



LLNL's  
Hriar S.  
Cabayan

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## Research Highlights . . .

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### NREL researchers rate solar power conditions for new PV plant

DOE's [National Renewable Energy Laboratory](#) worked with Xcel Energy to research different technologies and offer advice on what technologies were the most viable for a new photovoltaic installation being built in Colorado's San Luis Valley. Groundbreaking for the 8.22 megawatt installation was April 23 in Alamosa, Colo. Working with Xcel, NREL's team conducted modeling runs for various locations in Colorado to find the best place for the plant. NREL rates the San Luis Valley as having the best solar power conditions in the state and some of the best in the country. When completed, the Alamosa solar power plant will create enough clean energy to power nearly 1,500 homes a year.

**[Sarah Holmes Barba, 303/275-3023, [Sarah\\_Barba@nrel.gov](mailto:Sarah_Barba@nrel.gov)]**

### PNNL developing new approach to identifying catalysts

Researchers at DOE's [Pacific Northwest National Laboratory](#) are learning how to predict and identify better catalysts based on the relationships between "global energy maps" of a material. The maps detail the amount of energy it takes materials to get to the point where they can speed up a chemical reaction. Using these relationships, PNNL researchers discovered a new catalyst that is almost as active as the enzyme hydrogenase, the fastest known catalyst to reduce water to hydrogen. PNNL scientists are searching for a catalyst that is more durable, faster acting and even more efficient than current catalysts. They also are developing a predictive tool that will greatly improve chances of identifying valuable catalysts. The team hopes to find new catalysts to enhance hydrogen storage and carbon dioxide reduction.

**[Susan Bauer, 509-375-3688, [susan.bauer@pnl.gov](mailto:susan.bauer@pnl.gov)]**

### Research reactor sports 'cool' new feature

The High Flux Isotope Reactor at DOE's [Oak Ridge National Laboratory](#) has begun a new fuel cycle—its 408th since the HFIR opened in the 1960s—with new capabilities for materials analysis, most notably a "cold source." It can now produce lower energy, cold neutrons, which can be used to study soft materials like biological tissues. The temperature of thermal neutrons coming out of the reactor is lowered by passing them through the 20-Kelvin, liquid-hydrogen cooled cold source. HFIR's continuous, cold neutron stream combined with the [Spallation Neutron Source's](#) higher energy, pulsed neutron stream make ORNL a world center for neutron scattering research.

**[Bill Cabage, 865/574-4399, [cabagewh@ornl.gov](mailto:cabagewh@ornl.gov)]**

### Exploring the next steps in biofuels

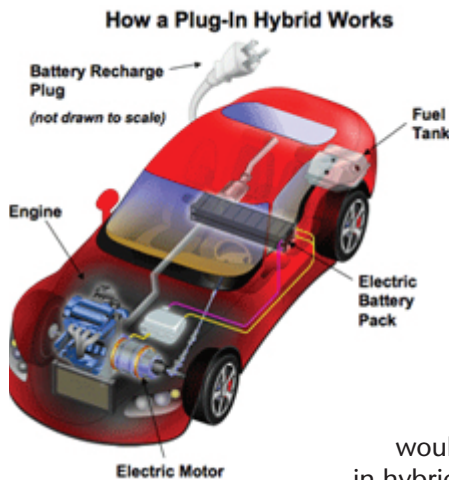
Switchgrass has long been regarded as a strong candidate for biomass crop. At DOE's [Oak Ridge National Laboratory](#) and the nearby University of Tennessee, researchers are paying particular attention to potential questions and issues, such as which are the best switchgrass varieties, how often should a farmer plant and harvest and what are the environmental consequences of a so-called "monoculture crop" that could span vast acreage across the nation? [ORNL is working with UT and other universities](#) to go beyond the groundwork toward developing a major biofuels industry as an alternative energy source.

**[Larisa Brass, 865/574-4163, [brasslm@ornl.gov](mailto:brasslm@ornl.gov)]**

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# NREL research advances plug-in hybrid electrics

In the 1990s, DOE's [National Renewable Energy Laboratory](#) worked to advance hybrid electric vehicles, particularly propulsion systems, building the technology's viability in the marketplace. Today, NREL is working with national labs and industry to take this concept one step further with plug-in hybrid electric vehicles. Plug-in hybrids have the potential to cut fuel consumption by more than 50 percent.



But extending the life and lowering the cost of plug-in hybrid batteries is needed to advance plug-in hybrid technology for market acceptance.

The larger battery pack would allow plug-in hybrids to operate predominantly on electricity for short trips. For longer trips, a liquid fuel powered internal combustion engine kicks in providing driving range and performance comparable to a conventional car. The vehicle's onboard computer chooses when to use electricity only or when to add power from the internal combustion engine. The plug-in hybrid battery can be recharged using a standard 110-volt outlet at home or even at work.

"I expect that home refueling will be one of the biggest selling points for plug-in hybrids," said Tony Markel, a senior engineer with the NREL Vehicle Systems Analysis Team. "Since many drivers travel less than 30 miles per day, home refueling with electricity means they probably won't visit the gas station as often."

But plug-in hybrids don't necessarily require gasoline; they can use biofuels, such as ethanol or biodiesel. For a light-duty vehicle fleet, NREL researchers estimate plug-in hybrids could reduce the per-vehicle demand for liquid fuel by more than 50 percent, making it practical to use domestically produced E85 (85 percent ethanol, 15 percent petroleum) on a national scale. The fuel cost savings with plug-in hybrids could amount to more than \$500 per vehicle per year.

**Submitted by DOE's [National Renewable Energy Laboratory](#)**

## PENTAGON RECOGNIZES A DECADE OF SERVICE



Hriar S. Cabayan

A special Pentagon event recognized service to our nation with the highest civilian award

that the Chairman of the Joint Chiefs can bestow. The recipient's name was Hriar S. Cabayan, PhD. But for a decade, everyone at the Pentagon had just called him "Doc." He served as liaison and conduit between the [DoD](#) and DOE laboratories, other government agencies, and the Combatant Commands.

Brigadier General Maurice H. "Maury" Forsuth requested that Colonel Mike Carroll, Division Chief for Joint Staff Operations, Information Operations, Operations Division, do the honors. Because much of Hriar's work was of a sensitive nature, some of his finest accomplishments went unmentioned, but nonetheless were much appreciated.

Commander Todd Veazie had worked with Hriar for just over one year on the Joint Staff, "He's a humble person. But a great patriot who rises above politics to serve our troops at the front, and who will cut through any bureaucracy to get help to our war-fighters. Lots of guys are alive and enjoying life today because of what he's done."

After ten years, Hriar's memories include the 9/11 terrorist assault on the building. "I was in Corridor 8, and the aircraft struck Corridor 5. I didn't hear the impact, but I did hear the screaming and shouting as we evacuated the building," Hriar recalled.

Hriar "Doc" Cabayan received his doctorate degree from the [University of Illinois in Urbana, Illinois](#) in 1971. After four years of teaching assignments at [New York](#) and [McGill](#) Universities, he joined DOE's [Lawrence Livermore National Laboratory](#) in 1977.

Initially he worked on nuclear weapons effects, Strategic Defense Initiatives related efforts, and directed-energy programs. Today he is part of the National Security Office, currently assigned to support the Office of the Secretary of Defense-Director of Defense, Research and Engineering.

**Submitted by DOE's [Lawrence Livermore National Laboratory](#)**