

# LA-UR-12-26715

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Title: FY 2013 Site Sustainability Plan

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Intended for: Report



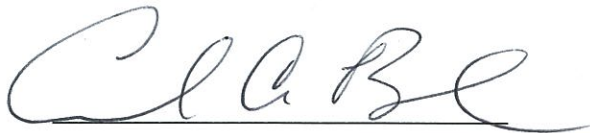
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FISCAL YEAR 2013 SITE SUSTAINABILITY PLAN



Approved By:



Carl A. Beard  
Principle Associate Director for Operations

Date: 11/29/12

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## Table of Contents

<b>MESSAGE FROM THE DIRECTOR .....</b>	<b>4</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>5</b>
Introduction .....	5
Site Sustainability Management Vision .....	5
Major Site Sustainability Planning Assumptions - Issues & Funding Strategies .....	7
Successes & Challenges .....	9
Site Sustainability Plan Summary Table of Goal Targets .....	10
<b>PERFORMANCE REVIEW AND PLAN NARRATIVE .....</b>	<b>18</b>
GOAL 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory .....	18
GOAL 2: Buildings, ESPC Initiative Schedule, and Regional & Local Planning .....	20
GOAL 3: Fleet Management .....	29
GOAL 4: Water Use Efficiency and Management .....	33
GOAL 5: Pollution Prevention .....	35
GOAL 6: Sustainable Acquisition .....	38
GOAL 7: Electronic Stewardship and Data Centers .....	40
GOAL 8: Site Innovation and Government Wide Support .....	42
Climate Change Adaptation .....	43
<b>REFERENCES .....</b>	<b>45</b>
<b>ABBREVIATIONS AND ACRONYMS .....</b>	<b>46</b>
<b>ATTACHMENTS .....</b>	<b>49</b>

MESSAGE FROM THE DIRECTOR



In 2013, Los Alamos National Laboratory will celebrate its 70<sup>th</sup> year of service to the nation.

Our people, facilities, and missions have stood the test of time because our predecessors took the actions necessary to sustain the intellectual and scientific vitality of the institution. With this Plan, we continue those actions.

We are making sustainability a way of doing business at the Laboratory, and it starts with individual choices. For example, saving energy equals saving money. Preventing pollution means protecting the environment for our workers and the community. Building sustainability into purchasing choices builds a more efficient operation.

The actions within the Site Sustainability Plan are part of the Laboratory's Long Term Strategy for Environmental Stewardship & Sustainability to create a sustainable future. By supporting sustainability and this plan, I'm challenging all Laboratory employees to reduce our environmental impact and keep us on the right path for mission growth.

Put simply, sustainability is the right thing to do to enable another 70 years of service.

Charles F. McMillan

Laboratory Director

## EXECUTIVE SUMMARY

### INTRODUCTION

LANL prepared the fiscal year (FY) 2013 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 2012 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 Mr. Carl Beard, the Principal Associate Director for Operations and Business. The Sustainability Management Council was chartered as a subcommittee of the Environmental Senior Management Steering Committee to manage the energy and water conservation, renewable energy use, greenhouse gas reduction, sustainable acquisition, and innovation goals prescribed by the *DOE Strategic Sustainability Performance Plan*. The Sustainability Management Council reports directly 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 2013 DOE Site Sustainability Plans*. The FY 2013 Plan reflects FY 2012 accomplishments and outlines FY 2013 actions that enable LANL to continue progress toward DOE's sustainability reporting requirements and goals.

### SITE SUSTAINABILITY MANAGEMENT VISION

LANL developed and recently issued [LANL's Long Term Strategy for Environmental Stewardship & Sustainability](#) which articulates the 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 through the Site Sustainability Plan focuses on three primary objectives: to make targeted investments that improve our efficiency and resources utilization, transparently track our progress through metrics, and engage employees and programs at all levels in the organization through our ISO 14001 certified Environmental Management System to sustain the changes to reduce resource use at each step in the process. The table below provides the crosswalk between LANL's Long Term Strategy for Environmental Stewardship & Sustainability goals, and the sustainability goals outlined by the Department of Energy's Strategic Sustainability Performance Plan.

The Site Sustainability Plan Summary Table provides an overview of LANL's plans and investments for meeting the requirements and goals of DOE's *Strategic Sustainability Performance Plan*. The attached Consolidated Energy Data Report (CEDR) tracks the data required to show goal progress and a consolidated list of the active and proposed energy management projects. The projects in the CEDR contribute to energy reduction, water reduction, and renewable energy goals.

LANL uses the LANL Dashboard system, which is part of the Laboratory's Contractor Assurance System, to report metrics associated with Site Sustainability Plan milestone implementation and progress to support senior leadership decisions related to sustainability. LANL also reports sustainability metrics in the annual Site Sustainability Plan CEDR and associated DOE metric databases, such as the Portfolio Manager for the High Performance Sustainable Buildings. LANL has a Utility Metering Program, which provides quality data for measuring energy and water consumption and greenhouse gas emissions.

LANL's EMS established goals and objectives for FY 2013 that addresses 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.

**LONG TERM STRATEGY FOR ENVIRONMENTAL STEWARDSHIP & SUSTAINABILITY, AND STRATEGIC SUSTAINABILITY PERFORMANCE PLAN GOALS CROSSWALK**

<p><b>LANL EMS and Long-Term Environmental Stewardship &amp; Sustainability Strategy Goals</b></p>	<p><b>DOE’s Strategic Sustainability Performance Plan Goals</b></p>
<p>Clean the Past:</p> <ul style="list-style-type: none"> <li>• Investigate legacy contamination according to the requirements of the Compliance Order on Consent with NMED</li> <li>• Protect surface water runoff through implementation of the Individual Storm Water Permit with EPA</li> <li>• Ship waste to WIPP</li> <li>• Reduce volume of waste in Site Treatment Plan</li> <li>• Footprint Reduction</li> <li>• Excess materials/Equipment/Liabilities reduction</li> </ul>	<p>Goal 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory                      Goal 4: Water Use Efficiency and Management                      Goal 5: Pollution Prevention and Waste Reduction</p>
<p>Control the Present:</p> <ul style="list-style-type: none"> <li>• Site Sustainability Plan Implementation</li> <li>• Integrate environment with safety tools for common work control message</li> <li>• Outfall Reduction / Zero Liquid Discharge</li> <li>• Consolidation of R&amp;D Open Detonation operations at Phermex</li> <li>• Monitor for compliance</li> <li>• Pollution Prevention with focus on problematic waste streams</li> <li>• Reduce spills &amp; leaks</li> <li>• Sustainable Acquisition</li> <li>• Expand chemical re-use program</li> </ul>	<p>Goal 4: Water Use Efficiency and Management                      Goal 5: Pollution Prevention and Waste Reduction                      Goal 6: Sustainable Acquisition                      Goal 7: Electronic Stewardship and Data Centers                      Goal 8: Innovation and Government-Wide Support</p>

<b>LANL EMS and Long-Term Environmental Stewardship &amp; Sustainability Strategy Goals</b>	<b>DOE's Strategic Sustainability Performance Plan Goals</b>
<p>Create a Sustainable Future:</p> <ul style="list-style-type: none"> <li>• Energy Intensity Reduction</li> <li>• Water Use Reduction</li> <li>• Greenhouse Gases with 10 Year GHG Reduction Plan</li> <li>• High Performance Sustainable Buildings</li> <li>• Data Center Management</li> <li>• Regional &amp; Local Planning</li> <li>• Long-Term Environmental Stewardship &amp; Sustainability Strategy Compendium</li> <li>• Integrated Site Planning</li> <li>• Environmental Outreach and Communications</li> <li>• New Environmental / Sustainable Technologies</li> </ul>	<p>Goal 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory</p> <p>Goal 2: Buildings, ESPC Initiative Schedule, and Regional &amp; Local Planning</p> <p>Goal 3: Fleet Management</p> <p>Goal 4: Water Use Efficiency and Management</p> <p>Goal 5: Pollution Prevention and Waste Reduction</p> <p>Goal 6: Sustainable Acquisition</p> <p>Goal 7: Electronic Stewardship and Data Centers</p> <p>Goal 8: Innovation &amp; Government-Wide Support</p>

**MAJOR SITE SUSTAINABILITY PLANNING ASSUMPTIONS - ISSUES & FUNDING STRATEGIES**

LANL is investing in a number of projects, including the recently completed Energy Savings Performance Contract (ESPC) and Sanitary Effluent Reclamation Facility (SERF) expansion, High Performance Sustainable Building (HPSB) implementation, lighting retrofits, HVAC re-commissioning, building night set-back scheduling, and the associated footprint reduction efforts to contribute toward the energy and water goals and achieve to GHG reduction. LANL plans to achieve a 3% energy intensity reduction in FY 2013 and reduce water consumption by 33 Mgals. In addition, LANL is relying on broad employee engagement through LANL's EMS to reduce energy and water use, and waste generation through its programs.

In FY 2013 the Site Sustainability Program was funded at a level of \$3.35M by the Director through indirect funding. Additionally the Laboratory is investing \$4.8M 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 3 FTEs for executing measurement and verification, energy and water conservation measure 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 supports project execution for the Site Sustainability Program. In addition, the Institutional Support Program provides base funding for program management and measurement and verification.



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 2012, the Pollution Prevention (formally Generator-Set-Aside Fund or GSAF) Fund, which directly funds generators to complete pollution prevention and waste minimization projects, totaled approximately \$1.3M. Core SME support and annual compliance reporting was funded at \$1M for FY 2012. In FY 2013, Pollution Prevention (formally Generator-Set-Aside Fund or GSAF) Fund will provide approximately \$1M for pollution prevention and waste minimization projects, and core SME support and annual compliance reporting will be funded at \$631,000. The table below shows Institutional Support (IS) funding for implementing Site Sustainability Plan milestones (\$3.35M in FY 2013) and additional IS funding (\$6M in FY 2013) that has a significant impact on energy and water reduction, e.g. footprint reduction.

<b>Site Sustainability Funding Plan (\$K)</b>				
<b>Fiscal Year</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>Program Total</b>
<b>HPSB Program (SSP funding)</b>	\$1300	\$1300-1800	\$1300-1800	\$3900
<b>BAS Upgrade Effort (SSP funding)</b>	\$600	\$600-850	\$600-850	\$1800
<b>Metering &amp; Publicity Program (SSP funding)</b>	\$350	\$500	\$500	\$1350
<b>Lighting Retrofit Program (SSP funding)</b>	\$250	\$250-500	\$250-500	\$750
<b>Re-commissioning and ECM Effort in Non-HPSB, EISA-Audited Buildings (SSP funding)</b>	\$450	\$450-950	\$450-950	\$1350
<b>Water Reduction Projects (SSP funding)</b>	\$400	\$400	\$400	\$1200
<b>Infrastructure Support Reinvestment</b>	\$3000	\$5000	\$7000	\$15000
<b>Footprint Reduction</b>	\$3000	\$3000	\$3000	\$9000
<b>Annual Total</b>	<b>\$9,350</b>	<b>\$11,500-13,000</b>	<b>\$13,500-15,000</b>	<b>\$34,350-37,350</b>

## SUCSESSES & CHALLENGES

LANL's recent sustainability successes include a leadership structure that supports and encourages efficient business best practices including a renewed focus on reducing natural resource use. Investments in local 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 forming partnership between science to advance sustainability and operations responsible for implementing sustainability. The synergy between the scientific and operations staff is necessary to cultivate a new environment to bridge the gap between mission growth and increasing resource use beyond existing capacity.

In FY 2012 the Laboratory's significant successes included:

- Completed ESPC project to retrofit lighting in 32 buildings and install new building controls in 8 buildings.
- Expanded and commissioned the SERF with the capacity to reduce potable water consumption up to 110 Mgal/year
- Achieved site's first LEED Gold certification for the Radiological Laboratory and Utility Office Building

Laboratory management acknowledges the conflict in forecast mission growth and current energy, water, and GHG reduction goals. The Laboratory will focus within facilities that have a potential to successfully impact energy and water reduction goals. Specifically for the water reduction goals, beyond SERF reductions the Laboratory will continue to have small successes but major reductions will not occur given current mission path due to the energy and cooling requirements forecast to support increases in the supercomputing and LANSCE accelerator operations.

The Laboratory has also been challenged by the impact of footprint reductions on the energy intensity metric. Through FY 2012 LANL has reduced the footprint by over 750kgsf. The reduction in footprint and operations consolidation has had a greater net effect than the associated energy reductions measured.

The Laboratory is working to institute cultural change to implement all DOE sustainability goals. Outreach efforts drive cultural change and 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. Realizing energy and water reductions through communications requires new focus and funding.

In order to meet the sustainability goals, LANL will pursue a combination of additional investment in renewable energy, green construction practices 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, \$3.35M is dedicated to energy and water reduction efforts. As outlined in the table below, LANL's Site Sustainability Program will contribute to NNSA's Sustainability goal achievement by allocating an additional \$3.5M-\$5M each year until the end of FY 2015 which is projected to reduce energy intensity by 3% per year. LANL finished FY 2012 with a net energy intensity reduction of -6.9% which is approximately 14% below the goals in the SSPP of -21% by the end of FY 2012. LANL will identify a strategy in FY 2013 that could enable the Laboratory to close the gap on energy intensity performance.

**SITE SUSTAINABILITY PLAN SUMMARY TABLE OF GOAL TARGETS**

SSPP Goal #	DOE Goal	Performance Status through FY 2012	Planned Actions & Contribution	Risk of Non-attainment
<b>GOAL 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory</b>				
1.1	28% Scope 1 & 2 GHG reduction by FY 2020 from a FY 2008 baseline 2008	LANL has achieved a 7% reduction in Scope 1 & 2 GHG emissions compared to the FY 2008 baseline.	LANL will purchase RECs and continue to pursue and implement lower carbon electricity resources 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 4% 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, large scale telecommuting, and relocating administrative and transactional functions to a satellite location.	M
<b>GOAL 2: Buildings, ESPC Initiative Schedule, and Regional &amp; Local Planning</b>				
2.1	30% energy intensity (Btu per gross square foot) reduction by FY 2015 from a FY 2003 baseline.	The ESPC lighting and HVAC upgrades project was completed during FY 2012. In FY 2012 LANL calculated and tracked a rolling 12 month energy intensity based on a FY 2003 baseline. A year-end net energy intensity reduction of 6.5% was reported. Year-end projections reflect an increase in base load electrical energy use and continued footprint reduction yielding the observed energy intensity trends.	In FY 2013 LANL plans to strategically invest \$2.3M 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 initial quadrennial EISA07 energy and water evaluations in all "covered" facilities.	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

SSPP Goal #	DOE Goal	Performance Status through FY 2012	Planned Actions & Contribution	Risk of Non-attainment
2.3	Individual buildings metering for 90% of electricity (by October 1, 2012); for 90% of steam, natural gas, and chilled water (by October 1, 2015). <sup>2</sup>	LANL used the same evaluation methodology and justification determination designed for electric meters for thermal metering. LANL will focus metering efforts on thermal meter installations for FY 2013 and FY 2014. LANL estimates a 25% completion rate for steam and a 5% completion rate for gas by the end of FY 2013.	LANL will complete 65% of gas and 15% of steam meter installations in FY 2013 and will meet the DOE metering goals by the end of FY 2014 as defined in the LANL metering plan.	L
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. <sup>3</sup>	All new roofs meet cool roof requirements per engineering standards. In FY 2012 there was 75,566 square feet of cool roofing installed.	RAMP has designed replacement of approx. 280,000 square feet of roof for 2013. 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

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<sup>2</sup> Per NECPA (42 U.S.C Section 8253), the term “buildings” includes industrial, process, or laboratory facilities.

<sup>3</sup> Secretary of Energy Dr. Steven Chu, *Installation of Cool Roofs on Department of Energy Buildings*, Memorandum for Heads of Departmental Elements, June 1, 2010.

SSPP Goal #	DOE Goal	Performance Status through FY 2012	Planned Actions & Contribution	Risk of Non-attainment
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 45% Guiding Principle implementation rate within the selected 32 HPSBs.	LANL plans to continue implementing the Guiding Principles within selected HPSBs focusing on HVAC and BAS recommissioning and plans to increase the average Guiding Principle implementation rate to 60% within FY 2013 as measured in the EPA's Portfolio Manager. LANL is investing approximately \$1.3M in HPSBs in FY 2013 as part of the overall funding to reduce energy use in facilities. The risk of non-attainment is high due to the challenges with the energy efficiency goal and the extent of deferred maintenance and state of Building Automation Systems. HPSB program evaluations are underway to better quantify the challenges to achieve the FY 2015 goal.	H
2.6	All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs. <sup>4</sup>	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

<sup>4</sup> DOE considers buildings meeting the following criteria as complying with GPs: any building that achieves LEED-EB Silver or higher or LEED-NC Gold or higher; any building that achieves a Green Globes-NC rating of four or a Green Globes CIEB rating of three; any building that has been occupied for more than one year that achieves Living Status designation by the Living Building Challenge. (Although included as policy in the 2012 SSPP, these equivalencies are contingent on OMB and CEQ approval.)

SSPP Goal #	DOE Goal	Performance Status through FY 2012	Planned Actions & Contribution	Risk of Non-attainment
2.7	7.5% of annual electricity consumption from renewable sources by FY 2013 and thereafter.	LANL exceeded the 7.5% renewable energy goal. LANL purchased 48,683 RECs in FY 2012. With the allowable double credit for federal site production, the Abiquiu Dam Low Flow Turbine, LANL is reporting a total of 86,033 MWh of renewable energy. The Laboratory used approximately 480,959 MWh of electricity in FY 2012 including on site renewable generation. The purchased amount in addition to onsite renewable energy amounts to approximately 18% of the annual electricity consumption.	LANL will continue to support economically feasible on-site renewable energy and purchase renewable energy credits to meet this goal.	L
<b>GOAL 3: Fleet Management</b>				
3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to a FY 2005 baseline.	In FY 2012, Alternative Fuel consumption was 46,227 gallons, 23,481 gallons (E-85) and 22,746 gallon (B5) Bio- Diesel fuel, which is an annual increase of 65% and a 420% increase compared to the FY 2005 baseline.	LANL will continue to purchase and increase utilization of alternative fuel for vehicles by 10% for E-85 and B-5 in FY13. LANL plans to increase the percentage of biodiesel within the blend over time based on operational performance.	L
3.2	2% annual reduction in fleet petroleum consumption by FY 2020 relative to a FY 2005 baseline.	Fleet petroleum use was reduced by 9.7% in FY 2012. LANL has reduced fleet petroleum by 25.6% compared to the FY 2005 baseline.	LANL will continue to right-size the fleet and expand alternative fuel use to reduce petroleum consumption by 2% in FY13.	L

SSPP Goal #	DOE Goal	Performance Status through FY 2012	Planned Actions & Contribution	Risk of Non-attainment
3.3	100% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by FY 2015 and thereafter (75% FY 2000 – 2015). <sup>5</sup> (For MSA areas.)	68% of LANL’s light-duty vehicles are considered AFVs. In FY 2012, LANL added 13.6% or 112 new light duty AFVs to the fleet. Availability of AFVs in the GSA schedule of replacements is limited and replacement vehicle requirements constrain AFV alternatives.	LANL will continue to replace vehicles with AFVs and expand fleet utilization to achieve 100% AFV purchases by the 2015 cycle.	L
3.4	Reduce fleet inventory of non-mission critical vehicles by 35% by FY 2013 relative to a FY 2005 baseline.	A reduction of 1.3% is estimated for all vehicles compared to the FY 2005 baseline. Utilization rates averaged over the last 35 months have been used to determine leases that will not be renewed.	Utilization rates averaged over the last 35 months have been used to determine leases that will not be renewed in FY13. LANL plans to review and determine non-mission critical status for the fleet and estimates reducing the non-mission critical vehicles by 20% in FY13 and develop a plan to reduce by net of 35% for non-mission critical vehicles. Vehicle reductions in FY13 may be constrained by GSA lease requirements.	M

<sup>5</sup> EPA Act 1992 goal updated per Presidential Memorandum on Federal Fleet Performance on May 24, 2011. <http://www.whitehouse.gov/the-press-office/2011/05/24/presidential-memorandum-federal-fleet-performance>

SSPP Goal #	DOE Goal	Performance Status through FY 2012	Planned Actions & Contribution	Risk of Non-attainment
<b>GOAL 4: Water Use Efficiency and Management</b>				
4.1	26% potable water intensity (Gal per gross square foot) reduction by FY 2020 from a FY 2007 baseline.	LANL's water use reduction was dependent in FY 2012 on SERF operations and industrial water reuse at the SCC. Completion of the SERF project and meeting the NPDES were a significant effort for the Laboratory In FY 2012. LANL's total water use was approximately 431 million gallons. Water intensity has increased by approximately 39% due to cooling towers supporting increasing supercomputing.	LANL will continue to operate SERF to reduce potable water use within the SCC. In addition, LANL will continue to implement some of the low-cost/no-cost recommendations in the SPO funded water analysis and report including once through cooling in the steam plant. LANL is also investing in a new chemical treatment system to increase cycles of concentration in LANL cooling towers that could reduce water consumption in cooling towers by approximately 35%. LANL estimates to reduce potable water consumption by 33 Mgal in FY 2013. Water reduction milestones in FY 2013 are estimated to change goal performance from a +39% to +16%.	H
4.2	20% water consumption (Gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline.	LANL has written and implemented a Landscape Implementation Plan in order to decrease water used for landscape irrigation.	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.	L
<b>GOAL 5: Pollution Prevention and Waste Reduction</b>				
5.1	Divert at least 50% of non-hazardous solid waste, excluding construction and demolition debris, by FY 2015.	LANL diverted 47% of solid, non-hazardous waste (1275 metric tons of 2726 metric tons).	LANL will continue to identify and implement opportunities for improvement in non-hazardous solid waste recycling / diversion in FY 2013 – 2015.	L



SSPP Goal #	DOE Goal	Performance Status through FY 2012	Planned Actions & Contribution	Risk of Non-attainment
5.2	Divert at least 50% of construction and demolition materials and debris by FY 2015.	In FY 2012, LANL recycled or diverted 93% of construction and demolition waste (6993 metric tons of 7480 metric tons). In FY 2012, LANL completed installation of the clean fill yard at TA-60 and documented shipping savings of over \$400K in its first two months. The on-site clean fill yard recycles C&D material and reduces shipping distances versus off-site disposal.	LANL will continue diverting construction and demolition waste.	L
<b>GOAL 6: Sustainable Acquisition</b>				
6.1	Procurements meet requirements by including necessary provisions and clauses (Sustainable Procurements/Bio-based Procurements).	Successful purchase of 11 designated Priority Products with leadership-level sustainable attributes in 5 categories, as well as elimination of Styrofoam products from cafeterias.	Work to increase procurement of environmentally preferable products while increasing visibility and reporting capability for those procurements. Analyze subcontracts to determine a sub-target population of large-volume EPP contractors and evaluate supporting subcontract content and language.	M
<b>GOAL 7: Electronic Stewardship and Data Centers</b>				
7.1	All data centers are metered to measure a monthly Power Utilization Effectiveness (PUE) of 100% by FY 2015.	LANL installed an Environmental and Power Monitoring System at the LDCC, 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 has identified a Data Center Evaluation Team to identify and evaluate the extent of metering required. LANL will install metering in the 3-132 data center to increase the data center metering to account for approximately 45% of the unclassified non high performance computing on-site.	M
7.2	Maximum annual weighted average PUE of 1.4 by FY 2015.	The PUE at the SCC is currently averaging 1.41 and the PUE at the LDCC is averaging at 1.65. The FY 2013 annual weighted average PUE for the SCC and the LDCC is 1.5. The calculated weighted average PUE for all data centers (CCF and +100 smaller data centers estimated) is approximately 1.8.	LANL will continue to use the Environmental Monitoring Systems at both the SCC and the LDCC to achieve this goal.	H

SSPP Goal #	DOE Goal	Performance Status through FY 2012	Planned Actions & Contribution	Risk of Non-attainment
7.3	Electronic Stewardship - 100% of eligible PCs, laptops, and management actively implemented and in use by FY monitors with power.	LANL completed a pilot implementing central management of Windows desktops and laptops using SCCM.	LANL will upgrade to Configuration Manager 2012 in FY 2013 power settings will be configured via SCCM on all new eligible windows workstations.	L
<b>GOAL 8: Innovation &amp; Government-Wide Support</b>				
8.0	Innovation & Government-Wide support.	Site-specific objectives: LANL is working to demonstrate control of multiple facilities on-site for up to 1 MW of load that can be controlled to smooth grid fluctuations as part of a research effort to stabilize PV resources with different storage devices.		

## PERFORMANCE REVIEW AND PLAN NARRATIVE

### 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 a 7% reduction in Scope 1 & 2 GHG emissions compared to the FY 2008 baseline through Renewable Energy Credit (REC) procurements to offset electricity purchases. 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.

During FY 2012, LANL purchased two leak detectors for the Hydrodynamic Experimentation group to identify and potentially reduce SF<sub>6</sub> emissions. The leak detectors were successfully used to find a few leaks in a system at the DARHT facility, which were quickly repaired. Sealing the system is expected to prevent the loss of at least six bottles of sulfur hexafluoride annually. Now that the leak detectors are available, any other leaks that develop can be fixed right away.

##### PROJECTED PERFORMANCE

In FY 2013 LANL will continue its current practice of purchasing RECs to meet our renewable energy goals and meet greenhouse gas reduction goals. For year 2013 the stated contractual amount is 45,571 RECs. 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 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, as shown above, 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 notionally in 2017 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 LRDP that will improve the energy efficiency of the building HVAC systems.

In addition to efficiencies, LANL plans reduce GHG from electrical energy by either purchasing RECS to replace fossil fuel dependent energy or focus on a power purchase agreement for lower or no carbon producing energy to change its generation mix to reduce the carbon footprint of electricity supplies. LANL's projections show that these initiatives will bring our carbon emissions to approximately 70% of the 2008 baseline even though in the same period electrical consumption will grow by 135%. One option under consideration is contracting for 'firm' wind power as the source of supply after those times when the generation owned by the Los Alamos Power Pool cannot meet the demand. The amount of power purchased in this agreement will vary by year and the range of capacity needed will be up to 30 to 60 megawatts by 2020.

Power generated in the NM-AZ region is 60% coal-fired and it is anticipated that this (these) resource(s) would displace open market purchases largely generated in regional coal-fired plants.

## 13% SCOPE 3 GHG REDUCTION BY FY 2020 FROM A FY 2008 BASELINE

### PERFORMANCE STATUS

LANL achieved a 4% reduction in Scope 3 GHG emissions due to decreased air and ground travel and employee commuting. LANL plans to focus on further reducing commuting to reduce Scope 3 GHG emissions through work schedules, 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 work-from-home policies and technologies are available and in place. LANL has 3000 workers currently approved to work from home, and LANL is working toward a mixed remote work site and work-from-home options. Nearly all other federal sites have telecommuting or flexible work place options available to workers.

LANL maintains and allows use of 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 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. More recently, mass transit to LANL via bus has been expanded from the surrounding communities of Santa Fe and Espanola and also within Los Alamos and White Rock. In addition, the Rail Runner train became operational, so employees from the Albuquerque area have this 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 and continues a special section on its internal website to connect potential carpoolers with each other.

Business air travel was over 20% less at LANL in FY 2012 when compared with FY 2011, and business use of rental cars was about 85% less when compared with all previous years since the FY 2008 baseline was established. Most of the ground travel decrease was due to fewer cars being rented in FY 2012, but part of the decrease was also due to a site-wide change in the average number of miles per trip to use for the calculation. Many Divisions within LANL restricted travel significantly during FY 2012 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 leased space utilize a County-owned wastewater treatment plant with aerobic and denitrification treatment. LANL operates a centralized wastewater treatment plant. The GHG emissions from the LANL plant are related to the number of employees working at LANL. The centralized treatment plant connected all areas at LANL in 1992 and consolidated three treatment systems into one. Currently 139 employees reside in buildings that are served by septic tanks, and these septic tanks contributed the majority of the GHG emissions in the onsite wastewater treatment category.

LANL has actively participated in pollution prevention for well over a decade, 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. Many kinds of unwanted materials can be recycled at LANL including toner cartridges, aluminum cans, plastic bottles, brush, paper, and cardboard, so none of this material needs to become waste.

### 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. Currently, less than 10% of the LANL workforce is 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. LANL is creating a commuter survey to get more accurate data in the future on the commuting habits of its employees. Reducing the number of miles commuted by LANL employees would make the most significant reduction to scope 3 GHG emissions.

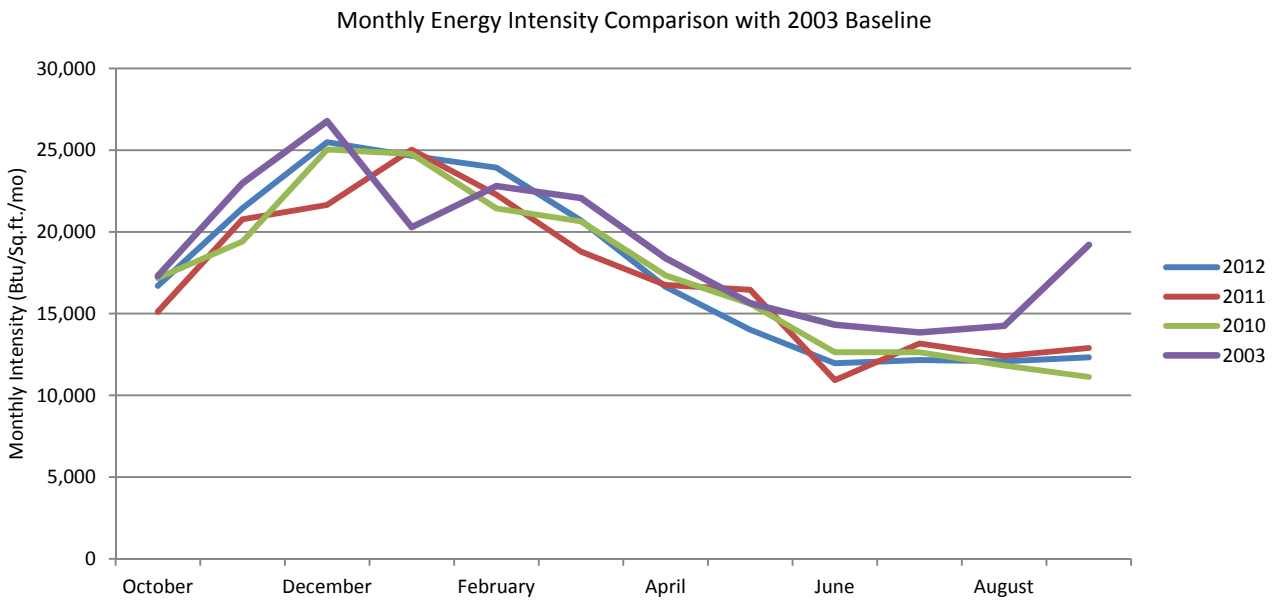
To a lesser extent, other ongoing activities will also reduce scope 3 greenhouse gas emissions. GHG emissions from municipal solid waste and offsite and onsite wastewater treatment make up a very small fraction of LANL’s scope 3 emissions. LANL’s recycling programs are ongoing, and the Pollution Prevention 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 from municipal solid waste generation.

**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 2012, LANL reduced its cumulative energy intensity by 6.5 percent. In FY 2003 LANL used 229,857 BTUs/sqft and in FY 2012 LANL used 214,993 BTUs/sqft.



LANL has invested in a number of energy reduction initiatives in FY 2012 including Building Automation System (BAS) repairs and upgrades including implementing night setback schedules, an Energy Savings Performance Contract (ESPC) for lighting and HVAC upgrades. The Associate Directorate for Nuclear and High Hazard Operations issued an institutional procedure requiring that facilities with Building Automation Systems (BAS) use the night setback feature to reduce energy consumption. LANL has reviewed the list of buildings to ensure compliance with the procedure and is investing funding to upgrade BASs in order to implement night setbacks within facilities.

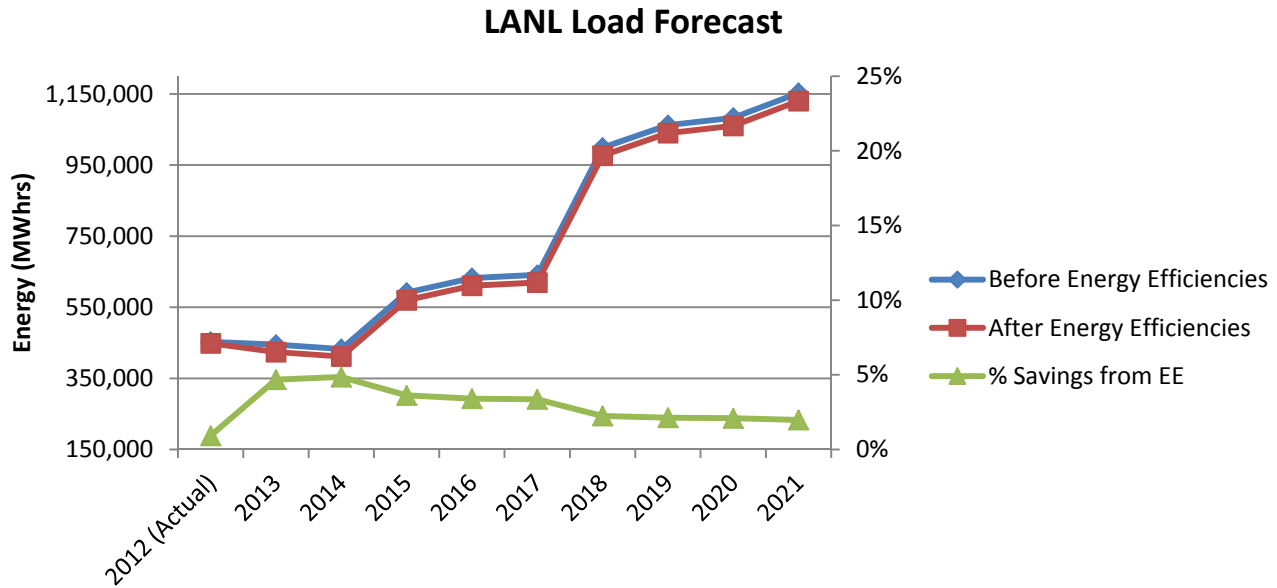
LANL completed an Energy Savings Performance Contract (ESPC) and upgraded existing HVAC and lighting at several facilities. The ESPC was completed in 2012 and were estimated to reduce the energy in Goal-Target facilities by about 65,000 MMBTU.

**PROJECTED PERFORMANCE**

LANL estimates that in FY 2013 through its planned investments that the site will reduce its energy intensity measure by 3%. LANL will continue to reduce energy in its facilities by investing \$1.8M in FY 2013 to upgrade BAS in large exhaust facilities to enable night setbacks, repair HVAC systems, and conduct steam trap surveys and repair.

The table below 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.

<b>LANL Actual and Projected Electricity Consumption (MWh)</b>										
<b>Fiscal Year</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Total Electricity Consumption	452,575	444,616	432,478	591,081	632,063	640,902	998,838	1,062,325	1,082,989	1,152,905
Demand Growth	199381	223258	224717	226889	229472	230050	232635	234716	236848	239226
DARHT	5617	5906	5906	5906	5906	5906	5906	5906	5906	5906
NHMFL	4201	3483	3483	3483	3483	3483	3483	3483	3483	3483
SCC	88972	69612	54600	153264	147234	141204	424488	424488	424488	424488
CCF	11131	15000	15900	16800	16800	16800	16800	16800	16800	16800
LDCC	30759	43800	54000	64800	64800	64800	64800	64800	64800	64800
TA53 (LANSCE, MaRIE, FEL, ect.)	99810	74900	64200	93500	104800	117050	148250	155650	167800	231850
GLOBAL SECURITY	0	0	0	16575	48000	48750	85400	136800	136800	136800
RLUOB/CMRR	7544	3497	4512	4704	6408	6684	10176	12782	19164	22652
RLWTF	5160	5160	5160	5160	5160	6175	6900	6900	6900	6900
Energy Efficiency - ESPC	(1300)	(1300)	(1300)	(1300)	(1300)	(1300)	(1300)	(1300)	(1300)	(1300)
Energy Efficiency - HPSB	(1500)	(1500)	(1500)	(1500)	(1500)	(1500)	(1500)	(1500)	(1500)	(1500)
Energy Efficiency - Metering & Publicity	(1131)	(1112)	(1081)	(1478)	(1580)	(1602)	(2497)	(2656)	(2707)	(2882)
Energy Efficiency - Lighting Retrofit	(225)	(225)	(450)	(450)	(450)	(450)	(450)	(450)	(450)	(450)
Energy Efficiency - Recommissioning and ECM (EISA Audited bldgs)	0	(15007)	(15007)	(15007)	(15007)	(15007)	(15007)	(15007)	(15007)	(15007)
Energy Efficiency - Computer Power Management	0	(1640)	(1640)	(1640)	(1640)	(1640)	(1640)	(1640)	(1640)	(1640)
Total of Energy Efficiency	(4156)	(20784)	(20978)	(21357)	(21477)	(21499)	(22394)	(22553)	(22604)	(22779)
Total Electricity Consumption Adjusted for Energy Efficiencies	448,419	423,832	411,500	569,707	610,586	619,403	976,444	1,039,773	1,060,384	1,130,126



The recently completed Energy Savings Performance Contract (ESPC) to upgrade and automate heating and air conditioning and replace energy-inefficient light bulbs in over twenty Lab buildings has resulted in an average energy reduction of 10-20% in each building since completion. The effort is expected to save the Laboratory more than \$1.2 million per year—a 3 percent savings on the Lab’s annual energy bill and reduce the energy intensity in Goal-Target facilities by about 65,000 MMBTU per year.

Approximately 387k gsf of facility construction is planned to be occupied between the beginning of FY2012 through FY 2020. A large portion of this construction includes the CMRR-RLUOB and Security facilities. The net reduction in space during that time period is planned to be about 1,581k gsf. Therefore net construction will be about 1,194M gsf. Approximately 507k gsf is to be excessed between FY2013 and FY2020. Net energy reduction is estimated to be about 108.8 MMBTUs.

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 gsf, and related costs. Annual disposition plans are aligned with this Site Sustainability Plan, the metering plan, and the 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 FY2009 – FY 2012 time frame. The first 4 year EISA 07 cycle ended in June FY 2012. In FY 2012 LANL completed HVAC audits in 65 buildings, lighting audits in 23 buildings, and water audits in 42 buildings. 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 covered facilities on a quadrennial cycle and that last received an audit in FY 2009. LANL will complete energy and water assessments in 21 facilities, which is approximately 25% of the covered facilities based on number of facilities. The list of facilities to be audited 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**

LANL has achieved compliance with the electric meter goal to install advanced electric meters on individual buildings or processes on site accounting for at least 90% of the site’s total electricity use. LANL has 40 water meters that are currently read and usage is reported. These meters monitor water used by large facility cooling towers and 8 satellite steam plants. Individual building water meters will be installed per guidance of the site Metering Plan. Natural Gas coming into LANL is metered at two main stations, Tech Meters 1 and 4. There are 17 other gas meters/consumers that are read and usage reported. Of these 17, 9 gas meters are interchange points between LANL and Los Alamos County. Steam is metered as it leaves the TA-3 Co-Generation Plant. Currently, LANL is not metering steam at the building level.

NSNSA provided \$1M in Energy Modernization and Investment Program (EMIP) funding during FY 2011 and FY 2012 to complete installation of advanced electric meters and begin installation of meters associated with HPSB facilities. Funding for additional metering beyond FY 2012 will be provided by the IS Program.

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 from various sources and create consumption reports for Facility Managers. Within the next 12-18 months, 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 FODs and programmatic tenants to improve awareness to reduce energy consumption through a quarterly report as well as available through the UI webpage. In addition, LANL will complete installation of all advanced electric meters.

SSPP Metering Stretch Goals	FY 2012 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 90% of the site’s total electricity use by October 1, 2012.	With the assistance of Energy Modernization and Investment Program (EMIP) funding allocated from DOE, LANL completed electric meter requirements to meet the 90% SSPP electric meter goal.	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 90% of the site’s natural gas, steam and chilled water use by October 1, 2015 (90% for each utility)	FY08 through FY11, LANL focused metering efforts on electric meter installations. In FY12, LANL’s efforts focused on the installation of thermal metering.	LANL has determined which facilities require a thermal meter by utilizing an “economic practicability” calculation. LANL estimates a 16% completion rate for steam and a 63% completion rate for gas by the end of FY13.
Independently meter 100% of agency	LANL installed an Environmental and Power Monitoring System at the LDCC,	LANL has identified a Data Center Evaluation Team to identify and evaluate



SSPP Metering Stretch Goals	FY 2012 Performance Status	Planned Actions and Key Issues
data centers by October 1, 2015.	and measures environmental conditions and power in real-time. Similar to the system within the SCC. LANL has two of three large data centers metered to determine the Power Utilization Effectiveness.	the extent of metering required. LANL will prepare and implement a plan to sub-meter data centers by the end of FY13.

### PROJECTED PERFORMANCE

In FY 2012, LANL installed thermal meters for select HPSB facilities and prepared an evaluation methodology and justification determination in order to meet DOE’s thermal metering goals. LANL will install 3 meters in FY 2013 and will meet the DOE metering goals by the end of FY 2014 using the “economically practicable” evaluation methodology provided by FEMP as detailed in LANL’s Metering Plan.

### 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 and is a subset of the Facilities and Infrastructure Recapitalization Program (FIRP), established to help manage and preserve the roof systems that protect the critical assets in the NNSA inventory. RAMP was established as a subset of FIRP to provide focus on the National Enterprise roofing assets, which comprised a large segment of the deferred maintenance with a greater impact to facility readiness. The primary goal of RAMP is to extend the life of each roof area and maintain it in a leak free state for as long as possible. All roofs are required to meet Secretary Chu’s initiatives to reduce energy consumption with increased thermal requirements of R-30 insulation and “cool” roof membranes. Since 2006, RAMP design criteria 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.

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 2012 RAMP, an additional 75,566 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. RAMP has designed replacement of approx. 280,000 square feet of roof for 2013. 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:

LANL Phase 1 – TA-03-0102, 03-0141, 09-0021, and 16-0410

LANL Phase 2 – TA-03-0066

LANL Phase 3 – TA-53-0003

Budgets are subject to funding availability. Site support costs are approximately \$10 per square foot. If all three phases are funded, a total of \$2,800K will be required to support all the roofing activities.

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**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 5000 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 is now LANL’s first HPSB and first LEED certified building. LANL is currently reporting 45% completion in EPA’s Energy Star Portfolio Manager database. LANL is continuing HVAC re-commissioning efforts in 5 facilities which include walk downs, 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. An HPSB program annual schedule with completion dates has been established within the energy program Access database and is also on the LANL Green Buildings web site.

In addition, the Institution’s EMS Environmental Action Plans (EAP) for FY 2013 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 will begin to integrate with the Laboratory’s Long Range Development Plan 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 Environmental Management System (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, empower building occupants around sustainability and create ownership in the effort to operate and maintain LANL buildings efficiently.

During FY 2012 LANL had 3 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 AD EMS 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 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 below identifies the remaining HPSB work for FY 2013 and FY 2014 (17 buildings of 31 total) 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. Some of the actions will be completed at an institutional level (vertical text) and some will be completed at the building level (horizontal text).

HPSB Facility	2013/2014 Year Cert. Planned	Employ Integrated Design		Optimize Energy Performance	Protect and Conserve Water	Enhance Indoor Environmental Quality			Reduce Environmental Impact of Materials													
		EMS Manual	Bldg Management Plan, augment bldg ops & maint.	Commissioning Report	Renewable Energy Generation Onsite	Use Energy Star Portfolio Manager	Reduce measured energy use by 20%	Install Thermal Meters	Storm Water Pollution Prevention Plan	Use no potable irrigation water	Install EPA’s WaterSense labeled products	Integrated Pest Management Plan	Tobacco Smoke Control	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007	Provide automated lighting controls, meet additional daylighting & lighting controls	Reuse and Recycling Services Available Site-Wide	Ozone Depleting Compounds Policy	Recycled Content meet or exceed EPA’s recommendations	Use products w/ highest content level per USDA’s biobased recommendations	Use Environmentally Preferable Products	
03-1400 NSSB	2013	Integrated Team to develop and implement policy	Bldg Management Plan, augment bldg ops & maint.	Commissioning Report	Renewable Energy Generation Onsite	Use Energy Star Portfolio Manager	Reduce measured energy use by 20%	Install Thermal Meters	Storm Water Pollution Prevention Plan	Use no potable irrigation water	Install EPA’s WaterSense labeled products	Integrated Pest Management Plan	Tobacco Smoke Control	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007	Provide automated lighting controls, meet additional daylighting & lighting controls	Reuse and Recycling Services Available Site-Wide	Ozone Depleting Compounds Policy	Recycled Content meet or exceed EPA’s recommendations	Use products w/ highest content level per USDA’s biobased recommendations	Use Environmentally Preferable Products	
03-1409 Office Bldg	2013													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
60-0175 Communications Ops Bldg	2013													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
63-0111 Office Bldg	2013													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
69-0033 Emergency Ops Center	2013													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
03-0502 Space Science Lab	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
03-1405 Office Bldg	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
03-1410 Los Alamos Site Office	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
03-1415 Office Bldg	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
03-2011 Adv Computer Lab	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
16-0969 Weapons Pit Support	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
22-0120 HDF Hydrotest Des Facility	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
52-0033 Weapons Support	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
53-0001 Lab Office	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
53-0006 Accelerator Tech	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
55-0066 FITS Office Building	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls
55-0313 Office Building	2014													Water Audit	Use low emitting materials	Meet ASHRAE Standard 55-2004 and 62.1-2007						Provide automated lighting controls, meet additional daylighting & lighting controls

**PROJECTED PERFORMANCE**

LANL is working to achieve a 60% overall completion rate in the Energy Star Portfolio Manager database and achieve full compliance within 2 facilities during FY 2013. LANL’s Twenty-Five Year Site Plan includes a list of sustainability projects highlighting HVAC improvements and recommissioning efforts in the High Performance Sustainable Buildings, lighting upgrades, implementation of energy conservation measures from the EISA 07 audits, and advanced utility metering. LANL provides funding for facility upgrades, such as HVAC replacements or bathroom retrofits. LANL is working to integrate sustainability with the project planning and increase the percentage of building’s compliant with the HPSB Guiding Principles.

Re-commissioning 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. Recommissioning is a main component within the HPSB program and a LANL Recommissioning Plan was developed to re-commission all 31 HPSB buildings by the end of FY 2015. All recommissioning reports will go to the Maintenance and Site Services Division management to utilize for maintenance planning efforts.

**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 since FY 2003 that were built to LEED standards, but have not been certified. These buildings are the Defense Program’s Nicholas C. Metropolis Center for Modeling and Simulation (otherwise known as the Strategic Computing Complex(SCC)), and 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 is currently being discussed.

A lab-wide effort called Footprint Reduction, removing buildings that are old or in disrepair, also reduced maintenance and utility costs.

## 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 (300,000 sq.ft.), Global Security Laboratory/Training/Office building (170,000 sq.ft.), CERDA Energetic Materials Laboratory/Office (70,000 sq.ft.) TA-03 Fire Station (30,000 sq.ft.), TRU-Waste Office (30,000 sq.ft.) and the Wellness Center Replacement (20,000 sq.ft.). Upcoming or current construction projects identified for LEED certification include: Tactical Training Facility, Indoor Shooting Range and the TA-48 Mass Spectrometer building.

Beginning in FY 2020 LANL will be investigating methods to achieve design of all new buildings as net-zero energy by FY 2030. Currently all new LEED construction is designed at 30% more energy efficient than baseline to the extent that this is possible. Some facilities cannot meet the energy efficiency criterion because of the nature of their work activity requirements and must be considered on a case by case basis.

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## 7.5% OF ANNUAL ELECTRICITY CONSUMPTION FROM RENEWABLE SOURCES BY FY 2013 AND THEREAFTER (5% FY 2010 – 2012)

### PERFORMANCE STATUS

LANL exceeded the 7.5% renewable energy goal. LANL exceeded the 7.5% renewable energy goal. LANL purchased 48,683 RECs in FY 2012. With the allowable double credit for federal site production, the Abiquiu Dam Low Flow Turbine, LANL is reporting a total of 86,033 MWh of renewable energy. The Laboratory used approximately 480,959 MWh of electricity in FY 2012 including on site renewable generation. The purchased amount in addition to onsite renewable energy amounts to approximately 18% of the annual electricity consumption. In addition, LANL completed installation of a 4 kW photovoltaic system originally purchased by the Environmental Program Directorate for well drilling. LANL took advantage of this program investment and connected it to its electric system to demonstrate continued progress in the development of an on-site renewable demonstration project.

### PROJECTED PERFORMANCE

LANL plans to purchase RECs to fully meet this goal and evaluate opportunities to change the generation mix as economically viable to fulfill this requirement and meet GHG reduction requirements by 2013. The Abiquiu LFT is estimated to conservatively produce 7,000 MWh per year and that is 18,400 MWh with double credit for on-site production. LANL will support NNSA to renegotiate the LAC ECA to support further third party development of long-term renewable and carbon neutral energy on-site generation.

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## 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 (of which NNSA will have a stake in 1MW when constructed) 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:

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 2012, LANL has 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 ft<sup>2</sup> 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 us 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
3. LANL is in the final stages of completing a Cooperative Research and Development Agreement (CRADA) with Tri-State Generation and Transmission (TSGT). By entering into this agreement, LANL will have access to important data including TSGT's load-balancing costs for existing coal and gas plants, TSGT's current portfolio of demand response resources, and TSGT's plan for expansion of this demand response portfolio. Access to such data will enable LANL to provide accurate assessments of the value of demand response portfolios in realistic settings.

In FY 2013 LANL will expand the BAS code implementation to enough buildings to control up to 1 MW of power on a 15-minute time scale. LANL is also partnering with the 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.

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.

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. The Laboratory and DOE maintain agreements and interactions with other federal agencies and tribal governments in regards to the White Rock Canyon Reserve. The U.S. Park Service operates a wildfire fire station with helicopter flight access to fight regional wild fires from DOE property. DOE maintains an agreement to provide land for the County ECO Station for waste recycling and landfill operations.

DOE also maintains a number of utility easements with the County of Los Alamos; the Public Service Company of New Mexico (PNM); New Mexico Gas Company; and Qwest. DOE maintains several communications towers that provide communications for a number of government agencies including the security and emergency response service at LANL, the County of Los Alamos police, fire and emergency response, and others. The SBA Structures tower, located on DOE property, provides communications for a number of businesses.

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 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 reconfigured and used more efficiently. 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.

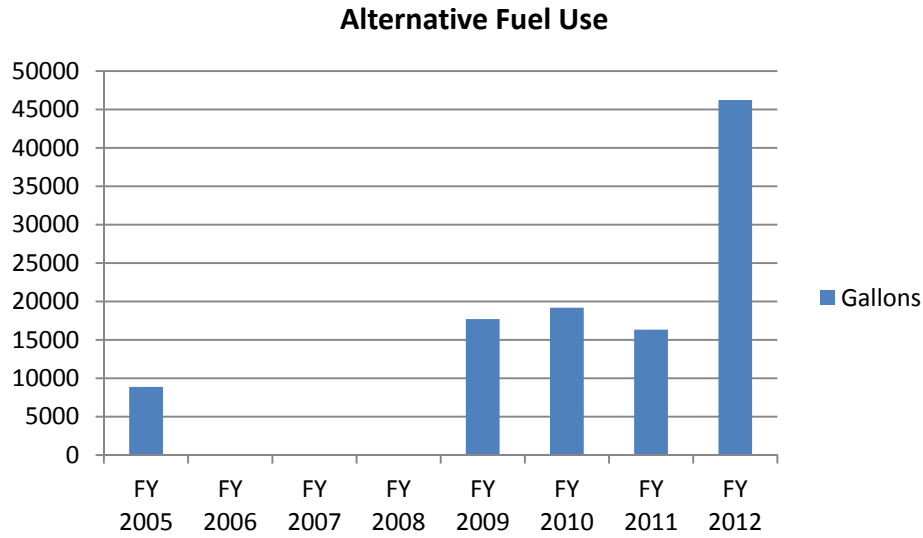
The proposed LANL Electrical Distribution Upgrade Project Phase I will optimize utilization of available power. This upgrade will replace two 55 year old transformers at the TA-3 substation and will enable all the substations to provide shared load capacities for load growth around the Laboratory and the Power Pool. This project will increase the efficiency, reduce transformer no-load losses, and provide the means for installing Smart Grid technology and metering along with means to connect renewable energy resources. As a result, operation and maintenance costs, and production losses will be reduced. 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.

### **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. LANL subcontracts with a local pueblo-owned business to provide bulk E-85 and Bio-diesel fuel procured with a mobile fuel tanker to transport the fuel to the site. In FY 2011, alternative fuel consumption was 16,329 gals, primarily E-85. In FY2012, LANL used 32,608 gals of E-85 fuel and used 13,619 gallons of B5 Diesel Fuel. In FY 2012 our Alternative Fuel consumption was 46, 227 gallons, 23,481 gallons (E-85) and 22,746 gallon (B5) Bio- Diesel fuel, which is an annual increase of 65% and a 420% increase compared to the FY 2005 baseline.



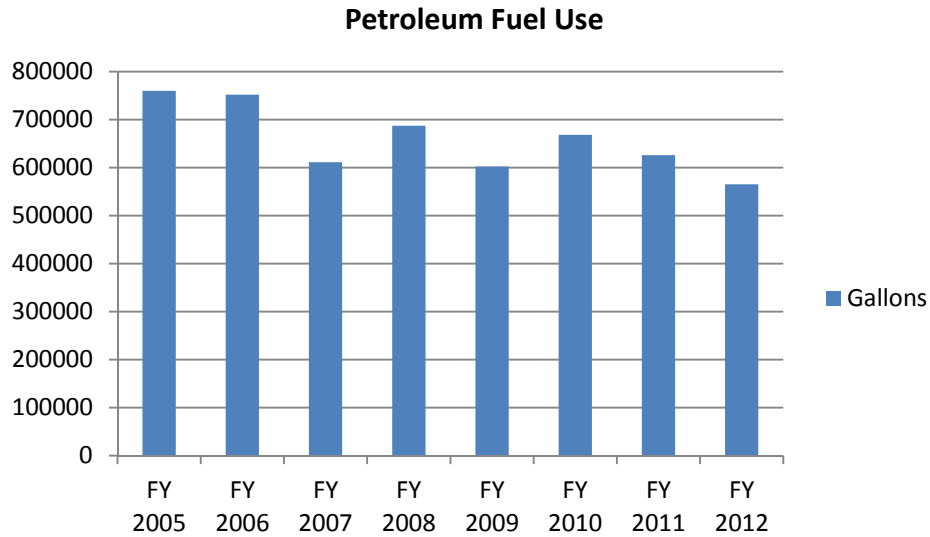
#### PROJECTED PERFORMANCE

LANL will continue working toward increasing use of alternative fuel in the current fleet. LANL will work to determine the feasibility of establishing on-site alternative fueling capability. In addition, LANL will continue to use and increase mobile fueling to increase the alternative fuel use.

#### 2% ANNUAL REDUCTION IN FLEET PETROLEUM CONSUMPTION BY FY 2020 RELATIVE TO A FY 2005 BASELINE

##### PERFORMANCE STATUS

LANL reduced fleet petroleum use by 9.7% compared to FY 2011 usage. Overall, using FY 2005 as a baseline, LANL has reduced fleet petroleum use by 25.6%. LANL plans to continue to reduce petroleum consumption in the LANL Fleet by increasing the use of AFVs to meet the goals of DOE's SSPP.



#### PROJECTED PERFORMANCE

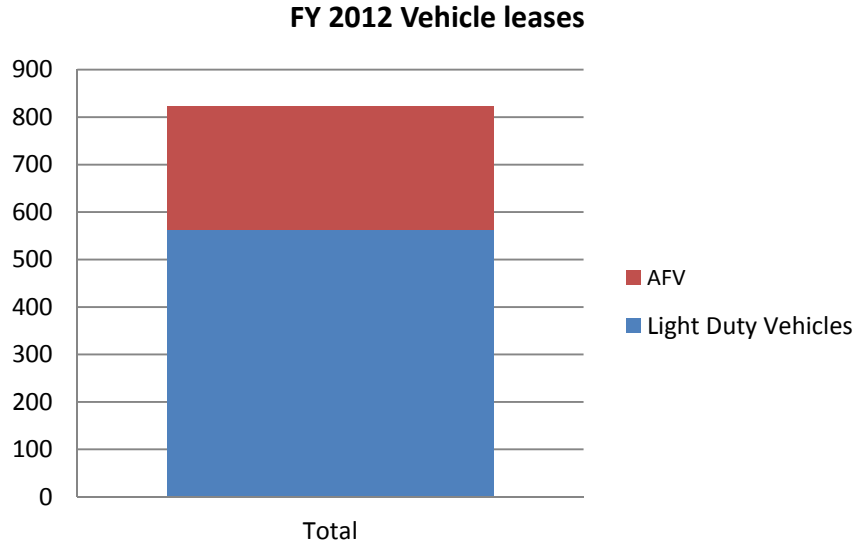
LANL will continue to research and test alternative fuel vehicles (AFVs) including Plug-in Hybrids and electric cars as available. LANL will continue collecting data on E-85 and Hybrid vehicles and work with management to continue downsizing and right sizing the Laboratory’s fleet. During the FY 2013 annual replacement cycle, LANL will continue to order more fuel efficient vehicles and continue supporting ordering only 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 1549 vehicles. 824 of those are considered Light Duty vehicles. Vehicles that weigh less than 8,500 lb gross vehicle weight rating (GVWR) are considered LDVs. EPCRA 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. Sixty eight percent of LANL’s current Light Duty Fleet are alternative fuel vehicles.





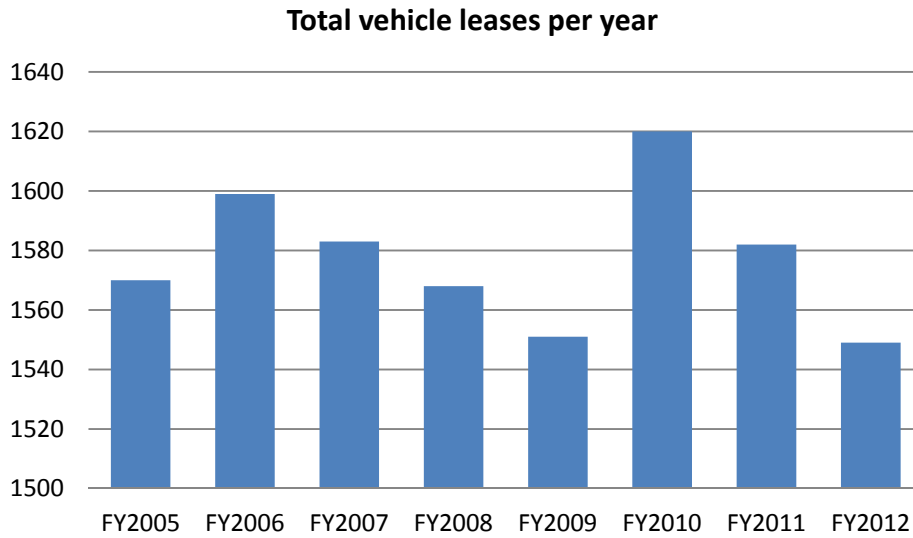
**PROJECTED PERFORMANCE**

LANL will continue to procure the maximum number of AFV to increase the number of alternative fuel capable vehicles in its Light Duty Fleet at each annual vehicle replacement.

**REDUCE FLEET INVENTORY ON NON-MISSION CRITICAL VEHICLES BY 35% BY FY 2013 RELATIVE TO A FY 2005 BASELINE**

**PERFORMANCE STATUS**

The Laboratory has reduced its overall fleet by 20 vehicles compared to the baseline year.



**PROJECTED PERFORMANCE**

LANL plans to review and determine non-mission critical status for the fleet and estimates reducing the non-mission critical vehicles by 20% in FY 2013 and develop a plan to reduce by a net of 35% for non-mission critical vehicles. As part of this year’s annual GSA Re-Order process, vehicles not meeting NNSA’s utilization standards averaged over the last 35 months will not be re-ordered. Additionally, as part of this year’s FY2013 Fleet Performance Objective, LANL will modify its vehicle categories to *Direct Mission* and *Indirect Support*, revisit utilization standards for Indirect Support vehicles and review the utilization of all *Direct Mission Support* vehicles in April 2013. LANL continues to turn in vehicles that are no longer necessary in order to meet the Laboratory’s programmatic mission or vehicles that have continually been underutilized. Utilization rates averaged over the last 35 months have been used to determine leases that will not be renewed in FY 2013. In addition, vehicle reductions in FY 2013 may be constrained by GSA lease requirements.

**GOAL 4: WATER USE EFFICIENCY AND MANAGEMENT**

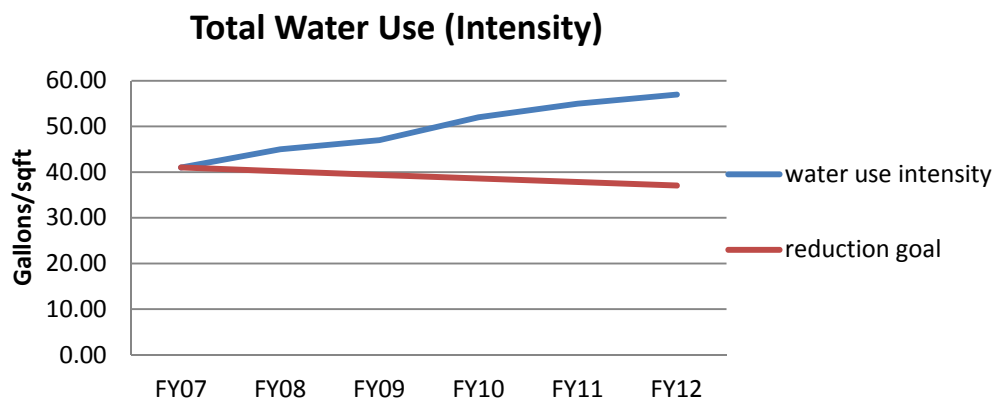
**26% WATER INTENSITY (GAL/GSF) REDUCTION BY FY 2020 FROM A FY 2007 BASELINE**

**PERFORMANCE STATUS**

LANL’s water use reduction was dependent in FY 2012 on SERF operations and industrial water reuse at the SCC. Completion of the SERF project and meeting the NPDES were a significant effort for the Laboratory in FY 2012.

The SERF expansion project was completed on schedule and on budget. Completion of the SERF project and meeting the NPDES were a significant effort for the Laboratory. LANL’s total water use was approximately 431 million gallons. Water intensity has increased by approximately 39% due to cooling towers supporting increasing supercomputing compared to the FY 2007 baseline year (336 million gallons).

LANL’s water intensity will reduce dramatically in FY 2013 with SERF coming on line. LANL’s total water consumption for FY 2007, the baseline year used to calculate the water intensity, was the second lowest within the last 10 years. The average total water consumption for the last 10 years is approximately 371 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 will make reaching the FY 2015 water intensity goal difficult and uneconomical.



Although there is no expectation of supply shortfall, LANL is implementing a project to reduce potable water use in selected cooling processes and in the steam generation equipment. These efforts, in conjunction with LANL’s water audits of domestic plumbing have revealed significant opportunity to upgrade to modern water-conserving fixtures. 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, and in light of the Return on Investment, LANL is focusing resources on energy conservation measures that are considerably more financially attractive. LANL has adopted an incremental approach to upgrade plumbing fixtures as they fail.

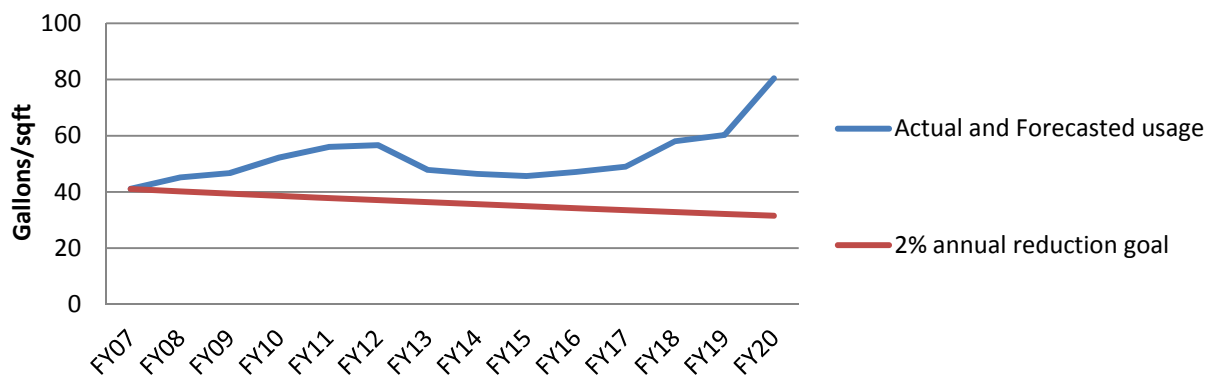
As the power consumption at LANSCE increases (including Matter-Radiation Interactions in Extremes (MARiE) and Weapons Neutron Research (WNR) growth), it is expected that cooling water requirements will proportionately increase. SERF water is not presently an option at LANSCE, so other water savings projects will be necessary as the cooling demand grows. In addition, due to the NPDES Permit, groundwater arsenic concentrations currently preclude increased cycles of concentration in LANSCE cooling towers and will need to be addressed.

**PROJECTED PERFORMANCE**

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. The combined consumption of these two facilities is anticipated to be 33,000 kgal/yr in 2013. It is forecast that the SCC will not consume all of SERF’s capacity until 2018. In FY 2013, use of SERF product as boiler make-up at the steam plant will reduce LANL’s water usage by 28,000 kgal. In FY 2011 the Laboratory connected the steam plant (SM-22) to the SERF reuse line.

During FY2011 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%. In FY 2013 LANL is funding installation of this chemical treatment system within additional proposed cooling towers in order to increase cycles of concentration and reduce water and chemical use in cooling towers not connect to the SERF reuse water supply.

**Water Intensity Actual & Forecast**



**20% WATER CONSUMPTION REDUCTION OF INDUSTRIAL, LANDSCAPING, AND AGRICULTURAL (ILA) WATER BY FY 2020 FROM A FY 2010 BASELINE**

**PERFORMANCE STATUS**

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 reduction.

**PROJECTED PERFORMANCE**

Landscape Management Plan deliverables will be tracked through the applicable Associate Directorate level EMS Environmental Action Plans (EAPs).

**GOAL 5: POLLUTION PREVENTION**

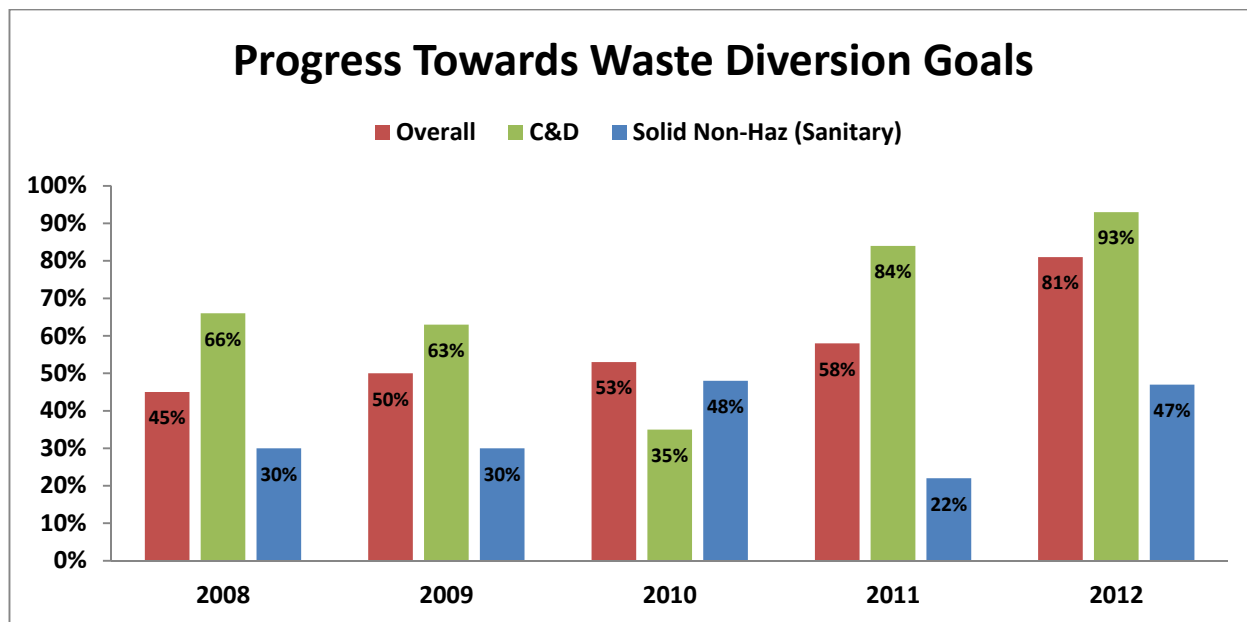
**RECYCLING & WASTE DIVERSION (50% BY FY 2015)**

**PERFORMANCE STATUS**

The LANL Pollution Prevention (P2) program conducts pollution prevention projects, prepares the Hazardous Waste Minimization Report in compliance with the New Mexico State Environment Departments (NMED) Hazardous Facility Operating Permit, completes P2 regulatory compliance and DOE Sustainability Goal reporting in the Pollution Prevention Tracking and Reporting System (PPTRS), holds the annual LANL Pollution Prevention (P2) Projects awards competition, submits LANL P2 awardees for National P2 Awards, and directly funds generators to conduct P2 projects via the P2 (formally Generator Set-Aside Fund or GSAF) Project Fund.

*Solid Non-Hazardous and Construction/Demolition Waste Diversion*

LANL diverted 47% of solid, non-hazardous waste (1275 metric tons of 2726 metric tons), and 93% of construction and demolition waste (6993 metric tons of 7480 metric tons), in FY12. Additionally, LANL construction and demolition activities produced 20,188 cubic yards of clean fill of which 5300 cubic yards was reused on-site. The remainder of clean fill is in controlled storage pending future needs. LANL's progress toward waste diversion goals, and overall recycling rates, is shown in the figure below.



*LANL P2 Awards*

The FY12 LANL Annual Pollution Prevention Award Ceremony recognized 55 projects at a ceremony held on April 17, 2012. The projects were completed during FY11 and involved more than 450 individuals from 141 different Laboratory organizations. The projects realized a conservatively estimated cost savings of over \$17M. Selected projects recognized at the FY12 LANL Pollution Prevention Award Ceremony were nominated for National Pollution Prevention Awards.

*National Pollution Prevention Awards*

LANL received one DOE of Energy Sustainability Award and six NNSA National Pollution Prevention Awards during FY12, including three 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.)

“Change Agent” Category –Department of Energy Sustainability and NNSA Best In Class Award

Ronnie Garcia – A Master of Minimization: For over a decade, Ronnie has been at the forefront of waste minimization activities both at his site and institutionally. Ronnie has led dozens of recognized pollution prevention projects, and his work has gone far above and beyond his job requirements. His efforts have saved LANL millions of dollars in avoided procurement and waste disposal, and literally millions of pounds of material have been recycled thanks to his work. LANL is deeply appreciative of Ronnie’s excellent work in overseeing environmental projects and waste management.

“Water Resources Category” – NNSA Best In Class Award

Outfall Reduction Program At LANL: In 1993, LANL maintained 141 NPDES permitted outfalls. The Laboratory’s Outfall Reduction Program (ORP) reduced the number of actively discharging outfalls from 21 to 9. It is anticipated that only 4 NPDES permitted outfalls will remain after the next permit cycle and of those only two will be actively discharging. The full realization of the Outfall Reduction Program strategy anticipates the reclamation, reuse and recycling of up to 500 acre feet per year or approximately 163 million gallons of potable groundwater annually.

“Greenhouse Gas Management Category” – NNSA Best In Class Award

Reducing Sulfur Hexafluoride Use in Ion Sources: A strategy to use much less sulfur hexafluoride in equipment has resulted in fewer electronics failures, less lost time to maintenance work, and no contamination of the system by toxic trace gases. The strategy avoids the use of approximately 240lb/year of sulfur hexafluoride and potentially over one million dollars per year in lost productivity time for the accelerator at LANSCE. This strategy could potentially be used at sites across the DOE complex.

“Living Laboratory Category” – NNSA Environmental Stewardship Award

Biodiesel Waste Improves LANL Sewage Plant Performance: Crude glycerol, the waste produced in the production of biodiesel, is being used to improve the effluent water quality of LANL’s sewage treatment facility and to increase opportunities for the reclamation and reuse of cooling tower discharges. The crude glycerol provides supplementary “food” to the microorganisms responsible for sewage breakdown, increasing the microorganisms’ activity, while subsequently improving the removal of pharmaceuticals and pharmaceutical metabolites, endocrine disruptors, heavy metals and nitrates. As a result, the effluent nitrate concentrations for LANL’s sewage plant were dramatically reduced with pre-supplementation nitrate concentrations averaging 1.60 mg/L versus post-supplementation nitrate values averaging 0.44 mg/L. Further, the improved plant performance has allowed the diversion of ~ 14.7 million gallons water/year of cooling tower discharges from the environment to LANL’s sewage plant. Annually, the crude glycerol fed to LANL’s sewage treatment plant, represents the beneficial use of waste generated from the production of greater than 300,000 gallons of B-10 biodiesel.

“Cradle to Cradle Category” – NNSA Environmental Stewardship Award

Thorium is Now Green – A 2011 R&D Winner: Anhydrous halide complexes are key starting materials that are effective at synthesizing transition metal, lanthanide, and actinide compounds. However, preparing thorium halides has proved expensive and further complicated by environmentally harmful processes that involve tricky reactions requiring harsh, unsafe reaction conditions. A new and versatile thorium chloride reagent has been developed using legacy thorium nitrate waste. This process is cost-effective, safe, and green. In addition, it has applications in thorium chemistry, materials science, and nuclear reactors.

“Greenhouse Gas Management Category” – NNSA Environmental Stewardship Award

Insensitive High Explosive (TATB) Synthesis Using Environmentally-Friendly Processes: Currently the US does not have the capability to manufacture TATB domestically because the precursor chemicals cannot be made in the US. One precursor chemical is 1,3,5-trichlorobenzene (TCB). Its manufacture requires the use of poisonous chlorine gas and carbon tetrachloride, a solvent banned in the US. To re-establish a domestic capability to manufacture TATB for DOE and DOD purposes, an environmentally-friendly method for producing the necessary precursor chemicals was needed. LANL studied alternative approaches and developed two different methods that showed promise as environmentally-friendly. Both methods produce non-toxic byproducts, and both methods use non-ozone-depleting solvents.

*Pollution Prevention Opportunity Assessments (PPOAs)*

In FY12, LANL completed several pollution prevention opportunity assessments (PPOAs) and assisted organizations in implementing recommendations from each PPOA where possible. The Metro DataVac Electric Duster was tested as a

replacement for the standard air-charged duster cans. This test targeted specific locations where work groups use a large number of air-charged duster cans. Within the work groups the air-charged duster cans were used to clean circuit boards and other electronics in chemistry and bioscience laboratory operations. Based on the feedback, the electric air duster appears to be a good alternative to the traditional air-charged duster cans. The electric air dusters are a viable alternative to charged air cans which are a one-time use product, must be disposed of as recycled metal, and generate sanitary waste (cap, nozzle, and flow tube).

The potential to recycle EnSolv® (solvent) was evaluated. An operation at Technical Area 3, Sigma Mesa 40 generated more than two 55-gallon drums of spent EnSolv® (solvent) annually. The drums were disposed through the services at Technical Area 54. LANL determined that WRR Environmental Services accepts spent solvent for recycling provided the solvent has been properly characterized. A small representative sample was collected from the operation at Technical Area 3, Sigma Mesa 40, and shipped to WRR Environmental Services for analysis along with a completed Waste Material Profile. WRR Environmental Services accepted the spent EnSolv® and provided the operation with non-hazardous material drum labels and approval number labels to be affixed to each drum shipped for recycling.

The potential for reducing plastic and cardboard waste from the In Vitro Bioassay Program was evaluated. The Vitro Bioassay Program analyzes more than 3,500 urine samples annually in support of Radiation Protection's dosimetry monitoring program. Each urinalysis monitoring kit is constructed of cardboard and contains four small plastic bottles. After confirming that rinsing the bottles with a 10% bleach solution was the only step necessary prior to recycling the plastic bottles, all appropriate operation and procedural documents were revised to reflect the new process. This effort is estimated to remove more than 17,500 plastic bottles and 3,500 cardboard boxes from the solid waste stream annually.

LANL collaborated with custodial subcontract personnel to evaluate the potential to replace liquid hand soap with foam soap Laboratory-wide. Greening cleaning and hygiene products enhances indoor environmental quality and reduces negative impacts on building occupants and janitors including adverse eye, skin and respiratory reactions. The environmentally-preferable foam soap proposed is as a replacement was Green Seal-certified and met the highest standards of environmental quality and performance. The foam soap was tested by Chemistry Division employees to ensure that no adverse impacts to the Sanitary Waste Water Treatment Facility would result from implementing the use of foam soap. The results of the tests revealed that the foam soap was far less toxic to the Sanitary Waste Water Treatment Facility than the liquid soap. Also, studies conducted outside of LANL indicated that use of foam reduces water consumption during hand washing.

LANL developed recommendations for optimizing cooling tower operations that may reduce the amount of water consumed, and the amount chemicals used and magnitude of chemicals discharged to the environment. LANL is working to evaluate implementation of these recommendations.

LANL studied alternatives to improve the biological oxygen demand of the Sanitary Waste Water System. Over the last couple of years, various factors have increased the influent flow to the Sanitary Waste Water System. In order to maintain the plant's biomass with the rise in influent, supplemental carbon (glycerol) is added regularly as a supplemental carbon source. The microorganism distribution in the waste water plant is being monitored to ensure that they have adapted to the glycerol feed and to evaluate if the glycerol can be effectively converted into a valuable feed product for biodiesel synthesis. The glycerol supplementation is projected to have reduced the concentration of polychlorinated biphenyls by 50% (confirmation sampling yet to occur) and doubled the volume of sludge. Leachate analyses of the sludge will determine if it can be land applied as a soil amendment.

#### *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 06/2012.

Pesticide management activities in FY 2012 included the development and implementation of a Pesticide Discharge Management Plan (PDMP) by LANL in order to comply with recent changes in EPA's National Pollutant Discharge Elimination System (NPDES) permit requirements. In October 2011, the EPA issued an NPDES Pesticide General Permit (PGP) for point source discharges from the application of pesticides to water of the United States. The PGP was issued in response to a federal court decision that point source discharges of residues of biological and chemical pesticides into waters of the US were pollutants under the Clean Water Act (CWA) and therefore subject to the NPDES permit program. LANL applies pesticides that may produce residues for control of mosquitoes and other insect pests, weeds and vegetation, and

rodents. These are PGP activities that trigger the requirement to develop a site specific Pesticide Discharge Management Plan (PDMP). LANL's PDMP was completed and submitted to the state regulatory agency, the New Mexico Department of Agriculture, in April, 2012. 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

In FY 2013, LANL will develop 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.

## PROJECTED PERFORMANCE

### *Solid Non-Hazardous and Construction/Demolition Waste Diversion*

LANL's FY13 solid, non-hazardous waste and construction and demolition waste diversion performance is expected to be similar to that of FY12 with progress toward the 50% recycling goal. Additionally, LANL will continue to reuse clean fill generated on-site.

### *P2 (Formally Generator Set-Aside Fund or GSAF) Fund Projects*

In FY13, LANL will provide approximately \$1,000,000 to generating organizations to conduct P2 projects. Presently, nine P2 (formally Generator-Set-Aside Fund or GSAF) Fund Projects are funded for FY 13.

## GOAL 6: SUSTAINABLE ACQUISITION

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## PROCUREMENTS MEET REQUIREMENTS BY INCLUDING NECESSARY PROVISIONS AND CLAUSES

### PERFORMANCE STATUS

In FY 2012, LANL received a Bronze GreenBuy Award for procuring products in FY11 with sustainability attributes and currently, 85% of copy paper purchased at LANL contains at least 30% post-consumer fiber. LANL met the DOE's leadership goals for five product types in three product categories, including:

- Construction category: carpet and concrete;
- Office category: furniture and computers/laptops; and
- Custodial category: trash bags.

LANL accomplished several milestones under its Sustainable Acquisition Plan and made significant progress toward the accomplishment of several others. An analysis of sustainable acquisition requirements contained in the Prime Contract was completed, along with an analysis of existing Sustainable Acquisition institutional policy documents to determine the best repository for the requirements. The decision to revise an existing policy document was made and the draft revision is in process. A communication plan was drafted in anticipation of the publication of the revised policy document.

For FY12 purchases, LANL is in the process of reporting on successfully purchasing 11 designated Priority Products with leadership-level sustainable attributes in 5 categories and the elimination of Styrofoam products from its cafeterias that are operated by its food service providers.

The goals met, product types, services, products eliminated and attributes include:

- 100% of In-Cafeteria service is durable and 100% of take-out service containers and dishware are 72% Biobased. ENV-ES working closely with the LANL food service provider has met the criteria and achieved the goal in the cafeteria category for FY 12 purchases
- ENV-ES working closely with the LANL food service provider has also eliminated the use of Styrofoam products from the cafeteria
- ENV-ES working closely with the engineering standards program and the buyers allowed LANL to exceed the leadership goal for the priority product *Carpet*. 100% of carpet purchased at LANL meets recycled content requirements and complies with LANL engineering standard carpet specifications
- ENV-ES working closely with the engineering standards program and the buyers allowed LANL to exceed the leadership goal for the priority product *Concrete*. 100% of the 8,597 yards of concrete mix that was used on site contains the (0-40%) Fly ash content requirements and complies with the LANL engineering standard concrete specifications
- ENV-ES working closely with the custodial contract has exceeded the leadership goal for the priority product, plastic trash bags. In FY12 LANL procured 100% of trash bags that meet the recycled content requirement.
- ENV-ES working closely with the custodial contract has exceeded the leadership goal for the priority product, plastic trash bags. In FY12 LANL procured 100% of Tissue Toilet products met the recycled content requirement and/or are EcoLogo certified.
- ENV-ES working closely with Utilities and Institutional Facilities to use a holistic approach to urban landscape management. The intent is to increase ecological integrity, enhance regional biodiversity, support sustainable building requirements, integrate LANL buildings into the surrounding landscape, improve aesthetics while minimizing the use of potable water or use non potable water for landscape maintenance of the LANL urban zone. In FY12, 100% of vegetation including seed mix, plants, shrubs and trees are compliant with LANL Landscape Management Plan (LMP) and are native to NM or the southwest, and/or are drought tolerant.
- ENV-ES working closely with the contract administrator and the vendors allowed LANL to meet the goal for desktops and notebooks. 100% of computers and laptops purchased are EPEAT registered.
- ENV-ES working closely with the contract administrator and the vendors allowed LANL to meet the goal for monitors. 97% of monitor purchases are EPEAT registered.
- ENV-ES works closely with infrastructure planning and the vendors to green furniture at LANL. In FY12 LANL procured furniture that met one or more attributes (BIFMA level 1 or higher, recycled content, Greenguard or EcoLogo 033). 99% of furniture procured in FY12 met or exceed the priority product requirements and comply with LANL statement of work and technical requirements, ES&H subcontract requirements and quality assurance requirements.

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 2013 LANL will continue to provide procurement data on purchases for PPTRS reporting. 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 which 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 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 and 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 STEWARSHIP AND DATA CENTERS**

### **DATA CENTERS AND ELECTRONIC STEWARDSHIP**

#### **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 will develop an institutional strategy 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 built and piloted a small desktop virtualization service. The results of the pilot demonstrated that today this service appears to be cost negative with respect to the traditional desktop approach. LANL will continue to use desktop virtualization where other factors make the technology attractive and also monitor the economics for when the overall service is more efficient and effective than the traditional approach. Desktop virtualization may be reviewed periodically to ascertain whether the approach can be used to provide a positive return on investment.

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 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. In addition, this team will evaluate use of the DOE tool DC Pro. The team will develop and publish an institutional data center plan/approach in first half of FY 2013 targeted for implementation in the FY14 through EMS and through metrics.

## **MAXIMUM ANNUAL WEIGHTED AVERAGE POWER UTILIZATION EFFECTIVENESS (PUE) OF 1.4 BY FY 2015**

### PERFORMANCE STATUS

The Power Utilization Effectiveness (PUE) is calculated and reported to DOE in order to track energy management improvements and best management practices. The weighted PUE measured for the SCC and LDCC data facilities is 1.48.

LANL will continue to work with other Laboratories in an effort to learn as well as share with them best management practices for lowering the PUE value.

### PROJECTED PERFORMANCE

By 2013, LANL will measure IT power within the CCF to calculate the PUE. In 2013 LANL forecasts an increase to the weighted PUE as additional older data centers are metered and added to the metric. LANL will increase the data center metering to account for approximately 45% of the unclassified non high performance computing on-site.

LANL continues to work with DOE laboratories and efficiency groups to share and acquire knowledge of data center best practices.

## **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 a goal of 100% of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY 2015. To achieve that goal, LANL implemented a pilot project in FY 2012 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.

LANL conducted a pilot that configured power management settings on approximately 400 systems using SCCM. The systems represented both desktops and laptops running Windows 7 or Windows XP. The pilot ran from February 2012 through May 2012. During the pilot SCCM applied power setting that turned off monitors after a short period of no user activity and put computers “to sleep” after longer periods of user inactivity. The pilot computers and monitors were also placed in low power states for the majority of non-business hours, i.e. at night.

For a period of time prior to the pilot implementation, SCCM gathered baseline power consumption and cost data on the pilot systems. At the completion of the pilot, all data was gathered and compared to determine projected power consumption and cost savings for all Windows SCCM clients at LANL. Following are the parameters and results of the Power Management Pilot:

- Pilot began January 18, 2012 and ran through May 31, 2012
- ~420 systems from DCS-1 and UI identified to participate in pilot
- ~330 were reporting data at the beginning of pilot and ~230 were reporting at the end of the pilot
- The pilot represents ~ 2% of total SCCM clients

- 11 people opted out of the pilot due to need for remote desktop

#### Cost Savings

- Average Cost/Computer
  - Control Group (before power settings were applied): August 2011 – November 2011
    - Average Number of Systems Reporting: 214
    - Average Power Cost/ System: \$2.97
  - Pilot: February 2012 – May 2012
    - Average Number of Systems Reporting: 222
    - Average Power Cost/System: \$2.64
- Savings Per System: \$0.33
- Potential Savings for 11,916 workstation clients: \$3932/month, \$47,184/year
- May see improved cost savings due to higher percentage of Windows 7 systems Lab-wide
  - Pilot: XP outnumbered Win 7 by more than 2 to 1
  - Lab-wide: 61% of workstations are Win 7

#### Limitations

- Special arrangements have to be made 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
- Opting Out in Configuration Manager 2007 is a manual process that will have to be maintained by the system administrators
- Users will have to opt-out of the entire program if they occasionally run processes that will be affected by power management settings.
- In Configuration Manager 2007, Power settings cannot be customized for individual systems

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

Due to some limitations discovered during the pilot, it was determined that the implementation of centrally managed power settings would be best accomplished using the latest version of SCCM (Configuration Manager 2012). Configuration Manager 2012 allows users to individually customize their power settings to meet their needs, including opting out. Additionally, System Administrators will no longer have to manually manage systems that opt out.

The SCCM team is currently on schedule to upgrade to Configuration Manager 2012 in FY 2013. Following a successful upgrade, the SCCM team will communicate to LANL users the power management plan and opt-out procedures. Power configurations will then be applied and centrally managed for all eligible Windows systems.

## GOAL 8: SITE INNOVATION AND GOVERNMENT WIDE SUPPORT

In FY 2012 LANL participated in a Functional Management Review on Sustainability. Peer reviews were conducted at three of the National Nuclear Security Administration (NNSA) Laboratories on the implementation of sustainability programs to

achieve the DOE Strategic Sustainability Performance Plan goals. The three Laboratories selected include Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratory (SNL). These reviews were initiated by the LANS/LLNS Board of Governors Business & Operations Committee and were joined by Sandia National Laboratories to get a broad understanding of the challenges and successes experienced at the three sites. Each review used a common approach and process for inquiry.

The peer review process provided a beneficial benchmarking opportunity for each of the Laboratories. The team identified many noteworthy practices and similar challenges faced at each of the three sites. At each site the review team saw a strong connection between the Environmental Management System (EMS) and the implementation of the site's sustainability program. One common challenge was that in spite of the linkage to the EMS program the implementation efforts to achieve the sustainability goals were perceived as the facility management and operations organizations responsibility vice a shared responsibility with strong employee engagement. Another common challenge was perceived within the procurement organizations and demonstrated effort toward meeting the sustainable acquisition requirements throughout the organization and the various contract instruments used at each site. Based on the review results, the Team has developed an integrated list of recommendations for future discussion with NNSA.

## CLIMATE CHANGE ADAPTATION

Goal: Improve Understanding of Climate Change Effects and Impacts

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

- Los Alamos National Laboratory is the leading DOE site for research in climate and ecosystem programs. Through a diverse set of programs and projects the objectives are to improve the prediction of climate change through advanced ocean and sea ice modeling, increased resolution of global models, and enhanced understanding of climate and ecosystem processes, especially in high latitude and semi-arid regimes.
- The Earth and Environmental Sciences (EES) Division of Los Alamos National Laboratory solves complex present-day problems in climate science, the production of clean energy, and national and global security missions using high-performance computing, modeling, local and regional monitoring, and other unique capabilities with one emphasis on understanding climate change effects and adaptation.

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 Los Alamos National Laboratory, 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.

- Laboratory's Directed Research and Development program for research includes Grand Challenges for FY13 Priorities. The Bioenergy and Environmental Science Grand Challenge aims to ensure the *energy security* of the nation by addressing the consequences of energy production and utilization, and to enhance biotechnologies for energy production and storage. The Energy and Earth Systems Grand Challenge is to develop transformative new energy technologies and to significantly enhance and extend the use of current technologies in a manner that is sustainable and that mitigates negative environmental, social, and national security impacts. Implicit in this challenge is the development of the capability to measure, model, and predict, in a quantifiable manner, the impacts of energy choices on climate and their cascading effects on the environment and society.
- Los Alamos National Laboratory 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.

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. To address the potential changes of the future the Los Alamos National Laboratory developed a *50 Year Environmental Stewardship Plan* which evolved to become the *Long-term Strategy for Environmental Stewardship and Sustainability*. This *Long-Term Strategy* provides a set of long-term goals and intermediate objectives and supporting strategies for effective environmental stewardship at the Laboratory. 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.

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*. Los Alamos National Laboratory is a key 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. Current and past research at the Parks includes not only measuring terrestrial ecosystem processes such as carbon and water cycling, but also determining ecosystem management options, and monitoring of endangered species, animal dynamics, virus threats, pollution and hydrology in response to climate change. 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.

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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
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
RECs	Renewable Energy Certificates
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
SF <sub>6</sub>	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) FIMS final list of buildings with excluded buildings and copy of the exclusions self-certification form**
- 2) Metering Plan**
- 3) Long-Term Strategy for Environmental Stewardship & Sustainability Consolidated Energy Data Report**
- 4) Consolidated Energy Data Report**