

PACIFIC NORTHWEST NATIONAL LABORATORY

2009 Sustainability Report

Innovative Solutions for a Sustainable 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

Available to DOE and DOE contractors from the
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(9/2003)

MESSAGE FROM THE DIRECTOR

Sustainability. Science and technology. At Pacific Northwest National Laboratory (PNNL), we have long recognized that excellence in environmental stewardship, social responsibility, and economic prosperity are foundational to advancing the frontiers of science and delivering solutions to some of America's greatest challenges.

At this U.S. Department of Energy national laboratory, our staff members are focused on:

- » advancing sustainable, efficient, and reliable energy use, which will fuel global economic development
- » improving the safety of Americans by predicting and preventing terrorism threats and responding effectively to disruptive events
- » reducing the environmental effects of human activity and creating sustainable systems
- » making fundamental discoveries about the nature of complex biological, chemical, and environmental systems that strengthen U.S. foundations for innovation.

Beyond the sustainable practices that underpin our science and technology mission, we operate the Laboratory in ways that improve our staff's quality of life, enhance our community, and protect the environment.

Recognizing that our staff members are our greatest asset, we create a work environment where they are intellectually challenged, supported in their work, and valued for their contributions to our nationally important mission.

We also are partners with the community, promoting quality of life. For more than four decades, we have been teaming with local and regional organizations to strengthen the economy, launch businesses, and educate the next generation of scientists and engineers.

Finally, as good environmental stewards, we set high standards for managing our "footprint" on this earth. We minimize our greenhouse gas emissions and other environmental impacts through energy efficiency, waste management, water and air resource protection, pollution prevention, and green product procurement.

While sustainability has always been engrained in our work, we produced this report for the first time to share with our stakeholders the results of our efforts to manage against the "triple bottom line" of social, environmental, and economic responsibility.

Whether you are a customer, a collaborator, our neighbor, or a visitor, I hope you'll take some time to read our report, view our website at www.pnnl.gov, or visit our campus to see the many ways PNNL is delivering innovative solutions for a sustainable future.



A handwritten signature in black ink that reads "Michael Kluse". The signature is fluid and cursive, with the first name being the most prominent.

Michael Kluse
Laboratory Director

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PNNL OVERVIEW

“Achieving sustainability in laboratory operations, by design, will strengthen PNNL’s long-term capabilities to meet its important national missions. DOE’s Pacific Northwest Site Office and PNNL have teamed to ensure future facilities are aligned with the mission and integrate sustainability at every phase of planning and building, and throughout the life of research.”

Michael J. Weis

Manager, Department of Energy’s Pacific Northwest Site Office

The Pacific Northwest National Laboratory (PNNL), located in Richland, Washington, is one of the U.S. Department of Energy’s (DOE’s) ten national laboratories managed by the Office of Science. PNNL performs research for DOE and other government agencies, universities, and industry to deliver breakthrough science and technology to address critical national challenges related to energy, the environment, and national security.

During 2009, PNNL employed more than 4,100 people who conducted approximately \$1.1 billion of contract-based research and development. In addition to the main campus in Richland, the Laboratory has offices in Seattle, Tacoma, and Sequim, Washington; Portland, Oregon; and Washington, D.C.

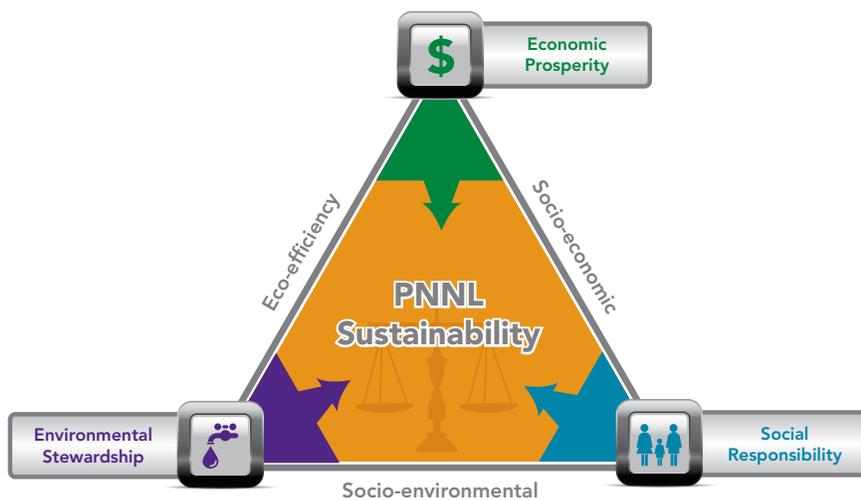
Battelle has proudly operated PNNL for DOE and its predecessors since 1965. Organized as a nonprofit corporation for charitable, scientific, and educational purposes, Battelle’s pursuit of science in the service of humankind has helped to foster a culture of sustainability at PNNL.

Sustainability in Operations

PNNL’s main campus is situated next to the Columbia River, a source of natural beauty, water, and hydroelectric power for the Pacific Northwest region. This connection to our natural environment inspires us to carry out our scientific mission in a way that balances the social, environmental, and economic interests of our stakeholders.

That is our triple bottom line, and in 2009 we began measuring our activities by this framework. This report follows the reporting guidelines of the Global Reporting Initiative (GRI) – the world’s most widely used and respected sustainability reporting standard. We used the GRI principles of materiality to our organization, importance to our stakeholders, and completeness in reporting in defining content for the print and web versions of this report.





The following pages describe PNNL’s performance for our highest priority environmental, social, and economic issues during fiscal years 2007 to 2009. More detailed information on our performance against GRI indicators can be found in the section, “About this Report,” and on our website at <http://sustainable.pnl.gov>.

This report is our first to formally consider the Laboratory’s performance through the sustainability lens, and we plan to keep you informed on our performance against the triple bottom line by reporting annually in the future.

Science for a Sustainable Future

At PNNL, we do more than strive to integrate the principles of sustainability throughout our operations, as described in this report. As a national laboratory, we are in a unique position to deliver science and technology solutions to some of America’s greatest sustainability challenges.

In the energy sector, our researchers are developing and deploying solutions that will help the nation and the world mutually sustain natural resources, energy, and the economy. We are improving our understanding of how energy generation and use affect the environment and climate and how to effectively mitigate those impacts, and enable the development of clean, reliable, domestic energy resources.

Our staff members are making the world safer and more secure by providing science-based practical solutions to prevent and counter acts of terrorism and the proliferation of weapons of mass destruction, and by creating communities that are more resilient to events of mass effect.

Finally, we are filling important gaps in our knowledge of how complex systems function, whether human, environmental, or chemical. These discoveries could result in chemicals processes tailored to deliver the highest volume of product and lowest amount of waste, energy materials that are inherently more effective and efficient, and better, more sustainable, solutions for environmental and human health.

Our website at <http://sustainable.pnl.gov> provides a wealth of information on ways PNNL researchers are advancing the frontiers of science for a sustainable future. We have highlighted just a few examples on the next pages.

What Does Sustainability at PNNL Mean?

Sustainability at PNNL means carrying out our mission in ways that meet the social, environmental, and economic needs of both current and future generations. We integrate sustainability principles into our operations in the following ways:

Environmental Stewardship

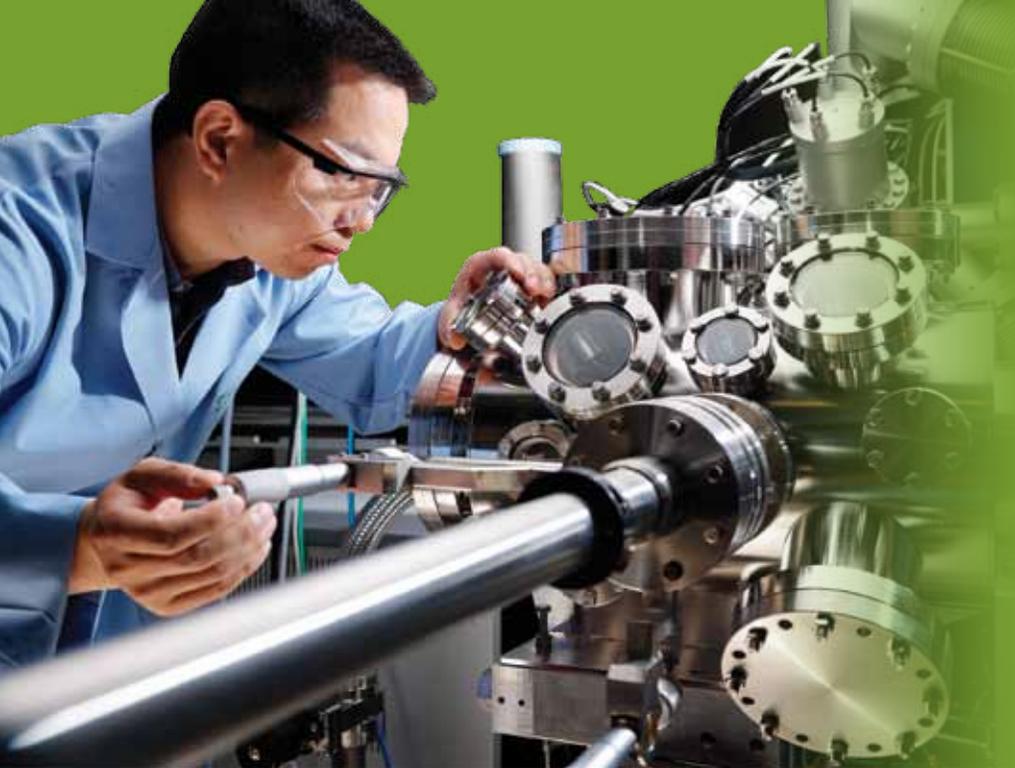
- » Reducing emissions
- » Promoting conservation, efficiency, and renewable energy
- » Minimizing use of water and materials
- » Protecting and restoring our natural resources

Social Responsibility

- » Protecting the health and safety of our employees
- » Investing in their professional development
- » Creating an inclusive and diverse work environment
- » Giving back to the communities in which we operate

Economic Prosperity

- » Creating economic value for the organization and our key stakeholders, including our customers, staff, and community
- » Supporting the growth of businesses through technology transfer.



ADVANCING THE FRONTIERS OF SCIENCE

From fundamental science to applied technologies, PNNL's research activities are providing innovative solutions for a sustainable future. Here are a few examples of ways that our scientific researchers worked to solve some of America's greatest sustainability challenges during 2009.

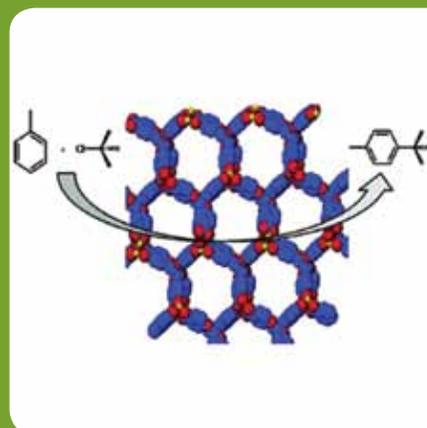


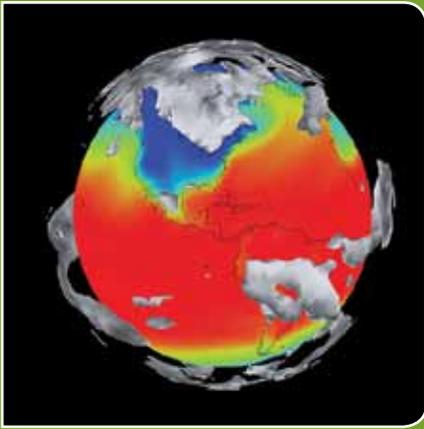
Creating a More Resilient Electricity Infrastructure

Our research staff worked to give grid operators an opportunity to better plan for major disasters and to improve their ability to respond during emergencies. Using parallel computing and advanced visualization techniques, PNNL is developing tools that will analyze large quantities of data from the grid, called "phasor data," much more quickly to provide grid operators a more accurate picture of grid health in near real time. These tools also will determine the potential impact of multiple component failures, examine multiple contingencies, and present the information to operators in a meaningful and intuitive way so they can respond faster to potential power grid failures.

More Efficient Chemical Processes for Fuel Conversion

By improving the fundamental understanding of chemical processes, PNNL is targeting the precise chemical reactions needed to efficiently convert biomass, carbon dioxide, and solar energy into useful fuels. In one project, our researchers showed that a new class of catalytic materials, metal-organic frameworks, completed up to 100 percent of reactions studied, meaning no waste and a faster, more efficient process. In contrast, commercial catalysts can complete only 60 percent or less of reactants. These catalysts could improve the refining of fossil fuel, using biomass as feedstock, and reduce automobile exhaust.



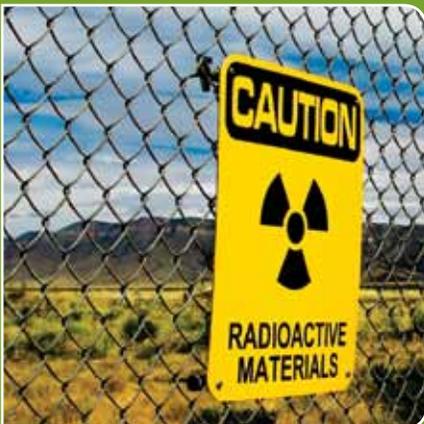


Future Climate Scenarios: Getting a Better Look at the Big Picture

To provide a complete picture of climate change consequences and to enable decision makers to take action, models must link physical earth processes with human systems, such as energy use, land and water use, policy, and economics. An international team of climate scientists from PNNL made great strides in designing a dynamic and robust approach to modeling the Earth's climate future, which more tightly links analyses of greenhouse gas emissions, projections of the Earth's climate, impacts of climate change, and human decision-making. The result: climate and socioeconomic data will be available more rapidly to those modeling the potential impacts of climate change, and researchers will be better able to diagnose how different groups of models treat feedbacks—such as additional releases of greenhouse gases from ecosystems—that have the potential to further amplify climate change.

Measuring Building Performance

The rapid increase in construction of sustainably designed or “green” buildings over the past decade has created a growing interest in understanding whether these buildings are performing as designed. PNNL has been at the forefront of these efforts and developed a framework for measuring building performance. This framework helps both building owners and managers determine whether these buildings are achieving the operational cost savings and the positive impacts on human health and the environment that were expected. Initial findings from analyses of dozens of federal buildings have shown the sustainably designed buildings on average use less energy, use less water, emit fewer greenhouse gas emissions, have lower operating costs, and occupants have higher satisfaction levels than the industry average.



Reducing the Threat of Global Terrorism

Reducing the threat of nuclear and radiological terrorism is essential to protecting the health and safety of citizens of the United States and other nations. As a key player in the National Nuclear Security Administration's Global Threat Reduction Initiative, PNNL is helping to assess and protect civilian nuclear and high-risk radiological facilities worldwide. This protection provides the first line-of-defense against the unauthorized acquisition and potential malevolent use of nuclear and radiological materials. Through 2009, PNNL has successfully completed security upgrades at 574 domestic and international locations housing commercial nuclear and high-risk radioactive materials, in over 64 countries worldwide, including the United States.



ENVIRONMENTAL STEWARDSHIP

At PNNL we are committed to protecting the public, the environment, and future generations from unacceptable risks resulting from our operations. As stewards of the environment, PNNL integrates the principles of conservation, waste minimization, and resource protection into all of our work activities. Since 2002, we have used an Environmental Management System (EMS) to help us continuously improve upon our environmental performance through a rigorous process of goal-setting, planning, monitoring, and reporting. In 2009 we began incorporating into our EMS a much broader set of sustainability indicators aligned with the GRI, to help manage our overall sustainability performance.

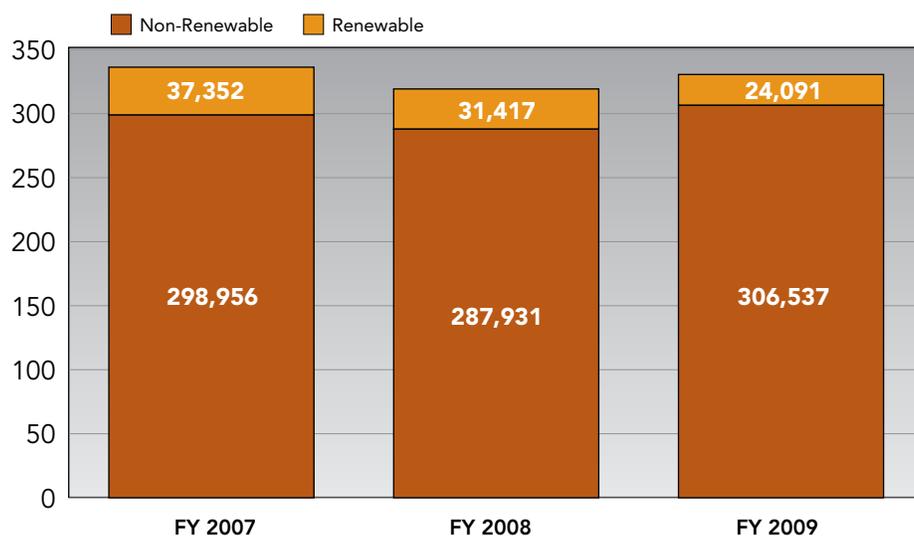
Highlights from our fiscal year (FY) 2009 environmental stewardship performance for our priority areas of energy, greenhouse gas emissions, materials use, and water are found below.

Energy

One of PNNL's primary environmental stewardship challenges is fulfilling our science and technology mission while reducing our overall energy consumption. Our scientific research requires a substantial and growing demand for energy-intensive laboratories and high-performance computing equipment. This demand drives us to continuously look for opportunities to improve the energy efficiency of our operations.

Despite employing a number of energy efficiency innovations during FY 2009, our electricity consumption increased by 3.5 percent. A primary reason for this increase was the increased use of our supercomputers—ranking among the fastest in the world—to support research in areas such as climate science, hydrogen storage, and molecular chemistry.

Electricity Use (MBtu)



Examples of successful energy efficiency efforts implemented during 2009 include:

- » virtualizing almost 500 servers resulting in increased server utilization rates and reducing energy use, while also providing additional backup and resiliency for the Laboratory
- » integrating water-side economizers into one of our data centers, resulting in “free cooling” of the data center for about 50 percent of the year
- » relocating under-floor cabling in the data center overhead, resulting in an improvement in power efficiency by 4 percent in one year
- » purchasing environmentally preferred desktops, laptops, and monitors using EPEAT (the Electronic Product Environmental Assessment Tool) to evaluate the environmental attributes of electronic products
- » installing advanced metering throughout our facilities to help us better understand how we are using energy and how successful our energy efficiency efforts are.

We realize there are still many opportunities for improvement and since electricity consumption is our greatest source of greenhouse gas emissions, it will remain a priority to manage going forward. For FY 2010, our goal is to reduce total electricity use by 3 percent despite our projection of business and staff growth.

Renewable Energy Use

PNNL negotiated a four-year Renewable Energy Certificate (REC) purchase agreement with our primary utility in 2005 to increase the Laboratory’s use of renewable energy. In 2009 REC purchases represented 7 percent of total electricity purchased and our goal is to purchase a greater portion of our electricity demand from RECs in the coming year.

We also plan to install a 125 kW ground-mounted photovoltaic system on our campus in 2010 which can be used to power our electric research vehicles or provide supplemental power to EMSL, the Environmental Molecular Science Laboratory.



Green Building at PNNL

Striving to improve the energy efficiency and quality of workspace for our employees, PNNL recently moved into the Biological Sciences Facility (BSF) and Computational Sciences Facility (CSF) which received LEED (Leadership in Energy and Environmental Design) Gold certification. One of the major accomplishments in operating this new facility is realizing a 31 percent reduction in energy use and 35 percent reduction in energy cost from our previous facilities that performed similar functions.

Co-location of the BSF and CSF has been an effective strategy for managing energy consumption in this building, because it enabled waste heat exchange. The CSF has high cooling loads because of the computer equipment. The BSF has high heating and cooling loads year-round because of the laboratory ventilation requirements. To reduce energy consumption in the building, we are recovering waste heat generated by the computer equipment in the CSF and using it to meet heating requirements for the BSF laboratory ventilation during most of the year.

The 10,000 square foot data center in the CSF also incorporates a number of best practices for energy-efficient data centers such as variable frequency drives on condenser water pumps and temperature settings for hot aisles set at 85 degrees Fahrenheit.



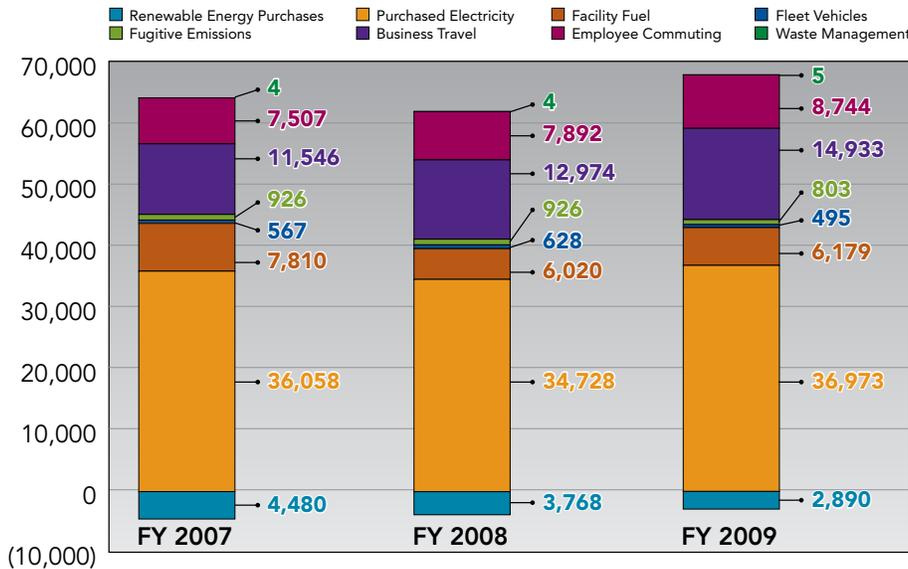
Greenhouse Gases

Since we conducted our first greenhouse gas (GHG) inventory for FY 2007, PNNL has been working to improve the quality of our GHG estimates and identify priority opportunities to reduce our emissions. We go beyond standard accounting of onsite emissions from fuel use in our facilities and vehicles, and have attempted to understand the indirect impacts of our operations from activities like employee business travel and commuting.

While we have taken a number of steps to improve our GHG performance, PNNL's total GHG emissions increased by 8 percent in FY 2009 from FY 2008. This increase was primarily a result of the addition of energy-intensive computing resources, more business travel, and the addition of 286 employees, which increased employee commuting emissions.

Despite an increase in total emissions in 2009, we saw a 10 percent decrease in our GHG emissions per dollar of business volume, when normalizing for our business growth, and a 3 percent decrease in emissions per employee.

Greenhouse Gas Emissions by Category (metric tons of CO₂ equivalent)



One area in which we successfully reduced emissions in 2009 was our vehicle fleet, where we achieved a 12 percent reduction from 2008. We accomplished this by increasing the number of flex fuel vehicles and operating them on cleaner burning fuels, like E85, an ethanol-blended gasoline. Our commitment to biofuels provided a catalyst for a small local business to build the first publicly accessible biofuel station in eastern Washington.

Through better vehicle usage guidelines and acquisition of additional hybrid electric and flex fuel vehicles, we believe we can

realize further reductions in fleet emissions. As part of this commitment, we have installed the infrastructure for plug-in hybrids and electric vehicles at our main campus. We also set a goal that all of our alternative and flex fuel vehicles will run exclusively on biofuels whenever the fuel is available.

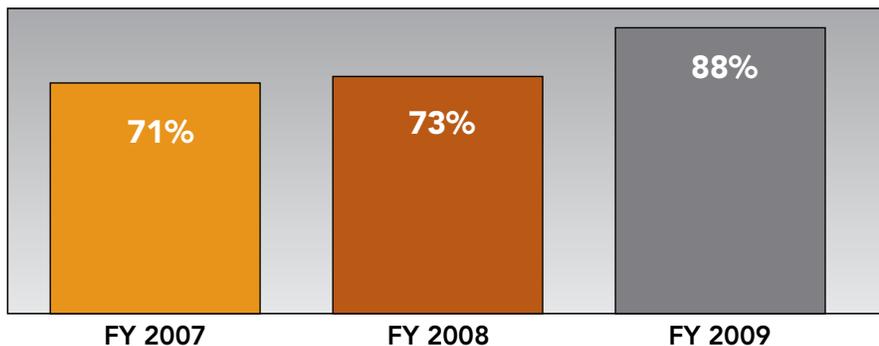
While we are taking steps in the right direction, reducing our total GHG emissions is one of our most important environmental stewardship priorities, and our goal for FY 2010 is to achieve a 2.5 percent reduction in total emissions.

Materials Use

As a research organization, two important material inputs to our operations are paper products and chemicals.

As part of the federal government, we have an obligation to purchase products that have a lower environmental and human health impact compared with competing products. We are working toward the goal of consuming only paper products with 30 percent or more post-consumer content. In FY 2009, 88 percent of the paper products we consumed met this requirement, up from 73 percent the previous year.

Paper Purchases with 30 Percent or More Recycled Content



Chemical use is another important area where we are actively trying to reduce our environmental footprint. We use thousands of different chemicals to support our research and operations, ranging from cleaning products to regulated materials. We created our ChemAgain program in 2007 to help divert unused chemicals from the waste stream and reduce unnecessary chemical purchasing.

ChemAgain is a chemical exchange program that puts surplus chemical products back to productive use by redistributing them to others who can use them—internal or external to the Laboratory. The ChemAgain program allows PNNL researchers to “shop” for the chemicals they need and acquire them free of charge if available through the ChemAgain store. The program works with our chemical ordering process to automatically search the ChemAgain database for existing products at PNNL before new chemicals can be purchased.

This program saves money, increases efficiencies, and reduces the Laboratory’s overall environmental impact. In FY 2009, the ChemAgain program redistributed more than 1,000 containers of chemicals—a lifecycle cost avoidance of over \$1.8 million. The innovative program won a “Best In Class” award for environmental sustainability from the U.S. Department of Energy.

ChemAgain Reduces Waste

Scientist Mike Schweiger uses the surplus chemicals to make glass for his research projects and for scientific demonstrations to students and teachers.

“I’m glad we are using what we have resourcefully. Over the years I’ve had to go down the phone list to see who has extra chemicals,” said Schweiger. “The ChemAgain redistribution center makes it so easy!”



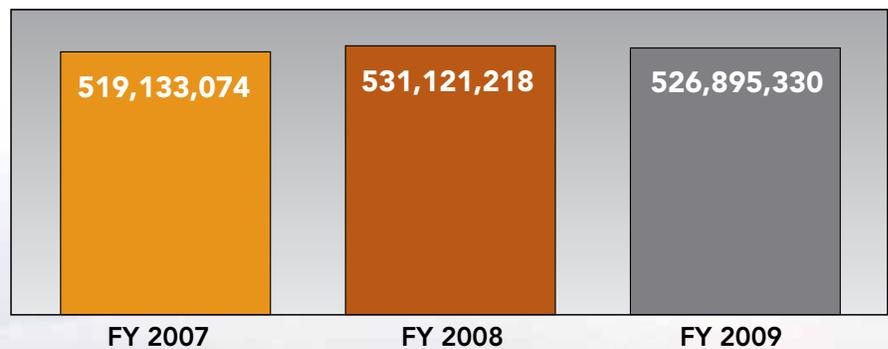
Water

The main PNNL campus is adjacent to the Columbia River, a regionally important and sensitive resource that is home to three endangered fish species. PNNL uses municipal water in its buildings and water from the Columbia River primarily for its cooling ponds. The Laboratory meters its intake from the Columbia River to make sure it never exceeds its state-permitted water withdraw.

The water in the cooling ponds is used to improve the efficiency of the air conditioning system in the summer months. When these ponds reach 85 degrees Fahrenheit, which occurs about 15 times a year, they lose sufficient cooling capacity. Instead of dumping the warm pond water into the local sewer system, PNNL redirects it to a local farmer who uses a portion of the Laboratory's unused land to grow hay. This puts our valuable water resource back into productive use and is another way in which we are looking for innovative and practical solutions to reduce our environmental impact.

As shown below, we decreased our total water use by 1 percent in FY 2009 and we are planning to implement a water recycling initiative that will help us achieve our 2 percent reduction goal for FY 2010.

Total Water Withdrawal by Year (gallons)



Opportunities for Improvement

While we have made progress in our focus areas of energy, GHG emissions, materials, and water, we are striving to do more. The table below summarizes our environmental goals for FY 2010. We are tackling our energy use and increasing renewables in order to reduce our GHG emissions. Operating our laboratory equipment, supercomputer, and other campus data centers in a more efficient manner will be key to accomplishing this, and will be our greatest challenge as the demand for our data-intensive computing work grows.

We also need to maintain the number of chemicals in our ChemAgain program and look for even more innovative ways to manage our waste streams and water usage. Our hope is to see improved results in 2010 through a combination of planned initiatives, including data center and facility air flow improvements, energy sub-metering, and water recycling.

Summary of Environmental Stewardship Goals for FY 2010

Energy Use	Reduce direct and indirect energy consumption by 3 percent through a combination of conservation and efficiency improvements. Achieve a 30 percent reduction from our 2003 baseline by 2015.
Renewable Energy Use	Purchase at least 10 percent of electricity from renewable sources.
GHG Emissions	Reduce total emissions 2.5 percent in 2010. Achieve a 28 percent reduction from our 2008 baseline by 2020.
Material Use	Increase the proportion of paper purchases with 30 percent or greater recycled content.
Water Use	Reduce water consumption 2 percent in 2010.



SOCIAL RESPONSIBILITY

Social responsibility at PNNL means protecting the health and safety of our employees, investing in their professional development, creating and celebrating an inclusive and diverse work environment, and nurturing a unique employee-driven volunteer program that allows staff members to give their time and talents back to the community. We have been recognized as an award-winning place to work because we take care of our employees, support their volunteerism, and provide a multidisciplinary work environment that gives them opportunities to create solutions for technically challenging and nationally important projects.

Working at PNNL

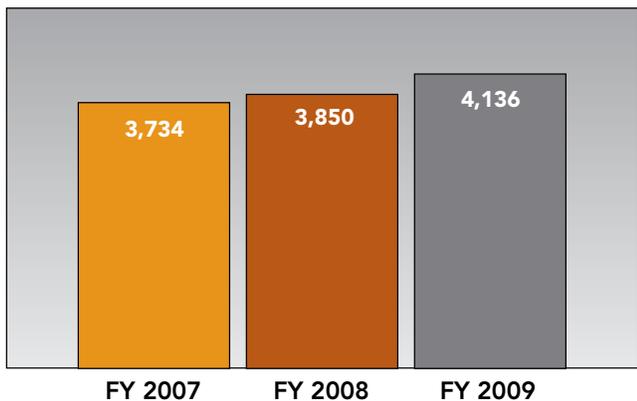
To help understand what motivates our employees and their level of satisfaction with their work environment, we conduct regular employee engagement and satisfaction surveys via Gallup and other organizations. Time and again, staff members cite that the reasons they come and the reasons they stay at PNNL are the opportunities to work for an organization where the mission of their work matters, to make a difference in the communities where they live, and to enjoy a healthy work-life balance. Our staff members know they are having a positive impact on the world by achieving or supporting one scientific discovery after another—discoveries that not only change the way people think, but also make the environment cleaner, increase our nation’s energy capacity, and make the world a safer place.

Our workforce continues to grow and in FY 2009 it increased by 11 percent to meet the Laboratory’s increasing demand for our capabilities as illustrated below. At the same time, our employee turnover rate fell to 4.5 percent in FY 2009. While this reduction may be related to the state of the economy, we review our retention rates annually and consistently achieve best-in-class turnover rates. The average length of service of our employees in 2009 was almost 12 years.

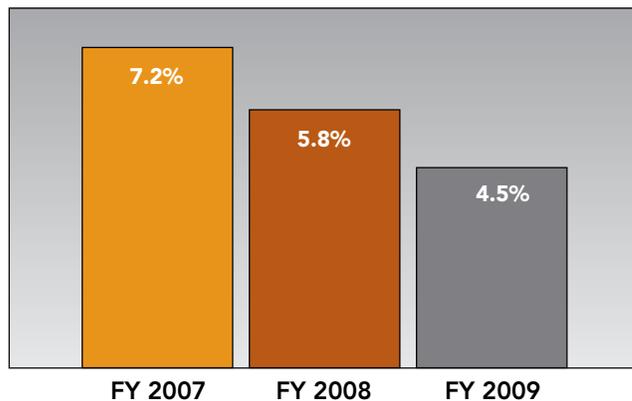
“Over the years we’ve heard very consistent messages about what attracts and retains the talented people who choose to work at PNNL. In part, our staff value the chance to work on multidisciplinary teams on technically challenging and nationally important problems; the opportunity to lead and be recognized in a field of science important to the nation; the chance to work on highly collaborative teams in a collegial and intellectually stimulating environment; and the chance to have at their disposal some of the most state-of-the-art equipment and facilities for conducting research.”

Paula Linnen
Associate Laboratory Director,
Organizational Development Directorate

Total Workforce



Turnover Rate



Staff Development

PNNL recognizes that investing in the development of our staff benefits both individual staff members and our organization. We have a long history of development programs that promote staff development and leadership within the organization, including the Scientist and Engineer Development Program (SEDP), the Management Skills Development Program (MSDP), and the Advanced Leadership Program (ALP).

Through the SEDP, we are investing in the professional development of mid-level staff members to help strengthen and diversify our science and engineering leadership. The SEDP is a two-year program that focuses on augmenting the scientist's technical capabilities with skills that are essential to a successful career. The program also supports the individual's future development by providing opportunities for networking across all Laboratory research areas and receiving support from senior staff members through a strong mentoring program.

The MSDP is a key part of our overall strategy for developing outstanding managers and leaders. We believe well-prepared managers can more effectively enable staff to achieve their individual and organizational goals. The MSDP is a three-year program designed to enhance the participant's knowledge, skills, personal effectiveness, and abilities to manage and lead staff groups.

Finally, the ALP is designed to ensure that the Laboratory has more than just a list of potential succession candidates for its leadership positions, but a pool of highly prepared, fully engaged leaders. It also represents our genuine desire to positively affect people's lives and careers by following a disciplined, objective, and purposeful process for leadership development. Through the ALP we aim to create a robust leadership pipeline that is well-aligned with future needs of the Laboratory, recognize highly valued employees, and prepare leaders who both deliver organizational results and enable the success of their staff.

Staff member participation levels vary year-to-year because these are multiyear programs. In FY 2009, a total of 161 staff members participated, compared to 170 in FY 2008. Our goal is to maintain similar levels of participation in FY 2010.

Employee Benefits and Pay

As part of our commitment to social responsibility, we not only want to be a great place to work, but we believe that by offering market competitive, pay-for-performance compensation and comprehensive benefits that we will attract and retain the type of employees we need to solve the nation's biggest challenges. PNNL benefits packages include life insurance, healthcare, vision and dental coverage, pension and 401(k) plans, as well as a variety of workplace incentives to nurture the whole employee including:

- » access to an Employee Assistance Program, which offers free, confidential, professional counseling services and information referral to employees and their immediate families

- » paid and unpaid time-off and leave-of-absence opportunities for all qualified employees, including medical and family care leave, short- and long-term disability leave, personal leave, bereavement leave, and military leave
- » educational leave and tuition assistance programs to support staff in pursuing education that will be used to achieve the Laboratory's scientific, technical, and administrative goals
- » an employee wellness program which gives employees tools to promote a healthy lifestyle.

Healthy and Safe Employees

The safety of our employees is our number one concern. We have been creating grassroots safety consciousness and fostering a culture of safety and health 24/7 through our Voluntary Protection Program since its inception in 1998. During FY 2009, we took steps to further improve our safety performance by launching the Directorate Zero Accident Councils (DZACs) to provide a forum for staff and management to identify and correct safety issues.

As a result of Laboratory-wide DZAC implementation, each organization now has an active and fully functional safety committee in place ensuring that 100 percent of staff are involved and represented by their parent organization's safety program. We have created an open environment that encourages people to bring up safety issues whenever there is a concern, and each quarter a group of safety representatives from each directorate meets with the Laboratory Director to proactively address issues before they become problems. This helps us in our efforts to constantly reduce the number of injuries and illnesses at the Laboratory.



“We want people to go home healthier than when they came to work. This means not only providing a safe place to work, but by looking into the overall wellness of our employees—their physical and emotional well-being.”

Cameron Andersen
 Director of Environment, Health,
 Safety, and Security



Investing in STEM Education

A major demonstration of PNNL’s commitment to science education reform and outreach is the role we have played helping to create Delta High School. In 2009, we partnered with regional school districts and other education institutions to open the area’s first Science, Technology, Engineering, and Mathematics (STEM) high school. By weaving STEM elements into every subject at the school, the goal is for Delta students to learn to think differently about science, technology, engineering, and mathematics.

In addition to financial support from PNNL and Battelle, PNNL played a major role in establishing the Delta’s core curriculum and an organizational design that would best support the program of study, as well as recruiting students and hiring staff.

Workplace Safety Performance

	Total Recordable Case Rate (TRCR)	Days Away, Restricted, and Transferred (DART)
FY 2007	0.68	0.31
FY 2008	0.87	0.34
FY 2009	0.79	0.29

TRCR = Number of recordable injuries and illnesses divided by total annual employee hours worked, multiplied by the base number of hours worked for 100 full-time equivalent employees (200,000 hours)

DART = Number of days away and/or restricted work activity and/or job transfer, divided by the total annual employee hours worked, multiplied by the base number of hours worked for 100 full-time equivalent employees (200,000 hours)

Our safety efforts have resulted in an accident rate that is 33 percent lower than similarly sized scientific research facilities. Our injury and illness rates were also among the best of all DOE Office of Science multiprogram laboratories in 2009. While our accident rates earned PNNL these distinctions, we will remain vigilant towards continued improvement in 2010.

We provide opportunities for all staff to take an active role in promoting worker health and safety at the Laboratory. Through our commitment to safety, staff development, and competitive compensation and benefits, we believe we are on our way to accomplishing that goal.

Science and Engineering Education

In addition to investing in the development of our permanent staff, one of PNNL’s priorities is supporting the development of future scientists and engineers. We believe that science, technology, engineering, and mathematics (STEM) education is an essential part of educating today’s students for tomorrow’s world. Our Science and Engineering Program links the human, financial, and technical resources of the Laboratory with schools, colleges, universities, and other education-oriented organizations in ways that support the education, diversity, and research objectives of the program and our education partners.

Our primary focus is on workforce development programs for students, professional development of teachers and faculty, science education reform, and outreach. An important measure of the success is the number of educational appointments we provide (e.g., internships, fellowships, post-doctoral assignments) and participant satisfaction ratings. In FY 2009, the number of appointments jumped by 35 percent, and satisfaction among participants has also remained high, as 89 percent of students and 94 percent of educators rated their experience at PNNL as “excellent” or above, compared to a goal of 80 percent.

Educational Appointments Satisfaction Ratings			
	FY 2007	FY 2008	FY 2009
Number of Educational Appointments	634	724	960
Percent of Intern/Fellow Participants Providing "Excellent" Satisfaction Ratings	86%	94%	89%
Percent of Teachers/Faculty Providing "Excellent" Satisfaction Rating	100%	100%	94%

Community Involvement

PNNL is also committed to benefitting the communities in which we operate by leveraging our people, financial resources, and knowledge. Just two of the ways we supported the Tri-Cities of Richland, Pasco, and Kennewick, Washington, and the broader Pacific Northwest region during 2009 were through staff volunteerism and Battelle philanthropic giving.

Staff Volunteerism

Our staff volunteer organization, Team Battelle, is dedicated to positively affecting the quality of life in communities where our staff live and work by supporting programs that meet the community's needs, capitalize on staff's interests, and are consistent with our corporate citizenship priorities. Team Battelle is a staff-driven volunteer program, which includes staff members, their families, and retirees. In FY 2009, 1,724 PNNL staff volunteers spent 17,322 hours on Team Battelle projects improving our communities.

Over the past decade Team Battelle volunteers at PNNL have given more than 100,000 hours of their own time to benefit local charities. Further, Battelle's philanthropic contributions support many of the organizations with which Team Battelle engages.

Below are several projects that demonstrate the impact that Team Battelle volunteers had on our communities in 2009.

Habitat for Humanity "Women Build"—Over 40 Team Battelle women volunteered to build the Tri-Cities' very first "Women Build" Habitat for Humanity home. Our crew donated a total of 450 hours over a 5-month period doing whatever was asked of them—from framing and roofing to landscaping and painting. This is now the home for a single mother and her three children, and the team has committed to building a second home in the near future.

“Team Battelle volunteers make a profound difference in what is accomplished by bringing their energy, professionalism, and willingness to do what is asked of them. A HUGE thank you goes out to Team Battelle. Tapteal Greenway has been so privileged to have you work with us.”

Pam Woodward
Tapteal Greenway



Team Battelle volunteers spent 17,322 hours on community projects in 2009.

Amon Basin Restoration—Located not far from the Laboratory and near the Columbia River, the Amon Basin is a natural area that was in great need of environmental restoration. A team of PNNL employees volunteered hundreds of hours to clean up this basin and restore its native habitat.

For the Love of Giving—A group of volunteers worked with 15 local charities to create a wish list of items they needed to provide services to those in need. Staff members donated 228 hours to gather over \$11,000 in donated items to organizations such as Benton Franklin Head Start, Fighting Children’s Cancer Foundation, and the Multi-Cultural Elder Awareness Committee.

Philanthropy

PNNL’s management contractor, Battelle, earns performance fee for operating the Laboratory for DOE. A portion of that fee is reinvested by Battelle for community and philanthropic purposes in the Tri-Cities and areas where PNNL operates (e.g., Sequim and Seattle, Washington). During 2009, Battelle reinvested \$450,000 into its Pacific Northwest Division at PNNL^a.

^aBattelle makes other direct investments in our community, which are not distributed by PNNL, but occur because of Battelle’s management role of the Laboratory. During 2009, direct capital investments from Battelle totaled \$1,016,667 to support the creation of Delta High School and Hanford Reach National Monument capital campaign.

Opportunities for Improvement

We have a long history of social responsibility and will remain committed to our employees' development and safety, and their ability to positively contribute to the community. One of our biggest challenges in the coming years is the increased employee growth to help meet our increased business volume. We will need to provide adequate space and infrastructure for staff with minimal expansion of our facilities footprint. We plan to accommodate this continued growth through better space utilization and exploring alternative work arrangements such as telecommuting, alternative hours, and other creative strategies. The table below summarizes our social responsibility goals for FY 2010.

Social Responsibility Goals for FY 2010	
Workforce	Attract and retain the necessary human resources to carry out our mission.
Turnover	Maintain employee turnover at 8 percent.
Injury/Illness	Reduce total recordable cases of injury/illness to 0.65 per 200,000 employee hours. Reduce time taken off work for injuries to 0.25 per 200,000 employee hours.
Philanthropy	Maintain the impact of Battelle's contribution from 2009.
Volunteerism	Encourage same level of Team Battelle volunteerism as 2009.



ECONOMIC PROSPERITY

Economic prosperity is not just about our own bottom line, but the value we bring to a broad set of stakeholders, including our staff, suppliers, small businesses, entrepreneurs, and the community as a whole.

Financial Performance

Two important measures of the economic value we generate and distribute include our sales and business volume. Sales reflect the value of new research projects we commit to, while business volume reflects the value of work performed. Fiscal year 2009 was another strong year for PNNL, as we carried out nearly \$1.1 billion of work and achieved a similar level of sales for the second time in our history. We also competitively distributed over \$526 million in the form of purchases of goods and services to suppliers.

Economic Value Generated and Distributed			
	FY 2007	FY 2008	FY 2009
Sales	\$ 843,017,000	\$ 1,123,136,000	\$ 1,074,450,000
Business Volume (total operating costs)	\$ 760,661,000	\$ 881,224,000	\$ 1,058,584,000

Regional Economic Development

Another important way in which we are contributing to the economic prosperity of our economy is through businesses development assistance. Our goal is to expand the economy's technology sector and create high-value jobs.

PNNL's Technology Assistance Program (TAP) helps small, technology-based companies improve their competitiveness by providing free technical assistance and information. In FY 2009 we helped 53 small businesses overcome technology challenges and develop potential new products. In our annual satisfaction survey of businesses served by TAP, 93 percent of respondents rated the assistance as satisfactory or better, and 82 percent have implemented, or plan to implement, the recommendations provided by PNNL staff.

Technology Transfer

One of the Laboratory's missions is to develop and deploy socially and economically valuable science and technology. We transfer the technology, information, and know-how from our Laboratory to public and private entities that can make the most valuable, widespread economic, social, and environmental impact. Three examples of our technology transfer successes are described in the following pages.

“We have been extremely successful during the past few years despite a dour economy. Our revenues and staff levels have grown while the country has experienced the worst recession in decades. Maintaining this momentum in the future is the challenge. Fortunately, PNNL is conducting world-leading research in energy, environment, and national security that is highly relevant to the national agenda. By aligning our capabilities with national needs, combined with keeping our costs low and continuing to work with our technology partners, I believe we have well positioned the Laboratory for continuing success.”

Marty Conger

Chief Financial Officer and
Associate Laboratory Director,
Business Systems Directorate



The Perpetua Power Puck™ allows the conversion of ambient thermal energy into electric power for a variety of low-power uses.

Self-Sustaining Power Source Pulls Energy Out of the Air

Scientists at PNNL developed a highly efficient and cost-effective renewable energy source for compact, low-power devices. The technology can save time and money in situations where information needs to be collected from remote sites where maintenance or repair is costly and logistically difficult, such as dams, bridges, and pipelines. PNNL entered into an exclusive license with Perpetua Power Source Technologies to build upon and commercialize the technology. The company was founded by a group of University of Oregon graduate students who created an award-winning business plan and marketing strategy for the technology through the joint University of Oregon/PNNL Technology Entrepreneurship Program.

Converting Waste to Clean Renewable Energy

PNNL researchers partnered with InEnTec to develop a new process for converting waste to renewable fuels, and industrial products through gasification and gas-to-liquids technologies. The process uses heating from electrically conducting gas (a plasma) to convert waste feeds to valuable commercial products including electricity, transportation fuels, and industrial materials. The technology is attractive based on its minimal environmental impact and ability to provide near-total destruction of organic materials.



InEnTec's Plasma Enhanced Melter Process converts waste to renewable energy.

“Mercury Sponge” Technology Goes from the Laboratory to Market

PNNL scientists developed an innovative sponge-like material named SAMMS™ that quickly and easily absorbs half its weight in contaminants—including heavy metals such as mercury—without creating hazardous waste or by-products, and it can be disposed of as a nonhazardous waste. The award-winning technology is significantly faster, more effective, and far less expensive than other mercury removal methods used in the past.

The U.S. Environmental Protection Agency estimates that coal-fired power plants contribute about 48 tons of mercury to the U.S. environment each year. This technology is licensed to Steward Advanced Materials for use in coal-fired power plants, municipal incinerators, and other plants to prevent some of this mercury from getting into the environment.

Opportunities for Improvement

While our business growth has had a positive impact on job creation and the local economy and our technology transfer successes are leading to innovative solutions for a more sustainable future, defining a sustainable growth trajectory in the years ahead presents a very real challenge for PNNL. We are working to meet the needs of our customers while maintaining staffing levels that we believe we can sustain over time, and we are exploring ways to accommodate space requirements for a growing workforce without dramatically increasing our facility footprint. Our economic prosperity goals for FY 2010 are summarized below.



Self-Assembled Monolayers on Mesoporous Supports (SAMMS™) is a technology that selectively removes metal contaminants without creating hazardous waste or by-products.

Economic Prosperity Goals for FY 2010

Sales	Planned decrease in sales of 16 percent. We anticipate sales to normalize after two years of exceptionally high funding because of one-time capital investment in new laboratory space and American Recovery and Reinvestment Act funding for capital equipment and energy research.
Business Volume	Increase by 2 percent as we work off a backlog of sales.

“Whether we’re designing and constructing new facilities or maintaining our existing assets, we strive to operate in a way that is safe, secure, environmentally sound, efficient, and effective from the perspectives of our key stakeholders. Our approach to operations integrates the principles of sustainability in all that we do.”

Mike Schlender

Associate Laboratory Director,
Operational Systems Directorate



ABOUT THIS REPORT

PNNL recognizes the value of using an external standard for sustainability reporting to enable a balanced, transparent, and comparable representation of our organizational performance toward the goal of sustainable development. We use the Global Reporting Initiative (GRI) G3 Sustainability Reporting Guidelines as a framework for measuring and reporting our environmental, social, and economic performance.

The following pages describe how the content of this report meets GRI required disclosures and where that information can be found. The external assurance letter offers a third party's opinion of whether we have effectively met these requirements. Finally, the performance summary table elaborates on our performance against the GRI indicators considered most material to our organization. On our website you will find expanded management disclosures and performance data against all GRI "core" indicators.

GRI Content

Materiality, Scope, and Boundary of Report: This report highlights PNNL's view of sustainability in both the context of the work we do and how we do it in relation to social responsibility, economic prosperity, and the environment. We measured and reported on those aspects of the GRI indicators that were applicable to our business, opportunity areas for improvement, and issues essential to our corporate values.

This report is for fiscal year 2009 and all years are reported as fiscal years, which run from October 1 to September 30. While PNNL is operated by Battelle, the boundary of this report is restricted to the activities that occur by the employees, activities, and operations of PNNL. It does not include Battelle's corporate headquarters or other Battelle-operated facilities unless otherwise noted.

Report Content and Balance: This being our first sustainability report, PNNL leveraged existing internal data and input on priorities from ongoing stakeholder engagement with our clients and community to develop the information for this report. We appointed a group to systematically go through all the data and GRI requirements, identify gaps, and to ensure the report was written in a balanced way by not just highlighting positive aspects and work already done, but also mentioning those areas that need improvement.

Stakeholder Inclusiveness: We did not complete a full stakeholder engagement for this report beyond existing stakeholder outreach with DOE, our communities, and our employees. We will continue to make sure that environmental, social responsibility and economic prosperity issues are discussed through these ongoing engagements with external stakeholders in the coming year and are addressed in our 2010 sustainability report.

Accuracy and Completeness: PNNL tried to be as complete, accurate, reliable, consistent, and detailed as possible with its information throughout the report. When data were unavailable, or not as complete as we would like, we explain why that is the case. The coverage of material topics in the indicators, and the three

years of data provided should enable stakeholders to assess the organization's significant economic, environmental, and social performance both during the reporting period and over time.

Governance and Management Disclosures: The leadership team at PNNL shares responsibility for delivering balanced and sustainable excellence in science and technology mission impact, operations, and community service, which encompass the economic, environmental, and social dimensions of our work.

The Deputy Director for Science and Technology stewards the economic dimension, the Chief Operations Officer stewards the environmental dimension, and the Associate Laboratory Director for Organizational Development stewards the labor and society dimensions. In actual practice, the leadership team—having a collective view across all dimensions—decides institutional priorities, resource allocations, and assesses performance. This includes ensuring compliance with the Laboratory's vision, goals, principles, code of conduct, product responsibility, conflicts of interest policy, and that the precautionary principle is followed. For complete management disclosure, please visit <http://sustainable.pnl.gov/>.

Membership and Awards: For a complete list of organizational memberships and the various community awards and patents received in 2009, please visit <http://sustainable.pnl.gov/>.

PNNL Report Contact: For more information about this report and its contents, please contact:

Mike Moran
Facilities & Operations Sustainability Office
mike.moran@pnl.gov

GRI Index and Report Application Levels



We have reviewed our 2009 disclosures against the GRI's G3 Reporting Guidelines and have declared an "A+" Application Level. This signifies that we have reported on all core performance indicators, provided the required management and organizational profile disclosures, and our report and application level was verified by an independent third party verifier.

As required by the GRI, the index below provides an overview of our reporting and provides the location within the report for all G3 Sustainability Reporting Guidelines.

Standard GRI Disclosures	G3 Indicator	Page	
Strategy and Analysis	1.1-1.2	Message from the Director, 2-3	
Organizational Profile	2.1-2.7	2-3	
	2.8 – 2.10	27-28	
Report Parameters	3.1-3.13	27-28	
Governance	4.1-4.11	28 and www.pnnl.gov	
Stakeholder Engagement	4.12-4.17	27-28	
Disclosures on Management Approach		28	
	Environmental	7	
	Economic	23-25	
	Society and Labor	15-21	
	Product Responsibility	Message from the Director, 7	
Human Rights	28		
External Assurance		30	
Performance Indicators		http://sustainable.pnnl.gov and	
	Economic	EC 1-9	31
	Environment	EN1-30	31-33
	Society and Labor	LA 1-14, SO 1-8	33-34
	Product Responsibility and Human Rights	PR 1-9, HR 1-9	34

External Assurance Letter from Sustainable Business Consulting

Sustainable Business Consulting evaluated Pacific Northwest National Laboratory's (PNNL) sustainability report to establish that the information in the report was a reliable representation of the company's social, environmental, and economic performance in relation to the Global Reporting Initiative (GRI) reporting framework and requirements as specified in the GRI G-3 Guidelines. Our responsibility was to carry out a limited assurance engagement and provide specific suggestions for improvement.

We found that PNNL satisfactorily meets the individual requirements of these guidelines and reported the information in the spirit of GRI disclosure. Their 2009 Sustainability Report provides a reasonable and balanced perspective concerning report content, quality, boundary setting, and indicators material to the Laboratory.

Completeness: PNNL reported on all the required management and profile disclosures regarding strategy and analysis, organizational profile, report parameters and governance. The organization also reported on all the required core indicators and disclosed additional information above the minimum requirements in each of the six performance indicators categories: Economic, Environment, Human Rights, Labor, Society and Product Responsibility.

We are not aware of the exclusion of any material issues or misstatements of information. Therefore, we support the company's self-assessment that its 2009 report meets the GRI application level of A+.

Verification approach: Our activities included a review of the definitions of the reporting metrics, all source data and a formal reading of the entire report. We also performed a site visit to the Laboratory's main campus in Richland, Washington, and conducted several meetings via phone with senior company representatives to discuss report content, data, methodologies, and strategies for balanced disclosure around their social, environmental, global security, and economic activities. Our assurance and verification team was made up of sustainability experts from our firm, which undertakes engagements similar to this with U.S. and multinational businesses. As part of this verification, we

- reviewed PNNL's procedures and disclosure statements
- conducted a high-level benchmarking exercise of the material issues of performance in relation to PNNL's peers as well as corporate leaders around sustainability.

Opinion and recommendations for improvement: This was PNNL's first attempt at a GRI-based sustainability report and we believe the organization will be able to use this report as a management tool to improve its reporting, stakeholder engagement, and sustainability performance over time. The company has rigorous internal procedures for data gathering and reporting. It is in our opinion that in the instances where PNNL does not collect data or have a specific policy or procedure it is because the issue is deemed not applicable at this time. As PNNL continues to grow, this may change, so attention to these may be necessary in the future to ensure continued compliance with the highest GRI application levels.

Sustainable Business Consulting
Seattle, Washington
May 24, 2010

Key Performance Indicator Summary Table

GRI Indicator	Indicator Title	2007	2008	2009
Economic Performance				
EC1	Sales	\$ 843,017,000	\$ 1,123,136,000	\$ 1,074,450,000
	Business volume (total operating costs)	\$ 760,661,000	\$ 881,224,000	\$ 1,058,584,000
	Employee wages and benefits	\$ 454,111,213	\$ 467,328,000	\$ 514,310,000
	Report estimated value of defined benefit (pension) plan liabilities	\$ 719,858,828	\$ 764,242,552	\$ 775,117,033
Environmental Performance				
Materials				
EN2	Percentage of materials used that are recycled input materials	Being a service-based organization, paper for printing and other uses represents one of the most important material inputs to our business. PNNL tracks consumption of paper products including: coated and uncoated printing papers, paperboard and packaging, heavyweight bristol papers, and commercial/ industrial sanitary tissue.		
	Percent of paper product purchases with 30% or greater recycled content	71	73	88
Energy				
EN3	Direct energy consumption by primary energy source (kBtu)	153,173,380	122,815,703	122,521,657
	Natural gas	146,759,300	115,385,700	116,157,500
	Propane	146,453	170,923	69,835
	Gasoline	5,223,125	5,141,125	3,852,500
	Diesel	906,053	1,364,717	1,535,654
	E85	138,450	753,239	906,167

GRI Indicator	Indicator Title	2007	2008	2009
EN4	Indirect energy consumption by primary source (kBtu)	336,308,297	319,348,487	330,628,235
	Non-renewable	298,956,147	287,931,494	306,537,605
	Renewable	37,352,150	31,416,993	24,090,631
EN5	Energy saved from conservation and efficiency improvements	We implemented a number of energy savings projects from 2007-2009, but have not been able to quantify the impacts of these initiatives. See pages 8-10 for examples of measures taken.		
Water				
EN8	Total water withdrawal (gallons)	519,133,074	531,121,218	526,895,330
EN10	Percentage and volume of water recycled/reused	0	0	0
Emissions				
EN16	Total direct (scope 1) ^a and indirect (scope 2) ^b greenhouse gas emissions (metric tons of CO ₂ equivalent)	44,646	41,671	45,619
EN17	Other relevant indirect greenhouse gas emissions (scope 3) ^c by weight (metric tons of CO ₂ equivalent)	19,764	21,721	24,668
EN18	Initiatives to reduce greenhouse gas emissions and reductions achieved	See pages 7-13.		

^aScope 1 “direct emission” sources include fuel combustion in our facilities (e.g. natural gas, propane), fuel combustion in our fleet vehicles, and fugitive emissions (e.g., refrigerants).

^bScope 2 “indirect emission” sources include electricity use in our facilities.

^cScope 3 “other indirect emission” sources include employee business travel (air and ground), employee commuting, and waste disposal.

GRI Indicator	Indicator Title	2007	2008	2009
Waste				
EN22	Total weight of waste by type and disposal method (tons)			
	Recycled	369	494	492
	Recycled demolition	26	118	2474
	Landfilled	496	575	666
	Compost	0.60	0.60	0.64
	Regulated hazardous waste—incinerated	15	30	289
	Rad-containing waste—landfilled (after stabilization, size reduction and/or thermo-treatment)	319	75	70
Social Responsibility				
Labor Practices & Workforce Performance				
LA1	Total workforce by employment type, employment contract, and region (excludes interns)	3,734	3,850	4,136
LA2	Total number and rate of employee turnover by age group, gender, and region	7.2%	5.8%	4.5%
LA7	Rates of injury, occupational diseases, lost days, absenteeism, and total number of work-related fatalities by region	All numbers reported are per 200,000 employee hours worked except fatalities, which is an absolute number.		

GRI Indicator	Indicator Title	2007	2008	2009
	Days Away From Work Rate	8.06	10.82	6.86
	Number of Fatalities	0	0	0
	Total Recordable Case Rate (TRCR)	0.68	0.87	0.79
	Days Away, Restricted, or Transferred	0.31	0.34	0.29
LA11	Programs for skills management and lifelong learning that support the continued employability of employees and assist them in managing career endings	103 participants	170 participants	162 participants

Product Responsibility Performance

PR5	Practices related to customer satisfaction, including results of surveys measuring customer satisfaction	Each year DOE evaluates PNNL's performance against established goals. Two of the most important goals relate to the quality of science and technology (S&T) we deliver in support of our mission and the effectiveness with which we manage and operate the Laboratory. We have consistently and notably exceeded DOE's expectations for S&T performance and have met its very high expectations for management and operations (M&O) performance.		
	Mission Accomplishment (S&T performance)	A	A	A
	Operating, Maintaining, and Renewing Facility and Infrastructure (M&O performance)	B+	B+	B+

The indicators reported in this table are a representative of our key performance indicators. PNNL has reported on all of its core indicators as required by the GRI and they are available on our web version of the report at <http://sustainable.pnl.gov/>.



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