# NREL, Sandia team to improve hydrogen fueling infrastructure

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A new project led by the Energy Department's National Renewable Energy Laboratory (NREL) and Sandia National Laboratories will support H2USA, a public-private partnership co-launched by industry and the Energy Department, and will work to ensure that hydrogen fuel cell vehicle owners have a positive fueling experience as fuel cell electric vehicles are introduced starting in 2014-2015. By tackling the technical challenges related to hydrogen fueling infrastructure, the Hydrogen Fueling Infrastructure Research and Station Technology (H2FIRST) project is designed to pave the way toward more widespread deployment of hydrogen fuel cell electric vehicles.

The goals of H2FIRST are to reduce the cost and time of fueling station construction, increase station availability, and improve reliability by creating opportunities for industry partners to pool knowledge and resources to overcome hurdles.

"Working with industry members who are installing stations and finding out what's working and what needs improvement is a key next step for fuel cell vehicle deployment," said Keith Wipke, manager of NREL's fuel cell and hydrogen technologies program. "H2FIRST aims to address cross-cutting, urgent challenges related to station performance and availability."

"The success of hydrogen fuel cell electric vehicles largely depends on more stations being available, including in neighborhoods and at work, so drivers can easily refuel," said Daniel Dedrick, hydrogen program

manager at Sandia. "With H2FIRST, we're definitely on the road to making that happen more quickly."

The project was established by the Energy Department's Fuel Cell Technologies Office in the Office of Energy Efficiency and Renewable Energy, drawing on existing and emerging core capabilities at the national labs.

H2FIRST's technical goal is to develop and apply physical testing, numerical simulation, and technology validation to help create low-cost, high-performance materials, components and station architectures. H2FIRST will also collect and distribute data supporting industry's efforts to reduce the costs of integrated fueling systems and networks. Watch this new Energy 101 video to learn more about how fuel cell electric vehicles work.

Specific H2FIRST objectives include:

- Develop hydrogen fueling station designs and requirements to further technical understanding of what is needed to achieve a national hydrogen fueling infrastructure.
- Accelerate hydrogen fueling station deployment by identifying a flexible set of technical experts and facilities to respond quickly to challenges that arise as new hydrogen stations are introduced.
- Reduce hydrogen fueling system costs and improve system availability, safety and reliability through innovative materials and novel designs.
- Design more efficient hydrogen fueling stations that are consumer-friendly and competitive with conventional liquid fuel stations.
- Integrate renewable hydrogen and the power grid by developing, optimizing, and validating technologies that enable distributed generation of renewable hydrogen in a broader energy ecosystem.

As the lead partners for H2FIRST, NREL and Sandia will share their hydrogen research, including expertise in hydrogen-specific materials and systems engineering. NREL's Energy Systems Integration Facility and Distributed Energy Resources Test Facility and Sandia's Center for Infrastructure Research and Innovation (CIRI) will serve as test facilities for H2FIRST. The project also includes several agencies from the state of California.

"This new project brings important federal know-how and resources to accelerate improvements in refueling infrastructure that support the commercial market launch of hydrogen fuel cell vehicles," said California Air Resources Board Chairman Mary D. Nichols. "California is committed to deploying at least 100 hydrogen refueling stations in the next decade, and the H2FIRST effort is a big step toward the development and deployment of a broader, consumer-friendly infrastructure for us and the rest of the United States. We are excited to be joined by such prestigious partners in this effort."

NREL will use its performance testing, analysis, and safety, codes and standards expertise and facilities to study renewable hydrogen generation and infrastructure systems and components. At NREL's new Energy Systems Integration Facility, capabilities such as a hose reliability testing robot and construction of additional refueling hardware will support H2FIRST's hydrogen infrastructure research needs.

CIRI will develop and test innovative infrastructure technologies to accelerate market readiness, drawing on Sandia's broader hydrogen program that includes such research areas as storage, delivery, production, systems analysis and safety, codes and standards.

H2FIRST is expected to include companies and organizations in the automotive, energy and industrial gas sectors, fuel cell manufacturers, station component providers, state and regional government agencies and

research institutions

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