

WSU students win international hydrogen competition with fueling station design

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A group of Washington State University students has designed a plan for an innovative and economical fueling station that could help make environmentally friendly, hydrogen-powered cars a viable option for future transportation.

The idea took first place this week in an international hydrogen [design](#) competition against teams from Asia, Europe, South Africa and North America. The award was announced at the 2014 Alternative Clean Transportation exposition in Long Beach, Calif.

Real-world designs rewarded

The annual Hydrogen Student Design Contest challenges university students to design energy applications for real-world use. This year, they were asked to design a transportable, stand-alone, reasonably priced refueling station for hydrogen fuel cell-powered cars.

While such cars exist, they have not been popular primarily because of a lack of available infrastructure to support them. Only a handful of hydrogen gas stations have been built in the U.S., and they have each cost \$2-\$4 million to build.

Increasing the number of hydrogen fuel-powered cars on the road could help reduce harmful carbon dioxide emissions that are changing the earth's climate. Unlike gasoline powered cars, which produce carbon

dioxide, the only waste product of hydrogen fuel cell-powered cars is water.

At least three car makers have said they plan on selling such vehicles in the U.S. in the next year.

"Hydrogen is everywhere," said Ian Richardson, team leader on the WSU project and a graduate student in the School of Mechanical and Materials Engineering. "You can get it from anything, and the emissions of fuel cell electric vehicles are just water."

Safe, reliable, economical

The competition called for students to create a fueling station that would be low cost, easy to permit, low maintenance, transportable and readily mass produced. It needed to gas up a vehicle with five kilograms of hydrogen fuel in less than five minutes - enough for a car to travel 300 miles or equivalent to what current gas stations provide.

The WSU team's fueling station design was safe and reliable while also lowering building costs of current stations by 75 percent.

Conducting an economic analysis, the students determined that filling a hydrogen fuel tank to go 300 miles would cost about \$48, which is comparable to regular gasoline. They developed a business plan in which a portable hydrogen fuel station could work in conjunction with existing gas stations in a way that would benefit both entities.

"The design the students developed looks to be completely implementable right now," said Jake Leachman, assistant professor in the School of Mechanical and Materials Engineering and an advisor on the project. "We want to build one, and we should. The business model/idea is innovative and could lead to a startup company."

Students from around the world who are conducting research in hydrogen for energy uses participate in the competition. WSU took second two years ago.

"We were going up against the best of the best," said Leachman.

Innovative design from diverse team

Judges for the competition said the WSU students had come up with an "innovative design with potential for implementation in the near future" and that they "made a strong case for liquid hydrogen delivery."

The student team benefited from having a wide variety of disciplines represented on the project, including mechanical, electrical and environmental engineering, economics, architecture and public policy, said Richardson. The team, which also had one University of Idaho student member, included Richardson, Jake Fisher, Brian Bebeau, Breanna Bence, Sayonsom Chanda, Patrick Frome, Simon Guo, Mikko McFeely, Austin Miller and Ben Smith.

In addition to Leachman, civil engineering professor Liv Haselbach also advised the students. Haselbach worked on development of one of the first U.S. hydrogen fueling stations.

"We are very proud of the WSU team for the recognition of their design of a drop-in, modular hydrogen [fueling station](#)," said Michael Kessler, director of the School of Mechanical and Materials Engineering. "Their design, which addresses critical design needs for practical, safe and economically feasible fueling stations for next-generation hydrogen vehicles, is timely and important.

"Since [hydrogen fuel](#) is a zero-emission fuel, this work fits naturally in WSU's initiatives in clean technology," he said, "and it builds upon

WSU's growing strength in hydrogen for energy research."

Provided by Washington State University

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