

LLNL's
Christopher
Cross

Research Highlights . . .



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NREL installs renewable recharge station

DOE's [National Renewable Energy Laboratory](#) recently built a renewable recharge station for electric and plug-in hybrid electric vehicles (PHEV) as part of a project run by Senior Engineer Tony Markel. The Solar Tree™ from Envision Solar is a 3.5 kilowatt solar array that provides shade and power for two PHEVs. The first space is reserved for NREL's Toyota Prius PHEV and the second parking space will accommodate other visiting vehicles for experimental purposes. The Solar Tree is equipped with both 120 and 240 volt outlets in expectation of future high energy vehicles.

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Cyber shoppers cut down on carbon

How much carbon did cyber shoppers keep out of the environment over the holidays? Holiday shoppers who do most of their gift gathering on-line are trimming emissions of carbon dioxide into the atmosphere by nearly half a million metric tons, according to calculations from DOE's [Oak Ridge National Laboratory](#). Calculation based on average miles driven by commuters and shoppers, carbon emissions from transportation and the growth in on-line shopping show that 492,519,720 kilograms, or nearly half a million metric tons, of carbon dioxide are kept out of the atmosphere. "On-line shopping's reduction of carbon emissions would be equal to 63 percent of America's workers staying home for one day," said ORNL researcher Jesse Miller.

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PNNL highlightss '07 science

Highlights of 22 fundamental science endeavors are gathered in a full-color annual report that is [available online](#) from DOE's [Pacific Northwest National Laboratory](#). For example, PNNL scientists were part of the first major assessment of the energy, economic and land-use implications of stabilizing global change. Other researchers used advanced three-dimensional mapping to demonstrate a technological platform for spatial mapping of mouse brain proteins, which may accelerate the development of a cure for neurodegenerative disorders such as multiple sclerosis. A PNNL/ university collaboration discovered that a single hydrogen atom cannot keep still after it splits from a water molecule on the surface of a specific catalyst, suggesting that the electronic structure of the catalyst is not as it seems.

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Termite gut yield enzymes for better biofuel production

Termites – notorious for their voracious appetite for wood – are providing insights into the molecular machinery that can enable the efficient breakdown of lignocellulose into fermentable substrates for biofuels. Stomachs of the termite are a rich source of microbes that produce enzymes that can be employed for improving the conversion of wood or waste biomass to valuable biofuels. The analysis of the termite gut microbes by DOE's [Joint Genome Institute \(DOE JGI\)](#) postdoctoral fellow Falk Warnecke, Microbial Ecology Program head, Phil Hugenholtz, and colleagues is highlighted in the November 22 edition of the journal *Nature*.

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DOE Pulse highlights work being done at the [Department of Energy's](#) national laboratories. [DOE's laboratories](#) house world-class facilities where more than 30,000 scientists and engineers perform cutting-edge research spanning DOE's science, energy, national security and environmental quality missions. *DOE Pulse* (www.ornl.gov/news/pulse/) is distributed every two weeks. For more information, please contact Jeff Sherwood (jeff.sherwood@hq.doe.gov, 202-586-5806).

NREL sets aggressive greenhouse gas reduction goal, supports DOE's TEAM initiative

By pledging to significantly reduce its greenhouse gas emissions (GHG), DOE's **National Renewable Energy Laboratory** is leading the way for the Department in achieving GHG reductions across the DOE complex.

The Department's Transformational Energy Action Management (TEAM) Initiative puts DOE on an aggressive footing toward meeting and exceeding President George W. Bush's executive order to reduce energy use across the federal government. In exceeding the TEAM GHG goal, NREL has pledged to reduce its total U.S. greenhouse gas emissions by 75 percent from FY2005 to FY2009 as part of the Laboratory's participation in the **Environmental Protection Agency's (EPA)** Climate Leaders Program.

"Our goal is one of the most aggressive in the national Climate Leaders Program and in the DOE complex," said Bob Westby, manager of NREL's Federal Energy Management Program and Sustainable NREL Lead.

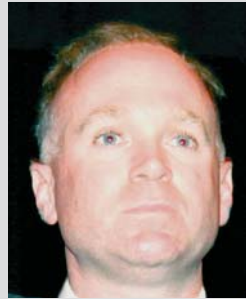
To help achieve its new goal, NREL will install two major on-site renewable energy projects: photovoltaics on a five acre site will provide approximately 7 percent of the Laboratory's electric needs and a biomass combustion plant fueled by forest thinnings and other regional wood wastes will offset the need for about 75 percent of its South Table Mountain campus natural gas use.

Both projects are notable for their use of private financing and contracting mechanisms. The Renewable Fuels Heating Plant will use an Energy Savings Performance Contract. Under an ESPC a private sector energy services company will finance, install and operate the plant and be reimbursed out of the savings over the term of the contract. The photovoltaics project will use a Power Purchase Agreement (PPA). Under a PPA, the private sector developer owns and operates the project. DOE/NREL agree to purchase the electric output of the project over the term of the project at price equal to or less than would have been paid to the local utility.

Building energy efficient and sustainable new buildings also contributed to meeting the goal. In April, the Laboratory's Science & Technology Facility became the first federal laboratory building to be certified at the Platinum level, the highest in the Green Buildings Council's Leadership in Energy and Environmental Design Green Building program.

Submitted by DOE's *National Renewable Energy Laboratory*

WEST POINT'S CROSS COMPLETES DOCTORATE AT LLNL



Christopher Cross

The ink was barely dry on the 2004 Memorandum of Understanding between DOE's **Lawrence Livermore National Laboratory** and the Naval Postgraduate School (NPS). That's when NPS physics student Lt. Col. Christopher Cross began his Ph.D. research supporting the Laboratory's efforts simulating

and analyzing nuclear weapons effects.

During the next three years, Cross worked closely with researchers in AX Division. Their goal was to enhance the ability to analyze and understand the full range of phenomena—from near-field to far-field—relevant to the impacts of a high-altitude detonation of a nuclear device. Cross split his study time between Livermore and Monterey, spending a year during this period at Livermore.

Working under the direction of LLNL Chair Professor Craig Smith along with Defense and Nuclear Technologies Directorate (DNT) researchers Dennis Hewett and Tom Thomson, Cross performed research critical to the AX Division mission, while fulfilling his academic and research requirements for his physics doctorate. The title of his dissertation is "Computational Modeling of the Spatial Distribution and Temporal Decay of Geomagnetically Trapped Debris of a High Altitude Nuclear Detonation."

Cross's close work with Livermore researchers during his post-graduate work resulted in immediate inclusion of his findings in Laboratory programs. His results are having a significant impact on modeling efforts within AX Division.

Having successfully completed his research and academic requirements at NPS, Cross joined the faculty as the Advanced Physics program director at the U.S. Military Academy at West Point, where he teaches and directs the upper-division physics curriculum.

As a **West Point** faculty member, Cross continues technical interactions with Lawrence Livermore National Laboratory. He expects to return to Livermore for summer research projects. And following completion of his West Point obligations, he may return to Livermore for a long-term assignment.

Submitted by DOE's *Lawrence Livermore National Laboratory*