

Engineering dean speaks to opportunities, challenges of hydrogen

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The dean of UW-Madison's College of Engineering says hydrogen represents a significant opportunity for Wisconsin's economy as the country moves to reduce greenhouse gas emissions.

But Ian Robertson also said society isn't ready yet for widespread adoption of clean hydrogen as a source of energy. He spoke yesterday during a Wisconsin Technology Council luncheon held in Madison.

"That's one of the challenges we have ...there has to be a huge educational component to train the workforce," he said. "There'll also going to have to be an effort that says, let's train the general public on why we're moving toward a hydrogen-based technology. And that's going to take time."

Gov. Tony Evers has recently signed onto two multi-state coalitions aimed at securing Department of Energy funding for regional clean hydrogen hubs. As part of an effort by the federal government to reach emissions reduction targets in the coming decades, DOE will be investing up to \$8 billion in fewer than 10 hubs around the country, Robertson explained.

Robertson said concept papers for the hub applications are due Nov. 7, raising the concern that "we don't yet have a draft of either one" for the coalitions Wisconsin has joined.

"Let's just say there's an awful lot of us working really hard to figure out how we can get a concept paper between seven states written and agreed upon," he said.

Robertson stressed that clean hydrogen will eventually be used to fuel aircrafts and heavy vehicles such as long-haul trucks, as well as in other emission-heavy applications such as steel production.

But he pointed to a number of challenges standing in the way.

For one, hydrogen easily permeates and degrades the properties of most metals. Because it results in lower mechanical strength for the metals it touches, “you will get metals crumbling at loads that are way below” standard capacity, he said.

“We can never tell when that failure is going to occur,” he said. “It’s sudden, it’s catastrophic, and it’s almost all related to hydrogen. You can ask the oil and gas industry about the problems they’ve encountered with hydrogen and their deep sea wells. It’s amazing the problems it’s caused.”

That poses an issue for using existing natural gas pipelines to transport pure hydrogen gas, according to Robertson. He said a combination of vehicle transportation and local site production will likely be necessary to compensate.

And because hydrogen gas needs to be highly pressurized to be used as a fuel, the possibility of explosions is also a concern, he added.

Also, while hydrogen is extremely abundant, Robertson said the process of breaking down water to extract hydrogen is currently expensive.

“We’ve got to figure out how to get better at catalysis, so we can reduce the cost of production,” he said, referring to that process.

Still, he emphasized the opportunities presented by the federal dollars coming through the clean hydrogen hubs. He noted the DOE is providing 50 percent of the funding for certain hydrogen-related projects that help achieve the goals of the program.

“Remember, these hubs are going to be funded at the level of about \$1.2 billion, so that’s really the incentive to get engaged,” he said. “If you’re not in the hub, you’re not a part of it, you don’t get access to the money.”

Watch a video of Robertson’s remarks here:

<https://wiseye.org/2022/10/25/wi-technology-council-wisconsins-hydrogen-economy/>