

FY2014



SITE SUSTAINABILITY PLAN

Taking Steps Toward the Future



Pacific Northwest
NATIONAL LABORATORY

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PACIFIC NORTHWEST NATIONAL LABORATORY
operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC05-76RL01830

Printed in the United States of America

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(9/2003)

Site Sustainability Plan

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On The Cover: Mentoring the next generation of scientists, engineers, and technologists through real-life experiences. At PNNL, we believe collaboration fuels innovation.

Acronyms and Abbreviations

AFV	alternative fuel vehicles	HEMSF	High Energy Mission Specific Facility
ARM	Atmospheric Radiation Measurement (Climate Research Facility)	HPSB	high performance sustainable building
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers	HVAC	heating, ventilation, and air conditioning
BOCC	Building Operations Control Center	IG	(DOE) Inspector General
BTU	British Thermal Unit(s)	ILA	industrial, landscaping, and agricultural (water)
CBCP	Certified Building Commissioning Professional	IM	Information Management
C&D	construction and demolition	IPM	integrated pest management
CD-2	Critical Decision 2	ISB2	Information Sciences Building 2
CEDR	Consolidated Energy Data Report	IT	information technology
CEM	Certified Energy Manager	JGCRI	Joint Global Change Research Institute
CEQ	Council on Environmental and Quality	kW	kilowatt(s)
CO ₂ e	carbon dioxide equivalent	LDRD	Laboratory Directed Research and Development
CRAC	computer room air conditioning	LDV	Light Duty Vehicle
CSF	Computational Sciences Facility	LEED®	Leadership in Energy and Environmental Design
DC Pro	Data Center Profiler Software Tool Suite	MHP	Managed Hardware Program
DHS	U.S. Department of Homeland Security	MT	metric ton(s)
DLA	Defense Logistics Agency	NASA	National Aeronautics and Space Administration
DOE	U.S. Department of Energy	NEV	neighborhood electric vehicles
DOEGRIT	DOE Green IT	N ₂ O	nitrous oxide
DSOM™	Decision Support for Operations and Maintenance Software	OMB	Office of Management and Budget
EB	existing building	PC	personal computer
ECM	energy conservation measure	P2	Pollution Prevention
EDL	Engineering Development Laboratory	PNNL	Pacific Northwest National Laboratory
EISA	Energy Independence and Security Act of 2007	PRIMA	Platform for Regional Integrated Modeling and Analysis
EMSL	Environmental Molecular Sciences Laboratory	PUE	power usage effectiveness
EPA	U.S. Environmental Protection Agency	PV	photovoltaic
EPAct	Energy Policy Act of 2005	R&D	research and development
EPEAT	Electronic Product Environmental Assessment Tool	RDHx	rear door heat exchanger
ESPC	Energy Savings Performance Contract	REC	Renewable Energy Certificate
FIMS	Facilities Information Management System	RPL	Radiochemical Processing Laboratory
FY	fiscal year	SEL	Systems Engineering Laboratory
gal	gallon(s)	SF ₆	sulfur hexafluoride
GGE	gallons of gasoline equivalent	sq ft	square foot/feet
GHG	greenhouse gas	SSP	Site Sustainability Plan
GP	Guiding Principles	SSPP	Strategic Sustainability Performance Plan
GRI	Global Reporting Initiative	S&T	science and technology
GSA	General Services Administration	T&D	transmission and distribution
GSF	gross square foot/feet	TRIM	Total Records Information Management
HD	high definition		
HDI	How Do I?, PNNL's standards-based management system		

Much like a honeycomb with its interlocking pieces that gain strength through mutual support and integration, our three pillars and twelve focus areas create a Sustainability Program that is greater than the sum of its parts.



PNNL's sustainability vision is to continue being recognized as thought leaders by our customers, our staff members, and the community. We develop and use solutions to make the world a more sustainable place. We set and achieve aggressive goals by empowering employees to be part of the solution.

At Pacific Northwest National Laboratory (PNNL), we achieve excellence in sustainability through our science and technology (S&T), management and operations, and through our role in the community. We continually increase our commitment to environmental stewardship through the S&T we deliver to solve global energy and environmental challenges and by managing the impact of our operations on the environment. We have a long history of protecting and using natural resources wisely. We strive to reduce energy use and greenhouse gas (GHG) emissions associated with our buildings and employee transportation.

With a comprehensive approach to fulfilling the Strategic Sustainability Performance Plan (SSPP), PNNL advances the U.S. Department of Energy (DOE) sustainability mission with a diverse, focused effort toward goals for the fiscal year (FY) 2020 and beyond. Our scientists and facilities staff partner to find and implement innovative solutions while educating staff members about ways they can minimize environment impacts as well as help us meet aggressive goals in these areas. PNNL achieved all FY13 Site Sustainability Plan (SSP) goals. Notable achievements from FY13 are listed below.

- High Performance Sustainable Buildings (HPSBs):** PNNL certified two additional buildings and has achieved 31% of our portfolio as meeting the HPSB criteria, which exceeds the DOE goal of 15% by FY15. The Radiochemical Processing Laboratory (RPL) is the first DOE Office of Science nuclear laboratory to achieve HPSB status using the five Guiding Principles criteria for existing buildings.
- Scope 3 GHG:** PNNL initiated a Telework Program, with staff members logging over 20,000 days collectively. Beyond helping achieve GHG goals by eliminating commuting miles, flexible work arrangements save our staff money and time, reduce stress, increase productivity, and help staff to meet a better work/life balance. In addition, 34 collaboration-ready conference rooms were established throughout PNNL and satellite locations. These collaboration tools contributed to a reduction in our Scope 3 GHG from employee commuting and will lead to reductions in business travel.
- Sustainability Pays:** PNNL's Sustainability Pays Program encourages staff to submit innovative ideas that would contribute to the achievement of SSP goals. Of the project proposals funded, three noteworthy successes were:
 - developing pump controllers for research vacuum equipment
 - replacing sulfur hexafluoride (SF₆) with nitrous oxide (N₂O) as a tracer gas
 - removing bicycle roadblocks through installation of communal bike pump/fixing stations.

For additional information about these projects, please refer to the success story sections of this SSP.

The following table summarizes each of DOE's Office of Science goals, along with PNNL's performance status, planned actions, and an assessment of the risk of non-attainment as noted below:

<p>Technical Risks: Technology is/is not available in current facilities and systems to attain goal</p> <p>Management Risks: Management systems and/or policies may require changes for which approval authority is outside DOE or requires an internal policy or procedural change</p> <p>Financial Risks: Funds are/are not identified in current or out-year targets to achieve goal</p>	<p>Each risk is assigned a rating of high, medium, or low, defined as follows.</p> <p>High Risk: Risk in one of the three categories is so significant that goal non-attainment is likely or expected</p> <p>Medium Risk: Risk in one of the three categories is significant enough that goal non-attainment is moderate</p> <p>Low Risk: Any risks are satisfactorily mitigated such that goal attainment is likely</p>
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Summary Table of Goals and Targets

SSPP Goal	DOE Goal	Performance Status Through FY13	Planned Actions and Contribution	Risk of Non-attainment
Goal #1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory				
1.1	28% Scope 1 & 2 GHG reduction by FY20 from a FY08 baseline (FY13 target: 17%)	FY08 Baseline: 36,076 metric tons (MT) of carbon dioxide equivalent (CO ₂ e) FY13 Actual: 41,706 MTCO ₂ e (367 MTCO ₂ e adjusted for renewable energy certificates [RECs]) FY20 Goal: 25,975 MTCO ₂ e Status: Including REC's goal achieved	Continue REC purchases for near-term GHG reduction goal and implement energy conservation measures, where cost effective.	Low
1.2	13% Scope 3 GHG reduction by FY20 from a FY08 baseline (FY13 target: 4%)	FY08 Baseline: 23,775 MTCO ₂ e FY13 Actual: 21,526 MTCO ₂ e FY20 Goal: 20,684 MTCO ₂ e Status: 9.5% Reduction	Continue promoting telework and high-end video usage to reduce travel; encourage staff through bus and carpool promotions and incentives.	Low
Goal #2: Buildings, Energy Savings Performance Contract (ESPC) Initiative Schedule, Regional and Local Planning				
2.1	30% energy intensity (British thermal units [Btu] per gross square foot [GSF]) reduction by FY15 from a FY03 baseline (FY13 target: 24%)	FY03 Baseline: 197,817 Btu/GSF FY13 Actual: 151,021 Btu/GSF FY15 Goal: 138,472 Btu/GSF Status: 23.7% reduction	Continue implementing Consolidated Energy Data Report (CEDR) projects and operational improvements	Medium
2.2	Energy Independence and Security Act of 2007 (EISA) Section 432 energy and water evaluations	Completed first year of the 4-year EISA cycle of eight Buildings	Continue executing EISA evaluations	Low
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) ⁽¹⁾ (FY13 target: 90% and 50%, respectively)	FY13: 100% metering of electricity, 100% metering of natural gas, 95.7% metering of water	Improve building performance through data analysis from the meters	Low
2.4	Unless uneconomical, install cool roof for replacements unless project already has Critical Decision-2 (CD-2) approval. New roofs must have thermal resistance of at least R-30. ⁽²⁾	FY13: 61% of PNNL roof area per Facilities Information Management System (FIMS) are cool roofs	Unless uneconomical, all new roofs will have a thermal resistance of at least R-30 and be solar reflective, consistent with former DOE Secretary Chu requirements	Low

(1) Per National Energy Conservation Policy Act (U.S. Code Section 8253), the term "buildings" includes industrial, process, or laboratory facilities.
 (2) Former Secretary of Energy Chu, Installation of Cool Roofs on Department of Energy Buildings, Memorandum for Heads of Departmental Elements, June 1, 2010.

2.5	15% of existing buildings greater than 5,000 GSF are compliant with the HPSB Guiding Principles by FY15 (FY13 target:11%)	31% of PNNL buildings > 5,000 GSF per FIMS are HPSB compliant	Continue trending toward 100% of facilities meeting HPSB	Low
2.6	All new construction, major renovations, and building alterations greater than 5,000 GSF must comply with the Guiding Principles ⁽³⁾	Institutionalized the Guiding Principles commitment in PNNL Engineering Standards	Achieve Guiding Principles for all new construction greater than 5,000 GSF	Low
Goal #3: Fleet Management				
3.1	10% annual increase in fleet alternative fuel consumption by FY15 relative to FY05 baseline (FY13 target:114% cumulative since FY05)	FY06 Baseline: 456 gallons (gal) of gasoline equivalent (GGE) (note: FY05 usage not measured) FY13 Actual: 10,590 (GGE) FY20 Goal: 1,183 gal Status: Exceeded Goal	Actively manage alternate fuel use through fleet oversight and staff training; increase percentage of alternative fuel vehicles (AFVs) when available	Low
3.2	2% annual reduction in fleet petroleum consumption by FY20 relative to FY05 baseline (FY13 target: 16% cumulative since FY15)	FY05 Baseline: 38,824 gal (GGE) FY13 Actual: 31,244 gal (GGE) FY20 Goal: 28,674 gal Status: 19.5% Reduction	Continue assessing the transition to AFVs	Low
3.3	100% of light duty vehicle (LDV) purchases must consist of AFV by FY15 and thereafter (75% FY00–FY15) ⁽⁴⁾	Of total 46 LDVs in PNNL fleet, 37 (80%) are AFVs; added 4 E85 AFVs and 1 hybrid in FY13	Continue working with fleet vendors to replace vehicles with AFV types where available	Low
3.4	Reduce fleet inventory of non-mission critical vehicles by 35% by FY13 relative to a FY05 baseline	Removed all 19 non-mission critical vehicles	Continue assessing fleet utilization and right-sizing, if appropriate	Low
Goal #4: Water Use Efficiency and Management				
4.1	26% potable water intensity ((gal/GSF) reduction by FY20 from a FY07 baseline (FY13 target: 12%)	FY07 Baseline: 66.85 gal/GSF FY13 Actual: 27.28 gal/GSF FY20 Goal: 49.47 gal/GSF Status: Exceeded Goal	As feasible, continue implementing potable water projects to reduce overall use	Low
4.2	20% water consumption (gal) reduction of industrial, landscaping, and agricultural (ILA) water by FY20 from a FY10 baseline (FY13 target: 6%)	FY10 Baseline: 97,522,000 gal FY13 Actual: 124,857,000 gal FY20 Goal: 78,017,600 gal Status: 28.0% Increase	Continue implementing Landscaping Plan with focus on reducing ILA where possible	Medium
Goal #5: Pollution Prevention (P2) and Waste Reduction				
5.1	Divert at least 50% of non-hazardous solid waste, excluding construction and demolition (C&D) debris, by FY15	FY13: Diverted 57% of non-hazardous solid waste	Continue conducting assessments for waste reducing opportunities	Low
5.2	Divert at least 50% of C&D materials and debris by FY15	FY13: Diverted nearly 100% of C&D waste	Continue monitoring C&D recycling performance and raising awareness on waste diversion requirements	Low

(3) DOE considers buildings meeting the following criteria as complying with Guiding Principles (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 upon Office of Management and Budget (OMB) and Council on Environmental and Quality (CEQ) approval).

(4) EPA 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>

Goal #6: Sustainable Acquisition				
6.1	Procurements meet requirements by including necessary provisions and clauses (Sustainable Procurements/ Biobased Procurements)	100% of acquisitions have sustainability requirements and clauses	Continue being proactive with sustainable item procurement	Low
Goal #7: Electronic Stewardship and Data Centers				
7.1	All data centers are metered to measure a monthly power utilization effectiveness (PUE) of 100% by FY15 (FY13 target: 80%)	Two of PNNL's three data centers (67%) are fully metered	Complete data center metering before FY15	Low
7.2	Maximum annual weighted average PUE of 1.4 by FY15 (FY13 target: 1.60)	FY13: Annual weighted average PUE is 2.1. One of PNNL's three data centers is below 1.4 PUE.	Implement projects to trend toward goal	Medium
7.3	Electronic Stewardship: 100% of eligible personal computers (PCs), laptops, and monitors with power management actively implemented and in use by FY12	100% of eligible equipment is compliant	Assure new equipment has power management features	Low
Goal #8: Renewable Energy				
8.1	20% of annual electricity consumption from renewable sources by FY20 (FY13 target: 7.5%)	FY13: 70.7% of annual electric consumption from on-site generation and REC purchases	Continue operating our 125 kilowatt (kW) on-site photovoltaic (PV) array and purchasing RECs	Low
Goal #9: Climate Change Adaptation				
9.1	Climate Change Adaptation - Address DOE Climate Adaptation Plan goals	Completed all actions planned for FY 2013	Continue to seek opportunities to participate in existing partnership with agencies in the Pacific Northwest region	Low



Telework Program provides flexibility enabling staff to work productively.

Goals

- 1.1 – 28% Scope 1 & 2 GHG reduction by FY20 from a FY08 baseline
- 1.2 – 13% Scope 3 GHG reduction by FY20 from a FY08 baseline

Greenhouse Gas

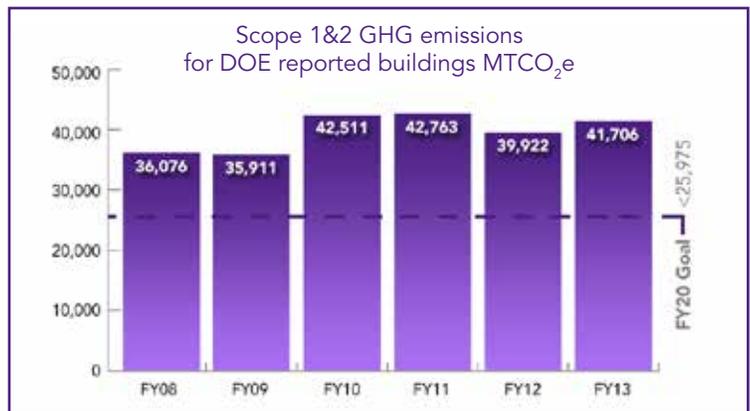
PNNL will continue targeting opportunities that have a net positive effect on Scope 1, 2, and 3 GHG emissions.

FY13 Performance Status

Scope 1 & 2

PNNL continues to work toward the goal of reducing GHG Scope 1 & 2 emissions by 28% by FY20 compared with our FY08 baseline. In FY13, PNNL targeted several activities to reduce Scope 1 & 2 GHG further. Items include installation of a higher efficiency supercomputer, further consolidation of servers, expansion of core business hours, updating our Engineering Standards and Specifications, and initiating monthly Building Operations Control Center (BOCC) meetings with building core teams.

The PNNL FY08 Scope 1 & 2 baseline is 36,076 MTCO₂e. Between FYs 08 and 13, growth (especially in computational sciences) increased our overall energy usage, resulting in a FY13 Scope 1 & 2 of 41,706 MTCO₂e. PNNL performance between FYs 12 and 13 shows a 4.5% increase of Scope 1 & 2, primarily driven by additional supercomputer loads. PNNL continues to implement its strategy of procuring RECs in FY13, resulting in an offset of 41,339 MTCO₂e.



SF₆ Reduction

PNNL inventoried all of its existing sources of SF₆ and has a good understanding of its uses, which have historically been as an insulator in electron microscopes and as tracer gas in research. In 2011, PNNL worked with researchers who used SF₆ as a tracer to adopt a substitute gas, N₂O, which has a lower global warming potential. This replacement has continued, and no new project work has included SF₆.

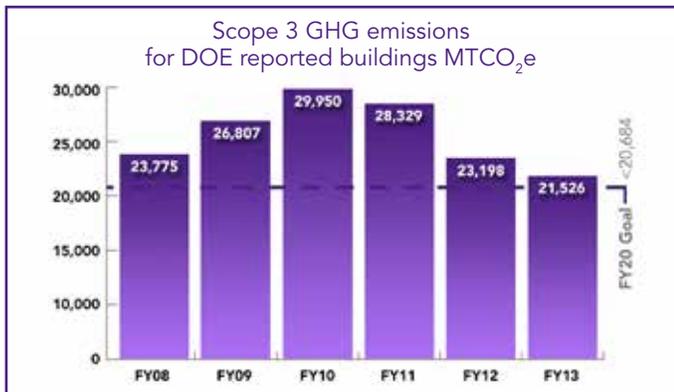
For electron microscopes, SF₆ is relatively stable, and any year-to-year fluctuations are primarily due to use of a mass balance inventory method. In 2013, a large container of SF₆, which had been in inventory since 2003, was removed, causing the appearance of a spike in SF₆ use.

Scope 3

All Scope 3 Emissions

Before adjusting for transmission and distribution loss-related emissions avoided through REC purchases, Scope 3 emissions totaled 21,526 MTCO₂e, representing a 9.5% reduction from the FY08 baseline.⁽¹⁾

Business travel was the largest contributor to these emissions (54.1%), followed by employee commuting (35.5%) and transmission and distribution (T&D) losses (8.6%). Emissions from contracted solid waste disposal and wastewater treatment made up just 1.8%. Reducing Scope 3 emissions continued to be a strategic priority at PNNL in FY13. Specific activities are discussed in more detail below.



Business Air and Ground Travel

In FY13, total emissions from business travel were 13,107 MTCO₂e, a decrease of 12.9% compared with FY12. Air travel totaled 12,318 MTCO₂e and decreased 13% compared with FY12. Business ground travel decreased 11% over the previous year.

While PNNL has had three years of business travel volume decreases, emissions remain 1% above FY08 baseline levels. As noted in previous SSPs, PNNL experienced a dramatic increase during FY09 and FY10 in business volume and business travel to support project-specific requirements (e.g., the Department of Homeland Security's (DHS) Radiation Portal Monitoring Program).

Compared with FY12, the decrease in business travel emissions is primarily attributable to decreases in project work requiring travel and reduced staffing numbers. In addition, in FY13 PNNL took major steps to enhance remote collaboration capabilities and encourage staff to explore alternatives to business travel where possible. Key accomplishments include:

- Rollout of Lync 2013 to all staff, which allows users to connect with both internal and external collaborators through instant message, video calls, online meetings, chat and desktop sharing.
- Rollout of a suite of mobile platform tools which allow employees to access work documents and applications remotely.
- Added high-end, easy-to-use Tandem video systems to 14 conference rooms throughout PNNL and satellite locations to facilitate Lync video meetings. Another 20 conference rooms will have a overhead projector and a Polycom Roundtable camera, which enables remote meeting participants to see 360° views of the meeting space and individual views that track according to the current speaker.
- Hands-on training to overcome barriers to using the new equipment, mobile tools and Lync software so all staff are comfortable with the modern collaboration tools.



Employee Commuting

PNNL's employee commute emissions in FY13 totaled 8,611 MTCO₂e, a decrease of 3.4% from FY12.⁽²⁾ As noted in previous SSPs, emissions climbed sharply after FY08 as employment levels increased by 17% from the baseline year. The decrease in FY13 emissions is attributed to a decrease in permanent staff of 2.9% from FY12 levels, an increased use of alternative commute methods and the expansion of the telework program to all of PNNL at the end of FY12. Employee commute emissions in FY 2013 were 2% above the FY08 baseline.

(1) FY12 and FY13 Scope 3 emissions are below FY11 levels largely due to a change in accounting practices. For the first time in FY13, transmission and distribution loss-related emissions avoided through REC purchases were deducted from the Scope 3 emissions total.
 (2) Commute emission estimates were calculated using the General Services Administration's (GSA's) Carbon Footprint Tool employee commute survey administered bi-annually. Note that because no survey was conducted in FY13, employee commute emissions were extrapolated proportionally based on the change in staffing levels from FY12.

More and more staff were able to take advantage of the telework option in FY13 as the culture shifted to greater acceptance of the new way of working. By the end of FY13, approximately 16% of employees had signed telework agreements, with 4.4% of staff reporting teleworking at least once per week on average. Staff recorded 20,928 telework days through the PNNL electronic time-keeping tool and avoided an estimated 196 MTCO₂e.

A Telework Advocate raised staff awareness of commute alternatives through all-staff communications, including a website and quarterly sustainability newsletter, which featured an “alternative commuter of the month” competition for prizes. PNNL hosted several events in FY13 to bring alternative commuters together to share best practices, including a wellness challenge, two bike-to-work days, booths at the Sustainability Fair, the Diversity Fair and the annual employee safety picnic, and three bicycling workshops.

PNNL continued its partnership with a regional alternative commute support service, RideShare Online, to provide custom tailored ride matching and alternative commute tracking support.

The newly formed PNNL Cycling Club remained active, and although the number of employees in it is small, it demonstrates strong enthusiasm for this commute method and continues to attract the attention of most staff. The club recently competed in a national competition to log their commute miles.

Bus passes continue to be purchased by 30-50 staff each month. PNNL bus commuters avoided even more emissions this year after the local transit authority deployed one of the first all-electric buses in the country.

Interest in and ownership of personal electric vehicles grew stronger this year, and several employees are taking a leadership role in the community to promote this mode of transportation. Employees may purchase pre-paid cards which enable them to use the car-charging stations located on-site.



Other Scope 3 Emissions Sources

All other emission sources comprise 10% of PNNL’s Scope 3 emissions. Specifically, T&D losses attributable to DOE-owned and leased facilities at PNNL totaled 2,090 MTCO₂e using the national loss factor of 6.18%, a 1.8% increase from FY12. Contracted wastewater treatment and waste disposal totaled 440 MTCO₂e, a 14% decrease from FY12.

PNNL does not plan to actively manage wastewater emissions, as it can be controlled only by reducing staff numbers under the current accounting methodology. T&D losses will be managed as a result of our Scope 2 electricity reduction efforts. Waste management emissions will be actively managed as described in the P2 section.

Plans, Actions, and Projected Performance

Scope 1 & 2

For FY14, PNNL will implement continuous commissioning, perform three EISA energy and water audits, and install variable air volume systems for enhanced heating, ventilation, and air conditioning (HVAC) savings. We will also continue procuring RECs at competitive rates to offset the remainder of our GHG emissions.

SF₆ Reduction

We will continue tracking SF₆ at PNNL in the future and will look for further opportunities to manage its use by creating an informal network of SF₆ users to raise awareness around risks and best practices.

Scope 3

To achieve the 13% reduction in Scope 3, PNNL will need to reduce annual emissions by another 840 MTCO₂e over the next six years. Most of this decrease will be achieved through a combination of activities aimed at reducing business travel, employee commuting, and T&D losses associated with electricity use. PNNL will continue advancing the programs conducted in FY13 and will pursue additional activities to decrease Scope 3 emissions further.

Business Travel Emissions

During FY14, PNNL will complete the deployment of remote collaboration tools in conference rooms including satellite locations. PNNL will hold a series of technical training sessions to help staff feel comfortable using the new tools. As part of this training, IT staff will work with employees to overcome technical barriers to collaboration with external customers across DOE and other federal agencies.

Employee Commute Emissions

PNNL's commute emissions reduction strategy will continue to emphasize telework in FY13 and beyond. PNNL established a goal of 40% of all employees teleworking one day per week on average by FY20, which corresponds with meeting the goal of a 13% reduction in commute emissions.

Additional activities in FY14 to help accomplish PNNL's Scope 3 emission reduction goals include engaging staff through communications, special events, seminars, challenges and staff recognition.



New collaboration tools: the engine behind innovation.

Success Story

Working together, the Sustainability Program and Information Management (IM) Services put mobile tools and audio/visual equipment in the hands of PNNL staff and in our conference rooms, enabling them to do their jobs exceptionally well—regardless of physical location.

2013 Lync software is more capable than ever, meaning PNNL staff members are as well! Wherever they go, staff can stay connected—to work, customers, and each other—via chat, audio, or video from their desktop or laptop, iPad, or cell phone device.

Collaboration-ready conference rooms have been outfitted throughout PNNL, including satellite locations. Nearly half of these have high-end Tandem video conferencing systems ideally suited for meetings that require a large high definition (HD) video display. Other rooms include a Polycom Roundtable, a 360 degree web cam with “smart” audio, so that participants in multiple locations have full visual and audio views of a meeting.

IM Services has extensive hands-on training for the Lync software and new equipment so that staff can transition smoothly to the mobile and modern tools. Collectively, these innovative and mobile collaborative options give staff members the chance to remain connected with clients and colleagues—all while helping PNNL reduce Scope 3 emissions.



PNNL's Building Operations Control Center.

Facilities Performance

Advanced metering, HPSB, EISA evaluations, and energy efficiency project implementation continues positive progress toward PNNL's energy goals.

FY13 Performance Status

Energy Intensity

PNNL remains aggressive about reducing its energy intensity by 30% before FY15. We are accomplishing this goal through a combination of energy-saving projects, operational efficiencies, and improvements to our Engineering Standards and Specifications.

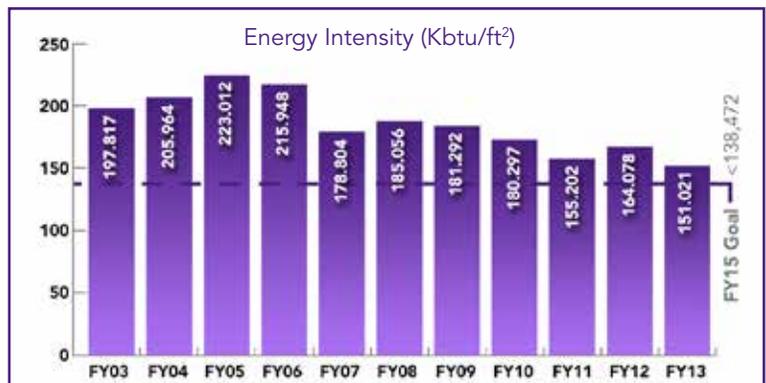
The PNNL FY03 energy intensity baseline was 198 thousand British thermal units (kBtu) per GSF. Between FYs 03 and 13, energy efficiency projects, operational improvements, and vacating several less efficient facilities offset PNNL's energy use, resulting in a FY13 energy intensity of 151 kBtu per GSF for a net 23.7% energy-intensity reduction.

Staffed by our sustainability engineer and three interns, PNNL's BOCC analyzed data from our advanced meters and building control system graphics. Developed at PNNL as an advanced supervision and diagnostic tool, Decision Support for Operations and Maintenance (DSOM™) software helped us reduce energy use, lower operations and maintenance costs, and extend equipment life in facilities. DSOM has been deployed into select PNNL facilities, which has resulted in many informed decisions about reducing energy use.

For reference, the final FIMS list of buildings dated November 22, 2013 (excluded from the energy intensity goal), and a copy of the exclusion self-certification letter can be found in Appendix A.

Goals

- 2.1 – 30% energy intensity reduction by FY15 from a FY03 baseline
- 2.2 – EISA Section 432 energy and water evaluations
- 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)
- 2.4 – Unless uneconomical, install cool roofs for replacements unless project already has CD-2 approval. New roofs must have thermal resistance of at least R-30
- 2.5 – 15% of existing buildings greater than 5,000 GSF are compliant with HPSB Guiding Principles by FY15
- 2.6 – All new construction, major renovations, and building alterations greater than 5,000 GSF must comply with the Guiding Principles



Engaged staff members who have optimal tools, equipment, and training are one of the most important contributors to our success as leaders in sustainability. We believe that staff certification through a qualified training program is vital to refreshing and sharpening staff skills about the latest energy and water saving techniques. In FY13, notable accomplishment for two of our staff members is their attending the Certified Energy Manager (CEM) and Certified Building Commissioning Professional (CBCP) courses with both successfully passing the exams. This brings our total CEM staff to six and CBCP to one, which enhances PNNL's knowledge base and organization depth.

EISA Evaluations

PNNL successfully completed the first of a four-year cycle for our eight buildings that are subject to EISA Section 432 energy and water evaluation requirements. In FY13, we finalized one facility, the information from which was used immediately to improve plant performance and plan for future energy conservation measures (ECMs) whenever cost effective. As it is difficult to project the exact energy and water reductions specific to retroactive commissioning efforts, the completed buildings showed overall energy and water use improvement.

Metering

Whole building metering as required by EISA for electricity, natural gas, and water has been completed for all buildings where economic calculations showed that it was viable to install. With real-time meter data, our BOCC has all the necessary information to perform system analyses on facilities. The PNNL Metering Plan details our successful completion of this goal and outlines future strategies of how we intend to use the data.

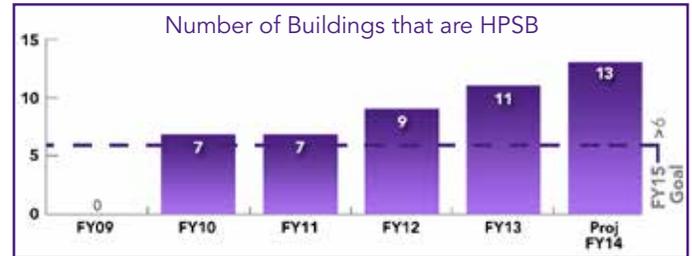
Cool Roofs

PNNL's Engineering Standards and Specifications meet the DOE-established cool roof requirements. In FY13, the PNNL cool roof inventory was 664,126 square feet or approximately 61% of FIMS facilities. We will continue to add cool roofs in both new construction and when replacing existing building roofs.

Existing Buildings

Currently, 31% of PNNL buildings meet HPSB requirements. All existing buildings have been assessed against the HPSB Guiding Principles using the checklist provided in the U.S. Environmental Protection Agency's (EPA's) ENERGY STAR Portfolio Manager.

A gap analysis in FY11 determined that pursuing either Leadership in Energy and Environmental Design (LEED®) for existing buildings (EB) Silver or Guiding Principles certification were both viable strategies to progress toward 100% of all buildings meeting the HPSB criteria. In FY13, two buildings were selected for this endeavor, and PNNL began documenting the LEED EB and Guiding Principles requirements. The results of our efforts led to the Sigma 4 building achieving LEED EB Silver certification, and the RPL building attaining HPSB status through the Guiding Principles.



New Construction

PNNL did not have any new construction activities in FY13. Potential strategies to achieve the FY30 goal of net zero buildings were discussed and incorporated into our Engineering Standards, along with adoption of the new American Society of Heating, Refrigerating & Air Conditioning Engineers (ASHRAE) 90.1 2010 energy code. While several ideas and methods were evaluated, it was determined that at this time, it is not economically practicable to construct a net zero building.

Plans, Actions, and Projected Performance

Energy Intensity

Through the BOCC, PNNL will continue initiating real-time commissioning of facility systems to increase attention on daily building system operations and reduce dependency on periodic retro commissioning. Energy conservation measures will be evaluated for life-cycle cost effectiveness and return on investment calculations. The ability to monitor, perform diagnostics, and make informed decisions will enhance the overall performance of PNNL facilities, leading to increased energy savings and greater operational performance.

Maintaining a highly qualified organization is vital to the long-term success of the Sustainability Program and ultimately the completion of the goals outlined in this SSP. We will continue to train our staff about the latest building efficiency technologies and maintain or increase the amount of qualified CEM and CBCP staff.

PNNL believes that meeting the 30% energy intensity reduction goal by FY15 will be difficult. Business growth

in key areas of PNNL's portfolio has led to energy intensity increases, most of which have been offset by aggressive management of energy usage in other areas. We will look for additional ways to reduce energy while continuing our world-class research.

EISA Evaluations

PNNL will continue to conduct energy and water evaluations in our eight covered facilities. In FY14, our plan is to complete three buildings as outlined in the CEDR. This will keep us on track to complete approximately 25% of our facilities every year, allowing us to distribute workload and funding. Identified ECMs will be tracked in the CEDR, with funding requests initiated into our planning process.

Metering

With advanced metering installations complete, PNNL will gather data for BOCC use and analyze it with our award-winning DSOM software. Any operational improvements or maintenance corrections can be easily identified and corrected in real time. Future strategies for data use will be outlined in the PNNL Metering Plan.

Cool Roofs

By institutionalizing the values and systems in our Engineering Standards and Specifications, PNNL is committed to continue installing cool roofs.

Existing Buildings

In FY14, PNNL is planning to obtain two additional facility certifications using the HPSB Guiding Principles. These certifications will continue to increase the number of HPSB certified facilities.

PNNL sees challenges in achieving 100% of all buildings reaching HPSB classification. Investments needed to achieve HPSB status may not be cost effective based on facility ages, mechanical equipment designs, or specific and specialized research activities.

New Construction

PNNL intends to begin building several new facilities over the next several years. We have committed that all new construction, major renovations, and alterations of buildings greater than 5,000 GSF will comply with the Guiding Principles or equivalent certification methods. Planning for future facilities, including line item, general plant project, or leases, will include these requirements.

The availability of high efficiency facility equipment and the incorporation of advancements in engineering methods will allow PNNL to work toward net zero buildings. PNNL will strive to meet this goal and will use life-cycle cost analysis methods to implement viable technologies and strategies.



PNNL's Radiochemical Processing Laboratory was added to our growing number of HPSB facilities.

Success Story

Constructed in 1953, the RPL is a 145,000 square foot fully functional laboratory for research related to national missions in nuclear energy, nuclear non-proliferation, environmental management, homeland security, and fundamental science.

To meet one of the most difficult HPSB requirements (i.e., 20% reduction in energy use compared to the 2003 baseline year), significant building improvements were necessary. These included revamping the heat recovery system, installing high efficiency chillers, adding cooling coils dedicated to the chilled water system, and installing Light Emitting Diode lighting. Together, these improvements reduced the energy consumption in the RPL by an impressive 25% compared to the baseline year.

Additional efforts to upgrade the RPL included the installation of meters (to measure electricity, natural gas, and water usage), occupancy-based lighting controls, and high-efficiency plumbing fixtures. The RPL is the first Office of Science nuclear research laboratory to achieve HPSB status using the Guiding Principles for existing buildings.



PNNL EV fleet.

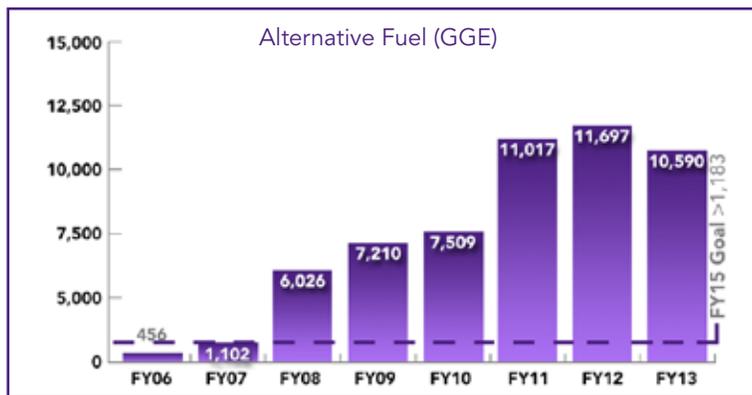
Fleet

PNNL will continue working diligently to meet all fleet goals and balance program requirements by increasing our alternative fuel fleet and integrating additional electric vehicles into service.

FY13 Performance Status

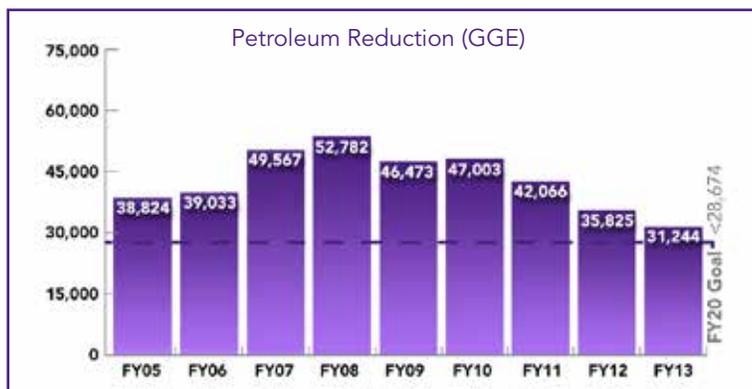
Alternative Fuel

Through continued training and proactive management, PNNL has far exceeded the goal of increasing alternative fuel use to the original baseline of 456 GGE. PNNL continues to work with local fuel stations to secure a continued supply of E85 fuel.



Reduced Petroleum

PNNL is trending in the right direction through expanded use of AFVs, including electric vehicles, and expects to achieve the goal by the end of FY20.



Alternative Fuel Vehicles

PNNL strives to meet the goal of 75% AFV purchases annually by working with vehicle suppliers to acquire AFV vehicles whenever possible. During FY13, 100% of the new fleet acquisitions consisted of AFV vehicles. Currently, PNNL has a total of 46 LDVs, of which 80% are AFVs.

Goals

- 3.1 – 10% annual increase in fleet alternative fuel consumption by FY15 relative to a FY05 baseline
- 3.2 – 2% annual reduction in fleet petroleum consumption by FY20 relative to a FY05 baseline
- 3.3 – 100% of light duty vehicle purchases must consist of AFVs by FY15
- 3.4 – Reduce fleet inventory of non-mission critical vehicles by 35% by FY13 relative to a FY05 baseline

Right-Sizing the Fleet

Completion of the right-sizing the fleet plan and identifying the critical business needs, PNNL has removed all 19 of its non-mission critical vehicles.

Plans, Actions, and Projected Performance

Alternative Fuel

PNNL will continue to research the availability of bio-diesel fuel in place of standard diesel. PNNL is also researching full-time electric vehicles and their capabilities for space and payload, with the idea of replacing some of the current larger gas and diesel engine vehicles.

Reduced Petroleum

Right now, PNNL is undergoing a transportation optimization review to assess the logistical routes presently used. This optimization team is looking to reduce both the total miles traveled and number of trips between buildings to gain efficiency and reduce petroleum consumption. The overall objective is to combine vehicle responsibilities and remove under-utilized vehicles from the fleet.

Alternative Fuel Vehicles

PNNL will continue working with the GSA or other vehicle suppliers to replace vehicles with AFV types whenever available.

Right-Sizing the Fleet

PNNL will continue to evaluate the utilization of fleet vehicles to identify and reduce non-mission critical vehicles as business needs change.



A reduced speed limit between the PNNL campus to the Hanford 300 Area helped facilitate the use of NEVs between those locations.

Success Story

PNNL now has more neighborhood electric vehicles (NEV) in its fleet than ever before. With the acquisition of additional NEVs in FY13, PNNL reduced 10 more traditional gas-powered vehicles from the fleet, reducing petroleum use and emissions.

PNNL staff worked with local government to reduce the speed limit from 55 to 35 mph on a stretch of roadway to the Hanford 300 Area. This change enabled the electric vehicles to travel between the nearby Hanford 300 Area and the PNNL campus. PNNL has staff and facilities in this area, including the newly HPSB certified RPL facility, so enabling NEV access to the area makes work easier—and greener without the use of a gas-powered vehicles.

Every staff member receives standardized training before driving the NEVs, ensuring that the new vehicles are used safely.



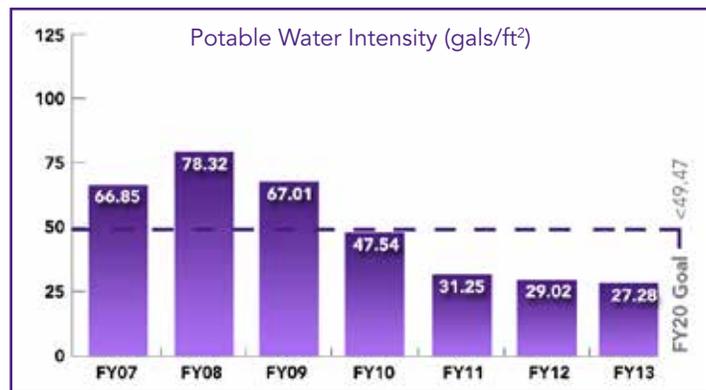
Water

PNNL will continue balancing water use with enhanced energy efficiency and sustainable landscaping for overall water reduction.

FY13 Performance Status

Water Intensity

PNNL has met the FY20 water reduction goal and, as of FY13, has reduced its intensity by 59.2%. Discharge permit regulatory reviews uncovered several opportunities for non-contact cooling water reductions and, utilizing Sustainability Pays funding, further reducing water intensity in FY13.



Efficient use of water at PNNL contributes to conservation of local nature resources.

Goals

- 4.1 – 26% potable water intensity reduction by FY20 from a FY07 baseline
- 4.2 – 20% water consumption reduction of ILA water by FY20 from a FY10 baseline

ILA Water

PNNL continued to leverage its Landscape Master Plan and implemented opportunities for ILA water savings. In FY13, three targeted actions were taken to reduce ILA:

- A recently completed repaving project will result in better ILA effectiveness because sprinklers were relocated to avoid spraying the roadway, with drainage swales capturing any excess for on-site (re)usage.
- The grounds maintenance department continued managing several large landscaped areas by daily resetting or even turning off irrigation when possible. Throughout FY13, maintenance succeeded in deactivating the water 28 times, which resulted in 20,000 gal of water each time the system remained off. This active management of our grounds maintenance team shows how engaged staff can make a difference.
- Irrigation meters were installed in several grass areas on our grounds to monitor, analyze, and control our ILA water usage even more effectively.

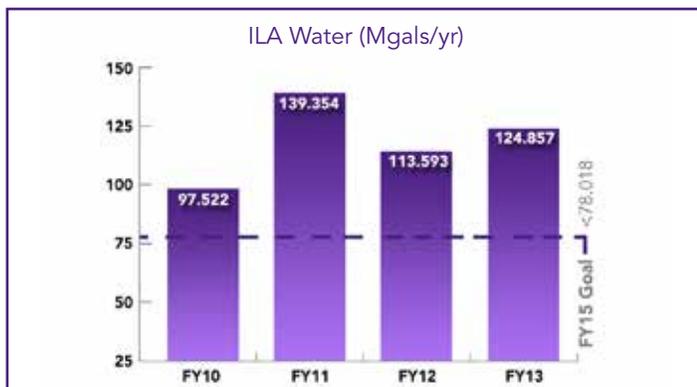
Plans, Actions, and Projected Performance

Water Intensity

PNNL plans to continue performing facility water audits specifically on the EISA-covered facilities. We believe that the trending of water usage through our BOCC will help identify additional savings. Projects that are determined to be cost effective will be completed.

ILA Water

As PNNL modernizes through new construction or major facility renovation, landscaping remains necessary for fire offsets, dust control, and heat island reduction. PNNL will continue using the Landscape Master Plan, installing metering and moisture monitoring, and using our Engineering Standards and Specifications to pursue opportunities for additional ILA reductions. Even with integrated ILA water reduction in our Engineering Standards, meeting this goal will be a challenge.



Bio-swales are incorporated into PNNL's engineering design standards for storm-water management.

Success Story

Innovation Boulevard, which runs down the center of the PNNL campus, was re-built in FY 2013 to improve safety, encourage walking to meetings through enhanced sidewalks and crossings, improve drainage and reduce irrigation water use.

Sustainable design criteria from the new *Eastern Washington Low Impact Development Guidance Manual* were used in lieu of using traditional storm water collection and conveyance features with point discharges. Flat concrete curbs and crowning of the road corrected drainage and water ponding issues which used to create slippery situations in winter. Sheet flow drainage off the road and "bio-swales" along the road now capture the storm water for percolation into the adjacent turf and root zone of the prominent sycamore trees lining the road. Extensive pavement discovered under the grass was causing shallow, dry root zones and lack of surface infiltration, so it was removed. The project team also collaborated with the grounds crew to modify sprinkler patterns along the pavement edges so that impervious surfaces aren't watered needlessly.



PNNL achieved “zero waste” events by sending food scraps to a local pig farmer.

Goals

- 5.1 – Divert at least 50% of non-hazardous solid waste, excluding C&D debris, by FY15
- 5.2 – Divert at least 50% of C&D materials and debris by FY15

Pollution Prevention

PNNL will continue to increase waste diversion, reduce its chemical inventory, and improve bio-based product purchases.

FY13 Performance Status

Waste Diversion

Solid Waste

PNNL has integrated recycling and excessing programs for multiple waste streams, including electronics, batteries, research equipment, furniture, office products, scrap metal, wood, paper, plastic, glass, aluminum, tin, and cardboard. In FY12, PNNL expanded recycling to accept all plastics coded 1 through 7. A slight increase in plastic recyclables occurred in FY13, partially due to the prior year’s efforts to increase awareness of the changes. PNNL’s excessing process includes verifying that items are free of beryllium or radiological and biological contamination. A procedure How Do I? (HDI), PNNL’s standards-based management tool, provides instructions and requirements to all staff prior to releasing any materials or equipment from PNNL.

As the strategy to move toward a fully integrated campus continues, several major relocation projects were conducted in FY13. As relocations occur, PNNL recycles as much as possible, including chemicals, furniture, books, journals, and electronic media. For example, our Technical Library relocation project donated 14,000 volumes of books. Recycling and reuse efforts will continue as additional moves are conducted in FY14.

PNNL also continues to host “zero waste” picnic events through mixed recycling and teaming with a local pig farmer. In FY13, PNNL diverted approximately 57% of non-hazardous sanitary waste.

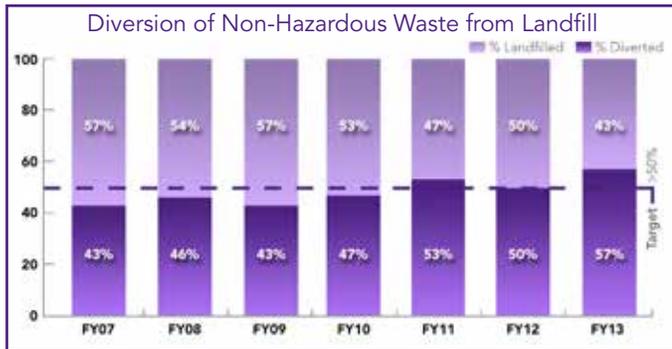
Construction and Demolition Waste

PNNL has a wide variety of C&D work activities from large construction projects to small scopes of work. In FY13, PNNL renovated one of the major campus roadways, which yielded the recycling of approximately 1,870 tons of asphalt. Based on available data, PNNL diverted nearly 100% of C&D waste in FY13.

Composting

PNNL’s composting program consists of two industrial-sized hot composters and a yard waste collection lugger. In FY13, PNNL composted approximately 1 ton of food waste. Additionally, the installation of a lugger cover

has prevented non-yard waste material from contaminating the off-site yard waste compost, allowing PNNL to divert another waste stream. Further, approximately 66 MT of yard waste and tree trimmings was sent off site for composting in FY13.



P2 Program

The fundamental mechanism for reducing waste at PNNL has been through our P2 assessments and the P2 Pays Program. In FY13, PNNL initiated a Sustainability Pays Program to encourage the triple-bottom line approach in evaluating P2/sustainability improvement opportunities. (See also the Sustainable Leadership section).

Toxic Chemical Reduction

Chemical Management

PNNL's ChemAgain chemical redistribution program provides the primary means of collecting and redistributing usable chemicals. This program has successfully redirected nearly 480 containers of chemicals through internal transfer or donation.

PNNL's strategy for implementing an integrated, risk-based approach in managing chemicals differentiates between substances based on the level of impact to safety and operations and contribution to the research and development (R&D) missions. The strategy accounts for the lifecycle of the material, its impact on facilities, and the data generated and used by staff and management. This process improves integration and effectiveness and helps reduce costs while maintaining excellence in management, research, and operations.

PNNL commenced replacing non-bio-based materials with bio-based products. In FY13, for example, a total of 1,000 gals of bio-based glycol was used to fill a new boiler system (see Sustainable Acquisition section).

Integrated Pest Management

PNNL has state-licensed commercial pesticide applicators on the grounds crew. These professionals

are required to complete continuing education annually to learn about the latest trends in pest control, current chemical and biological control agents, and updated legislative changes. All applicators are committed to integrated pest management (IPM) principles, where applicable.

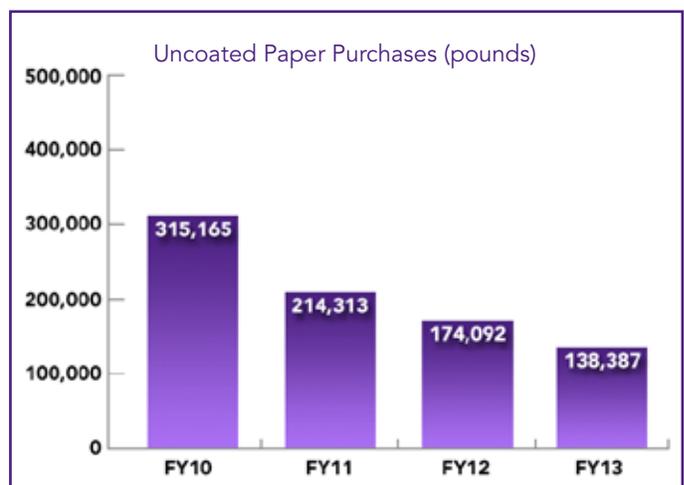
The grounds staff recognizes the responsibility to provide a clean, low-pest environment at PNNL and strives to limit control efforts to those absolutely required for optimal results. Pest control methods begin with the lowest impact, escalating when required, and only to the level necessary for acceptable control.

IPM best practices are summarized below:

- using wasp traps in lieu of spraying
- removing unwanted cardboard and wood pallets in yards and storage areas to prevent nesting
- using sticky and metal traps for mouse control
- using netting and spikes to reduce bird droppings.

Printing Paper Use

Printing continues to be an essential element for conducting PNNL's mission-related work. However, many processes are moving to electronic or paperless systems. For example, records are maintained electronically in the Total Records Information Management (TRIM) system, required training records are completed electronically and conference rooms are equipped with audiovisual equipment that enable staff to deliver presentations electronically. Networked duplex printers are provided, and new printing servers were deployed. In FY13, PNNL continued reducing printing paper use with the successful implementation of a paperless procurement process. As of April 2013, nearly half of all purchase orders were processed without using paper.



In FY13, 100% of the uncoated paper purchased contains at least 30% post-consumer content. PNNL has also reduced its consumption of uncoated printing paper by approximately 38% by weight from FY12.

Plans, Actions, and Projected Performance

Waste Diversion

PNNL has achieved both DOE 50% waste diversion goals. The following initiatives have been established to identify and address opportunities in the P2 programs.

Solid Waste

- Continue evaluating opportunities for reducing sanitary waste by evaluating recyclable collections from laboratory spaces.
- Compose a white paper on cost-effective options to improve pollution prevention practices.
- Continue fostering culture and behavior changes in waste reduction through “zero waste” and mixed recycling opportunities at events.

P2 Program

PNNL will retain the ChemAgain program to help decrease chemical inventory, thus reducing chemical disposals. PNNL will also continue supporting the implementation of staff-generated P2/sustainability opportunities.



America's emissions qualification testing going green thanks to a PNNL study.

Success Story

A study funded by the Sustainability Pays Program successfully demonstrated the use of N_2O as a ventilation tracer gas (instead of SF_6). N_2O is now included as an alternative in the draft American National Standards Institute/Health Physics Society standard on stack sampling in nuclear facilities. When revisions to the standard are finalized, users will have an alternate tracer gas that reduces GHG emissions.

For full-scale and scale model tests performed this past year, CO_2e emissions were reduced by 98%, saving 260 $MTCO_2e$. In the full-scale test alone, this change was equivalent to removing 500 cars from roadways for 1 year.

The feasibility study began in 2011 and required strong collaboration between environmental research scientists, the Effluent Management Radiological Air Task team, user facility building management, and Waste Treatment Plant contractors.

Sustainable Acquisition

PNNL includes sustainable acquisition provisions in 100% of applicable solicitations and contracts.

FY13 Performance Status

During FY13, PNNL implemented several improvements to its acquisition system for sustainability compliance. Below are highlights:

- Implemented a policy of no incandescent lighting (research equipment exceptions permitted)
- Implemented a policy to increase the use of rechargeable batteries
- Performed a targeted self-assessment of compliance with sustainable acquisition.

In addition, the Contracts Department advertised sustainable ideas to employees via an information booth at several events and remained actively involved with various ongoing internal issues to enhance PNNL staff's awareness of and commitment to sustainable purchasing.

Plans, Actions, and Projected Performance

PNNL will continue increasing staff awareness on available sustainable products, participate again in Earth Day and other events, and educate staff about sustainable acquisitions. Benchmarking with other federal agencies on best practices will also proceed. Planned activities for FY14 include the following:

- Provide continuing education to contracts specialists and technical oversight representatives about sustainable requirements and their roles/responsibilities to comply
- Provide education to end users via vendor product demonstrations and training
- Conduct a sustainability compliance self-assessment.



Bio-based products are incorporated into PNNL's procurement process.

Goal

6.1 – Procurements meet requirements by including necessary provisions and clauses (Sustainable Procurements/Bio-based Procurements)

Success Story

In summer 2013, the aging steam heating system in the Engineering Development Laboratory (EDL) was replaced with high efficiency gas-fired boilers and hydronic heating coils in air handling units. Propylene glycol was selected as the heat transfer fluid to provide coil freeze protection.

Traditionally, propylene glycol, which is manufactured from petroleum is used; however, a new, plant-based glycol was selected for this project.

First developed by PNNL researchers, the plant-based glycol is more environment friendly, reducing GHG by 61%. Economically, it also makes sense—the cost is no more than traditional petroleum-based glycol. This fluid is functionally equivalent to standard glycol, requires no special design considerations, and has no adverse effects on system components or performance.

If successful in EDL, it will be used in more PNNL facilities and ultimately included in the *Projects & Engineering Standard Design Guidelines*.

Electronic Stewardship and Data Centers

PNNL balances high performance computing and electronic stewardship while maximizing energy efficiency and operational effectiveness.

FY13 Performance Status

Data Center Metering

PNNL performed energy assessments and profiling of its data centers during FY13 using DOE Green IT (DOEGRIT), part of the Data Center Profiler (DC Pro) software tool suite. Assessment results help outline projects that will guide us to better data center efficiencies. Metering of data centers continues and is expanding with the addition of our third, and final data center in the Environmental Molecular Sciences Laboratory (EMSL).

Power Usage Effectiveness

PNNL continued to leverage a previous campus-wide data center consolidation assessment that resulted in a prioritized list of equipment to move and computer rooms from which to migrate. PNNL is still aggressively eliminating small computer rooms by moving users onto the campus institutional computer Olympus, where possible, and relocating user servers when necessary. In FY13, approximately 61% (as measured by square footage) of the less efficient computer rooms were emptied and re-purposed for other uses.

Since FY06, PNNL has aggressively pursued virtualization as the tool to minimize server sprawl, conserve energy, and reduce equipment footprint of the Information Sciences Building 2 (ISB2) data center. As of fourth quarter (Q4) FY13, PNNL business virtualization is over 85%, up from last year's 80%. With our virtual desktop early adopters, PNNL is strategically positioned to continue being a leader in data center energy efficiency. Additionally, we report several data center-related highlights:

- Installed environmental instrumentation in data centers, allowing higher operating temperature.
- Newer, more energy efficient uninterruptible power supplies and transformers.
- Moved cooling closer to the IT load, reducing cost and improving efficiency.



Cold aisle containment has improved datacenter PUE.

Goals

- 7.1 – All data centers are metered to measure a monthly PUE of 100% by FY15
- 7.2 – Maximum annual weighted average PUE of 1.4 by FY15
- 7.3 – Electronic stewardship: 100% of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY12

- Specified more energy efficient computer clusters by including Total Cost of Ownership as a purchasing factor.
- Eliminated the humidification cycle in two of the three data centers while maintaining ASHRAE recommended parameters.
- Continued to virtualize applications as needed, especially older systems moving to the more energy efficient data centers.
- Closed five small data centers, which allowed us to shut down six computer room air conditioners (CRACs) that varied in size from 5 to 20 tons each. This action will save nearly 500 megawatt hrs/year in cooling at those discrete sites. On average, one-third of the servers were physically moved to more energy efficient data centers, with the other two thirds converted to virtual machines or completely eliminated, saving even more energy.

Achieving an annual PUE-weighted average of 1.4 across all three PNNL data centers will require different solutions at each building to maximize the unique existing configurations. Our PUE metering will allow us to determine the success and degree of impact of various energy efficient projects. Some energy saving projects have included removal of under-floor cable, replacement of outdated equipment and supplies, and use of rear door heat exchangers (RDHx) to cool the Cascade and Olympus high density high performance computers.

All three data centers have been profiled using DC Pro by our Certified Data Center Energy Practitioner. Results are as follows:

- CSF: PUE 1.325 annualized (slight increase due to construction)
- EMSL: PUE 2.36 annualized
- ISB2: PUE 1.55 annualized.

Electronic Stewardship

With the deployment of Windows 7, PNNL minimized power consumption with user pre-configurations on new Windows-based systems and displays. PNNL continued to promote upgrading desktop operating systems, resulting in a 9% improvement in Windows 7 adoption. An aggressive campaign is underway to upgrade or retire the remaining Windows XP systems.

A pilot program in FY12, teleworking was formally rolled out in FY13 and specifically targets Scope 3 commuting emissions. A side benefit of teleworking is a migration

to energy efficient laptop devices (for ease of mobility and taking home) in the office environment, which will further decrease PNNL's overall energy use. The acquisition of electronic office products is through our Managed Hardware Program (MHP), where 100% of the PC offerings are Electronic Product Environmental Assessment Tool (EPEAT) and ENERGY STAR registered. Any deviation from the pre-approved MHP purchase list is discouraged and requires management approval.

Disposition of 100% of PNNL's electronic assets is through the Excess Materials and Redeployment Service group, where equipment can follow one of four paths: Computers for Learning, redeploy within PNNL, Tri-City Asset Recovery, or DOE-approved vendor recycling.

Plans, Actions, and Projected Performance

Data Center Metering

PNNL will continue performing energy assessments and profiling of its data centers using DOEGRIT. Assessment results will be analyzed using the Decision Tool and implemented if cost effective. Installation of data center metering will also continue, and PNNL intends to meet the FY15 goal of having all data centers metered. The EMSL data center will join the Computational Sciences Facility (CSF) and ISB2 data centers with sufficient metering in place to report PUE information.

Power Usage Effectiveness

As PNNL continues to move toward the 1.4 PUE goal, various methods will be considered and employed to improve energy efficiency in the data centers, to include minimizing the number of systems that exist in general laboratory space.

Some of the major focuses to achieve the PUE goal are listed below:

- Migrate data center lighting onto motion-sensing circuits to minimize energy wasted by leaving lights on throughout nights and weekends.
- Revamp 240 Volt power distribution to sensed higher voltage units, where appropriate.
- Continue virtualizing systems to reduce both the physical footprint and energy use.
- Use ceiling plenums as hot air returns to avoid hot and cold aisle mixing.
- Reduce operating CRACs to a minimum and place

spare cooling capacity into an emergency start pool controlled by an auto-start circuit to save cost of running idle AC units.

- Replace CRAC air circulation motors with high efficient motors to reduce energy consumption.
- Install aerodynamic fans and more efficient motors on outdoor chillers.

Electronic Stewardship

PNNL will continue to accomplish electronic stewardship goals through a variety of mechanisms, including the use of power management capabilities (part of our current management suite), accelerating the pace of upgrading remaining workstations to Windows 7, and upgrading to the latest version of the Mac operating system. We continuously look for more energy efficient end user devices as they appear on market and work hard to educate users about how they can be more efficient consumers of computational resources. PNNL is proactive with our existing MHP for the acquisition and proper disposal and disposition of excess computers and electronic equipment.

PNNL will continue to establish and implement policy and guidance to encourage the use of appropriate power management, duplex printing, and other energy efficient or environmentally preferred options and features on capable electronic products. Low energy intensive laptop computers will become the norm as PNNL works towards its goal of 40% of employees teleworking at least one day per week by FY20.

Potential energy conservation initiatives in the desktop/end user computing space that are under consideration include; increasing utilization of virtual desktops and more energy efficient end user devices, and increasing the use of mobile and collaboration technologies. The use of virtual desktops also reduces the need for multiple user systems. Other potential conservation initiatives include implementing a power management strategy for desktops and conducting an evaluation and pilot for the use of public cloud for targeted services. Currently, self-service provisioning is available and functional campus-wide via PNNL's private cloud.



EMSL's "Cascade" supercomputer.

Success Story

PNNL's new supercomputer Cascade can do in 1 hour what would take a typical laptop over 20 years. With a DOE-required PUE of 1.4, Cascade needs just 0.59 kW per teraflop of computing capability, far below its Chinook predecessor with over 8 kW.

Facility modifications further improved Cascade's energy efficiency. Subfloor cooling gave way to piping that distributes chilled water to all of the computer racks. Saving the energy and the expense of air handling units like Chinook, Cascade is water-cooled via RDHxs. This feature enabled PNNL to remove four CRACs, saving even more energy as well as space. Additionally, a new transformer yard was located near the data center, reducing transmission loss and further aiding in fulfillment of PUE requirements.



Renewable Energy

Leveraging large-scale, interagency REC procurements will continue to enable purchasing at the lowest cost possible.

FY13 Performance Status

In FY13, PNNL procured enough RECs to offset 70.7% of its electrical use and is already meeting the FY20 goal of 20% annual electrical consumption. As noted in this section's Success Story, we standardized the process for evaluating and procuring RECs through a third-party supplier, leveraging multi-agency REC procurements. This competitive bidding process enables us to achieve the best price as recognized during a recent DOE IG audit.

Aside from RECs, PNNL has several on-site solar arrays. The solar hot water heater installed at EMSL produces approximately 160,000 Btu/hr of hot water and is dedicated to the lunchroom and associated restrooms, fulfilling the majority of that area's hot water needs. Several solar PV arrays also power various air and water monitoring stations throughout the campus. In addition, PNNL operates a 125 kW PV array, which includes charging stations for electric fleet vehicles and is used for several R&D projects.

Competitive bidding process saves money on RECs.

Goal

8.1 – 20% of annual electricity consumption from renewable sources by FY20

Success Story

In FY13, PNNL standardized the process for evaluating and procuring RECs annually to the desired number of certificates. Adjustments are made based on growth, LEED commitments, and desired GHG Scope 1 and 2 offsets. RECs are solicited every two years to minimize the internal cost and manpower needed for the procurement. Utilizing the Defense Logistics Agency (DLA) multi-agency REC solicitations, PNNL has successfully leveraged its procurement through an established competitive bidding process in order to attract the attention of enough REC brokers to achieve the best overall price. This best practice was recognized during a recent DOE Inspector General (IG) audit.

Plans, Actions, and Projected Performance

As previously noted, PNNL annually assesses the necessary number of RECs based on growth, LEED commitments, and desired GHG Scope 1 and 2 offsets. The strategy of competitively bidding for REC procurement will continue to meet (and likely exceed) the renewable energy goal of 20% of annual electrical consumption.

PNNL is committed to finding ways to increase the amount of renewable power generated on site. We will periodically review the addition of new projects where economically feasible. All new building construction will evaluate the cost effectiveness of the use of solar hot water heaters (EISA section 523), in accordance with our Engineering Standards and Specifications.



Climate Change Adaptation

During FY14, we will continue seeking opportunities to participate in existing partnerships with agencies in the Pacific Northwest region that focus on adaptation strategies.

PNNL continues to examine the impacts of climate variability and change on our site's operations and is integrating approaches to managing these impacts into strategic planning efforts for our campus.

Goal 1: Improve Understanding of Climate Change Effects and Impacts

Objective 1.1: Work with other agencies to improve our understanding of climate change

PNNL has a number of collaborative research efforts underway that seek to improve our understanding of climate change effects and impacts. Our Climate and Earth Systems Science research tackles key questions related to atmospheric aerosols, clouds, and precipitation; human systems such as agriculture and energy; the cycling of water, carbon, and other important constituents; and the impacts of and potential responses to climate change. To help better understand these systems and their interactions, PNNL draws from core research capabilities in:

- climate, aerosol, and cloud physics
- regional and global scale modeling
- integrated assessment of energy and the environment
- complex regional meteorology and chemistry
- computational science and mathematics

Much of this work involves collaboration with other federal entities, including DOE, DHS, EPA, National Aeronautics and Space Administration (NASA), universities, and industry. A few examples of the programs and facilities we bring to climate research include the following:

- Joint Global Change Research Institute (JGCRI) – With the University of Maryland, PNNL has domestic and international collaborators to deepen our understanding of the interactions between climate, energy production and use, economic activity, and the environment.

Researchers at PNNL taking steps to advance understanding of global climate change.

Goal

9.1 – Climate Change Adaptation — Address DOE Climate Adaptation Plan goals

- The Platform for Regional Integrated Modeling and Analysis (PRIMA) initiative – A Laboratory Directed Research and Development (LDRD) initiative, PRIMA evaluates interactions among climate, energy, land, and water systems at a regional scale in an integrated manner.
- Atmospheric Radiation Measurement (ARM) Climate Research Facility – PNNL plays a leadership role in the multi-laboratory ARM program. A scientific user facility aimed at improving climate models, ARM provides in situ and remote sensing climate measurements from strategically located sites around the world.

Objective 1.2: Work with other Federal agencies and local jurisdictions (as appropriate) to develop regional partnerships for climate change information sharing and collaboration and

Objective 4.2: Identify or establish and participate in regional climate change adaptation partnerships, as appropriate, for all DOE facilities

In FY13, PNNL staff reached out to the DOE-Hanford Site Sustainability Program lead to discuss opportunities for information sharing and coordination on climate change adaptation plans. PNNL staff met with the Hanford Site Sustainability Working Group and presented our climate change vulnerability and risk assessment, along with the emerging adaptation plans and actions. PNNL will continue to seek opportunities to collaborate with Hanford Site subcontractors on climate adaptation measures. In FY14, PNNL also plans to perform outreach to local government authorities (i.e., City of Richland Public Utilities) to understand how local agencies view the potential impacts of climate change – particularly about local hydro and nuclear power supply – and to collaborate on climate change adaptation planning.

Goal 2: Improve Understanding of Climate Change Vulnerabilities and Risk

Objective 2.2: Conduct detailed risk or vulnerability assessments, as appropriate, for specific DOE programs or facilities

The DOE *High Level Analysis of Vulnerability to Climate Change* and the *Washington State Integrated Climate Response Strategy* (both April 2012) were used to establish potential climate change vulnerabilities at PNNL's major sites east and west of the Cascade Mountains. There have been no documented changes to these assessments in the past year.

The greatest vulnerabilities and risks to PNNL's operations in the Pacific Northwest region are described below.

- **Facility energy shortages** – Projected declines in springtime snowpack will lead to reduced stream flows during the summer months and potentially reduced hydro-electric power generation. Considering that over 75% of Richland's fuel mix currently comes from regional hydropower sources, changes in water supply could affect the seasonal availability of and reliability of power to PNNL.
- **Reduced water supply** – Projected reductions in seasonal water supply may lead to policy changes regarding Columbia River water use. As the Columbia River Treaty between the United States and Canada is renegotiated in the year ahead, anticipated climate impacts will likely inform this process (e.g., Canada may not offer as much flood protection, which has implications for domestic hydropower production). PNNL currently withdraws the full amount of its water permit – 330 mil gals of water each year, half of the total annual water usage – for use in our cooling ponds and facility landscaping and to irrigate Battelle-owned land adjacent to PNNL facilities. Changes to PNNL's water permit could necessitate increased withdraws from municipal sewer/water and groundwater sources and would impair our ability to perform aquaculture research in support of our DOE mission.
- **Physical damage from wildfires** – Higher summer temperatures and earlier spring snowmelt are projected to increase the risk of later dry season wildfires.
- **Physical damage from sea level rise and storm surge** – Increases in sea level and/or in the frequency or intensity of coastal storms could pose a physical threat to PNNL coastal research facilities in Sequim, Washington.
- **Loss of fish and natural systems** – Higher summer stream temperatures and reduced flow are projected to increase lethal stream conditions for salmon and other coldwater species. Sea level rise is also projected to eliminate valuable coastal habitats, and increased acidity in marine waters from CO₂ emissions and upland runoff threatens the aquaculture and shellfish industry.
- **Increase in extreme precipitation events** – In addition to long-term changes in the overall and seasonal distribution of rainfall, it is expected that a higher fraction of precipitation will fall in extreme events (i.e., when it does rain, it will rain harder).

These occurrences can impact various aspects of campus operations, some of which have already occurred. For example, a flood from a heavy rainfall event caused a significant computer outage at PNNL this past year.

Goal 4: Improve the Climate Resiliency of all DOE Sites

Objective 4.1: Update all appropriate DOE site plans to address climate change resiliency

During FY13, PNNL Sustainability Program members met with several individuals responsible for near- and long-term planning to discuss the climate change vulnerabilities and risks posed to our operations, as outlined above. The team identified and reviewed three plans that either currently addressed or presented an opportunity to address climate change adaptation: the *Building Emergency Plan*, *Business Continuity Plan*, and *Campus Master Plan*.

The current *Building Emergency Plan* was determined to address adequately the vulnerabilities in the areas of physical damage from wildfires, sea level rise, and

flooding/storm surge. Currently in progress, the *Business Continuity Plan* is examining a response to the resulting impacts of some of these vulnerabilities (e.g., loss of power), with processes for keeping buildings operating and people safe immediately after an event. While these short-term solutions would help PNNL in the event of a rolling blackout due to power supply shortages, it was determined that the *Business Continuity Plan* is less relevant to long-term adaptation planning.

The *Campus Master Plan* was determined to present the most important opportunity to address climate adaptation planning. The current 2012 Plan does not specifically address climate change adaptation but does include commitments to climate change mitigation through sustainable campus design. The Plan is scheduled to be revised during FY14, and the campus planning team is now committed to working with the Sustainability Program to understand and address the greatest vulnerabilities to PNNL in the Plan, particularly facility energy shortages and reduced water supply.

Sustainable Leadership



Bike pump/fixing stations promote alternative commuting.

Success Story

PNNL initiated a Sustainability Pays Program last year to fund staff-generated innovations with measurable impact on sustainability performance.

Development of pump controllers: Pumps are running 24/7 to maintain vacuum to equipment at EMSL. PNNL built and successfully tested two plug-in prototype controllers enabling auto-monitoring, shut-down and restart of the vacuum pumps. The controllers are expected to reduce ~47,000 kWh per year (\$2,600) from nine pumps. Additional energy and cost savings are expected if extended to other pumps throughout PNNL.

Replacing SF₆ with N₂O: Full-scale tests resulted in an estimated emissions reduction of 260 MTCO₂e, which is equivalent to taking 500 cars off the road for one year.

Removing bicycling roadblocks: Communal bike pump/fixing stations were purchased and installed on the campus to help the existing bike-to-work population and to attract would-be riders. The stations are equipped with a variety of tools to make adjustments or fix bicycles. Staff can also scan the quick response code to get guidance, if needed.

PNNL's holistic triple-bottom line approach to sustainability yields operational efficiencies and positive impacts to our environment and in the community. While this SSP focuses on PNNL's environmental performance under Executive Order 13514, PNNL continues to raise our triple bottom-line performance by tracking key indicators of our social and economic impacts, as summarized in Appendix B.

Environmental: PNNL's long-standing commitment to the environment is evidenced by the success stories throughout this document: increasing the PNNL HPSBs, establishment of Sustainability Pays, and decreasing petroleum with additional NEVs. However, a gap at PNNL is access to modern, multi-program space for systems engineering work. In September 2013, the DOE Pacific Northwest Site Office approved construction of a new HPSB, the Systems Engineering Laboratory (SEL), which is part of the overall campus plan to expand our reach as a multi-purpose laboratory while consolidating research and support activities. The space will support ongoing electricity transmission research and demonstrate and evaluate tools in a setting that reflects current industry conditions.

Social: We believe that investing in our employees, the community, and the next generation of scientists and engineers is vital to long-term sustainability and is our responsibility as stewards of a national laboratory. Staff members live out their citizenship and share their passion for the betterment of society through Life@PNNL activities and clubs as well as Team Battelle volunteer community projects. In support of local agriculture, a PNNL site-specific farmers market is offered weekly during the summer. From on-site mentoring to classroom and extracurricular science and math learning activities, PNNL inspires future scientists, engineers, mathematicians, and technologists and provides real-life research experiences. Staff will continue to mentor and volunteer time to support their local community and the nation.

Economic: We gauge our economic performance on our ability to deliver S&T that generates value for the nation while operating efficiently and supporting small businesses. For example, through our Mentor-Protégé Program, PNNL connected with the agricultural technology firm UNIBEST International with industry-specific technical, marketing, and legal advisors. This link yielded a new partnership for a product that monitors plant nutrients for optimal crop yields, garnering an 800% increase in income for UNIBEST. A total of 65% of PNNL's procurement spending benefits small and socio-economically disadvantaged businesses, with 3.5% going to veteran-owned businesses. PNNL will continue working with small and minority-owned businesses to help entrepreneurs pursue their dreams and meet their business objectives.

High Energy Mission Specific Facilities

High performance computing is integral to the mission, and PNNL has two FIMs-excluded facilities that meet the definition of high energy mission specific facilities (HEMSF).

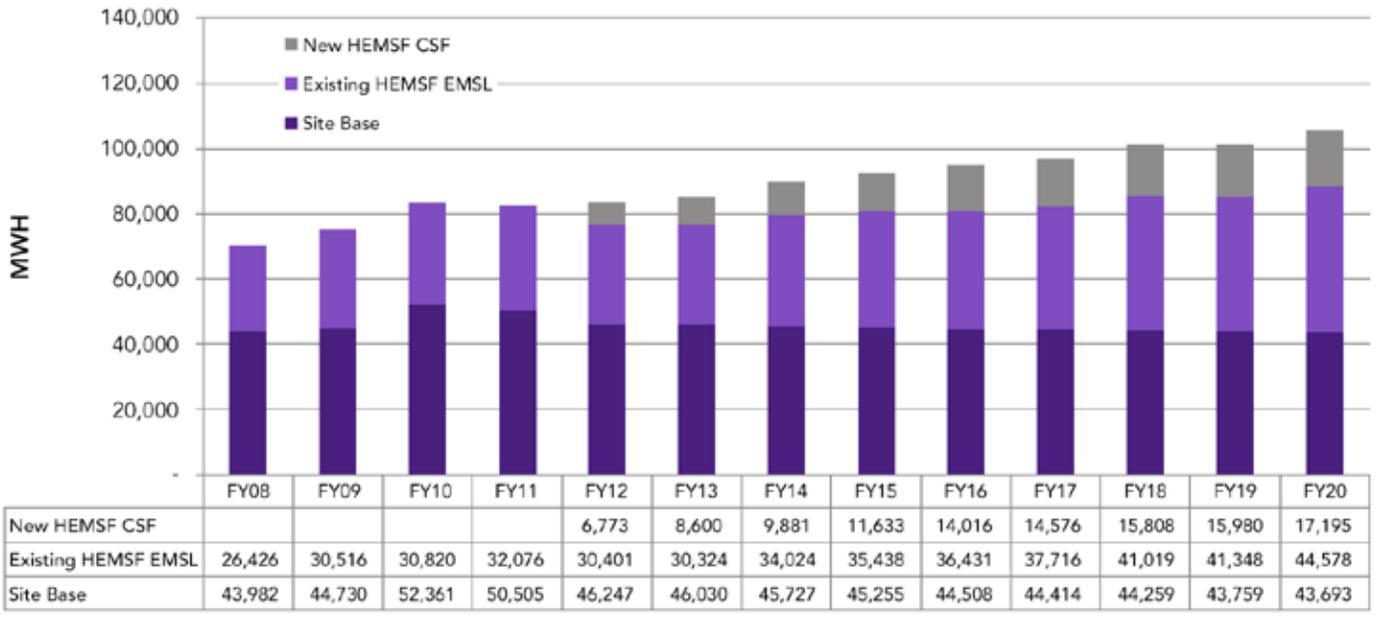
EMSL provides integrated experimental and computational resources for discovery and technological innovation in the environmental molecular sciences to support the needs of DOE and the nation. It boasts an unparalleled state-of-the-art collection of computational and experimental capabilities focused on three science themes – biological interactions and dynamics; subsurface science, geochemistry, and biogeochemistry; and the science of interfacial phenomena – to address critical challenges in DOE’s environmental and energy mission areas. Expert collaborators solve complex problems through multiple, high-performance and resolution sciences via data centers that use advanced instrumentation (e.g., 163 teraflops and an 18,000+ core super-cluster with a 4.5 petabyte data archive Chinook computer). In FY13, PNNL installed the new 2.35 petaflop Cascade supercomputer. Testing has shown that it is 14 times more energy efficient per teraflop than its predecessor Chinook and avoids using a traditional air handling unit.

The CSF is focused on the design and efficient implementation of computational capabilities for the analysis of data from high-throughput experimental technologies, the abstraction of models from this data, and the predictive simulation of these models. High-performance computing merges science and technology by:

- employing hardware that maximizes processor speed, memory and interconnect bandwidth, efficient use of secondary storage, and reliability;
- developing algorithms that are scalable, resource-efficient, and load-balanced and that manage computational complexity and exploit space-time locality; and
- creating programming models, numerical libraries, communication libraries, compilers, and debuggers that support data decomposition, low communication overhead, and portability.

EMSL boasts an unparalleled state-of-the-art collection of computational and experimental capabilities to address critical challenges in DOE’s environmental and energy mission areas.

HEMSF Electricity Projections for PNNL



Budget and Funding

The successful implementation of long-term sustainability goals requires a sound budgeting strategy and adequate funding. PNNL uses several methods, as outlined below, to secure the appropriate funding for energy and water efficiencies.

- The most efficient and preferred method is budgeting sustainable components into projects through our Engineering Standards and Specifications. We recognize that key project energy and water efficiency components (e.g., advanced building electrical meters) are mandatory, and we plan accordingly within project funding requests.
- Projects that result from energy and water evaluations are identified in ECMs. They are submitted in our annual budgeting process and prioritized along with all other requests using a weighted analysis to incorporate life-cycle cost, deferred maintenance, return on investment, and direct ties to the PNNL mission.
- Direct utility savings identified from implemented energy or water projects are used to fund additional ECMs as encouraged by the Energy Policy Act (EPA) of 2005, Section 102(e).
- Where available, Utility Incentive Programs will be leveraged to the maximum extent practicable to enhance energy and water reductions as encouraged by EPA 1992, Section 152 and EISA 2007 Section 516.
- If internal funding is not feasible, PNNL is willing to leverage the use of alternate financing through ESPCs or Utility Energy Services Contracts.

PNNL recognizes that energy and water savings program success requires appropriate funding. Using our Engineering Standards along with our annual prioritized budgeting process will contribute to the completion of all viable energy and water measures.

Using our Engineering Standards and Specifications along with our annual prioritized budgeting process will contribute to PNNL's completion of all viable energy and water measures.

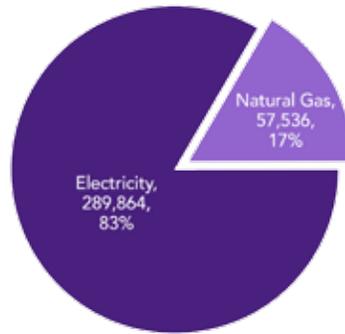
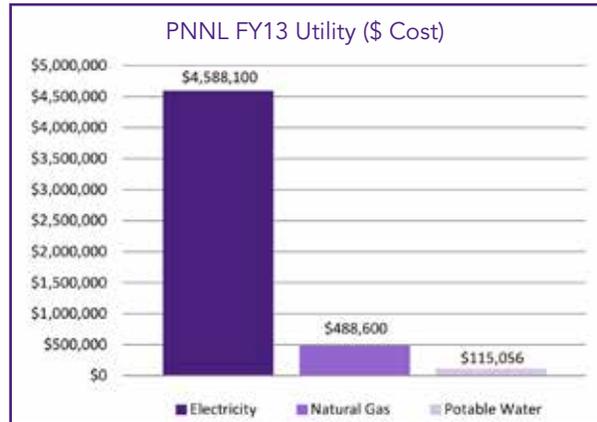
Summary of Overhead Funded Projects (\$K)

Category	FY13 Actual	FY14 Planned	FY15 Planned
Energy Efficiency	725	650	650
EISA	50	50	50
HPSB	75	100	100
Water Reduction	100	50	50
Meters	45	25	25
IT	350	125	125
All Other	650	600	600
Total	1,995	1,600	1,600

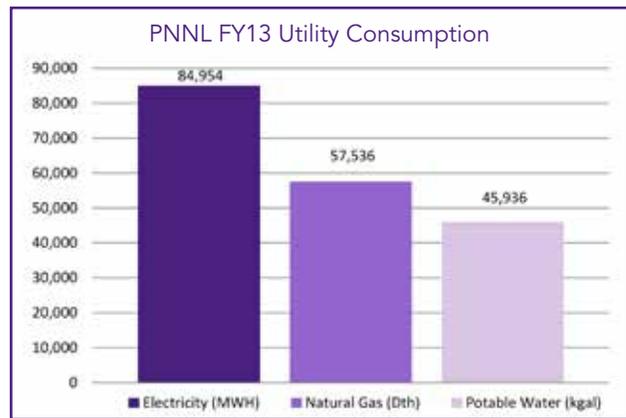
Utility Usage, Costs and Projections



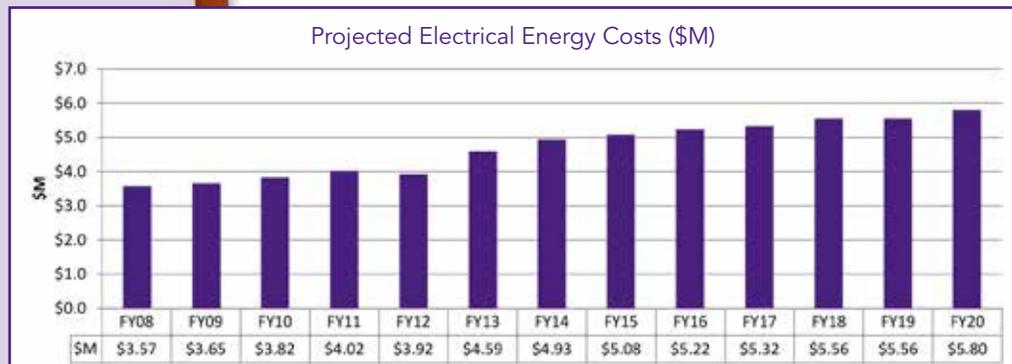
Utility data provided through advanced meters.



PNNL FY13 Energy (MMBtus)



Costs and usage on electricity, water and natural gas with projections through FY20.



Appendix A — Self Certification



Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K9-42
Richland, Washington 99352

MEMORANDUM FOR SUSTAINABILITY PERFORMANCE OFFICE

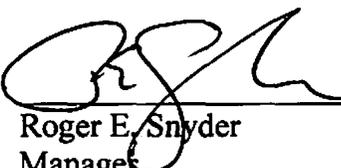
FROM: DOE PACIFIC NORTHWEST SITE OFFICE
PACIFIC NORTHWEST NATIONAL LABORATORY

SUBJECT: SELF-CERTIFICATION FORM FOR THE ENERGY INTENSITY
GOAL OF EISA 2007

Each building excluded under the criteria for a Part G or Part H exclusion is metered for energy consumption, and their consumption is reported annually.

If any building has been excluded under the criteria for Part H for impracticability, then all practicable energy and water conservation measures with a payback of less than 10 years have been installed. A justification statement that explains why process-dedicated energy in the facility may impact the ability to meet the goal has been provided in the FIMS Report 063.

I certify that the PNNL buildings listed on the Excluded Buildings List, produced by FIMS as Report 063 dated November 22, 2013, meet the exclusion criteria in *Guidelines Establishing Criteria for Excluding Buildings* published by FEMP on January 27, 2006.



Roger E. Snyder
Manager

11/20/13

Date

Contact Information:

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E-mail: ron.gallagher@pnso.science.doe.gov

Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Property ID	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
Program Office SC Site 10014 Pacific Northwest National Lab						
CSF	207161	Computational Sciences Facility	G - Metered intensive loads	Building	74,000	74,000
excluded started in FY12 because the data centers and supercomputers dominate the energy usage in the building. 9/18/13 building is separately metered and was recently constructed as a LEED Gold Facility						
ISB2	139811	Information Sciences Building - 2	G - Metered intensive loads	Building	60,080	3,854
Excluding the data center located in this building. 9/18/13 building is separately metered and data center is the predominant load in the building and all LCC ECMs have been implemented.						
3020	131274	William R. Wiley - EMSL	G - Metered intensive loads	Building	234,566	234,566
Excluded starting in FY07 because the supercomputer dominates usage in the building. GSF increased from 224,463 due to 5/12 with Owing. 9/18/13 building is separately metered and LCC ECMs have either been implemented or are in progress for implementation.						

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

Appendix B — Social and Economic Performance

Since 2009, PNNL has used the Global Reporting Initiative (GRI) Sustainability Reporting Guidelines as a basis for disclosing our governance approach and the environmental, social, and economic performance and impacts of our operations. The GRI provides reporting principles, standard disclosures, and criteria to ensure consistency in reporting, and is used by thousands of organizations worldwide.

PNNL defines the content of our GRI report considering the interests of our stakeholders, the sustainability context within which we operate, how material the sustainability aspect is, and whether it provides a complete view of our significant impacts. Our material issues are conveyed through the honeycomb diagram and scorecard below. These are the issues that most influence our stakeholders (our employees, customers, and community) and that represent our significant sustainability impacts. To ensure a comprehensive view of our performance the boundaries of our annual GRI report extend beyond our DOE facilities to include all facilities that PNNL operates as part of the integrated campus.



Now in our fifth year of sustainability reporting, PNNL is transitioning to an online-only GRI report to save resources and streamline results. PNNL's FY 2013 Annual Sustainability Report will be completed in early 2014 and available at <http://sustainable.pnnl.gov>. The content on the next few pages provide a glimpse of our social and economic performance.

SUSTAINABILITY PERFORMANCE SCORECARD

did not meet target
 risk of not meeting target
 met or on track to meet target

2012 2013

		2012	2013	
SOCIAL	Keeping employees healthy and safe			
	• Total recordable case rate ≤ .65 ¹	0.65	0.60	
	• Days away, restricted, or transferred rate ≤ .25 ¹	0.20	0.24	
	Investing in our employees' professional development			
	• Average participant satisfaction rating from professional development programs ≥ 4.5/5	4.6	4.6	
Creating an inclusive work environment				
• No goal established			N/A	
Fostering the next generation of scientists and engineers				
• Average participant rating of work-based learning programs ≥ 4.0/5	4.8	4.7		
ECONOMIC	Transferring technology that makes a difference			
	• Economic contribution to global economy from licensed technologies (Target: Minimum=\$50M, Stretch=\$100M)	\$88.5M	\$107.7M	
	Maintaining financial viability through research and operational excellence			
	• Sales (Target: >\$857M)	\$1,049.1M	\$1,064.0M	
	• Business volume/operating budget (Target: >\$991M)	\$1,103.7M	\$936.0M	
Supporting small businesses				
• Award at least 52% procurement dollars to small businesses	50.1%	65.8%		
Giving back to our communities				
• Philanthropic investments (No target) ²	\$616,925	\$732,500	N/A	

1. Reported per 200,000 employee hours worked.

2. Philanthropic investments are distributed by a committee of employees from Battelle's Pacific Northwest Division. At least 50 percent of giving is directed to STEM education.

Social Performance



FARMER'S MARKETS

A dozen vendors
plus ~200 staff weekly

Staff continued to enjoy swinging by after work on Mondays to pick up a few delicious items from local vendors. Part of an array of perks offered via Life@PNNL.



TELEWORK OPTION FOR STAFF



4.5% participation weekly

A dedicated telework advocate, on-demand training and better video-conferencing and mobile technology tools helped this option become a success in its first year. Staff enjoy better work-life balance while helping the Lab maintain operations during inclement weather or crisis.

VOLUNTEER HOURS



by 2,800 employees
54 local organizations

**team
battelle**

EMPLOYEE HEALTH AND SAFETY

Days Away From Work,
Restricted Activity, or Transferred

TARGET MET!



Injury & Illness
Incident Rate
Exceeded

down **5%**
from 2012

OPERATIONAL EXCELLENCE

86%



of respondents agreed that supervisors are accessible, care about their employees' well-being and take their concerns seriously.

NEXT GENERATION STEM WORKFORCE

1,100 interns, fellows, educators
and post-docs hosted



NEW CONVENIENCE PARKING

Employees who face temporary mobility issues can request one of 15 reserved parking spots closer to their building's entrance.



Staff and visitors to PNNL are asked not to park in designated temporary parking spots, as a courtesy to mobility limited employees.

RIGHT-SIZING EHS&S TRAINING

\$625,000

annual savings in labor
and course fees

Research Staff Time:
reduction of

~1,300

training hours per year

Economic Performance



ECONOMIC DEVELOPMENT

PNNL's Mentor-Protégé Program connected agricultural technology firm UNIBEST International with industry-specific technical, marketing and legal advisors. Those connections yielded a new partnership for a product that monitors plant nutrients for optimal crop yields, garnering an 800% increase in income for UNIBEST which is located in Walla Walla, Washington.

DELTA HIGH SCHOOL

\$327,000

(incl. pro bono, in-kind investments)

Invested in Delta High School, STEM-focused and local



PURCHASED GOODS AND SERVICES

> \$430 million



WORKFORCE

Down
3%
from previous year



PHILANTHROPY

~\$732,500

Invested in local organizations

DOE's

Top-performing lab for

5 years

PATENTS

85

U.S. and Foreign



SUPPORTING VETERAN-OWNED BUSINESSES

3.5%

of contracts (target 3%)

SUPPORTING SMALL BUSINESSES

65.8%

contracts went to small and socioeconomically disadvantaged businesses (target 52%)

PUBLICATIONS



1,168

peer-reviewed publications

Mission

We transform the world through courageous discovery and innovation.

Vision

PNNL science and technology inspires and enables the world to live prosperously, safely, and securely.

DISCOVERY

in Action

CREATIVITY
integrity *Values* courage Impact
COLLABORATION



Pacific Northwest
NATIONAL LABORATORY

Proudly Operated by **Battelle** Since 1965



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