

PNNL explores future safe use of hydrogen fuel

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Hydrogen is envisioned as a primary energy resource of the future, and Pacific Northwest National Laboratory is helping to safely usher it into the 21st century. Named as the lead for the Department of Energy's Energy Efficiency and Renewable Energy Hydrogen Safety program, PNNL will carry out and coordinate the research necessary to develop safety codes, standards and guidelines for using hydrogen.

In January 2003, President George W. Bush proposed in his State of the Union address that \$1.2 billion be allocated for hydrogen research and development. A highly regarded resource, hydrogen, if produced by renewable resources, produces no pollutants. If used in a fuel cell, the only exhaust from a pure hydrogen input stream is water vapor.

Besides the obvious environmental benefits, there could ultimately be economic and national-security benefits too. Widespread commercialization of hydrogen-powered vehicles, coupled with renewable production, would reduce the United States' dependence on imported fuel resources.

Like any fuel, hydrogen is combustible and therefore potentially dangerous. "There is a public-perception problem with its relative safety, however, originating as far back as the Hindenburg accident in 1937," said Bruce Kinzey, a senior research engineer managing the project. He was referring to the explosion of the luxurious airship floated by 7 million cubic feet of hydrogen. Thirty-six people died in the incident.

"Although highly flammable, hydrogen is no more dangerous than other fuel sources such as gasoline and propane, and safer in some respects," Kinzey said.

Industries and the National Aeronautics and Space Administration have used hydrogen relatively safely for decades. PNNL is working to make sure that, as it becomes more readily available for general use by the public, hydrogen continues this safety record and that these results are widely communicated.

Because hydrogen's application as a widespread energy carrier is relatively new, it faces several challenges not confronted in previous uses to date. "Obviously, NASA and industrial personnel have been highly trained and have proper equipment for handling hydrogen safely. But now we're talking about putting this into the hands of the general public," Kinzey said. "For example, a lot of people like to work on their cars themselves. We need to make sure that we build safe components and systems that, when maintained by relatively untrained personnel, won't compromise safety. Currently there are a lot of challenges to accomplishing that."

Fortunately, the transition to a hydrogen economy is not expected for a number of years — perhaps even decades. In the meantime, there are more immediate needs facing the safety program — many related to ongoing research and development of various hydrogen-related technologies. Safety is important here, too.

One of the first tasks for the PNNL team will be to establish a safety guidelines document that will become a part of all future DOE procurements involving hydrogen. The document will encompass all aspects of the envisioned hydrogen economy including production, distribution, storage and use. All future projects supported by DOE funding will be required to follow these guidelines as a condition of the funding contract.

A second task in this effort is to establish a Hydrogen Safety Panel whose purpose is to help guide the DOE safety program by identifying the research, development and data needed to support hydrogen safety. The panel will also provide annual reviews of all ongoing DOE hydrogen projects to ensure that safety is maintained.

"It is of paramount importance that there be no accidents involving hydrogen fuel," Kinzey said. "No new Hindenburgs!" ■