



**National Renewable Energy Laboratory**  
*Innovation for Our Energy Future*

# 2008 SUSTAINABILITY REPORT



NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

# Introduction



PIX15681

NREL campus in Golden, Colorado

The National Renewable Energy Laboratory (NREL) is the only federal laboratory dedicated to the research, development, commercialization and deployment of renewable energy and energy efficiency technologies. Backed by 32 years of achievement, NREL leads the way in helping meet the growing demand for clean energy. Our core competencies allow us to develop and advance renewable energy and energy efficiency technologies more effectively through the full R&D cycle, including basic scientific research, applied research and engineering,

testing, scale-up, demonstration and deployment.

NREL's core competencies:

- Renewable electricity – solar, wind, biomass, and geothermal
- Renewable fuels – biomass and hydrogen
- Integrated energy systems – buildings, vehicle systems, and electricity and transportation infrastructure
- Strategic energy analysis – policy, economic, financial, and market analysis, and planning and portfolio prioritization.

## Laboratory Background

Established in 1974, NREL began operating in 1977 as the Solar Energy Research Institute as a governmental-owned, contractor-operated laboratory of the U.S. Department of Energy. In September 1991, it was designated a national laboratory and renamed the National Renewable Energy Laboratory. NREL conducts research primarily for DOE's Office of Energy Efficiency and Renewable Energy. The DOE Golden Field Office provides oversight to the laboratory, which is operated by the Alliance for Sustainable Energy LLC.

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## Acknowledgments

The 2008 Sustainable NREL Master Plan was managed by **Bob Westby**, Sustainable NREL Lead, and **Ellen Parker**, Sustainable NREL coordinator.

The following NREL management and staff members have primary roles in implementing the Sustainable NREL Master Plan: **NREL Executive Management** (laboratory stewardship and direction); **Drew Detamore** (site planning and new buildings); **Chandra Shah** (water and green power purchasing); **Otto VanGeet** and **Anna Hoenmans** (electricity and natural gas use); **Kari Burman** (greenhouse gas reductions); **Tim Peele** (transportation); **Karri Bottom** and the Near-Zero Waste Committee (materials); **Maureen Jordan** (environmental management systems, including sustainability); **Grace Griego** (communications); **Laura Michael** (policies and procedures); **Kerry Masson** (public responsibility); and **Barb Stokes** (financial stewardship).

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## Message from the Director



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Dan Arvizu, NREL Director

There perhaps has never before been a more exciting time than today to be part of the National Renewable Energy Laboratory. The demand for energy continues to grow at an unprecedented rate, and investment in clean energy technology research and development, on both a national and international scale, is increasing exponentially. As the nation's leading laboratory for renewable energy and energy efficiency research and development, we are in a position to significantly impact our nation's energy security, environmental, and economic goals.

Because of our position, we have been charged with providing sustainability leadership and serving as a global model for sustainability under DOE Order 430.2B which establishes aggressive goals as it relates to energy efficiency, use of renewable energy, sustainable building requirements, and conservation efforts at federal agencies. In support of our mission and the DOE mandate, we continue to

proactively pursue sustainability in all of our operations. In 2008, we upheld our leadership role and integrated sustainability at an unparalleled rate and scale. Specifically, we launched or completed several new-large scale on-site renewable energy projects and energy-efficient buildings, including:

- South Table Mesa Photovoltaic (PV) Project (initial operation, December 2008)
- Renewable Fuel Heating Plant (initial operation, May 2009 )
- National Wind Technology Center (NWTC) PV Project (scheduled operation, 4th quarter 2009)
- Science and Technology Facility (S&TF) PV Project (scheduled operation, 4th quarter 2009)
- Research Support Facility (RSF) new net zero energy building (occupancy scheduled for 2010).

The combined benefits of these projects and buildings are manifested in a smaller carbon footprint, electricity from renewable resources to power some of our facilities, and NREL buildings

that qualify for a Platinum designation by the U.S. Green Buildings Council's Leadership in Energy and Environmental Design (LEED) Green Building program. (For details, see the sections on Renewable Energy and Sustainable Green Buildings.)

In addition, we continued to reduce our laboratory's energy and water use, procure green products, recycle, use alternative fuel in NREL vehicles, and purchase renewable energy certificates that offset our environmental footprint. I am proud to report that we achieved carbon neutrality in all of our operations for the third consecutive year.

As the demands for energy as well as the investment in research and development continue to increase, so does the importance of creating and deploying renewable energy and energy-efficient technologies. By maintaining our leadership in sustainability, we can better support and advance our mission.

Dan E. Arvizu  
NREL Director

# DOE Order 430.2B

## Goal Requirements

- Energy Use Reduction
- Renewable Energy Generation and Use
- Greenhouse Gas Reduction
- Sustainable Design/High Performance Buildings
- Petroleum and Alternative Fuel Use
- Water Use Reduction

NREL's sustainability activities are underpinned by federal requirements. These requirements are primarily included in DOE Order 430.2B (Departmental Energy, Renewable Energy, and Transportation Management). DOE Order 430.2B consolidates the 2007 Executive Order (E.O.) and a follow-up DOE initiative, both of which were enacted to strengthen federal environmental, energy, and transportation management.

- E.O. 13423 established comprehensive, aggressive federal agency goals for increased energy efficiency, renewable energy generation and use, petroleum reduction/alternative fuel use, sustainable building standards, water conservation, and environmental protection.

- The DOE Transformational Energy Action Management (TEAM) Initiative required DOE to lead federal agencies in the implementation of the E.O. goals at an unprecedented scale and rate.

DOE Order 430.2B required that a binding Executable Plan to achieve compliance with all stipulated goals be submitted by December 31, 2008. DOE approved NREL's Executable Plan as meeting or exceeding all goal requirements.

NREL's progress in meeting these goals and its more aggressive internal goals headline the applicable sections of this report.

# About Sustainable NREL

## NREL Sustainability Vision

The vision of Sustainable NREL is to establish a formal change in laboratory culture, ensuring that every decision we make fully considers all resource implications. When sustainability is a part of everything that we do at the lab, we will know that we have achieved our objective.



## Sustainability Management Framework

### Economic Viability

### Environmental Stewardship

- Campus
- Water
- Electricity/Natural Gas
- Transportation
- Reduce, Recycle, Reuse, Rebuy
- Environmental Management
- Education/Communications

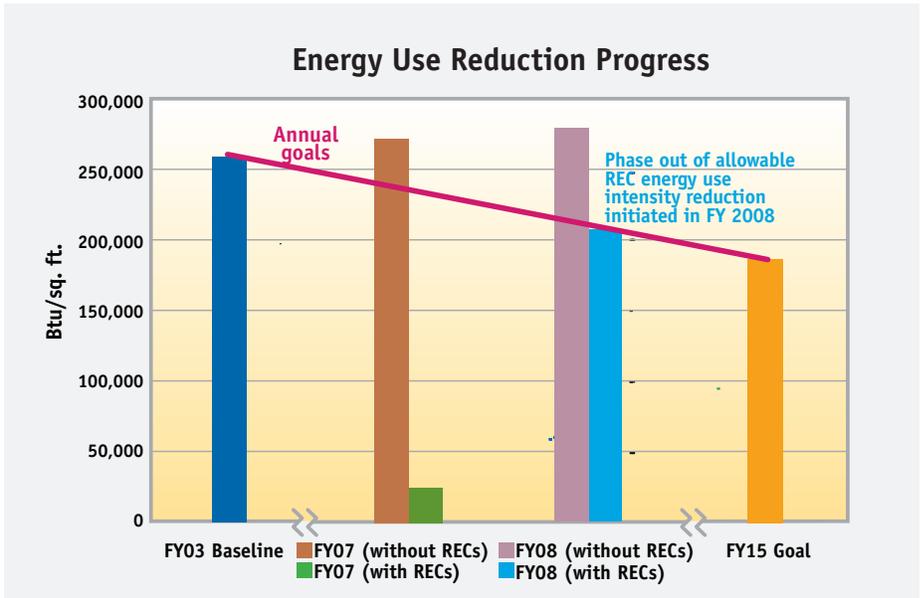
### Public Responsibility

At NREL we are committed to sustainability, which we define as the simultaneous and balanced pursuit of economic viability, environmental health, and public responsibility over the long term through appropriate investment decisions and operating practices.

Laboratory activities are integrated in our Environmental Management System, which emphasizes minimal use of resources (such as energy, materials, and water) while maximizing the value of those resources.

NREL has made significant progress in making sustainability an integral part of its culture and providing a global sustainability model.

# Energy Efficiency



## Energy Use Reduction Goal

**DOE Order 430.2B.** Beginning in FY 2006, improve energy efficiency through reduction of energy use intensity by 3% annually through the end of FY 2015 or 30% by the end of FY 2015 as compared to the baseline energy use in FY 2003.

**Progress.** Actual FY 2008 energy use intensity was 2.4% higher than the FY 2003 baseline. This increase was due primarily to a full year of operation of the new Science and Technology Facility (S&TF) at full capacity and growth in laboratory staff. NREL exceeds the FY 2008 goal including the allowable renewable energy credit (REC) reductions. NREL will exceed the FY 2015 goal through the significant additions of highly energy-efficient new buildings (exclusive of the use of RECs).

Energy use reduction on NREL's campus is focused on the design and construction of highly energy-efficient new buildings (see the section on Sustainable Green Buildings). Cost-effective energy-efficiency retrofit opportunities have, for all practical purposes, been implemented. Specifically, NREL expects to exceed the required FY 2015 energy use intensity reduction goal of 30% by significantly exceeding the energy use requirements of the federal energy efficiency new construction requirements.

# Renewable Energy



This “solartree,” a demonstration PV electric charging station at NREL, is equipped with both 120 V and 24 V outlets for expected high-energy vehicles. One plug-in hybrid electric vehicle (PHEV) consumes about 300 watt-hours per mile in charge-depleting mode. This means that the array will provide enough energy to power a PHEV for a range of some 90 miles per day.

## Renewable Energy Generation and Use Goals

**DOE Order 430.2B.** Use of renewable energy shall be 3% for each year from FY 2008 through FY 2009, 5% from FY 2010 through FY 2012, and 7.5% from FY 2013 forward. At least half of the statutorily required renewable energy consumed each fiscal year shall come from “new” (post January 1, 1999) renewable sources.

**Progress.** FY 2008 renewable energy use was 100% of annual electric consumption achieved primarily through the utilization of on-site renewable energy projects and the purchase of RECs. One hundred percent (100%) of the renewable energy use was from “new” renewable energy resources. These results significantly exceed the FY 2013 renewable energy electric use goals.

NREL currently has the largest on-site PV generation capacity in Colorado. It has 3.27 MW of PV capacity with the capability of generating 5,054 MWh annually in operation or under contract. This electrical production represents 28% of NREL’s FY 2008 electrical use. Four of the five systems have been, or will be, installed under Power Purchase Agreements

(PPAs) with a third-party developer, and one will be purchased utilizing appropriations. The Mesa Top PV system was the first DOE PPA agreement. Additional on-site renewable energy projects are planned, including the purchase of a 1.5 MW turbine for R&D and demonstration purposes to be located at the NREL NWTC. PV is also planned for all new

### On-site Renewable Energy Electric Generation

Site	Rating	Annual Energy	Operational Year
South Table Mesa Top	720 kW	1,200,000 kWh	12/2008
Science and Technology Facility	94 kW	134,813 kWh	10/2009*
National Wind Technology Center	1,083 kW	1,913,661 kWh	12/2009*
Research Support Facility I (RSF I)	741 kW	976,009 kWh	6/2010*
RSF I Parking Garage	630 kW	829,710 kWh	6/2010*
<b>Totals</b>	<b>3,268 kW</b>	<b>5,054,193 kWh</b>	

\*Scheduled operation dates



PIX16178

Delivery of one of the three 1.5 MW GE turbine rotor to the NWTC

major buildings. The 1.5 MW turbine is scheduled to be operational in the fall of 2009. NREL plans to sell the power produced by this R&D turbine to the grid through a “sale of power” agreement with the local utility.

The Renewable Fuel Heating Plant (RFHP) utilizes a wood-fired (biomass) combustion boiler that combusts regional urban wood

wastes and forest thinnings. This on-site renewable energy project is significant because it is projected to offset up to 75% of the current natural gas use at the South Table Mountain (STM) campus.

In addition, the thermal output of the RFHP positions NREL to significantly exceed the DOE Order 430.2B renewable energy

thermal generation goal (7.5% of annual thermal energy use by FY 2013). The RFHP was installed through an energy savings performance contract (ESPC) and will begin its first full heating season of operation in the fall of 2009.

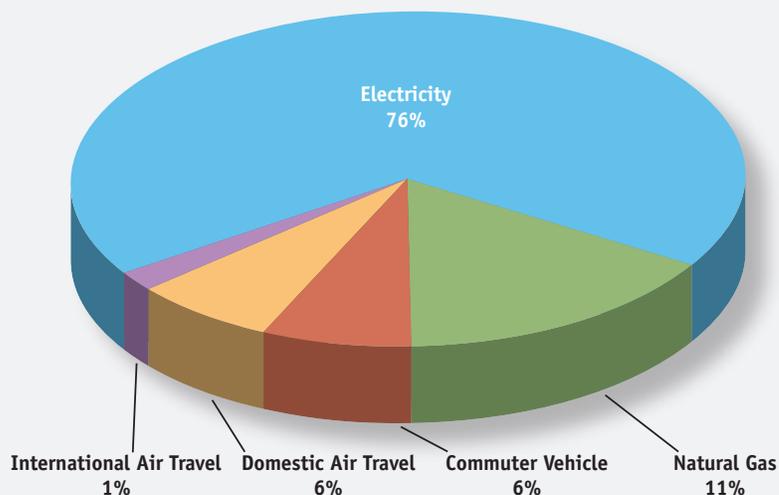


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Renewable Fuel Heating Plant

# Environmental Footprint

FY08 CO<sub>2</sub> Emissions Breakdown



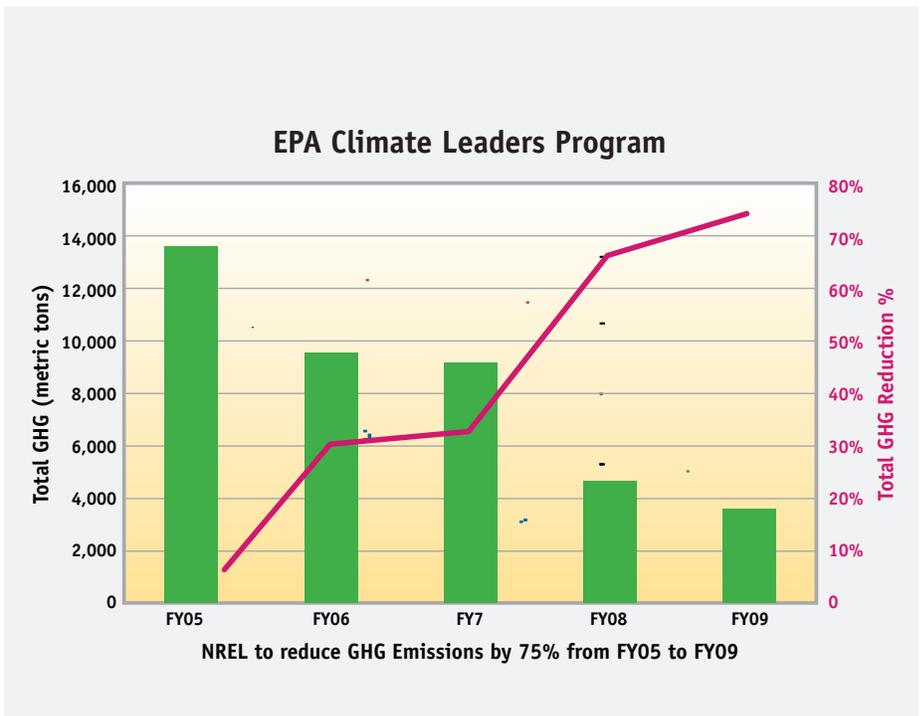
NREL began tracking its CO<sub>2</sub> emissions in FY 2003. NREL quantifies its “carbon footprint” by including emission sources beyond the laboratory’s boundary, such as laboratory leased space, air travel, and the commuting of staff members to and from work. Sources with negligible emissions such as fleet vehicle emissions, solid waste disposal, and water (associated electricity or natural gas consumed) are not included in the graph.

The quantification of this footprint provides a metric which allows the laboratory to:

- Take into account the carbon implications of its investment decisions
- Measure progress towards achieving carbon reduction goals
- Benchmark performance
- Take responsibility for its actions.

SOURCE	Kg CO <sub>2</sub> Eq.
Electricity	20,194,796
Natural Gas	4,634,065
Commuter Vehicle Emissions	2,171,715
Domestic Air Travel Emissions	2,000,383
International Air Travel Emissions	622,542
Fleet Vehicle Emissions	85,144
Solid Waste Disposal	80,978
Water (Electricity Consumed)	17,435
Water (Natural Gas Consumed)	14,676
<b>Total</b>	<b>29,821,734</b>

# Greenhouse Gas Reduction



## Greenhouse Gas Reduction Goals

**DOE Order 430.2B.** Reduce GHG emissions by 3% annually, or 30% by the end of FY 2015, relative to GHG emissions in FY 2003.

**NREL Goals.** NREL will achieve “carbon neutrality” annually. NREL has pledged through the Environmental Protection Agency (EPA) Climate Leaders Program (CLP) to reduce its total U.S. GHG emissions by 75% from 2005 to 2009.

**Progress.** NREL is meeting and significantly exceeding the E.O. GHG reduction goals. Beginning with FY 2006, NREL has annually achieved “carbon neutrality.” NREL is on track to meet its FY 2009 EPA CLP GHG reduction goal.

New federal GHG reduction requirements are expected to be mandated as soon as 2010. These mandates will focus on GHG emission measurement and reduction and utilize these reductions as its primary metric.

NREL is well positioned to provide leadership in this area, having established a baseline for its carbon footprint beginning in FY 2003. The laboratory was the first federal facility to voluntarily set and meet an EPA Climate Leaders Program (CLP) GHG reduction goal in FY 2005. The laboratory has also set a second CLP goal of reducing its total U.S.

GHG emissions by 75% from FY 2005 to FY 2009.

The laboratory has achieved “carbon neutrality” since FY 2006. NREL is committed to:

- Implementing cost-effective energy retrofits
- Significantly increasing on-site renewable energy projects
- Requiring all new construction to achieve at least a LEED Gold rating and significantly exceed energy efficiency requirements
- Continuing its purchase of RECs to totally offset the laboratory’s CO<sub>2</sub> footprint.

# Environmental Management



PIX16592

## NREL Environmental Leadership Recognized

NREL has been recognized annually as a Gold Leader by the Colorado Department of Public Health and Environment Leadership Program (CDPHELP) since 2005. Frank Rukavina, Maureen Jordan, and Denise Rayborn from NREL accept an award from James Martin of CDPHELP (third from left). NREL has also been recognized as a Silver Leader in the Federal Electronics Challenge sponsored by EPA and the White House Office of the Federal Environmental Executive. [www.federalelectronicschallenge.net/](http://www.federalelectronicschallenge.net/)

NREL's Environmental Management System provides effective environmental stewardship of its federally-owned sites and minimizes the environmental impacts of our activities wherever we are working, whether on our own sites or the sites of partners or subcontractors. The laboratory's environmental management efforts:

- Protect and enhance the vegetation, wildlife, and natural resources of our sites
- Comply with environmental requirements
- Encourage continuous improvement in environmental protection.

NREL prepares an annual environmental performance report, summarizing NREL's environmental protection programs and activities. It includes a brief summary of how the program is managed in each area, including any permitting or notification efforts that have been completed during the reporting period. These reports are available on the NREL Environmental Health and Safety Website, [www.nrel.gov/eshq/environmental\\_management\\_system.html](http://www.nrel.gov/eshq/environmental_management_system.html).

# Sustainable Green Buildings



PIX16250

The RSF is a 220,000 sq. ft. office building, which is expected to be completed by late 2010.

## Sustainable Design/ High Performance Buildings Goals

**DOE Order 430.2B.** New construction and major renovations shall comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles). Fifteen percent (15%) of the existing building inventory as of the end of FY15 will incorporate the sustainable practices in the Guiding Principles. DOE sites will achieve at least a LEED "Gold" rating on all new buildings.

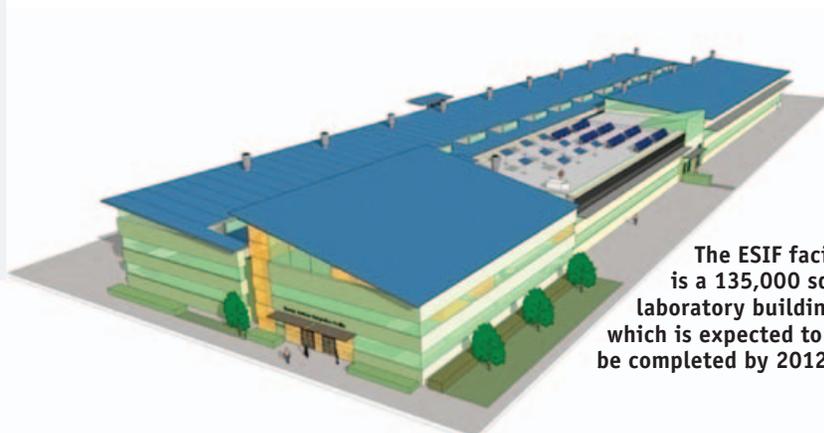
**Progress.** All laboratory new construction complies with the Guiding Principles. As of FY 2008, 13% of NREL's existing building inventory incorporates the sustainable practices in the Guiding Principles. With the completion of the RSF in FY 2010, NREL will significantly exceed the FY 2015 15% goal. NREL has achieved a certified LEED Platinum rating on its most recent new building, the Science and Technology Facility (S&TF), a 71,000 sq. ft. laboratory building.

The first priority in the NREL campus energy strategy is to invest in site design and building development to maximize energy efficiency with appropriate building orientation and mass. This strategy takes advantage of passive solar design for heating, cooling, and natural lighting in all new building construction. Low-energy design strategies in office buildings focus primarily on reducing energy for lighting and cooling. Strategies in laboratories focus on reducing the energy needed to meet ventilation requirements.

NREL's next new major building, the RSF, is a 220,000 sq. ft. office building scheduled for occupancy in 2010. The RSF is a design-build project with an aggressive energy budget of 28,000 Btu/sq. ft. The RSF is also being designed as a net Zero Energy Building (ZEB) and at the LEED Platinum level.

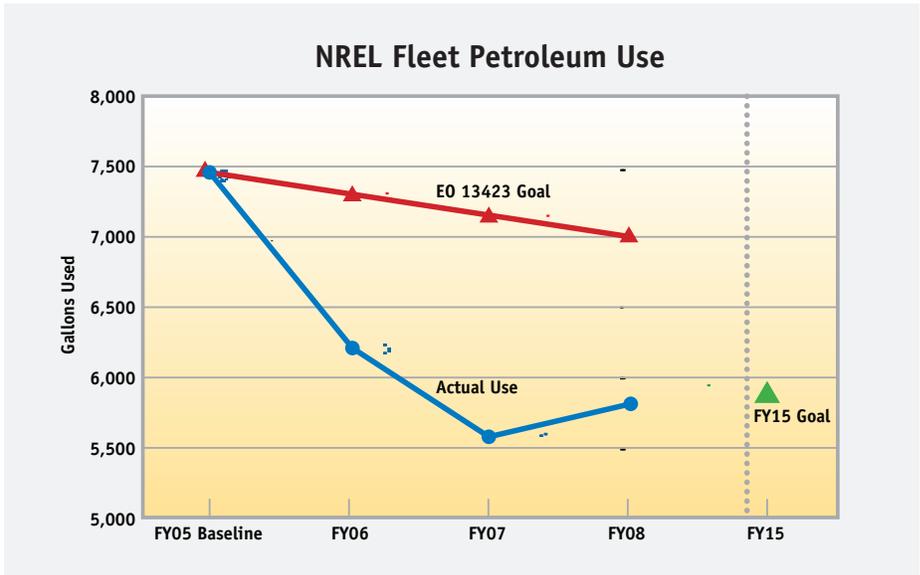
Increased demand for renewable energy and energy efficiency technologies requires critical laboratory space and partnering facilities. Attributes of the planned space include net-zero energy, carbon neutrality, and LEED Platinum or Gold certification.

To meet this demand, NREL has developed plans that more than double its current laboratory space with the build out of the STM campus planned to be completed by 2020. Currently, building has been authorized for the Research Support Facility II (RSF II) and the Energy Systems Integration Facility (ESIF) for occupancy by 2012. Ten future STM buildings will host translational science research, systems integration, and laboratory/marketplace interface. The NWTC plans include facilities for development and reliability testing and public outreach.



The ESIF facility is a 135,000 sq. ft. laboratory building, which is expected to be completed by 2012.

# Transportation



## Petroleum and Alternative Fuel Use Goals

**DOE Order 430.2B.** Reduce total fleet petroleum product consumption by 2% annually through the end of FY 2015 as compared to the FY 2005 baseline.

Increase the total fleet fuel consumption that is non-petroleum-based by 10% annually.

**Progress.** In FY 2008, NREL exceeded the FY 2015 fleet petroleum use reduction goal of 20% by achieving a 21% reduction. In addition, NREL exceeded the goal of increasing the FY 2008 use of non-petroleum-based fuel by 10% by increasing its alternative fuels use by 19%.

NREL’s strategy to reduce petroleum consumption includes the use of:

- Alternative-fuel vehicles
- Bio-based fuels
- Alternative modes of commuting
- Flexible work place practices.

**Alternative-fuel vehicles and bio-based fuels.** NREL has a fleet of 47 leased vehicles. Because 36 (75%) of the fleet use alternative fuels, the laboratory was able to reduce its petroleum consumption in FY 2008 by 21% – consuming only 5,812 gallons. This decrease from the FY 2005 baseline year exceeds the goal of DOE Order 430.2B, which caps petroleum use at 5,958 gallons for FY 2015.

NREL has been fueling its fleet with bio-based fuels since 1977.

In FY 2008, 26 (55%) of its 47 vehicles were fueled by E85 (85% ethanol). These vehicles used 11,096 gas gallon equivalents (GGE) of E85, which is more than 70% of the total fleet usage of 15,113 GGE of fuel. This increase in alternative fuel use represents an increase of 19% over the previous year. NREL is also exploring the use of biodiesel.

**Alternative modes of commuting.** Alternative transportation opportunities for employees are key to achieving sustainability in transportation. Options available to employees include:



Free RTD EcoPasses are available to NREL employees.



PIX16575

FY08 Bike to Work Day participants

## Denver Regional Council of Governments

DRCOG hosts a Bike to Work Day each year during Bike to Work Month to encourage alternative commuting.

Officially, 232 NREL and DOE staff members participated in Bike to Work Day in FY 2008. This was a 12% increase over the previous year, and reflects an impressive total of 2,128.15 miles traveled each way by bike, bus, carpooling, or walking.

NREL was again the recipient of the Business Challenge Winner – Class D for Jefferson County. NREL also won this award in 2007.

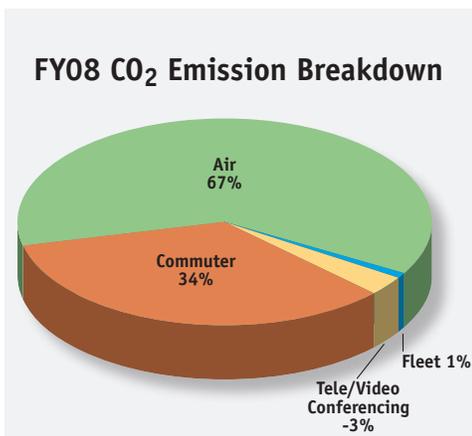
- Free EcoPasses to use the Regional Transportation District (RTD) public transportation – unlimited RTD regional, express, local, light rail, and Call-n-Ride services.
- Alternative-fuel shuttle vehicles that reduce miles traveled at its South Table Mountain and Denver West sites in Golden, Colorado.

### Flexible work place practices.

Conferencing by video, telephone and the internet as well as alternative work schedules provide flexibility in how people work – saving time, energy, and money.

Air travel represents 67% of the total miles traveled. During FY 2008, it is estimated that the use of video conferencing mitigated 174 domestic flights totaling 513,648 air miles, and that 2,032 hours of conferencing via other media mitigated an additional 32,472 air miles traveled.

An alternative work schedule policy allows employees to work varying schedules (with management approval), including four-day workweeks – reducing the miles driven by employees to and from the laboratory.



Tele/video conferencing displaced 3% of NREL's emissions.



PIX16578

Video conferencing helps reduce the necessity for air travel.

# Water Conservation



PIX15442

The S&TF roof collects and directs rain water to irrigate the surrounding landscape (annual collection estimate: 175,000 gallons/year).

## Water Use Reduction Goal

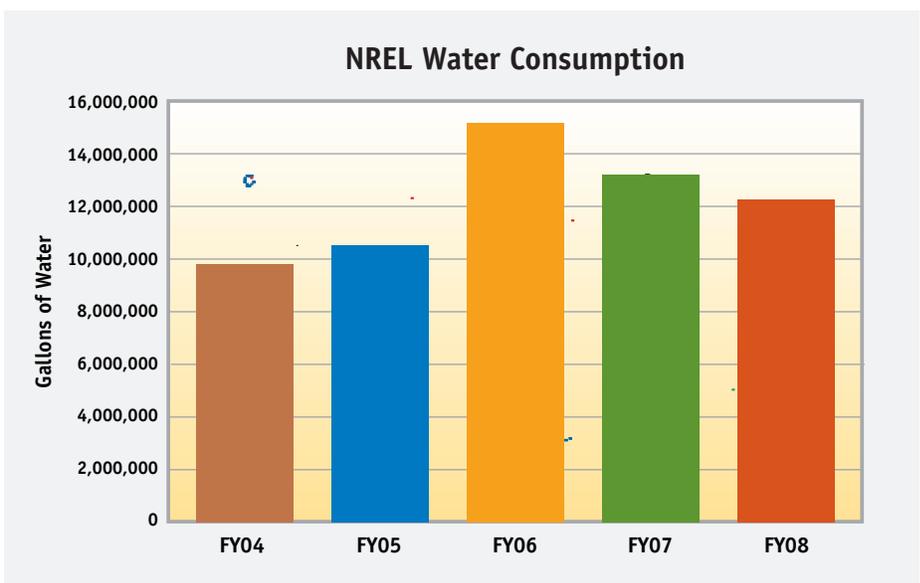
**DOE Order 430.2B.** Beginning in FY 2008, reduce water consumption intensity by 2% annually through the end of FY 2015 or 16% by the end of FY 2015, relative to the baseline water consumption in FY 2007.

**Progress.** In FY 2008, NREL reduced its water consumption by 8% relative to the FY 2007 baseline. NREL completed a water audit in FY 2007 identifying cost-effective water conservation measures which will result in a total savings of 14%. To exceed the overall reduction goal of 16%, NREL will incorporate water saving measures in all new construction facilities as a part of achieving the minimum LEED Gold rating.

The FY 2007 NREL water consumption baseline is 13.2 million gallons or a water consumption intensity of 28.7 gallons/sq. ft. In 2008, NREL reduced its water consumption by 8% relative to the FY 2007 baseline. For FY 2008, the S&TF had a water consumption intensity of 12.1 gallons/sq. ft. Refer to the table below for the total annual laboratory water consumption from FY 2004 to FY 2008.

Water conservation retrofit projects are expected to result in a

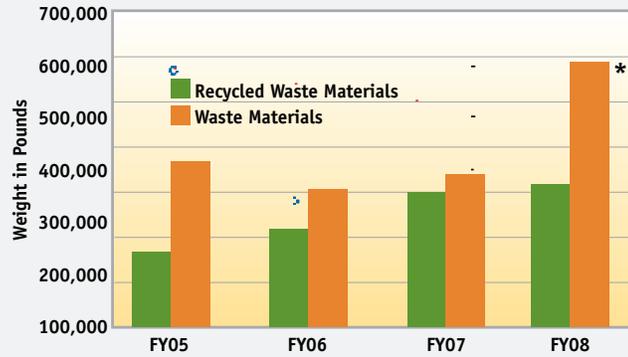
total 14% reduction. To exceed the overall reduction goal of 16%, NREL will incorporate water conservation measures in all new construction facilities as a part of achieving the minimum LEED Gold certification. Meeting LEED requirements will result in a 34% water consumption reduction at the RSF. Based on the current RSF design, this facility will consume 786,700 gallons of water – a water consumption intensity of 3.6 gallons/sq. ft.



NREL reduced its water consumption by 8% in FY08 relative to the FY07 baseline.

# Materials

FY05-FY08 Total Waste Comparison



\* This increase in waste materials is due to a one-time clean up at the NWTC. Most of the materials were not recyclable.

## Material Use Goals

**DOE Order 430.2B.** Reduce the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of by the laboratory; increase diversion of solid waste as appropriate; and maintain cost effective waste prevention and recycling programs.

**NREL Goal.** Near-zero waste (working to eliminate the laboratory's waste stream).

**Progress.** Since FY 2003, NREL's recycling of waste has continued to increase. NREL has implemented comprehensive reduce, reuse, recycling and rebuy activities.

NREL is working toward near-zero waste – taking the 4Rs program (reduce, reuse, recycling and rebuy) to a higher level – systematically eliminating the laboratory's waste stream.

### Reduce

Activities intended to reduce material use include:

- Replacing paper drafts with electronic files
- Installing duplex modules on all network printers for double-sided printing option
- Reusing cardboard boxes, packing peanuts, plastic containers, and drums
- Sharing chemicals and redistributing extra chemicals through a chemical management system.

### Recycle

NREL's long-established recycling effort includes a recycling station in each building for common office materials such as mixed office paper, commingled glass, plastic, aluminum cans, corrugated cardboard, batteries, and printer toner cartridges. Scrap metal, computer monitors, and fluorescent light bulbs are also recycled.

A local electronic recycling company collected more than 4,100 pounds of electronic waste from 43 participating NREL employees.

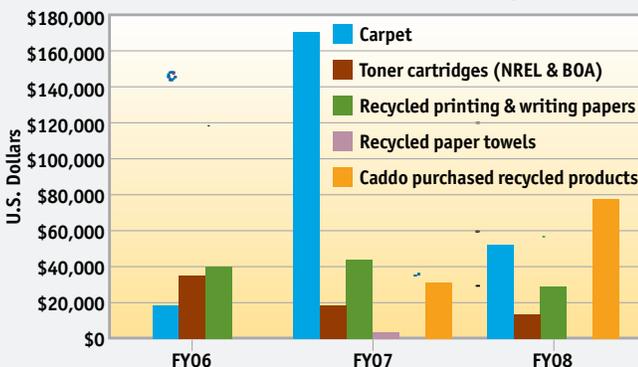
### Rebuy

NREL makes green purchasing possible through an online catalog featuring environmentally preferable (recycled content) office products. Green purchasing was integral to NREL's decision to create an electronic purchase card system in FY 2005. The system tracks metrics on green purchases made at the laboratory and encourages staff to purchase green products whenever possible.

### Reuse

NREL's Reusable Office Supply Center encourages staff members to take any used office supplies they need and to drop off any reusable items.

FY08 CO<sub>2</sub> Green Purchasing Data



Since 1999, 100% of all carpet, toner cartridges, and office paper purchased by NREL have contained recycled content.

## Public Responsibility and Community Outreach



Members of Congress visit NREL's cellulosic ethanol pilot plant.

PIX16580

Colorado was in the national and world spotlight in FY 2008 with Denver hosting the Democratic National Convention. NREL played a key role as a member of the energy planning committee and had significant input to "green the convention." NREL's visibility also reached into local businesses, such as hotels and restaurants, as they "greened up" for the convention.

NREL hosted significantly more policy leaders than ever before, including 37 members of Congress, 41 congressional staff, and representatives of three governors' offices. An additional 60 visits were coordinated for international government and business leaders, including several ambassadors and consulate generals. The increased interest by national and international leaders indicates the importance of NREL's role in the world discussion about renewable energy and is helping NREL build productive relationships with decision makers.

NREL continues to emphasize public education and outreach. This year, guests at the Visitors Center neared 14,000, and the

addition of the dynamic Science on a Sphere exhibit will attract new and repeat visitors. In addition, NREL leads a partnership with the Governor's Energy Office (GEO) to create a permanent exhibit at the Colorado Convention Center titled Colorado's New Energy Economy. The exhibit, to be seen annually by thousands of convention-goers in Denver, showcases renewable energy technologies and their positive impact on the state's economy.

NREL continued to develop a strong role in economic development, hosting a visit and on-site briefings for the Economic Development Council of Colorado, through our participation in the Jefferson Economic Council's Energy Task Force, and through ongoing coordination with the Colorado Solar Energy Industries Association.

The highly successful NREL Energy Executive Leadership program set a standard for business leadership programs in the state. Participant feedback has been positive, and twice as many people applied for the 2008 class. The remarkable success has been continued in partnerships with several of the members whose

companies or government agencies have implemented efficiency and renewable energy strategies into their business operations.

National, international, and specialty media relied on NREL's expertise at an unprecedented rate during the past year as renewable energy technologies became front-page news. NREL's Public Affairs Office positioned NREL as a reliable source of information, and journalists depended on NREL experts to define the "state of technology" in solar, wind, biomass and other research areas.



Science on a Sphere is an animated globe (6 ft. in diameter) showing images of the atmosphere, oceans, and land. NREL uses the sphere to show the importance of energy to the planet.

PIX15873

## Moving Forward



PIX16577

Bob Westby, Sustainable NREL Lead

This is the fifth year of formally reporting on the state of sustainability activities at NREL.

The challenge ahead is the emergence of carbon management as the global paradigm for measuring energy management and sustainability progress. To meet this challenge, NREL's two primary sustainability strategies are the use of renewable energy and sustainable and energy-efficient new construction. These strategies also support the laboratory's long-term vision of a Net Zero Energy campus.

NREL's goal is to maximize its use of on-site renewable energy. The laboratory has 3.2 MW of PV capacity in operation or under contract, displacing 28% of its FY 2008 electrical use. Multiple on-site renewable energy projects are planned as an integral part of the campus build-out plans.

NREL plans to increase the number of its employees by up to 50% and more than double its building square footage by 2020.

The planned new buildings will showcase best practices for energy efficiency and sustainability. The next major new building, the Research Support Facility (RSF), is a 220,000 sq. ft. office building which will be a Net Zero Energy LEED Platinum building with an energy budget of 28,000 Btu/sq. ft./year.

A new Federal Presidential Executive Order is expected to be issued in late 2009. This E.O. will focus on GHG emission measurement and mitigation and utilize aggressive reduction targets as its primary metric. The DOE Federal Energy Management Program (FEMP) will be directed to develop this GHG protocol and inventory methodology, and FEMP has in turn tasked NREL to support its development.

NREL is well positioned to provide leadership in this area, having established a baseline for its carbon footprint beginning in FY 2003. The laboratory was the first federal facility to voluntarily set and meet an EPA Climate Leaders Program (CLP) GHG reduction goal. The laboratory has also set a second

CLP goal of reducing its total U.S. GHG emissions by 75% from FY 2005 to FY 2009.

FY 2009 will be a transitional year in the evolution of implementing sustainability at NREL. Sustainability activities at the laboratory have been organizationally elevated with the creation of a senior sustainability position that reports directly to the Deputy Director for Laboratory Operations.

This transition will mark the end of my six years as the Sustainable NREL Lead. Sustainable NREL has moved from its planning phase to an established program that has positioned NREL as a national leader in sustainability.

I would like to take this opportunity to express my appreciation to NREL management and employees for their support for the progress we have made in institutionalizing sustainability at the laboratory.

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# Memberships and Awards

2008



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## Science and Technology Facility Earns “Laboratory of the Year”

The NREL Science and Technology Facility received the Laboratory of the Year Special Mention award for its unique sustainable design, which reduces energy consumption by as much as 41 percent compared to similar facilities. R&D Magazine editors recognized the building’s environmental design and low cost as key factors in its selection for the award.

ASHRAE Technology Award-Institutional Buildings – New Construction. ASHRAE Region X.

Colorado Renewable Energy and Sustainable Design in Buildings – Institutional. Colorado Renewable Energy Society.

Gold-level Leader, State of Colorado. CDPHE’s Environmental Leadership Program.

Gold-Level Recognition. Colorado Environmental Leadership Program.

Laboratory of the Year Special Mention Award. R&D Magazine.

Pollution Prevention Star Award, Leadership in Energy and Environmental Design for the S&TF.

Silver-Level Award, Federal Electronics Challenge. The Office of Federal Executives and the EPA recognized NREL for reducing the environmental impacts of electronics in all three life-cycle phases.

Sustainable Building Award for the S&TF. Colorado Renewable Energy Society.

Transformation Energy Action Management Renewable Energy Award. DOE Federal Energy Management Program.

2007

Chairman’s Award for Outstanding Contributions to the Labs21 Team. Presidential Award for Federal Energy Management.

Gold-Level Recognition. Colorado Environmental Leadership Program.

LEED Platinum Designation. U.S. Green Buildings Council’s LEED Green Building program. NREL’s S&TF is the first LEED Platinum federal building. Only 28 other buildings in the world have achieved this rating.

2006

Federal Energy Saver Showcase Award for the S&TF.

Gold-Level Recognition. Colorado Environmental Leadership Program.

Jefferson County Commissioners’ Award, Design Excellence for NREL’s S&TF.

Silver Hard-Hat Award, Outstanding Sustainable Design. Colorado Construction Magazine.

U.S. EPA Climate Protection Award.

White House Closing the Circle Pollution Prevention Honorable Mention.

2005	<p>Gold-Level Recognition. Colorado Environmental Leadership Program.</p> <p>U.S. Department of Energy Federal Energy and Water Management Award.</p> <p>U.S. Department of Energy Pollution Prevention Star Award for Green Fleet Team. Petroleum reduction through alternative fuels.</p>
2004	<p>U.S. Department of Energy Pollution Prevention Best-In-Class Awards:</p> <ul style="list-style-type: none"> <li>Office of Energy Efficiency and Renewable Energy</li> <li>Sustainable NREL: New Building Program</li> <li>Sustainable NREL: Recycling Program</li> <li>Sustainable NREL: Education, Outreach and Information Sharing.</li> </ul> <p>U.S. EPA National Environmental Performance Track.</p> <p>Gold-Level Recognition. Colorado Environmental Leadership Program.</p>
2003	<p>University of Colorado Wirth Chair Award in Environmental and Community Development Policy.</p> <p>U.S. Department of Energy Departmental Energy Management Achievement Award. Effective Program Implementation of Sustainable NREL.</p>
2002	<p>U.S. EPA Climate Leaders Partnership. NREL was the first federal laboratory member and one of seven members to establish a target reduction.</p> <p>Labs for the 21st Century. NREL was one of the first federal-sector labs to join the program as a pilot partner in 2002.</p> <p>Federal Energy Management Program Energy Saver Showcase Award for the Thermal Test Facility.</p>
2000	<p>U.S. EPA Green Power Partnership for NREL's commitment to purchasing 10% of its annual electric use in wind energy and for becoming the first federal laboratory member.</p>

## **National Renewable Energy Laboratory**

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