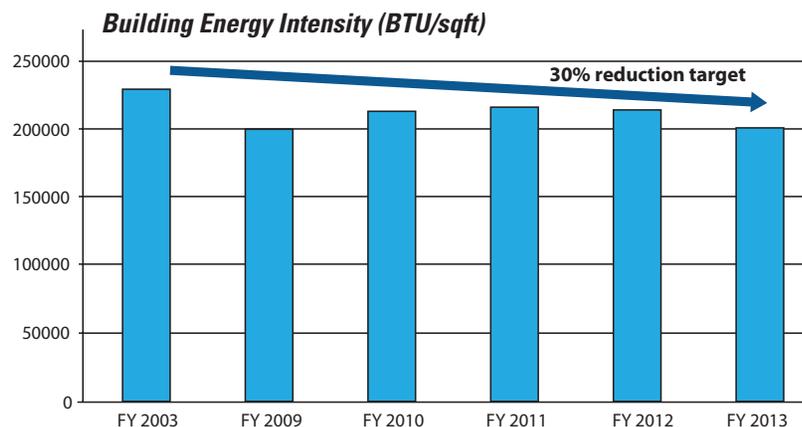
MBTU/Capita



LANL is working to develop a broader set of metrics to improve understanding of the site's energy use and reduction performance. The proposed new metrics will provide a more comprehensive view of progress towards accomplishing the sustainability goals within the context of mission growth and site footprint reduction. The first graph shows the site's total energy use divided by the total operational budget of the site. The second graph shows the site's total energy use divided by the total operational staff on site. LANL will continue to evaluate whether these additional metrics are value-added or if additional metrics should be considered.



| Fiscal Year | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|---------|---------|---------|---------|---------|---------|
| Total Electricity Consumption | 444,616 | 432,478 | 591,081 | 632,063 | 640,902 | 998,838 |
| Demand Growth | 223,258 | 224,717 | 226,889 | 229,472 | 230,050 | 232,635 |
| DARHT | 5,906 | 5,906 | 5,906 | 5,906 | 5,906 | 5,906 |
| NHMFL | 3,483 | 3,483 | 3,483 | 3,483 | 3,483 | 3,483 |
| SCC | 69,612 | 54,600 | 153,264 | 147,234 | 141,204 | 424,488 |
| CCF | 15,000 | 15,900 | 16,800 | 16,800 | 16,800 | 16,800 |
| LDCC | 43,800 | 54,000 | 64,800 | 64,800 | 64,800 | 64,800 |
| TA53 (LANSCE, MaRIE, FEL, ect.) | 74,900 | 64,200 | 93,500 | 104,800 | 117,050 | 148,250 |
| GLOBAL SECURITY | 0 | 0 | 16,575 | 48,000 | 48,750 | 85,400 |
| RLUOB/CMRR | 3,497 | 4,512 | 4,704 | 6,408 | 6,684 | 10,176 |
| RLWTF | 5,160 | 5,160 | 5,160 | 5,160 | 6,175 | 6,900 |
| Energy Efficiency - ESPC | -1,300 | -1,300 | -1,300 | -1,300 | -1,300 | -1,300 |
| Energy Efficiency - HPSB | -1,500 | -1,500 | -1,500 | -1,500 | -1,500 | -1,500 |
| Energy Efficiency - Metering & Publicity | -1,112 | -1,081 | -1,478 | -1,580 | -1,602 | -2,497 |
| Energy Efficiency - Lighting Retrofit | -225 | -450 | -450 | -450 | -450 | -450 |
| Energy Efficiency - Recommissioning and ECM (EISA Audited bldgs) | -15,007 | -15,007 | -15,007 | -15,007 | -15,007 | -15,007 |
| Energy Efficiency - Computer Power Management | -1,640 | -1,640 | -1,640 | -1,640 | -1,640 | -1,640 |
| Total of Energy Efficiency | -20,784 | -20,978 | -21,375 | -21,477 | -21,499 | -22,394 |
| Total Electricity Consumption Adjusted for Energy Efficiencies | 423,832 | 411,500 | 569,706 | 610,586 | 619,403 | 976,444 |



Funding projections are adjusted annually as part of the budget process. LANL modifies its site-wide Facility Disposition Plan to align with program funding expectations for disposition. The disposition plan includes funding source, planned excess year, estimated disposition year, amount of gs, and related costs. Annual disposition plans are aligned with this Site Sustainability Plan, the metering plan, and the Ten Year Site Plan (TYSP), which includes new construction or lease plans.

Integration of the Facility Disposition Plan with the Site Sustainability Plan goals assures that investments are not made for metering or for energy reduction projects in facilities that are planned for disposition. In addition, plans to meet the FY 2015 energy intensity goals must factor in the effect of the reduction of the total Laboratory footprint and projected energy reduction associated with facilities planned for disposition.

EISA Section 432 Energy and Water Evaluations, Benchmarking, Project Implementation, and Measures Follow Up

Performance Status

LANL has 84 covered facilities that received an energy and water evaluation during the FY 2009 – FY 2012 time frame. The first 4 year EISA 07 cycle ended in June FY 2012. In FY 2013 LANL completed energy audits in 21 buildings or approximately 25% of the covered facilities. LANL's EISA 07 facility evaluations are used to generate a list of energy and water conservation measures (ECMs). All ECMs are entered into a searchable database that captures ECMs at the building level.



ECMs are categorized using a return on investment or simple payback calculation. Maintenance staff can use the list of ECMs for their annual maintenance planning and include any necessary maintenance in the deferred maintenance reports.

Projected Performance

LANL is scheduled to perform energy and water audits in FY 2014 on covered facilities on a quadrennial cycle. During the initial quadrennial cycle LANL conducted HVAC, lighting and water assessments separately within each covered facility. LANL will now complete energy and water assessments concurrently following the original HVAC schedule. The same facilities that received HVAC audits four years ago – in FY 2010. The list of facilities to be audited in FY 2014 is tracked within the Consolidated Energy Data Report.

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)

Performance Status

During FY2011, LANL completed electric meter installations and achieved compliance with the electric meter goal and is metering over 90% of electric consumption on individual buildings and processes loads of the site's total electricity use. All electricity distributed throughout LANL is measured by one hundred and thirty one (131) electric meters at the 13.2 kilovolt level in distribution switchgears. LANL has twenty one (21) water meters that are currently read and usage is reported. Most of these meters monitor water used by large facility cooling towers and eight (8) satellite steam plants. Individual building water

meters will be installed per guidance of 430.2B. Natural Gas coming into LANL is metered at two (2) main stations, Tech Meters 1 and 4. There are forty seven (47) other gas meters/consumers that are read and usage reported. Of these 47, ten (10) gas meters are interchange points between LANL and Los Alamos County. Steam is metered as it leaves the TA-3 Co-Generation Plant.

Projected Performance

LANL has one remaining economically practicable thermal (steam) meter installation to complete. LANL has chilled water for comfort cooling in only two main facilities, TA-03-0207 LANL Research Library and TA-03-0132 Central Computing Facility, which also feeds several smaller building loads. These two locations receive chilled water from the TA-03-1498 Laboratory Data Communications Center (LDCC). LANL has determined that metering these facilities is not economically practicable due to the planned installation of a PUE metering system in building 03-132 in FY15.

The Laboratory is planning to manage, report, and share energy usage information across the site and is working to develop a database that will collect metering data and create consumption reports for Facility Managers. This database will be used to analyze and trend energy consumption on a facility basis to improve tenant and building management awareness and conservation efforts. Usage information will be communicated to the RADs and programmatic tenants to improve awareness to reduce energy consumption through a quarterly report as well as available through the UI webpage.



Maura Miller, Metering Program Administrator

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

NNSA's Roof Asset Management Program (RAMP) manages roofing assets across the DOE Complex was established to help manage and preserve the roof systems that protect the critical assets in the NNSA inventory. All roofs replaced through RAMP are required to meet the Secretary's initiatives to reduce energy consumption with increased thermal requirements of R-30 insulation and "cool" roof membranes. Since 2006, a RAMP design criterion specifies that new roofs have a 20+ year life and meet a thermal resistance of R-30. RAMP designs have also permitted LANL to disallow the use of inferior roofing systems with short life spans. RAMP has been providing reflective light-colored or white surfaces on roof replacements since 2005.



| SSPP Metering Stretch Goals | FY 2013 Performance Status | Planned Actions and Key Issues |
|--|--|--|
| Install electricity meters on individual buildings or processes at each site so that these individually metered buildings and processes account for at least 75% of the site's total electricity use by October 1, 2011, working toward a goal of 90% by October 1, 2012. | LANL achieved compliance with the electric meter goal by installing advanced electric meters on individual buildings and process loads on site. This accounts for 90% of the site's total electricity use. | Maintenance and continued outreach. |
| Install natural gas, steam and chilled water meters on individual buildings or processes so that these individually metered buildings and processes account for at least 10% of the site's natural gas, steam and chilled water use by October 1, 2011 (10% for each utility) and 90% by October 1, 2015 (90% for each utility). | In FY12 and FY13, LANL focused metering efforts on natural gas and steam meter installations. | LANL has one remaining economically practicable thermal meter to install in FY14. |
| Independently meter 40% of agency data centers by October 1, 2011 working toward a goal of 100% by October 1, 2015. | Currently, LANL has one of the three major data centers sub metered – approximately 33% complete. | LANL will prepare a plan to meter distributed data centers once all site virtualization and consolidation is considered. |

While individual metering of energy costs at a building level have not been obtained, estimates using EnergyWise energy savings calculator have established average cost reductions of over 69% per year for all NNSA managed sites. At LANL, this equates to \$143,500/year and \$2.8 million over 20 year roof life expectancy. RAMP data base ranks all facilities by age/remaining life and mission dependency. Facilities with poor or failed roofs have been upgraded to mission dependent and mission critical as the goals of LANL have changed, therefore allowing for roof replacement

to meet new mission needs. When necessary, poor roofs of aging facilities are often repaired to extend the life of the roof to meet a future demolition of cold and dark goal in lieu of a full replacement. Fiscally responsible management of the roof assets to ensure enduring operations until a facility is no longer needed.

Under the FY 2013 RAMP program, an additional 61,476 square feet of cool roofing was installed.

Projected Performance

Cool roofs are part of LANL's engineering standards and will continue to be implemented for most roof replacement projects. The RAMP has designed replacement of approx. 35,000 square feet of roof for 2014. Every roof will be replaced within the parameters established at an R-value of 30 or above and the membranes will meet the cool roof initiatives.

The following buildings will receive a full tear-off and replacement to all or portions of the roof:

15% of the Number of Existing Buildings Greater Than 5,000 Gross Square Feet (GSF) to be Compliant with the Five Guiding Principles of HPSB by FY 2015

Performance Status

E.O. 13514, Sec. 2(g) directs the head of each agency to “implement high performance sustainable Federal building design, construction, operation and management, maintenance, and deconstruction by ensuring that all new construction, major renovation, or repair and alteration of Federal buildings complies with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles) and ensuring that at least 15 percent of the agency's existing buildings (above 5,000 gross square feet) and building leases (above 5,000 gross square feet) meet the Guiding Principles by fiscal year 2015 and that the agency makes annual progress toward 100-percent conformance with the Guiding Principles for its buildings inventory.”



In response to these requirements and guidance on implementing the guiding principles by the Interagency Sustainability Working Group, LANL has selected 31 buildings (15% of total number of buildings that are 5,000 square feet and above) and will work to comply with the guiding principles within these facilities by the end of FY 2015.

LANL achieved LEED Gold certification for the Radiological Laboratory, Utility, Office Building (RLUOB) which was LANL's first HPSB and first LEED certified building. LANL is currently reporting 65% completion in EPA's Energy Star Portfolio Manager database. An HPSB program schedule with completion dates has been established within the energy program Access database and is also on the LANL Green Buildings web site. LANL completed the HPSB Guiding Principles in 4 facilities in FY 2013. HVAC recommissioning was a major focus. Recommissioning is essentially the same process as commissioning, but applied to existing building's HVAC, controls, and electrical systems. When the standardized maintenance and energy management procedures fail to correct chronic building problems, recommissioning provides a systematic approach for discovering and solving these

problems. All recommissioning reports will also go to the Maintenance and Site Services Division management to utilize for future maintenance planning efforts.

LANL has made significant improvements in HPSB facility energy use, as detailed in the graph on page 25.

In addition, the Institution's EMS Environmental Action Plans (EAP) for FY 2014 will include HPSB elements. The directorates housed in buildings chosen for the HPSB program will be encouraged to include measurable goals within their EAPs to address tenant education and green purchasing. The HPSB program has integrated with the Laboratory's LRDP and the current leasing agreements in order to reach the goal target.

One of the major initiatives LANL is pursuing is the establishment of building level green teams, focusing on buildings that are part of the LANL HPSB program. The objective is integrating sustainability by discussing, planning, and executing sustainable practices in line with EMS objectives and targets and site sustainability goals on a building level. The goal is to improve integration and lines of communication between stakeholders; educate, inspire, and empower building occupants around sustainability; and create ownership in the effort to operate and maintain LANL buildings efficiently.

During FY 2013 LANL had 10 active green teams. LANL is using the green team approach to strengthen building level stakeholder collaboration and communication. Building level green teams help educate and incentivize building occupants to promote green practices. LANL Green teams are initiated through the EAP process because it indicates an AD's commitment to promoting efficient use of resources, encouraging its staff to reducing waste, and promoting sustainable practices in the buildings they occupy. Building green teams are often composed of a champion (Associate Director), a senior management representative that acts as the green team lead, designated procurement representative (DPR), LANL HPSB team members, waste management coordinator (WMC), LANL energy manager, EMS/P2 team representative, building operations manager (FOD), building maintenance coordinator, WSST member, AD EMS POC, division EMS POC, and tenant representative. To



Radiological Laboratory and Utility Office Building



date, green teams have contributed to achieving LANL copy paper (containing at least 30% post-consumer fiber) goals, energy conservation goals, sustainable acquisition goals, green janitorial cleaning product goals and green furniture goals.

The table on page 26 identifies the remaining HPSB work according to the Laboratory's HPSB Plan, specifically focusing on the Guiding Principle actions that are the most challenging. The red text indicates the action is in progress and the black indicates the action has been completed. In several instances the 20% reduction of the energy usage for the facility has been seen in monthly verification charts but is merely waiting for more time to

pass so that LANL may claim that completed in Portfolio Manager. Under "Indoor Water" the term 'Fixture Upgrade' implies that a water audit has been completed, but work needs to be completed in order to meet the guidelines in that area.

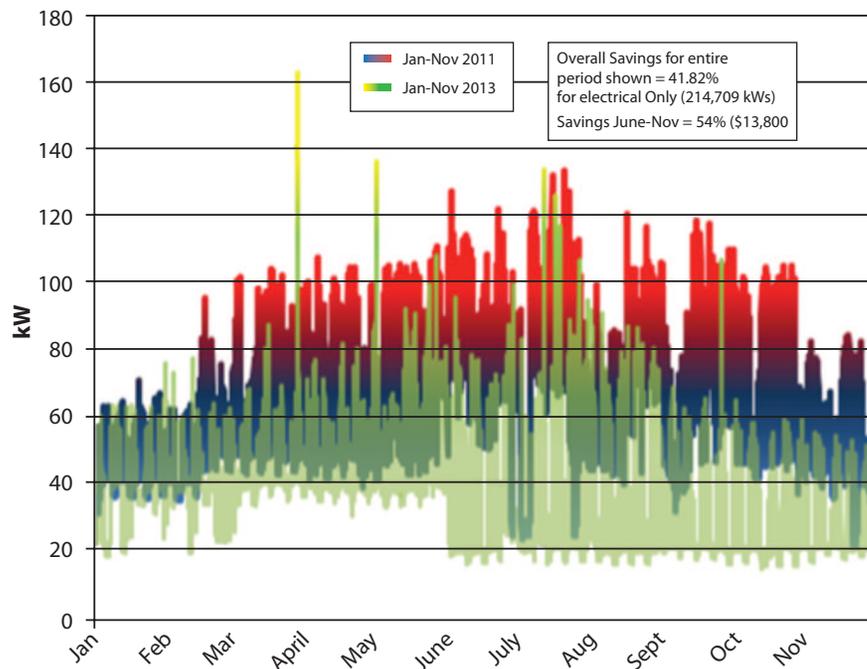
Projected Performance

In FY 2014, LANL is investing approximately \$1.3M in HPSB HVAC recommissioning and BAS controls tuning as part of the overall funding to reduce energy use in facilities. LANL will target energy reduction as the main HPSB focus in order to make progress in energy intensity reduction. LANL will complete HVAC re-commissioning efforts in 5 facilities which includes walk downs,



Emergency Operations Center

Electrical Energy Savings Jan-Nov, Building 03-1411



Building Automation Systems (BAS) controls re-work, installing occupancy controls and water flow restrictors on faucets, and performing a test and balance of the air distribution after the BAS is optimized. LANL's Ten Year Site Plan includes a list of sustainability projects highlighting HVAC improvements and recommissioning efforts in the HPSBs, lighting upgrades, implementation of energy conservation measures from the EISA 07 audits, and advanced utility metering. LANL is working to integrate sustainability into the project planning and increase the percentage of building's compliant with the HPSB Guiding Principles. LANL has completed the Guiding Principles in 5 facilities and does not plan on full completion of the HPSB Guiding Principles within any facilities in FY 2014 full focus is on recommissioning to get the highest ROI. Currently, LANL is not on track to meet the FY2015 HPSB goal, and has assigned this goal a "High" risk of non-attainment.



All New Construction, major renovations, and alterations of buildings greater than 5,000 GSF Must Comply with the Guiding Principles

Performance Status

LEED Gold for new construction is included in LANL's Engineering Standards as of 2009.

Four buildings have been built between FY 2003 and FY 2006, which were designed and constructed to LEED 1.0 standards. However, these four buildings were not registered or ever certified through the USGBC. These buildings are the Defense Program's Nicholas C. Metropolis Center for Modeling and Simulation (otherwise known as the Strategic Computing Complex (SCC)); the National Security Sciences Building (NSSB); the Defense Nuclear Nonproliferation program's Nonproliferation and International Security Complex (NISC); and the Office of Science's Center for Integrated Nano Technologies (CINT). Retro certification of these facilities under one of the appropriate LEED systems, such as LEED-EB is currently being discussed.

Since 2006, two additional buildings have been registered under the USGBC; the Radiological Laboratory, Office Utility Building ((RLOUB); and the Tactical Training Facility (TTF). The RLOUB has been completed and certified as LEED-Gold. The TTF has been completed and is currently under review for LEED certification.

Projected Performance

LEED Gold and energy performance as standard design/construction requirements are being incorporated into early project design. Over 600,000 square feet of major new projects, currently in the planning stages are being

formulated to be certified as LEED Gold projects. These facilities include: MaRIE M4 Laboratory/ Office building (100,000 sqft.), Global Security Laboratory/Training/Office building (170,000 sqft.), CERDA Energetic Materials Laboratory/ Office (40,000 sqft.) TA-03 Fire Station (30,000

sqft.), TRU-Waste Office (30,000 sqft.) and the Wellness Center Replacement (20,000 sqft.). Beginning in FY 2020 LANL will be investigating methods to achieve design of all new buildings as net-zero energy by FY 2030. Currently, under DOE directive, all new LEED construction is designed

| HPSB Identifier | Building Name | Target Year | GSF | Optimize Energy Performance | Integrated Assessment, Ops & Mgt. Principles | | | Protect & Conserve Water | Enhance Indoor Environmental Quality | | | Estimated Cost |
|-----------------|--------------------------------|-------------|---------|-----------------------------|--|-------------------|--------------------|--------------------------|--------------------------------------|--------------------|---------------------------------|----------------|
| | | | | Energy Efficiency | Plan | Occupant Feedback | Commissioning | Indoor Water | Ventilation & Thermal Comfort | Moisture Control | Daylighting & Lighting Controls | |
| 2555989 | 03-1409 Office Bldg | 2015 | 21,159 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2556034 | 03-2011 Adv Computer Lab | 2015 | 8,857 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2556044 | 15-0313 Radiogr Support Lab | 2015 | 24,668 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$101,473 |
| 2556073 | 03-1415 Office Bldg | 2015 | 20,646 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2556118 | 16-0824 Office Bldg | 2015 | 23,061 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$81,311 |
| 2556122 | 16-0933 Office Bldg | 2015 | 22,765 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$80,267 |
| 2556126 | 16-0969 Weapons Plt Support | 2015 | 22,156 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$91,140 |
| 2556136 | 22-0120 HDF | 2015 | 14,327 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$58,935 |
| 2556236 | 63-0111 Office Bldg | 2016 | 19,874 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2720914 | 16-0204 | 2016 | 13,651 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$48,132 |
| 2803699 | 52-0033 Weapons Support | 2016 | 14,351 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2804235 | 55-0066 HTS Office Building | 2016 | 24,369 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2804305 | 59-0003 Office | 2016 | 17,222 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2847641 | 55-0313 Office Bldg | 2016 | 23,860 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 3000259 | 03-0261 Otowi | 2016 | 140,596 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2555772 | 03-1400 NSSB | 2016 | 296,650 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2556007 | 03-1698 Material Science Lab | 2017 | 71,772 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$337,415 |
| 2556175 | 46-0535 Chem Tech Support Bldg | 2017 | 21,618 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$76,223 |
| 2556199 | 03-2322 NISC Building | 2017 | 169,574 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$697,551 |
| 2556244 | 69-0033 Emergency Ops Center | 2017 | 37,825 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | Unknown |
| 2720779 | 03-0207 Oppenheimer Study | 2017 | 78,185 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | 20% Reduction | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$367,563 |
| 2720885 | 03-0502 Space Science Lab | 2017 | 23,807 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$111,921 |
| 2803711 | 53-0001 Lab Office | 2017 | 81,939 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$337,060 |
| 2803752 | 53-0006 Accelerator Tech | 2017 | 35,171 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$144,678 |
| 2803778 | 53-0031 NPB Technical Support | 2017 | 47,168 | 20% Reduction | Building Mgt Plan | Tenant Survey | Remcommiss. Report | Fixture Upgrade | Meets ASHAE Standards | Remcommiss. Report | Lighting Audit | \$221,746 |



Center for International Nanotechnology

to meet a minimum improvement of 30% better than the ASHRAE energy consumption baseline, where applicable. Some facilities, due to their experimental uses, are unable to meet the 30% energy efficiency criterion because of the nature of their work activity requirements and must be considered on a case by case basis.

Regional and Local Planning

The Laboratory is situated on Federally owned property located in Northern New Mexico within Los Alamos County and is currently operated by Los Alamos National Security (LANS) for the Department of Energy. The County was formed during World War II by the Federal government, as the site for Project Y of the Manhattan Project. Since that time, the Laboratory has been transformed through real property transfers to tribal, federal, local governments and to private landowners, resulting in the current LANL site area of approximately 40 square miles, which comprises a significant portion of the 109 square miles which Los Alamos County now encompasses. The communities of Los Alamos and White Rock are governed by the County of Los Alamos. The Laboratory's neighbors include among others the tribal governments of San Ildefonso Pueblo, Santa Clara Pueblo, Jemez Pueblo, and Cochiti

Pueblo. Other neighbors are Bandelier National Monument, administered by the U. S. Park Service; and the Santa Fe National Forest, administered by the U. S. Forest Service. Neighboring counties include Santa Fe, Sandoval, and Rio Arriba Counties.

The Laboratory sponsors and engages interactive and ongoing relationships with all neighbors to promote common goals and interest; as well as resolving cross jurisdictional issues. The Laboratory participates as positive partner in many community efforts and as a large stakeholder has the ability to bring diverse entities together in a common effort.

The Laboratory maintains and allows use of a central transit station facility within TA-3 on DOE property. This central station allows three transit systems to converge at this point: the Laboratory

taxi and bus system, the County of Los Alamos's Atomic City Transit, and the State of New Mexico's Department of Transportation Park and Ride who contracts with All-Aboard America providing a regional bus service.

The partnership between the Los Alamos County (LAC) municipal utility and the Japanese technology development organization NEDO has installed a Smart Grid Technology Test Bed consisting of 2 MW of photovoltaic (PV) generation and 1.8 MW of battery capacity (1 MW NaS and 0.8 MW lead-acid) to firm the PV. The battery storage capacity installed in this demonstration is more than adequate to firm the PV output; however battery installations of this size are expensive pointing several needs:

TA-3 Main Campus area





1. Optimal sizing of battery storage so that small utilities and co-ops do not invest in more storage than is required to meet their objectives
2. Control of inexpensive demand response resources to offset the need for battery storage
3. Modeling of the control of these demand resources and investigation of how these resources interact with and potentially reduce the need for battery storage.

LANL realizes that development of many small scale (<10MW) community-level projects by rural electric cooperatives and small municipal electric utilities is an effective way to raise renewable penetration onto the electric grid and reserve transmission capacity for larger-scale renewable generation to serve urban electrical demands. However, increasing the self-sufficiency of these small communities through renewable generation must be done in a transmission-friendly manner to avoid injecting large net-load fluctuations into regional transmission systems that would degrade their performance and increase integration costs. Effectively integrating time-variable renewable generation will require deployment and control of dispatchable resources in order to firm up the intermittent power output. These resources can include other nearby generation, demand response-enabled loads, and/or storage.

In FY 2013 LANL developed several tools, demonstrations, and relationships that will be useful in addressing these needs.

1. Implemented Building Automation System (BAS) code for open-loop control of the HVAC in a 300,000 ft² office building (NSSB) providing direct control over changes in HVAC power consumption on a 15-minute time scale while imposing hard constraints on the comfort impact to the occupants. During peak cooling season, this demand response resource provides us with approximately 100 kW of generation-following capability and a unique test bed for exploring the capabilities of this control.

2. Development of a Model Predictive Control (MPC) code that enables LANL to simulate the simultaneous optimal control of many forms of battery storage for varying degrees of PV forecast uncertainty. LANL can use this tool to assess the performance of different portfolios of storage assets and determine the optimal storage portfolio



Los Alamos Smart House testing new technology

In FY 2014 LANL plans to:

1. Expand the BAS code implementation to enough buildings to control up to 500 KW of power providing demand response on a 15-minute time scale.

To balance the Laboratory's facility portfolio, about 430,000 gross square feet (gsf) of space is currently leased from private companies within Los Alamos County. Another 12,000 gsf is leased in the City of Carlsbad to support the WIPP project. These leased facilities are strategically located within the community to provide highly accessible space for general public access and also provide convenient access to public transit and are pedestrian friendly, enhancing eco-friendly transportation opportunities for the public as well as employees.



The Laboratory and DOE interact frequently with County, State, Tribal and other Federal Agencies to affect positive working relationships on matters of common interest. DOE is in frequent interface with the local tribal governments in reference to Laboratory actions that may affect tribal lands or cultural resources. DOE maintains an agreement to provide land for the County ECO Station for waste recycling and landfill operations.

The DOE and the Laboratory participate in a pooling arrangement with Los Alamos County to provide electrical power to both the County and the Laboratory. The Pool installed a new 3MW hydroelectric unit at Abiquiu Dam, and are pursuing the installation of up to 1MW of PV generation on a capped landfill on DOE property.

With the increase in supercomputing power and accelerator programs, power demand is expected to increase and the transmission of power must be upgraded to meet increased demand. The Central Steam Plant Repowering and Distribution System Revitalization is a proposed project that will replace a 60 year old inefficient system. The new system will be more reliable and provide the electrical capacity needed for the future missions of the Laboratory and the Power Pool more efficiently. This system will provide up to 35MW of the annual electrical consumption of the Laboratory at a quarter the carbon emissions per kWh when compared to coal generated power available in the Four Corners region.



LA County Solar Photovoltaic panels

Continued planning for new federal facilities and leases will include the consideration of sites that are pedestrian friendly, near existing employment centers, and accessible to public transit unless the program requirements are specifically otherwise.

LANL is working to incorporate DOE Procurement Policy Purchase of Electricity, Energy Products, and Energy By-Products from Indian Tribes; which gives preference to tribes and tribal majority-owned businesses for the purchase of renewable energy. In FY 2011, LANL conducted a preliminary renewable site assessment of Zia Pueblo through the Lab's small business

development program. Power flow analysis of Zia Pueblo's existing 115-kV transmission circuit indicates under 2011 summer peak flow conditions, up to 30 Megawatts was determined to be technically feasible for interconnection. A detailed assessment funded by the Department of Energy's Tribal Energy Program (TEP) is now underway



GOAL 3

GOAL 3: Fleet Management

10% annual increase in fleet alternative fuel consumption by FY 2015 relative to a FY 2005 baseline

Performance Status

LANL began testing the cost and efficiency of E-85 in flex-fuel vehicles using eighty SOC vehicles and has expanded the use of Bio-diesel in its maintenance support vehicles in FY 2012. LANL subcontracts with a local pueblo-owned business to provide bulk E-85 and Bio-diesel fuel which is transported to the site in a LANL mobile fuel tanker. In FY 2012, alternative fuel consumption was 46,277 gallons, primarily E-85. In FY 2013, LANL used 56,159 gals of E-85 fuel and 9,851 gallons of Bio-Diesel Fuel. Alternative

Fuel consumption in FY 2013 has increased by 30% compared to the FY 2012 consumption and a 743% increase in alternative fuel relative to the FY 2005 baseline.



Fuel truck dispenses E-85 to fleet vehicles

Projected Performance

LANL will continue working toward increasing use of alternative fuel in the current fleet and, where cost effective, LANL will continue to use mobile fueling to increase alternative fuel use.

2% Annual reduction in fleet petroleum consumption by FY 2020 relative to a FY 2005 baseline

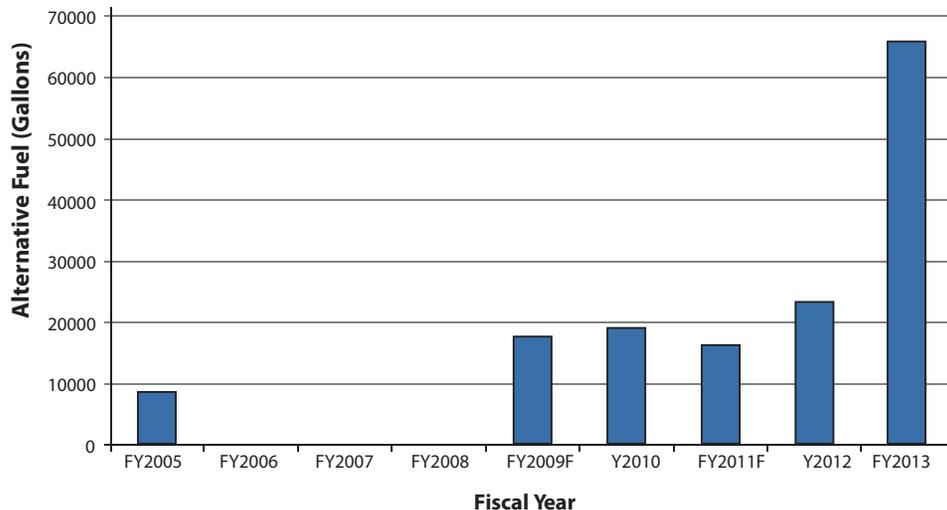
Performance Status

LANL increased its fleet petroleum use in FY 2013 by 1% as compared to FY 2012 usage. However, LANL has reduced fleet petroleum use by 19% when compared to a FY 2005 baseline. In FY 2013 LANL acquired 57 additional low Green House Gas vehicles, 52 sedans and 5 small SUVs. Additionally, during the FY 2013 replacement cycle, LANL down-sized 81 vehicles to smaller more fuel efficient vehicles.

Projected Performance

LANL continues to research and test alternative fuel vehicles (AFVs) including Plug-in Hybrids and

Alternative Fuel Use





electric cars as available. LANL continues to collect data on E-85 and Hybrid vehicles and is working with management to downsize and right size the Laboratory's fleet. During the FY 2014 annual replacement cycle, LANL will order more fuel efficient vehicles and low-GHG emitting vehicles, where practical to meet the fleet sustainability goals.

100% of Light Duty Vehicle Purchases Must Consist of AFVs by FY 2015 and Thereafter (75% FY 2000 – FY 2015)

Performance Status

LANL's total Fleet consists of 1570 vehicles. 793 or 51% of those are considered Light Duty vehicles (LDVs). Of the 793 Light Duty vehicles 497 or 63% are alternative fuel vehicles (AFVs). Vehicles, that weigh less than 8,500 lbs gross vehicle weight rating (GVWR) are considered LDVs. EPA's

2005 requirements apply to fleets of 20 or more LDVs that are centrally fueled or "capable of being centrally fueled" and are primarily operated in a Metropolitan Statistical Area (MSA)/Consolidated Metropolitan Statistical Area (CMSA). Vehicles heavier than 8,500 lb GVWR or not located or operated primarily in a covered MSA or CMSA are exempt from the requirements. Since Los Alamos is not located in a MSA we are exempt from this requirement, however in an attempt to meet the requirement, 63% percent of LANL's current Light Duty vehicles are alternative fuel vehicles.

Projected Performance

LANL will continue to increase the number of AFVs in its Light Duty fleet during each annual vehicle replacement cycle.

Reduce Fleet Inventory on non-mission critical vehicles by 35% by FY 2013 relative to a FY 2005 baseline

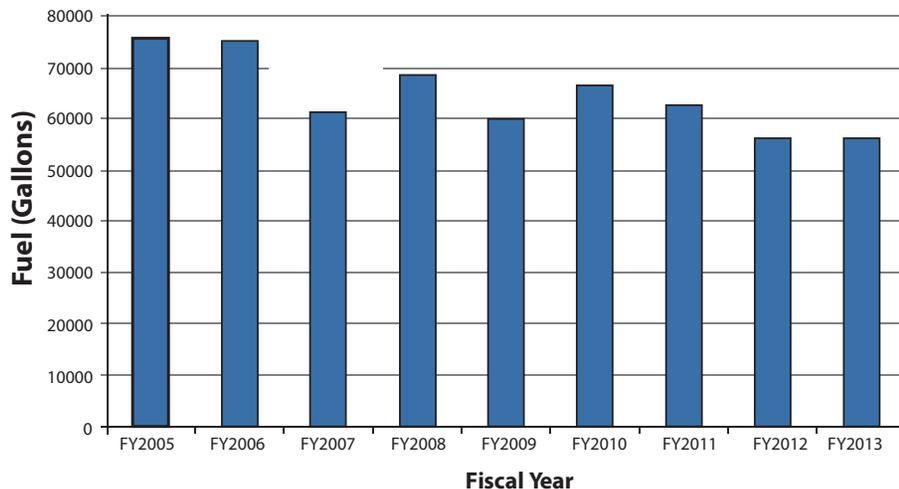
Performance Status

In support of the Secretary's 35% reduction plan, NNSA is in process of right-sizing the collective fleet. LANL contributed to this initiative by reviewing and re-categorizing its vehicles into two categories; Mission Support and Mission Essential. As part of this year's annual GSA Re-Order process, vehicles not meeting NNSA's utilization standards averaged over the last 24 months will not be re-ordered. LANL continues to turn in vehicles that are no longer needed to meet the Laboratory's programmatic mission or vehicles that have continually been underutilized.

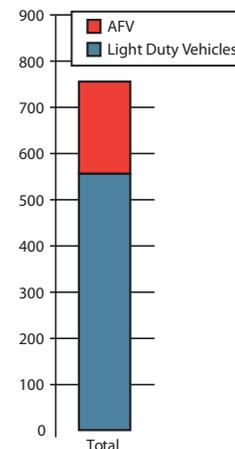
Projected Performance

LANL will continue to support NNSA's reduction goal of 35% by ensuring LANL's Fleet is mission-appropriate and remains cost effective in accordance with NNSA guidance and policy.

Petroleum Fuel Use



FY2013 Vehicle Leases





GOAL 4

GOAL 4: Water Use Efficiency and Management

26% Water Intensity (Gal/gsf) Reduction by FY 2020 from a FY 2007 baseline

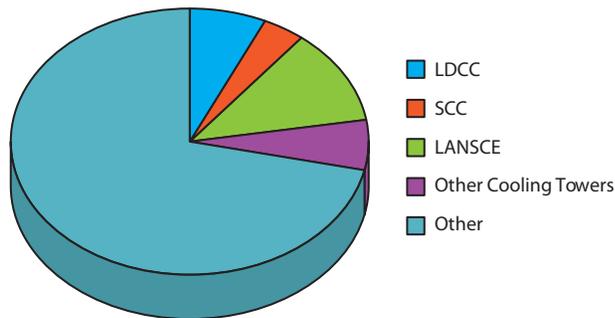
Performance Status

In FY 2013 LANL's water use reduction was dependent on SERF operations and industrial water reuse at the SCC. SERF supplied 100% of SCC water demand from mid-April to September 2013. LANL's total water use in FY 2013 was approximately 387 million gallons. Twenty-eight percent of that total was used by the SCC, LDCC, and LANSCE cooling towers. Water intensity has increased by approximately 21.6% compared to the FY 2007 baseline due largely to cooling towers supporting increased supercomputing. This represents a 12% reduction from FY 2012.

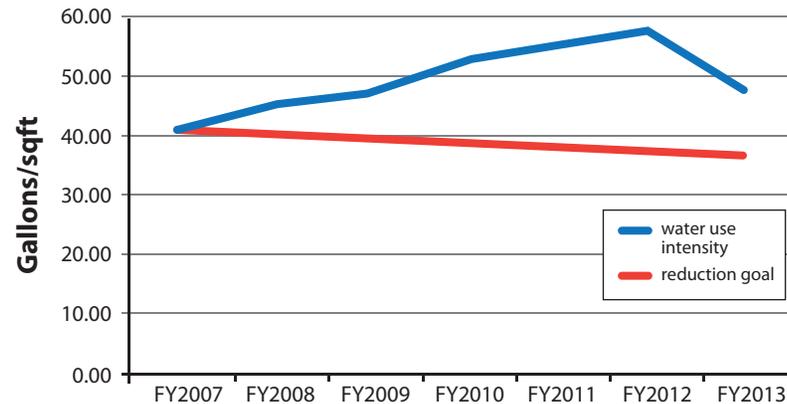
LANL's total water consumption for FY 2007 (about 335 million gallons), the baseline year used to calculate the water intensity, was the second lowest within the last 10 years. The average total water consumption for FY 2007 to FY 2013 is approximately 389 million gallons. In addition, LANL's footprint reduction efforts project a 835,000 sqft reduction between FY 2007 and FY 2015. The low baseline year in conjunction with footprint reduction and increased water use to meet cooling demands will make reaching the FY 2020 water intensity goal difficult and uneconomical for LANL.

LANL water usage represents approximately one-third (1/3) of the total water usage on the regional aquifer. The 2008 Site-wide Environmental Impact Statement (SWEIS) measures potential environmental impacts by comparing projections of utility resource requirements against utility system capacities. LANL's annual water use ceiling, the system capacity, is 542 million gallons. Any water use exceeding this ceiling can be considered an indicator of an environmental impact, and further analysis is warranted. Water use below this ceiling is not expected to have any additional impacts to the regional aquifer. In addition, as projected in the 2008 SWEIS, trends in water levels

FY 2013 Water Consumption by User

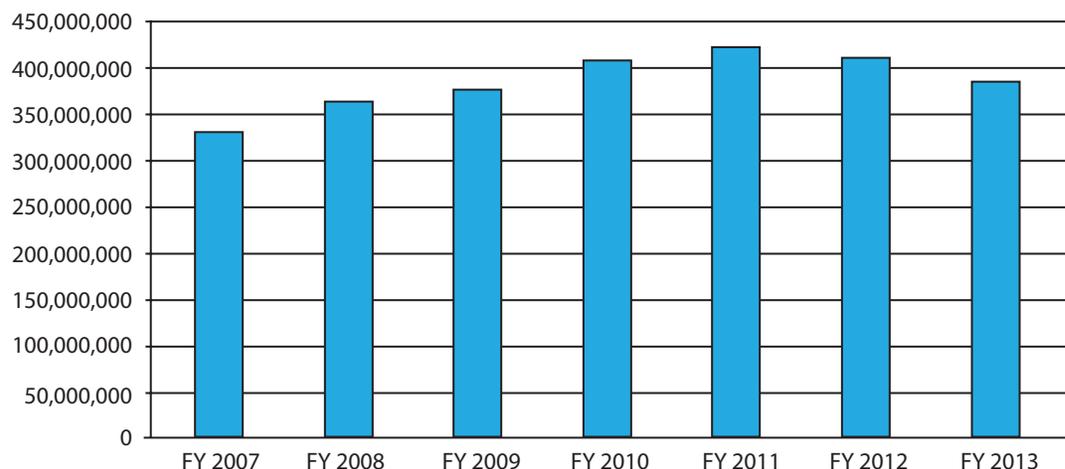


Total Water Use (Intensity)





Total Water Use (gallons)



Sanitary Effluent Reclamation Facility

in wells reflect a plateau-wide decline in regional aquifer water levels starting in 1977 in response to municipal water production, typically by several feet each year. No unexplained changes in patterns have occurred since this time. The decline is gradual and does not exceed one to two feet per year for most production wells. In areas where pumping has been reduced, water levels show some recovery. When pumping stops, the static water level returns in about six to 12 months. Hence, the water level trends suggest no adverse impacts on long-term water supply production from groundwater withdrawals (LANL 1998 and LANL 2003).

Projected Performance

Due to the low environmental impact from LANL’s current water level usage, LANL’s overall sustainability efforts focus is mainly on a cost-effective life-cycle approach emphasizing energy efficiency to reduce LANL’s regional impact on

water use associated with energy generation. In FY 2014 the Site Sustainability Program was funded at a level of \$3.5M by the Director through indirect funding. Approximately \$200,000 of the \$3.5M was allocated for cooling tower upgrades. Additionally the Laboratory is investing \$3.2M per year of indirect funding in the operation of SERF to achieve its water reductions.

Although there is no expectation of supply shortfall nor of substantive environmental degradation from continued usage at present levels, LANL is implementing a project to reduce potable water use in selected cooling processes and in the steam generation equipment. In addition, LANL has collected water conservation measures from water assessments in over 80 facilities. Extrapolating from the audits completed to date, 8 million gallons per year could be saved if all LANL facilities were upgraded. This amounts to

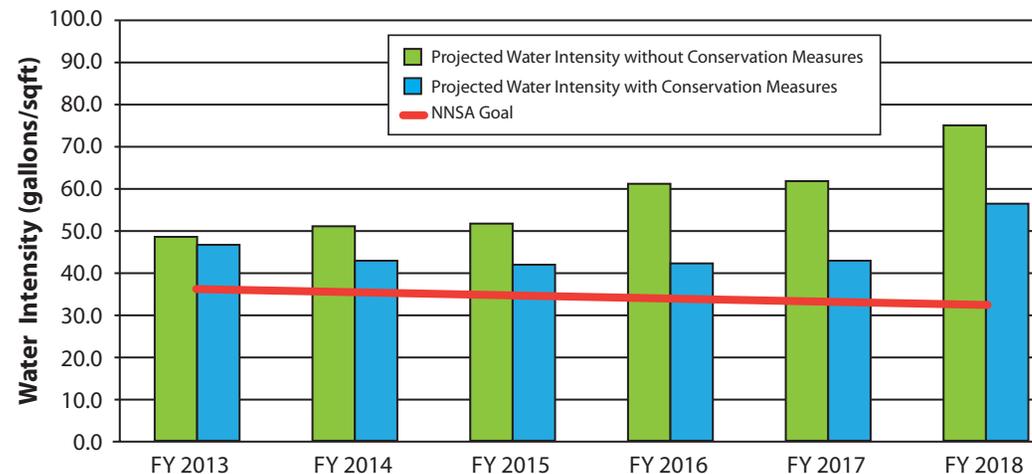
2% of the average yearly water consumption over the last 10 years. Unfortunately, due to the low cost of water, the payback period is over 100 years. In light of this Return on Investment (ROI), LANL has adopted an incremental approach to upgrade plumbing fixtures as they fail. LANL is making smart investments in water conservation measures that have a cost-effective life cycle (e.g. SERF and select cooling tower upgrades), and with a primary focus on high ROI energy efficiency measures, in order to reduce LANL’s regional impact on water use associated with energy generation.

In addition to energy conservation measures that address regional water use, LANL will focus on the projects listed below to further reduce water consumption.



- SERF can produce up to 110,000 kgal/yr of reclaimed industrial water and is connected to the SCC cooling towers and the TA-3 steam plant. In FY 2014, SERF is projected to meet all of SCC water needs. It is forecasted that the SCC will not consume all of SERF's capacity until 2018.
- LANL conducts a leak detection survey biennially. The identified water system leaks are prioritized with all other water system maintenance for repair. LANL will continue to maintain the distribution system by replacing portions of the over-60-year-old system as leaks are identified.
- Fifty (50) monitored water meters have been installed. Many of these meters measure large consumers such as: the TA-3 Co-Generation Plant processes, cooling towers, satellite steam plants, and water distribution flows. Data are being accumulated to establish a basis for conserving water.
- Installation of water savings fixtures in HPSBs to align with the recommissioning schedule, as economically practical.
- Upgrades in domestic plumbing to modern water-conserving fixtures as fixtures fail.
- Air-cooled chillers for cooling towers. Many of the water-cooled cooling towers will be replaced due to age of the system. As the systems are funded for replacement, system engineers will evaluate options for water conserving air-cooled systems.
- LANL completed a pilot project to reduce the amount of water discharged from cooling towers to prevent silica scale. The pilot project demonstrated that the cycles of concentration in LANL cooling towers could be raised from the current 2.0 to 3.0 – 3.5 using a polymer which prevents dissolved silica from plating out on heat transfer surfaces. This means that water consumption at towers adopting the new treatment technology could reduce their water consumption by approximately 35%. LANL is funding installation of this chemical treatment system within proposed cooling towers in order to increase cycles of concentration and reduce water and chemical use in cooling towers not connected to the SERF reuse water supply. This measure was delayed and rolled over from FY 2013 due to a procurement process issue.
- In FY 2011, Pacific Northwest National Laboratory (PNNL) evaluated water usage and identified water saving opportunities across LANL. The report highlighted potential water conservation measures and their associated water, energy and cost savings. One of the report findings identified approximately 23% of site consumption as “unknown”. As a result, LANL metered a section of main water piping to determine the leak rate. The leak rate was relatively small (~5%) compared to industry average. LANL will continue investigations to determine the supply and discharge from main water users on site. One main water meter will be installed in FY 2014. The meter will be networked and will report hourly to the existing utilities server. Numerical data will identify unusually high usages in buildings, groups of

5-Year Water Intensity Projection





buildings and distribution branches. The project has three desired outcomes: 1) an easy-to-access and use water model, which includes a “water balance” to help determine unknown uses, water losses, and possible system inefficiencies; 2) testing protocols and analysis methods to identify further unknown uses; and 3) further detailed analysis of existing operations, focused on large water consuming activities (typically industrial), to update relevant and feasible opportunities from the last assessment.

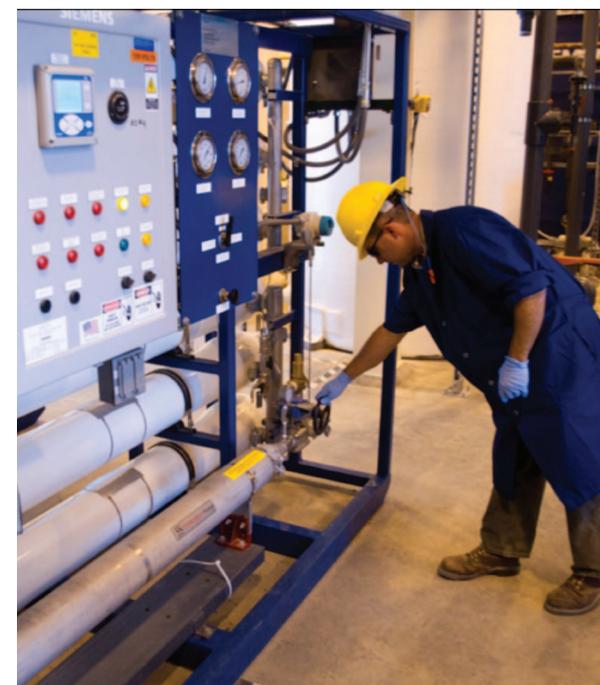
20% Water Consumption reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline

Performance Status

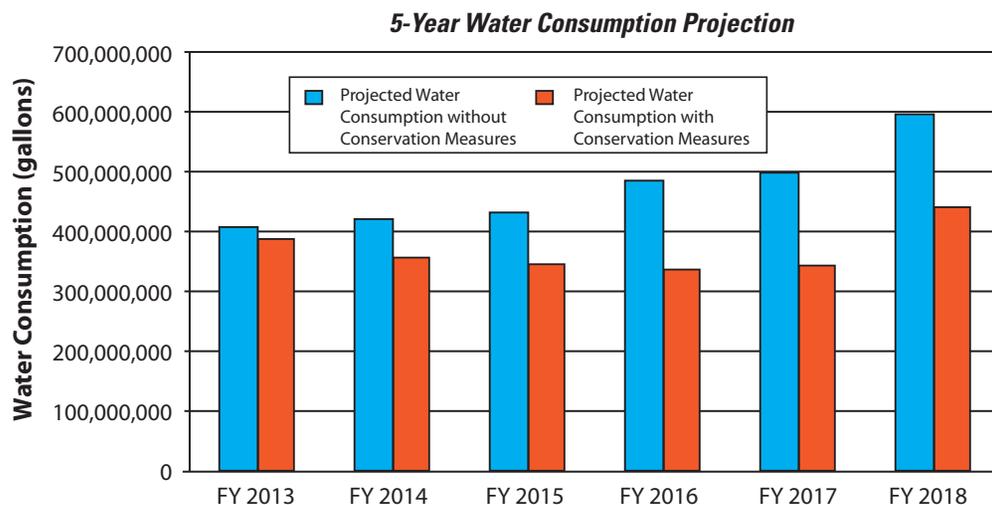
All of LANL’s water use is potable water and is therefore considered part of the 26% water intensity reduction goal reporting.

Projected Performance

LANL will not report on the ILA goal, but will focus efforts in on potable water use reduction.



Gabriel C. Herrera checks gauges inside the SERF





GOAL 5

GOAL 5: Pollution Prevention

Recycling & Waste Diversion (50% by FY 2015) Performance Status

The LANL Pollution Prevention (P2) program conducts pollution prevention projects, prepares the Hazardous Waste Minimization Report in compliance with the New Mexico Environment Department (NMED) Hazardous Facility Operating Permit, completes P2 regulatory compliance and DOE Sustainability Goal reporting in the Site Sustainability Plan (SSP), holds the annual LANL P2 Projects awards competition, submits LANL P2 awardees for National P2 Awards, and directly funds generators to conduct P2 projects via the P2 Project Fund.

Solid Non-Hazardous and Construction/Demolition Waste Diversion

LANL diverted 56% of solid, non-hazardous waste, and 98% of construction and demolition waste, in FY 2013. Additionally, LANL construction and demolition activities continued to produce clean fill for reuse on-site; however those numbers were not developed in time for the completion of this report. LANL's progress toward waste diversion goals, and overall recycling rates, is shown in the figure on right.

LANL P2 Awards

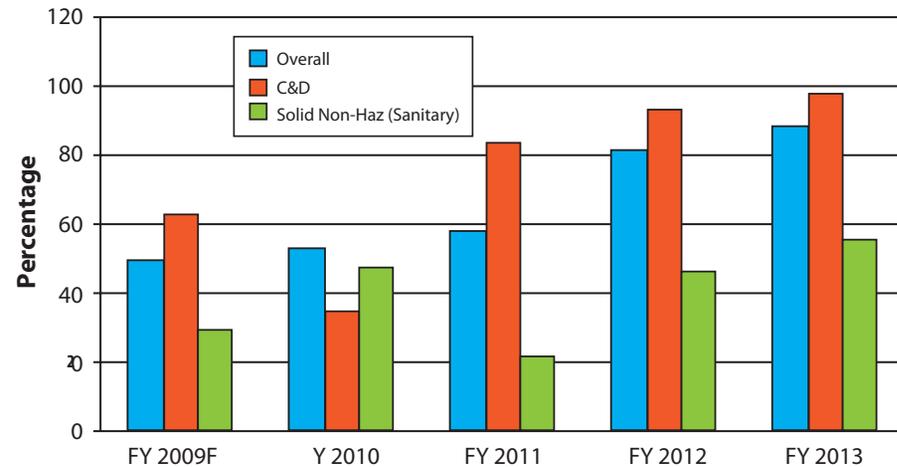
The FY 2013 LANL Annual Pollution Prevention Award Ceremony recognized 47 projects. The projects were completed during FY 2012 and involved nearly 400 individuals from across numerous Laboratory organizations. The

projects realized a conservatively estimated cost savings of over \$8M. Selected projects recognized at the FY 2013 LANL Pollution Prevention Award Ceremony were nominated for National Pollution Prevention Awards.

National Pollution Prevention Awards

LANL received four NNSA National Pollution Prevention Awards during FY 2013, including two Best-in-Class awards. The winning projects are described below. (Note: The NNSA and DOE Pollution Prevention Awards are given to the previous FY's projects.)

Progress Toward Waste Diversion Goals



- **NNSA Best-In-Class Award:** Tracer Forensic Incident Response Exercise (FIRE) is a workshop for training and meetings on cyber security problems. The team converted the workshop, which was annually held in New Mexico, into an online meeting. Having a virtual exercise allowed more than seven times as many people to participate and avoided all travel costs and associated fuel use. An estimated 250 metric tons of carbon dioxide emissions were avoided by the reduced travel.



- **NNSA Best-In-Class Award:** Dr. Dennis Hjeresen won in the individual category of “Sustainability Champion” because he has demonstrated a deep understanding of sustainability and implemented innovative approaches to sustainability over his entire career at LANL. He is known nationally and internationally through the Green Chemistry Institute, his work on water issues, and green technology development. Dr. Dennis L. Hjeresen currently serves as senior advisor for the Principle Associate Directorate for Business Services and Operations at LANL. He is responsible for integrating environmental responsibility and sustainability into all aspects of LANL operations. An important goal at the Laboratory is to not only increase the efficiency of building energy use but also to understand how to manage energy resources more intelligently.
- **NNSA Environmental Stewardship Award:** The National Security and Sciences Building (NSSB) provided a great opportunity for energy savings

and Smart Grid Demand-Response experiments. Multiple energy conservation measures for the HVAC system resulted in almost a 13% reduction in energy use.

- **NNSA Environmental Stewardship Award:** Andrew Erickson won in the individual category of “Change Agent”. As the Division leader for Utilities and Institutional Facilities at LANL, Andrew is responsible for meeting the DOE sustainability goals. He has been responsible over the past three years for the establishment and implementation of a sustainability program at the Laboratory. He is responsible for over four million square feet of facilities along with the site’s utility and road infrastructure.

Pollution Prevention Projects/Activities

In FY 2013, LANL successfully completed thirty-one of thirty-three pollution prevention projects. The following are brief examples:

- **Smoke Alarm Recycling (\$18,200)**
The funds for this project will be used to recycle smoke detectors that contain americium and/or radium. These are smoke detectors that cannot be returned to their manufacturers and would otherwise be handled as MLLW.
- **Oil-free and Cost Efficient Freeze Drying (\$6,500)**
A new oil-free pump will be installed for synthesizing and preserving peptides. The new pump will not generate any hazardous waste oil and will require less maintenance.
- **Replacement of Oil-Vacuum Pumps (\$81,200)**
Many new oil-free pumps will be purchased with these funds for materials science research.



Without oil, the new pumps will not generate hazardous waste oil, and there will be no chance of oil spills into the environment from these pumps.

- **Sanitary Effluent Recycling (SERF) Sludge Makes Carbon Neutral Concrete (\$158,000)**
Research will be performed on the best method to use for incorporating sludge from the SERF into concrete. Once the process is optimized, less sludge will need to be disposed of as New Mexico Special Waste because it can be incorporated into useful concrete.
- **Dewar Refurbishment & Re-use (\$100,000)**
The Gas Facility contracted High-Purity Resources and established a refurbishment project for unused - but serviceable - dewars, containers of pressurized gases. The Gas Facility picks up the dewars slated for disposal and provides them to High-Purity Resources for refurbishment. Once refurbished, the Gas Facility redistributes the dewars for reuse.





Project outcomes are summarized as follows:

| GHG Reduction | Resource Conservation | Recycling | Re-Use | Avoid/Elimination |
|-------------------------|----------------------------|---------------------------|----------------------|-------------------------|
| 656,642 kg | Fuel \$200K | Pb (Lead) 10,720 lbsA | Aggregate 1,000 lbsW | aste Oil 43.75 gal |
| | Reagents (sampling) 80 gal | Paper 200 lbsW | Water 1M gal | LLW 32.53 m3 |
| | Nitrogen 200K gal | Batteries 9,240 lbsM | | LLW 1m3 & 151 kg |
| | | Asphalt/Concrete 45359 kg | | TRU 1m3 |
| | | | | HW 1058 kg |
| | | | | NM Special Waste 907 kg |
| | | | | Solid Waste 1,134 kg |
| Total Savings | \$4,852,331 | | | |
| Total # Projects | 31 | | | |



TA-21 Demolition

Unrestricted Materials Release

The LANL procedure P412, Environmental Radiation Protection describes the process and associated requirements for releasing materials from radiological areas. The procedure became effective in 2012. In 2013, two projects were funded by P2 to continue the progress towards radiological assessment capabilities for items/material that have been stored in radiological areas. This includes items/material that could be volumetrically contaminated (activated) and/or exhibiting low levels of surface contamination potential. Procedures were developed and approved internally with the intent to demonstrate capabilities in FY 2014. Successful completion of this next phase will position LANL to present results to DOE for consideration.

Integration of Pest and Landscape Management Practices

Pesticide management activities in FY 2013 included the implementation of a Pesticide Discharge Management Plan (PDMP) by LANL in order to comply with changes in EPA's National Pollutant Discharge Elimination System (NPDES) permit requirements. The PDMP describes LANL's actions to minimize pesticide discharges through the use of pest management measures and monitoring/reporting of adverse incidents, including:

- Description of Pesticide Management Area and application sites
- Pest problem descriptions and management options
- Chemical/biological pesticides currently in use
- Response and reporting procedures for spills and adverse incidents
- Application, spill, and adverse incident reporting

Projected Performance

Solid Non-Hazardous and Construction/Demolition Waste Diversion

LANL's FY 2014 solid, non-hazardous waste and construction and demolition waste diversion performance is expected to be similar to that of FY 2013 and sustain performance levels above the 50% recycling goal. Additionally, LANL will continue to reuse clean fill generated on-site.



P2 Fund Projects

In FY 2014, LANL will provide approximately \$700,000 to generating organizations to conduct P2 projects. Presently, fifty-five P2 Fund Projects are undergoing review for funding in FY 2014. Integration with the EMS Objectives & Targets process, as well as the Grand Challenges associated with the Long Term Strategy for Environmental Stewardship & Sustainability (LTSESS), resulted in a new approach and criteria for P2 Projects. The P2 Program established six focus areas and subcategories that identify specific areas for improvement opportunities (e.g., waste minimization/avoidance, resource conservation, process improvement, etc.). This targeting approach will result in a more focused level of effort which in turn will increase project success rates and increase the ROI potential, while also increasing operational efficiency and safety.

LANL will implement an integrated pest

management plan that implements compliance with the PDMP at the workers' level including processes and forms for documenting pesticide: investigation and application; adverse incident follow-up and response; spill or release reporting; list of approved pesticides; and continuous improvement practices. In addition to the PDMP, other regulatory drivers, DOE plans, and site-specific considerations impact pesticide application and management, including (but not limited to):

- FIFRA
- Site Sustainability Plan
- Pollution prevention and “green” products
- Physical security around nuclear and high security facilities
- Safety concerns about silica exposure and terrain-related slips/trips/falls
- Fuel mitigation and vegetation control in explosives areas
- Stormwater run-on/runoff and erosion control

SMEs from these areas will be included in periodic reviews and discussions of pesticide management practices for urban and wildland areas as appropriate to ensure that relevant environmental and safety factors are considered.



Stormwater run-off best management practice





GOAL 6: Sustainable Acquisition

Procurements meet requirements by including necessary provisions and clauses

Performance Status

In FY 2013, LANL received a Gold “GreenBuy” Award for procuring products in FY 2012 with sustainable attributes. LANL met the DOE’s leadership goals for nine product types in six product categories, including:

- Construction category: carpet and concrete;
- Cafeteria category: containers, cutlery, dishware, and food;
- Office category: furniture, computers/laptops, and monitors;
- Custodial category: toilet paper;
- Grounds category: vegetation; and
- Other category: elimination or reuse of a product.

LANL completed two of three milestones under its Sustainable Acquisition Plan (SAP). The goals met, product types, services, products eliminated, and attributes include:

SSP Goal 6.1(a) Identify between 10 and 15 subcontracts that represent the largest significant suppliers of products/services that fall into EPP categories. Modify these subcontracts whenever possible to ensure that they require the supply or use of environmentally preferable products or services.

• **Goal:** Identify between 10 and 15 subcontracts that represent the largest significant suppliers of products/services that fall into EPP categories. Modify these subcontracts whenever possible to ensure that they require the supply or use of environmentally preferable products or services.

• **Status:** LANL identified 9 subcontracts which represent 100% of all custodial services subcontracts at LANL and modified Statements of Work to require the provision of sustainable products during the performance of the work.

- Identified the subcontracts
- Discussed the new requirements with the requesters who “owned” the subcontracts
- Drafted the new requirements language

• Coordinated with the Procurement Specialists and



Concrete contains fly ash which lowers the environmental impact and increases durability

Requesters to ensure that the new requirements were added to the SOW



- Monitored Vendor feedback about the inclusion of the requirements in the RFP
- **Path forward:** While the requirements have been incorporated into all the new SOWs, all the procurements are still in process. The largest, with TSAY Construction and Services LLC, representing over 90% of all the custodial services work, should be awarded by the end of the calendar year. The balance of the subcontracts should be awarded in the next six months.
- To ensure 100% of all custodial products at the lab are green, the next step will be to identify any subcontracts which allow LANL employees to buy their own cleaning materials and get those subcontracts modified also.



- **Result:** These modified SOWs will ensure that 100% of the custodial products used by subcontractors at LANL owned or leased spaces are green products

SSP Goal 6.1(b): Identify energy affecting subcontracts such as service subcontracts that include electrical repair parts (eg. repairs to HVAC systems). Modify these subcontracts whenever possible to ensure that they require the supply or use of environmentally preferable products or services.

- **Goal:** Identify energy affecting subcontracts such as service subcontracts that include electrical repair parts (eg. repairs to HVAC systems). Modify these subcontracts whenever possible to ensure that they require the supply or use of environmentally preferable products or services.

- **Status:** LANL has not made significant progress toward the accomplishment of this goal, because completing 6.1(a) developed into a much larger effort than anticipated. Even though 6.1(a) involved targeting “10-15 subcontracts”, that effort required identification and prioritization of commodity types which LANL wanted to target for the definition of sustainable requirements. This had to be done in consideration of:

- What the procurement method was, and how centralized it was (affecting efficient change and maintenance of that change)
- What the environmental leadership goals were for the commodity types
- What commodities should be prioritized



for our goal attainment efforts

- Electrical repair parts, identified in the goal, are just one of many commodities that LANL could target, and not one of the commodities that LANL decided to prioritize. Instead, the following list was created:
 - Custodial Services (the commodity chosen to meet the 6.1(a) milestone)
 - Furniture
 - Cafeteria Services
 - IT Hardware

Several meetings were conducted with Furniture and Cafeteria Services requesters and technical SMEs to discuss the definition of requirements and revising those subcontracts in FY 2013, and these efforts will continue in FY 2014.

- **Path forward:** Define requirements and modify subcontracts (as appropriate) for the 4 commodities identified above, in FY 2014. As the Custodial Services action is complete, Furniture is next.

SAP Goal 5: 95% of new subcontract actions, including task and delivery orders under new subcontracts, require the supply or use of products and services that are energy efficient, water efficient, bio-based,

environmentally preferable, , non-ozone depleting, contain recycled content or are non-toxic or less toxic alternatives.

- **Goal:** 95% of new subcontract actions, including task and delivery orders under new subcontracts, require the supply or use of products and services that are energy efficient, water efficient, bio-based, environmentally preferable, non-ozone depleting, contain recycled content, are non-toxic, or less toxic alternatives.

- **Status:** LANL created solicitation and subcontract clauses for Green/ Sustainable products, obtained review and approval through the LANL legal office, and has published the clauses in every solicitation and subcontract pro forma. The clauses state LANL preference to receive bids with green/sustainable products and actually be provided green/sustainable products whenever possible, as well as requiring subcontractors to support LANL green reporting requirements.

- **Result:** 100% of new LANL solicitations and subcontracts will contain green/sustainable acquisition clauses, effective October 2013.





The above-mentioned accomplishments are due to a combination of, working directly with vendors, contract administrators, and the engineering standards program to update specifications that allow LANL to meet or exceed the attribute requirements.

Projected Performance

In FY 2014, LANL will strive to increase its procurement of environmentally preferable products while simultaneously increasing its visibility of those procurements and the associated reporting capability. LANL will accomplish this through an analysis of what types of products are offered under existing subcontracts for specific commodities, followed by a determination whether the appropriate types of products are offered, and a determination of whether a modification of the subcontract is possible. LANL will consider both modifications to scope and reporting requirements to accomplish this intent. Because of the complexity of this action, coupled with the possibility for increased costs, and a need for internal stakeholder and subcontractor cooperation; LANL will target a relatively small population of subcontracts which represent the conduits through with a large volume of EPP are obtained. If it is determined that it would

be cost prohibitive or unproductive to modify a subcontract, LANL will develop a plan to modify the scope or reporting requirements upon re-solicitation for the commodities and identify the anticipated expiration date of the existing subcontract.

LANL has initiated an IT work package for updates to the Oracle business system, with preparatory work to be conducted in FY 2014, and the actual upgrades to be installed in FY 2015. The upgrades will enable more precise data collection on the actual procurement of environmentally preferable products, and enhance reporting capabilities in alignment with DOE requirements.

LANL will complete a similar analysis of existing service subcontracts which potentially supply energy affecting repair parts, and make similar efforts to modify or plan for the eventual modification of the subcontracts.

Sustainable Acquisition language continues to be incorporated in new procurements for priority products. In addition, a draft subcontract clause is under development for incorporation into new eligible subcontracts, with a goal of inclusion in 95% of subcontracts for sustainable products and 60% for bio-based products.



GOAL 7: Electronic Stewardship and Data Centers

100% of All Data Centers Metered to Measure monthly PUE by FY 2015

Performance Status

LANL installed an Environmental and Power Monitoring System at the LDCC in FY 2012, and measures environmental conditions and power in real-time. Similar to the system within the SCC, this system enables LANL to continually trend power and temperature measurements and systematically optimize efficiencies in the data centers.

LANL continues to grow the institutional Infrastructure On Demand (IOD) virtualization service and provide users the opportunity to consolidate their servers. Currently this is a voluntary effort for the programmatic server administrators. LANL plans to develop an institutional approach to close small building server rooms and consolidate computing resources into larger institutional data centers where feasible. This would include moving appropriate servers to IOD and either re-purposing server rooms into less energy intensive uses or closing them completely.

LANL shares information on success stories, accomplishments, etc., with other Data Centers including LLNL, ORNL, Berkeley, Energy Efficient HPC Working Groups, and Supercomputing Trade Shows as well as appropriate vendors to identify ways to improve data center efficiencies.

Projected Performance

LANL surveyed 130 distributed computer and server rooms during FY 2013. Sixty-three of the 130 rooms have 5 or more servers in them. Twenty-six of the 63 rooms are over 500 square feet. Four of these rooms are either below 10 servers or are multi-functional. Programs are expected to follow the steps outlined below to manage existing data centers or when creating new data centers and server rooms in order to achieve a PUE of 1.4.

LANL estimates that approximately 10 of the 130 distributed server rooms/computer rooms will qualify as “data centers” per the LANL definition and plan to be metered within the next two years. LANL will use the process below to determine whether or not metering is required.

LANL has identified a Data Center Evaluation

Team to identify and evaluate the extent of metering required and develop a plan to improve management of data centers across the Laboratory leveraging best practices and experience at the Laboratory. LANL will develop a server room and data center plan to meet the sustainability goals for PUE and metering. This plan will first focus on 1) virtualization, 2) consolidation, and 3) management of server rooms and data centers. Metering will be part of this plan and prioritized meters will be installed within enduring data centers only. Data Center meter installation is planned to begin in 2015.

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

Performance Status

Currently the Lab has three main data centers/high performance computing facilities (SCC, LDCC, and CCF) and approximately 130 computer/server rooms installed in distributed facilities (not SCC, LDCC, and CCF) on the red and yellow networks. Computer/server rooms can include application servers, file servers and clusters of computers used for high performance computations. Many of the remaining distributed computer/server rooms and high performance computing clusters are estimated to operate at a PUE of between 1.7 and 1.8.



Cielo supercomputer



LANL closely monitors PUE in the SCC and the LDCC. LANL periodically measures and estimates PUE in the CCF. The PUE in the SCC is currently averaging 1.32 and the PUE in the LDCC is averaging at 1.58. The PUE in the CCF is estimated at 1.5. The FY 2013 annual weighted average PUE for all three major data centers is 1.41.

A sizeable portion of the Laboratory's recent base load electrical growth is attributed to increased energy use for computers and servers across a broad spectrum of the Laboratory's programmatic work and infrastructure support. The Laboratory's trends mirror increases nationally in server use and electrical consumption. Excluding the SCC and LANSCE programs the Laboratory's electrical consumption has grown from 265,605,978 kwh in 2008 to 269,760,147 kwh in 2012. This 1% increase in electrical consumption shows the high risk of goal attainment compared to the FY 2013 24% energy intensity reduction target DOE has established for the Laboratory in the Strategic Sustainability Performance Plan. The increased electrical consumption has been steadily increasing the cost of electricity to the Laboratory. Computer energy usage has increased to the point where energy costs are

now an important contributor to the total cost of ownership for computing infrastructure, and fast approaching as the dominate cost versus the capital cost of the equipment for high density computing applications.

LANL has established the definitions below in order to better manage PUE and distributed computer/server rooms.

Computer/Server Room: Room with 1 or more servers and uses less than 20kW (per nameplate or as measured). No metering required.

Data Centers/High Performance Computing Clusters: Room with 1 or more servers which uses greater than 20kW (per nameplate or as measured). Metering required in enduring (remaining for more than 5 years) data centers only.

Metering: Electrical metering for all equipment (including telecommunications). Combination of different meters could also be used including UPSs and PDUs. It should be determined if the metering should be done at circuit level, rack level, or room level. Metering should be collected monthly and reported quarterly.

Exemptions: Telecommunication rooms, Operations Center for mission-critical projects (i.e. DARHT Operations Center, LANSCE Operations Center, TA-55 Operations Center).

Projected Performance

The Laboratory can recognize savings of energy, operations and maintenance dollars, and space by adopting a policy for management of computer/server rooms while enabling

programmatic growth in computing areas. The proposal for managing servers and computer clusters would have three elements in order of priority: 1. virtualization, 2. consolidation, and 3. management of existing distributed data centers. The Laboratory would reduce the number of distributed data centers and restrict reconfiguration of existing building space for data center/high performance computing cluster use; unless there is a demonstrated need that cannot be met through the existing infrastructure, either virtual or existing machine room space.

The institutional emphasis to reduce the number of distributed computer/server rooms would focus on two areas: to virtualize servers and applications and to consolidate server and high performance computing clusters into managed data



Roadrunner supercomputer



centers. Managed data centers provide the most cost effective mechanism to ensure the industry leading techniques are used to reduce energy consumption in the data center, while ensuring high levels of machine availability. Consolidation activities will be funded based on the return on investment or through the owning program.

Electronic Stewardship – 100% of eligible PCs, laptops, and monitors with Power Management actively implemented and in use by FY 2012 and thereafter

Performance Status

LANL has met the goal of 100% of eligible PCs, laptops, and monitors with power management actively implemented. To achieve that goal, LANL implemented a project in FY 2013 for power management of eligible Windows desktops and laptops using the power management capabilities of Microsoft Systems Management Server 2007 (SCCM). SCCM leverages power settings on Windows computers to both assess power saving opportunities and to centrally manage client system power settings. These capabilities help to realize energy and cost savings.

Windows computers have built-in power settings to regulate how and when both computers and monitors are powered down to low power states, called “sleep”, “standby” or “hibernate”. The Windows platform has the most extensive power management capabilities of the desktop computing platforms in use at LANL and SCCM has the ability to granularly manage those setting in an automated fashion. While the Macintosh has some limited power settings, there are no

tools currently available to centrally manage those settings. The Linux platform does not include power management capabilities. Because of these platform-based limitations, the power management effort of PCs at LANL is limited to Windows. Fortunately, Windows computers make up close to 80% of the desktops in use at LANL.

Limitations

- Special arrangements have to be made for systems that use Tivoli Backup software
- Some processes will keep system from sleeping, therefore systems left in a “locked” rather than “logged out” state may not sleep
- Users are not able to use Remote Desktop while system is sleeping

LANL does not initially intend to attempt to manage power settings on Windows server systems for obvious reasons, as most servers are designed to have 24 X 7 availability. Some desktops may also be considered ineligible for power management if they are either incapable of

being put into a low power state due to hardware limitations (including virtual computers), or have requirements to be constantly powered on for running experiments, collecting data or other similar operations. To summarize, computers “eligible” for power management at LANL include all Windows desktops and laptops on the unclassified network except:

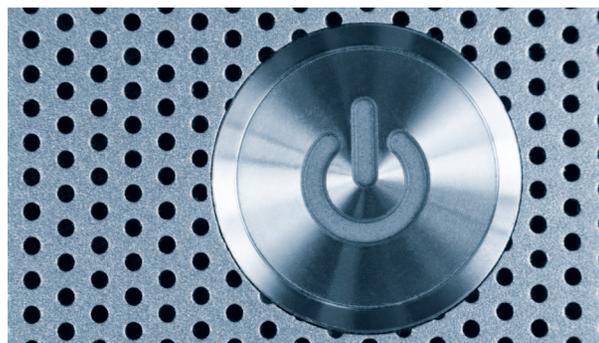
- Computers with incapable hardware
- Virtual computers
- Computers that are voluntarily excluded due to programmatic needs that preclude power management

Projected Performance

LANL has implemented this goal. Further, due to situations where many Windows systems are failing to sleep at the designated time, the projected cost savings using SCCM 2012 may not be as high as initially projected. The DCS-1 SCCM team is currently evaluating third-party products that actually power off and power on Windows systems rather than putting them into sleep mode. While these third-party products show great promise, funding may be an issue.

Actual Cost Savings

- Average Cost per computer per month
 - Production: May 2012 – September 2012
 - Average Number of Systems Reporting: 7900
 - Average Power Cost/System/Month: \$2.70
- Savings Per System: \$0.27
- Potential Savings for 7900 workstation clients: \$2133/month, \$25,596/year





GOAL 8: Renewable Energy

20% of annual electricity consumption from renewable sources by FY 2013 and thereafter (FY 2013 target: 7.5%)

Performance Status

LANL exceeded the 7.5% renewable energy goal in FY 2013. LANL purchased 163,089 RECs in FY 2013. With the allowable double credit for federal site production, the Abiquiu Dam Low Flow Turbine (LFT), LANL is reporting a total of 42,294 MWh of renewable energy. The Laboratory used approximately 437,290 MWh of electricity in FY 2013 including on site renewable generation. The purchased amount in addition to onsite renewable energy amounts to approximately 9.7% of the annual electricity consumption.

Projected Performance

LANL plans to purchase RECs to fully meet the 20% of annual electricity consumption from renewable sources by FY 2020 goal, while evaluating opportunities to change the electrical generation mix as economically viable.

The Abiquiu LFT is estimated to conservatively produce 7,000 MWh per year, which is 18,400 MWh with double credit for on-site production. In FY 2014, LANL will partner with Los Alamos County and the US Army Corps of Engineers to adjust the water flow at Abiquiu Dam to provide 1-2 MW of spinning reserve that can be dispatched in coordination with PV system output to minimize system fluctuations on the grid.

LANL will support NNSA to renegotiate the Los Alamos County ECA to support further third party development of long-term renewable and carbon neutral energy on-site generation.

Solar hot water heating is a normal consideration for energy reductions in the design of new buildings at Los Alamos National Laboratory. New projects that include construction budgets in excess of \$5 million dollars include provisions for LEED Gold certification and also include DOE energy reductions of 35% below ASHRAE standards. In order to meet these

requirements, all potential avenues for energy savings are considered in the early design phases. Depending on the building type, solar hot water domestic water heating may provide energy advantages. Typically, cafeteria's or laundry facilities, with high water use are positive candidates for solar applications. The existing Otowi building includes the central Laboratory cafeteria and it was designed with a solar hot water system. Due to the system's age, it is not currently in operation, but it is not economically feasible to repair. Office and light laboratory uses, with low domestic hot water demands, are characteristically poor candidates for small solar domestic hot water systems.



Abiquiu low-flow turbine generator





As an example, a small GPP size office building (14,000 g.s.f.) will have an occupant load of approximately 120 people and provide offices for about 50 staff. With hot water demand at 1 gallon per person, per day, the maximum daily demand is 120 gallons, which reflects a fairly small system. Using a basic calculator from the DOE Federal Energy Management Program web-site, the following results are obtained as a preliminary outlook:

As the preliminary calculation indicates, the payback for this type of system is in excess of 30 years. With a low cost for Natural Gas, and the ability to cost effectively incorporate a high

efficiency hot water tank into the mechanical design, it is difficult for solar hot water heaters to offer overall cost and operational savings with an extended payback cycle.

Solar hot water, as well as other solar applications are given detailed analysis during the design process for all new construction projects. The current and projected low cost for Natural Gas will continue to be evaluated against evolving technologies for solar heating on a case-by-case basis for new construction and for renovation projects to determine the most effective and energy appropriate application to meet domestic hot water requirements.



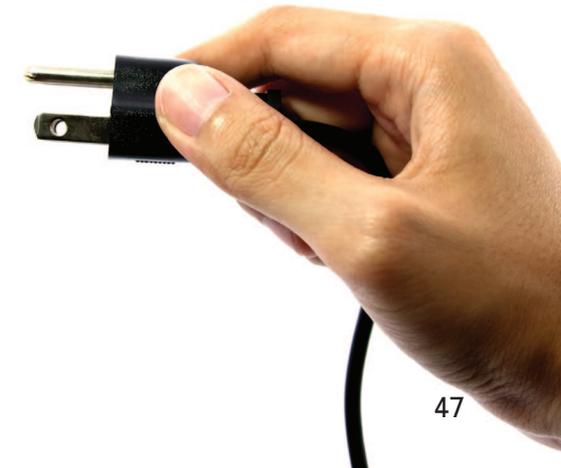
Tour of the Los Alamos County Photovoltaic array

Step 3. Final Report

[E-mail Report](#) [Return to Step 1](#)

Based on the data provided, the results for your facility includes the following. Note that these outputs do not include available incentives or rebates. [Learn more about energy incentive programs](#)

| Site Information | |
|---|--|
| Project: | Office Building Prototype |
| Zip Code: | 87545 |
| Closest City: | ALBUQUERQUE, NM |
| E-mail: | bodelson@lanl.gov |
| Input Values | |
| Building Type: | Office |
| Amount of Water Usage: | 120 gal/day |
| Number of person(s): | 120 |
| Cold Water Temperature: | 50 |
| Hot Water Temperature: | 130 |
| Water Heater Fuel Type: | gas |
| Water Heater Efficiency: | 0.85 |
| Average Fuel Price: | \$9.15/1,000 cu. ft. |
| Calculations | |
| System Size: | 7.56 m ² |
| System Cost: | \$9,890.99 |
| Annual Energy Savings: | 8,992.01 kWh/year |
| Annual Cost Savings: | \$273.35 based on \$9.15/1,000 cu. ft. |
| SIR: | 0.66 |
| Simple Payback: | 36.18 years |
| Solar Fraction: | 89.00% |
| Annual Greenhouse Gas Reduction: | 3,588.17 lbs. of CO ₂ |





GOAL 9

GOAL 9: Climate Change Adaptation

Goal: Improve Understanding of Climate Change Effects and Impacts

Objective: *Work with other agencies to improve our understanding of climate change.*

- LANL is the leading DOE site for research in climate and ecosystem programs. The atmosphere, Climate, and Ecosystem Science Team at Los Alamos develops and applies numerical models to a range of atmospheric phenomena: including coupled wildfire-atmosphere interactions, wind energy optimization, and regional climate impacts at high latitude. DOE's Atmospheric Radiation Measurement climate research facility sites, operated by LANL, are in the Tropical Western Pacific, as well as mobile research facilities recently deployed in China and India, and currently deployed in Cape Cod.
- LANL contributes to the DOE-BER Next Generation Ecosystem Experiment to examine climate change impacts and feedbacks in sensitive Arctic landscapes. Los Alamos researchers also study the impact of fire emissions and aerosol-cloud-precipitation interactions on global climate, improved sensing and attribution of greenhouse gas emissions across multiple scales, and validation of satellite greenhouse gas observations. Scientists at Los Alamos also use field observations, manipulations and modeling to quantify the

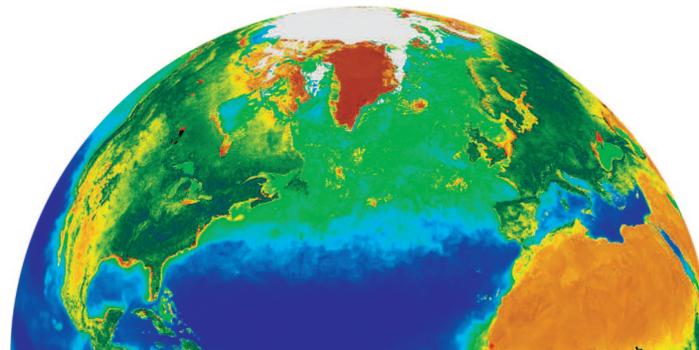
response of ecosystems to climate variability, including increasing frequency and magnitude of droughts, and feedbacks on climate through the release of stored carbon. As a leader in climate sciences, Los Alamos scientists strive to integrate terrestrial and atmospheric measurements, mechanistic understanding, and numerical simulation to improve prediction of regional and global climate change impacts.

- Laboratory's Directed Research and Development program for research includes a Scientific Pillar to discover climate and energy impact signatures to facilitate mitigation of energy-use impacts, by developing signal detection hardware, computation and analytical techniques.
- LANL has one of the largest supercomputing centers, with massive resources being used for applied scientific simulation of climate change prediction. The result is a unique and tight integration of theory, modeling, and computational science being developed and utilized for climate change modeling and risk assessment.



Objective: *Work with other Federal agencies and local jurisdictions to develop regional partnerships for climate change information sharing and collaboration.*

- Using tree-ring growth record with historic information, climate records and, computer-model projections of future climate trends; a team of scientists from LANL, the U.S. Geological Survey, University of Arizona, and several other partner organizations predicted the future of trees in the southwestern United States. Described in a paper published in Nature Climate Change in October, 2012, "Temperature as a potent driver of regional forest drought stress and tree mortality," the team concluded that in the warmer and drier Southwest of the near future, widespread tree mortality will cause forest and species distributions to change substantially.





Goal: Improve Understanding of Climate Change Vulnerabilities and Risk

Objective: Conduct detailed risk or vulnerability assessments, as appropriate, for specific DOE programs or facilities.

- The Laboratory's long-time planning also includes addressing land management challenges with plans to develop an Integrated Land Management Plan that addresses large scale environmental changes in the region in 20, 40, and 70 years. Significant temperature and habitat changes are predicted for the region of Northern New Mexico around Los Alamos. In 2013 an Integrated Land Management Plan was outlined to be developed in 2014 to address future environmental changes to the Los Alamos site over the next 70 years.

Goal: Improve the Climate Resiliency of all DOE Sites

Objective: Update all appropriate DOE site plans to address climate change resiliency.

- Climate models project substantial changes in New Mexico's climate over the next fifty to one hundred years, if no measures are taken to reduce global greenhouse gas emissions. Projected climate changes in New Mexico in the next 50 years are predicted to have air temperatures warmer by 6-12°F on average. The Long-Term Strategy sets forth the following long-term environmental grand challenges and objectives, which the Laboratory will achieve through integration of the Laboratory's environmental and operational programs, providing a coordinated approach

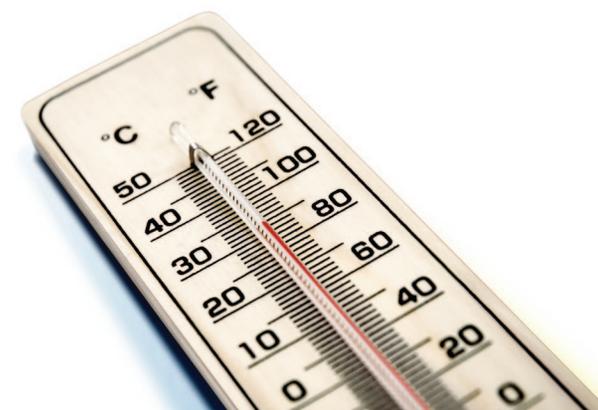
to environmental stewardship. Each goal is accompanied by a series of objectives and strategies within projected climate-driven environmental changes:

- Grand Challenge 1: Collaborate with our stakeholders and tribal governments to ensure that LANL's impact on the environment is as low as reasonably achievable.
- Grand Challenge 2: Remove or stabilize pollutants from the Manhattan Project and Cold War eras.
- Grand Challenge 3: Protect water resource quality and reduce water use.
- Grand Challenge 4: Eliminate industrial emissions, discharges and releases to the environment.
- Grand Challenge 5: Protect human and environmental health by managing and restoring lands.
- Grand Challenge 6: Produce zero radioactive, hazardous, liquid, or solid wastes.
- Grand Challenge 7: Use energy efficiently while creating sustainable energy resources.

The Laboratory will be implementing the objectives through the Laboratory's ISO 14001 registered EMS. Climate resiliency and adaption to changes to the changes on the Laboratory's landscape and environment are specifically addressed in the plan. In addition, the Integrated Land Management Plan will address environmental resiliency to climate changes through adaptive forest health management practices.

Objective: Identify or establish and participate in regional climate change adaptation partnerships, as appropriate, for all DOE facilities

- In addition to the Long-term Strategy for Environmental Stewardship and Sustainability, LANL is a partner in the National Environmental Research Parks. The Parks were formally created in the 1970's following passage of the National Environmental Policy Act (1969). As specified by the Department of Energy in 1976, the charter of the Environmental Research Parks is to assess, monitor and predict the environmental impact of energy use and other human activities. Los Alamos is looking to build on the partnerships with the other eight Research Parks and develop integrated research plans for climate change adaption and effects.
- LANL has a strong relationship with our neighbors at Bandelier National Monument where we have several long-term collaborative research projects investigating the impacts of drought and environmental changes in the region. Other local partnerships in sharing environmental information and research projects include the Nature Conservancy, the U.S. Forest Service, and all neighboring Indian Pueblos.



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Abbreviations and Acronyms

| | |
|-------------|--|
| ADESH | Associate Directorate for Environment, Safety & Health |
| A/E | Architectural/Engineering |
| ASM | Acquisition Services Management |
| ASM-AO | Acquisition Services Management – Assurance Operations |
| ASM-PM | Acquisition Services Management – Property Management |
| BOA | Basic Order Agreement |
| BOD | Biochemical Oxygen Demand |
| BTFLP | Beryllium Test Facility Laundry Project |
| BTU | British Thermal Units |
| CA | Contract Administrator |
| CCF | Central Computing Facility |
| C&D | Construction & Demolition |
| CEM | Certified Energy Manager |
| CMR | Chemistry and Metallurgy Research |
| COC | Cycles of Concentration |
| CT | Cooling Tower |
| CRAC | Computer Room Air Conditioners |
| COGEN | Co-generation plant |
| DARHT | Dual Axis Radiographic Hydrodynamic Test facility |
| DISPOSITION | Decontamination and Decommissioning |
| DES | Detailed Energy Survey |
| DOE | Department of Energy |
| DO | Delivery Order |
| DPR | Designated Procurement Representative |
| EAP | Environmental Action Plan |
| ECA | Electric Coordination Agreement |
| ECM | Energy Conservation Measure |
| EERE | Energy Efficiency and Renewable Energy |

| | |
|--------|---|
| EMR | Electronic Medical Record |
| EMS | Environmental Management System |
| ENV-ES | Environmental Stewardship |
| EO | Executive Order |
| EPEAT | Electronic Product Environmental Assessment Tool |
| EPA | Environmental Protection Agency |
| EPEAT | Electronic Product Environmental Assessment Tool criteria |
| ESPC | Energy Savings Performance Contract |
| ESPM | Energy Star Portfolio Manager |
| FEMP | Federal Energy Management Program |
| FIMS | Facilities Information Management System |
| FIRP | Facility and Infrastructure Recapitalization Project |
| FOD | Facility Operations Director |
| FY | Fiscal year |
| GHG | Greenhouse gas |
| GSAF | Generator Set Aside Funds |
| GSF | Gross Square Feet |
| HPC | High Performance Computing Division |
| HPLC | High Pressure Liquid Chromatography |
| HPSB | High Performance and Sustainable Buildings |
| HVAC | Heating, Ventilation, and Air Conditioning |
| IEQ | Indoor Environmental Quality |
| ILA | Industrial, Landscape, and Agricultural |
| IOD | Infrastructure On Demand |
| IP | Infrastructure Planning |
| IPM | Integrated Pest Management |
| IS | Infrastructure Support |
| LAC | Los Alamos County |
| LANL | Los Alamos National Laboratory |

| | |
|---------|---|
| LANS | Los Alamos National Security, LLC |
| LANSCE | Los Alamos Neutron Science Center |
| LASEC | Los Alamos Science & Engineering Complex |
| LASO | Los Alamos Site Office |
| LDCC | Laboratory Data Communications Center |
| LDRD | Long Range Development Plan |
| LEED | Leadership in Energy and Environmental Design |
| LFT | Low Flow Turbine |
| LLNL | Lawrence Livermore National Laboratory |
| LMP | Landscape Management Plan |
| LN2 | liquid nitrogen |
| MaRIE | Matter-Radiation Interactions in Extremes |
| MLLW | Mixed Low-Level Waste |
| MMBTU | Million British Thermal Units |
| MRRL | Methanol Recirculation and Recovery Loop |
| NAABB | National Alliance for Advanced Biofuels and Bioproducts |
| NEPA | National Environmental Policy Act |
| NLDC | National Laboratory Director's Council |
| NMED | New Mexico Environment Department |
| NNSA | National Nuclear Security Administration |
| NPDES | National Pollutant Discharge Elimination System |
| OD | open detonation |
| ORNL | Oak Ridge National Laboratory |
| ORP | Outfall Reduction Program |
| P2 | Pollution Prevention |
| PHERMEX | Pulsed High-Energy Radiographic Machine Emitting X-rays |
| PFITS | Performance Feedback and Improvement Tracking System |
| PPA | Power Purchase Agreement |
| PPOA | Pollution Prevention Opportunity Assessment |

| | |
|-------|---|
| PPTRS | Pollution Prevention Tracking & Reporting System |
| PUE | Power Use/Utilization Effectiveness |
| PV | Photovoltaic |
| RAMP | Roof Asset Management Program |
| RCA | Radiological Controlled Area |
| REC | Renewable Energy Credit |
| RCRA | Resource Conservation and Recovery Act |
| ROI | Return on Investment |
| SA | Sustainable Acquisition |
| SAP | Sustainable Acquisition Plan |
| SCC | Strategic Computing Complex (also known as Metropolis Center) |
| SCCM | Microsoft Systems Management Server 2007 |
| SERF | Sanitary Effluent Recycle Facility |
| SF6 | Sulfur Hexafluoride |
| SOC | LANL Protective Force |
| SSP | Site Sustainability Plan |
| SWEIS | Site-Wide Environmental Impact Statement |
| SWWS | Sanitary Wastewater System |
| TA | Technical Area |
| TEAM | Transformational Energy Action Management |
| TYSP | Ten Year Site Plan |
| UI | Utilities and Institutional Facilities |
| UESC | Utility Energy Services Contracts |
| WNR | Weapons Neutron Research |

Attachments

- 1) Metering Plan
- 2) Consolidated Energy Data Report Summary

