

Davis-Besse chosen as pilot site for hydrogen production research



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A national laboratory has chosen the Davis-Besse nuclear plant in Ottawa County as the site of a \$10 million, first-of-its-kind research project to see if nuclear plants can efficiently produce hydrogen for industrial and commercial uses.

The project was the focus of an all-day workshop inside the University of Toledo's College of Engineering, where business leaders and energy experts from around the country gathered Tuesday to hear details.

The Idaho National Laboratory's goal is to help make America more energy independent while also reducing the country's climate-altering greenhouse gases.

Using nuclear plants has even more potential to reduce an area's carbon footprint, because they could provide electricity for hydrogen extraction without releasing air pollution, speakers said.

Under the 80/20 cost-share agreement, the U.S. Department of Energy's Idaho National Laboratory has committed \$8 million to the project, now set to begin in January, 2021, and run through January, 2023.

The other \$2 million, or 20 percent, will come from Davis-Besse's owner, which is currently Akron-based FirstEnergy Solutions but is soon to be the newly formed Energy Harbor Corp. once bankruptcy proceedings for FirstEnergy Solutions are completed.

Richard Boardman, Idaho National Laboratory chief technology officer, said Davis-Besse will continue producing electricity throughout the pilot program.

The project will use only a fraction of what the nuclear plant normally puts on the regional electric grid — about 2 megawatts of the 925 megawatts the plant produces.

If the project proves to be as successful as the Idaho National Laboratory believes it can be, there will likely be a bigger investment for hydrogen production, he said.

"These are game-changing industrial opportunities," Mr. Boardman said.

Many of America's remaining 98 nuclear plants, including Davis-Besse, are struggling financially because of falling natural gas and renewable energy prices. The nuclear industry has feared more plant closures.

But the Idaho National Laboratory believes many could be converted into hybrid plants that serve as anchors for regional energy hubs. In other words, producing hydrogen could keep the nuclear plants operating longer, according to Mr. Boardman, who added that producing hydrogen could "give them additional purpose and give them additional revenue."

Davis-Besse was chosen because of the Toledo area's transportation network, its proximity to large potential industrial users, its failing economics, and its geographical location in America's heartland, he said.

A \$8 million award also has been funded for Chicago-based Exelon to do similar research.

However, Exelon, which owns more nuclear plants than any other utility, is behind Davis-Besse in planning. It has not yet announced which of its sites will be used for that research, Mr. Boardman told The Blade.

Hydrogen is currently in anything from automotive fuel cells to NASA space vehicles, but is expensive to harness and produce. It is coveted because it is both clean and powerful.

The research project at Davis-Besse will use a process known as low-temperature electrolysis, one in which purified water will be cracked in order to separate out the hydrogen molecules from the oxygen molecules. The cost savings come from a small amount of electricity being diverted straight from the nuclear plant, rather than being mixed on the grid with multiple other sources of electricity first.

Advanced high-pressure electrolysis uses the same concept, except for steam instead of purified water. It produces cheaper hydrogen, but the Idaho National Laboratory believes there would be more technical challenges pairing that up with a nuclear plant right off the bat and, thus, is beginning its research with purified water, Mr. Boardman said.

The Idaho National Laboratory began investigating the possibility of creating hydrogen by diverting electricity straight from nuclear plants almost 20 years ago, he said.

Uses for hydrogen are practically endless, and America has trouble meeting today's demand.

Locally, hydrogen could be a cleaner, more efficient fuel to eventually displace natural gas at the \$700 million Cleveland-Cliffs iron briquette manufacturing plant nearing completion in East Toledo, Mr. Boardman said.

The nation's two largest users of hydrogen now are refineries and plants that produce ammonia for fertilizers and other agricultural products. The nation's carbon footprint could be greatly reduced by using clean hydrogen to power steel mills, currently one of the larger sources for greenhouse gases, he said.

"Making steel with virtually no [carbon dioxide] emissions is absolutely conceivable," Vincent Chevrier, general manager of business development for Midrex Technologies, Inc., said. "The challenge is where that hydrogen's coming from and if it's coming at a cost."

Though the ownership transfer is not yet complete, another one of the speakers, Alan Scheanwald, First Energy project manager, told the audience he is confident Energy Harbor Corp. will follow through.

“I would say the commitment is still there,” he said.

A site for the low-temperature electrolysis unit has been selected on the Davis-Besse campus. It is on the nuclear plant’s property, but outside the highly secured perimeter where the most restricted areas, including the plant’s reactor and containment building, are located, he said.

“The objective is to diversify and increase the revenues of nuclear plants facing increased competition from renewables and low-cost natural gas,” Mr. Scheanwald said. “The project will demonstrate the technical feasibility and economic viability of a hybrid system in order to facilitate large-scale commercialization.”

Jason Marcinkoski, a U.S. Department of Energy project manager, said the federal government is “looking at hydrogen more holistically now” to help reduce America’s carbon footprint and keep more failing nuclear plants viable.

“We’re looking at nuclear applications to go past the grid,” he said.

The research also could lead to fewer emissions from Ohio, the third-largest state for coal combustion behind Texas and Indiana, according to Amgad Elgowainy, an Argonne National Laboratory senior scientist.

Ohio remains one of the nation’s leaders for air pollution even though it has rapidly embraced natural gas, with 28 times more natural gas usage in 2018 than just six years earlier, in 2012, Mr. Elgowainy said.