

National Renewable Energy Laboratory -- Sustainable NREL – An Innovative Approach to EMS (Environmental Management Systems)

Point of Contact: Maureen Jordan
National Renewable Energy Laboratory
Golden, Colorado 80401
Phone: (303) 275-3248
Fax: (303) 275-4002
E-Mail: maureen_jordan@nrel.gov

Award Category: Environmental Management Systems

Nominee: Team Nomination: National Renewable Energy Laboratory

Robert Westby
Susan Huffnagle
Maureen Jordan

Nomination Abstract:

The mission of the National Renewable Energy Laboratory (NREL) is to develop renewable energy and energy efficiency technologies, advance related science and engineering, and transfer knowledge and innovations to address the nation's energy and environmental goals. NREL's Sustainability Vision is to exemplify sustainability in a research and development organization by maximizing efficient use of all resources; minimizing waste and pollution; and serving as a positive force in economic, environmental, and community responsibility. Through Compliance, Life Cycle Assessments and Community Outreach, NREL has successfully implemented its Environmental Management System and sustainability initiatives throughout the Laboratory and in the community.

Nomination Description:

The mission of the National Renewable Energy Laboratory (NREL) is to develop renewable energy and energy efficiency technologies, advance related science and engineering, and transfer knowledge and innovations to address the nation's energy and environmental goals. Consistent with the focus on renewable energy and energy efficiency technologies, NREL strives to make the Laboratory a global model for sustainability. NREL's Sustainability Vision is to exemplify sustainability in a research and development organization by maximizing efficient use of all resources; minimizing waste and pollution; and serving as a positive force in economic, environmental, and community responsibility.

NREL's Environmental Management System (EMS), established in 1997, integrates environmental considerations into routine business operations and management

processes, and also improves internal environmental management effectiveness. Specifically, the EMS focuses on areas including natural and cultural resource protection, pollution prevention, and waste management.

Sustainable NREL, formalized in 2001, is an initiative to help NREL become more sustainable in all its operations and facilitate constant progress in Laboratory wide environmental stewardship. Sustainable NREL is comprehensive in that it encompasses three of the major elements of sustainability; financial viability, environmental stewardship, and public responsibility. (The 2004-2005 Sustainability Report can be reviewed online: http://www.nrel.gov/sustainable_nrel/pdfs/sn_report_05.pdf.)

As NREL's Environmental Management System (EMS) has expanded to include both environmental compliance and related sustainability initiatives, it has been able to capitalize on the ongoing, complimentary Sustainable NREL activities. This synergy has enabled the NREL EMS program to expeditiously meet and exceed compliance requirements.

Through Compliance, Life Cycle Assessments and Community Outreach, NREL has successfully implemented its EMS and sustainability initiatives throughout the Laboratory and in the community. With improved metric tracking, the Laboratory has been able to more effectively monitor operations, and can make well informed decisions to optimize the positive impact of pollution prevention programs.

Compliance

NREL meets its environmental compliance requirements and stewardship obligations through a strong EMS that establishes policies and procedures to implement requirements in such areas as permitting (air, water, hazardous materials), natural and cultural resource protection, waste management, pollution prevention, and National Environmental Policy Act environmental review requirements. Currently, NREL has over forty policies and procedures central to Sustainability and the EMS.

NREL's EMS meets and exceeds the requirements of E.O. 13148. In 2004, NREL's EMS was acknowledged for its accomplishments and progressive approach by being accepted into EPA's National Environmental Performance Track (NEPT) program. NEPT is a voluntary public/private partnership recognizing top environmental performance among participating U.S. facilities of all types, sizes, and complexity. NREL's EMS was also recognized in 2004 by being accepted for membership in the Colorado Department of Public Health and Environment's Environmental Leadership Program.

E.O. 13123 tools have been formally incorporated into Laboratory policies and procedures. This has occurred both through the adoption of a formal Laboratory Sustainability Policy and the annual Sustainable NREL Master Plan. Both require compliance with this and other Executive Orders. The Master Plan sets forth the specific implementation plans. The stand alone Sustainability Policy was developed and included in the Laboratory's formal Policy and Procedures. An indicator of the breadth and depth

of this Policy are the linkages to twelve related Policies and thirteen Laboratory-level Procedures. The Master Plan for FY05 can be reviewed online:
http://www.nrel.gov/sustainable_nrel/pdfs/fy05_masterplan.pdf.

The Laboratory has further achieved institutionalization of E.O. 13123 compliance and its sustainability activities through:

- The creation of Sustainable NREL with a directive to institutionalize sustainability and to guide and help assure Executive Order implementation;
- The development of a 25-year General Development Vision (GDV) which guides the various required DOE site planning processes, assuring that sustainability is an ongoing consideration. The GDV can be reviewed online:
<http://www.nrel.gov/docs/gen/fy04/33696.pdf>;
- Accountability to DOE by including Sustainable NREL in the Performance Self-Assessment process, and;
- Implementation of stand alone Material Recycling policies and procedures.

Life Cycle Assessment (LCA)/Energy Use

NREL created its first Laboratory-wide Life Cycle Assessment of its operations in FY2003. Since this time, Sustainable NREL has tracked its performance in this area by completing an annual update of this footprint. Figure 1 in the attached document graphically represents NREL's FY05 "footprint" - the amount of CO₂ emissions that NREL creates through its annual operations. The footprint highlights eight major areas of interest: Electric use, natural gas use, water, commuter vehicle emissions, international and domestic air travel, fleet vehicle emissions, and solid waste disposal. Details on how the original 2003 footprint was created are available through a peer reviewed NREL publication, "Sustainable NREL: Laboratory Life Cycle Assessment of Environmental Footprint" (<http://www.nrel.gov/docs/fy04osti/36529.pdf>)

The CO₂ footprint provides a "cradle to grave" analysis of NREL's operations. However, the breakdown of the footprint enables analysis of the specific categories listed above. Through the use of extensive metrics and measurement, NREL has been able to track its progress to achieving multiple goals that were set for FY05. The following list is just a few highlights of NREL's accomplishments in the past year:

- The laboratory energy consumption was 23% lower than our 1990 baseline. This reduction was achieved almost exclusively through investment in cost-effective energy retrofit measures. In addition, when accounting for renewable energy credits, NREL was 61% lower than our 1990 baseline. Although we have met and exceeded current federal energy use-reduction goals, NREL continues to support these expenditures.

- The Laboratory fleet petroleum use was reduced by 3% to 7448 gallons as compared to FY2004. Forty-three percent of the fleet was fueled by E85 and biodiesel, representing nearly 73% of the total fleet use.
- In FY05, we purchased renewable energy certificates equivalent to 100% of our annual electric use in DOE-owned buildings.

Since 88% of the CO2 footprint comes from energy consumption, a primary component of Sustainable NREL is a comprehensive energy management program. Multiple renewable energy sourced on-site electrical generation projects offset utility electrical purchases. The FY05 on-site production was 80,000 kWh from wind and 58,000 kWh from photovoltaic systems. There are also multiple on-site solar thermal applications including solar thermal hot water systems, ventilation air collectors and trombe walls. In addition, Energy Management Control Systems (upgraded DDC EMCS installed on all major buildings and HVAC systems), Site Metering (state of the art site metering and data management installed on all Laboratory/Department of Energy (DOE) owned-buildings and major process loads), and the Computer Power Management System (implemented Laboratory wide centralized computer power management) are all closely monitored and provide performance metrics so decisions can be made for energy use reduction. With these programs and measures in place, NREL was able achieve the goals set by DOE Executive order 13123. Figure 2 in the attached document shows that with the purchase of Renewable Energy Credits, on-site electrical generation and Laboratory-wide energy efficiency programs, NREL reached both its FY05 and FY10 goals for energy use reduction.

Community Outreach/Involvement

NREL was the first Federal facility to join EPA Climate Leaders Partnership and to set a GHG reduction goal. In FY05 the Laboratory achieved its goal of reducing Green House Gas emissions by 10% over a 1990 baseline. Figure 3 in the attached document shows that NREL consistently reduced its GHG emissions.

To highlight the metrics that NREL tracks on an ongoing basis, the Laboratory publishes an Annual Sustainability Report. This report is distributed nationally and contains information regarding the environmental impacts of the Laboratory. The 2004-2005 Sustainability Report can be reviewed online:
http://www.nrel.gov/sustainable_nrel/pdfs/sn_report_05.pdf.

In addition to the numerous internal reporting processes, NREL is a member and supporter of multiple sustainability stakeholder groups, such as the Pollution Prevention Multi-State Working Group, Interagency Sustainability Working Group, Environmental Council of States, and several regional and local sustainability organizations including the Denver Regional Council of Governments on the issues of commuting and transportation options.

Future Vision for Environmental Stewardship and Sustainability at NREL

There is a natural synergy between the Laboratory's EMS and Sustainable NREL. This synergy has allowed NREL to maintain excellence in environmental compliance while also focusing on setting increasingly ambitious standards in sustainability and environmental leadership. As evidenced by the qualitative and quantitative achievements noted herein and by the future commitments to excellence in environmental stewardship, NREL "walks the talk" of maintaining a sustainable environment through pollution prevention. It is NREL's goal to weave sustainability and environmental stewardship into the "fabric" of all activities and processes at the Laboratory as a means to achieve excellence in environmental and business performance.