HERE COMES HYDROGEN

With proposed federal funding in sight, utilities and other partners have a 'once-in-a-generation moment' to accelerate the hydrogen conversation.

By M. Diane Mccormick

As the U.S. Department of Energy's Regional Clean Hydrogen Hubs program brings tranches of federal funding to innovative partnerships, natural gas utilities are experiencing what Jeff Lyng calls a "once-in-a-generation moment."

"The hydrogen hubs program created a very large table of collaborators," said Lyng, area vice president, energy and sustainability policy, Xcel Energy. "It's been effective in creating a unified vision around this technology and putting our best projects forward collectively as regions of states. In that way, it has accelerated the technology conversation."

Natural gas utilities are key players at those tables. Their ante is experience in hydrogen production, blending and distribution—including, in the case of Hawai'i Gas, nearly 50 years of distribution.

Only six to 10 selected proposals will be announced this fall, but no matter the outcome, participating gas utilities say they are all winners, committed to pursuing hydrogen as a key piece of their decarbonization and net-zero plans.

Hawai'i Gas: A Legacy of Hydrogen

In 1974, Gerald Ford became president, Ford Torino station wagons averaged 9.5 miles per gallon, the 1973 oil crisis was a searing memory, and Hawai'i Gas started moving a mixture of hydrogen and synthetic natural gas through its pipelines.

The story begins in the central Pacific Ocean, where the Hawaiian Islands lacked—and still lack—their own supply of natural gas and other energy sources. Pacific Resources Inc., then owner of Hawai'i Gas, built a new oil refinery to produce the

gasoline, jet fuel and propane needed to fuel the state's cars, planes, trucks and tiki torches (yes, they are a big deal in Hawai'i).

The refinery also produced naphtha, the light hydrocarbon that had no market in Hawai'i. Instead of burning it off as fuel or exporting it, PRI officials pondered making use of it. With the Lurgi coal gasification process, they found an application to reform naphtha molecules into methane.

The suitability of that naphtha as a feedstock for the production of synthetic natural gas inspired construction of a companion $7.4 million SNG plant that, like the refinery, operates to this day.

The process also created hydrogen as a byproduct, and again, officials debated its use. Should they invest in machinery to remove the hydrogen, which constituted 10% to 15% of the SNG, or leave it in the gas?

They determined that the SNG-hydrogen mix could safely and effectively be moved through the Hawai'i Gas transmission and distribution pipeline system and fuel natural gas appliances.

"Since day one, we've said it's a blend of hydrogen and methane," said Kevin Nishimura, Hawai'i Gas vice president of operations. "We're not necessarily blending like utilities on the mainland, where they have methane and will blend in hydrogen. In actuality, our mixture is a process mixture."

In the nearly 50 ensuing years, Hawai'i Gas has not found any evidence of safety or performance issues on pipelines, valves, meters, regulators and end-use appliances.

At Hawai'i Gas' synthetic natural gas facility on Oahu, the utility has long used a mix of SNG and hydrogen to fuel natural gas appliances.

PHOTO COURTESY OF HAWAI'I GAS

"We've seen generations of different appliances come and go," said Nishimura. "We've used the same pipeline meters and regulators that the industry uses for natural gas. We have not had to make any changes to our equipment or our procedures to account for the hydrogen blend."

Now, those decades of experience are taking center stage, generating inquiries from mainland utilities and positioning Hawai'i Gas as a partner in the Hawai'i Pacific Hydrogen Hub proposal.

In a hydrogen future, including the possibility of the Pacific Hub's greenlighting, Hawai'i Gas is occupying the gap between hydrogen producers and buyers, said Nishimura. As production scales up, finding early adopters for all of the product will

be challenging. “[But] in the Hawai‘i marketplace, we have this unique opportunity to increase the hydrogen in our mixture, which further decarbonizes our product,” Nishimura said, especially as blending possibilities approach 20%. “I don’t think anyone else in Hawai‘i is in position to offtake that product except for Hawai‘i Gas.”

The political climate in Hawai‘i is also “very supportive of hydrogen” as a contributor toward the state’s goal of carbon neutrality by 2045. “Our story is consistent with the state’s,” said Nishimura. “We want to decarbonize our fuel mix. We want to do it safely and affordably, and hydrogen has a very compelling role in that future endeavor.”

Hawai‘i Gas is also participating in HyBlend, providing samples for the DOE hydrogen-blending initiative because “who else can provide real pipeline samples that have transported a hydrogenblend gas for nearly 50 years?” said Nishimura.

Whether or not the Pacific Hub is selected, Hawai‘i Gas sees a major gain in the interest that the hub proposal has generated in hydrogen. Leaders in finance, transportation, heavy equipment and industry, along with residential customers, are suddenly intrigued by the prospect of a hydrogen economy in Hawai‘i and its benefits to the environment, business development and job creation.

“The hub could be a huge steppingstone for us for developing what hydrogen in Hawai‘i could look like,” said Nishimura.

Nicor Gas: Building Possibilities

From its Northern Illinois base, Nicor Gas joined the Midwest Alliance for Clean Hydrogen, or MachH2, in 2022. More than 50 energy producers, national labs, universities, and hydrogen technology providers and users are “united in a shared vision to create an immediately scalable hydrogen hub in the Midwest that uses the region’s abundant supply of zero-carbon energy to produce clean hydrogen,” said Meena Beyers, Nicor Gas vice president of community and business development. That’s in combination with the region’s “central, strategic location for national hydrogen distribution and access to major freight routes primed for decarbonization.”

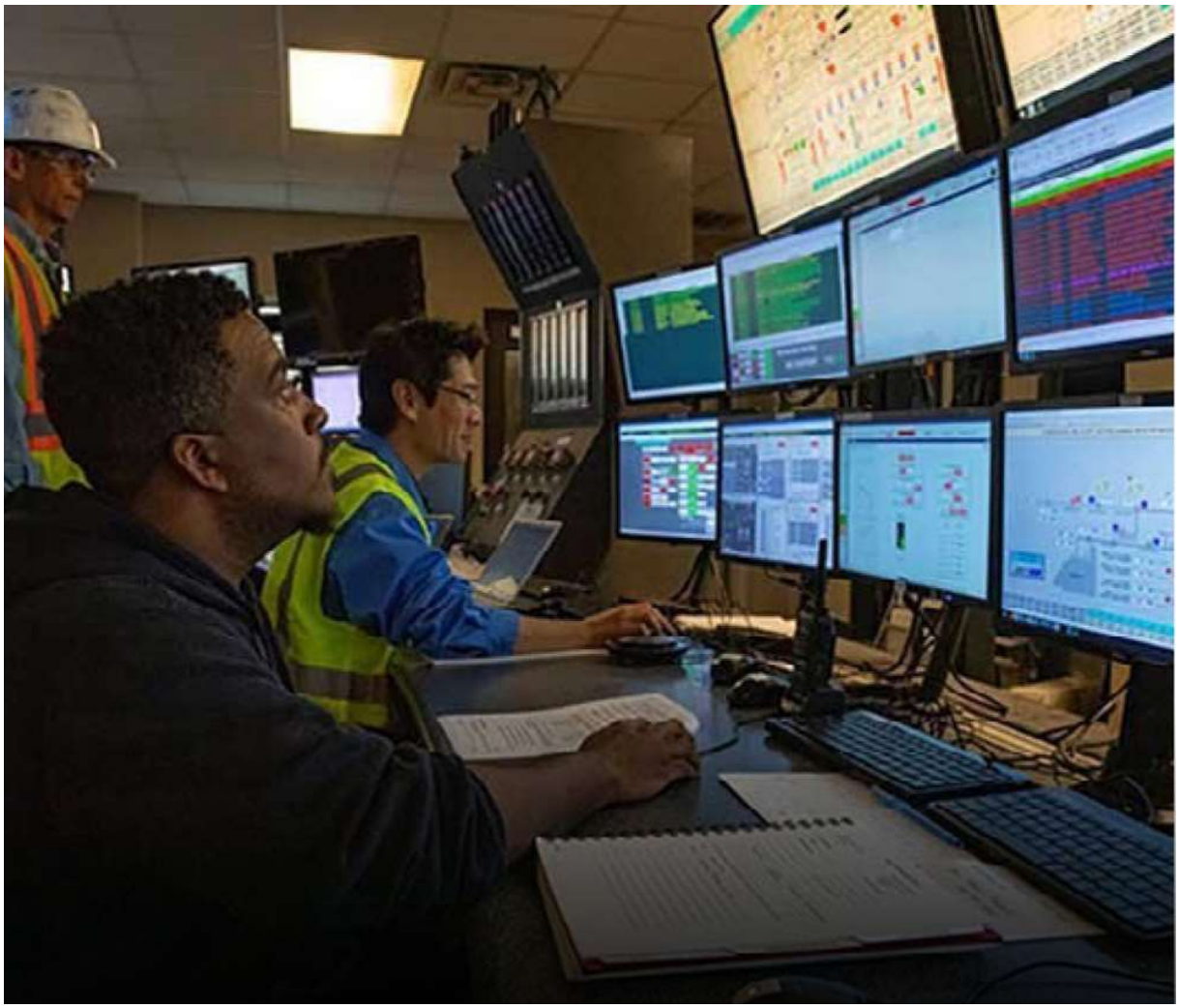
While Nicor Gas’ participation is conditional on appropriate legislative and regulatory authority, the utility is excited about contributing to hydrogen’s future in the Midwest. “Nicor Gas is poised to play a key role in providing connective infrastructure to ensure safe and reliable delivery of the clean hydrogen produced as a

direct result of the investment spurred by the Regional Clean Hydrogen Hubs initiative," Beyers said.

As a MachH2 partner, Nicor Gas can draw on lessons learned from the high-level R&D initiatives of Southern Company, its parent company. Southern Company is a founding partner of HyBlend, the DOE hydrogen-blending initiative, and is an anchor sponsor of the Low-Carbon Resources Initiative, the EPRI-GTI Energy project developing pathways to large-scale deployment of hydrogen and other low-carbon technologies.

The utility sees many possibilities for clean hydrogen to support decarbonization as part of a broader portfolio approach, said Beyers. Those advantages include emissions-free storage and use, supply chain diversity, the capability to decarbonize many industrial processes now hampered by limited alternatives, and a range of other applications. "[Hydrogen] has the potential to support the sustainability goals of our customers, local businesses and the states in which we operate," she added. "Natural gas utilities are uniquely positioned to consider opportunities to transition existing assets or leverage their existing knowledge base to develop new assets to move and store hydrogen."

Under DOE guidelines, 20% of scoring for the H2Hub proposals scrutinizes Community Benefit Plans, demonstrating impact on engaging communities and labor, creating good jobs, delivering benefits from federal clean energy initiatives to disadvantaged communities, and achieving diversity, equity, inclusion and accessibility. The MachH2 alliance is "leveraging the clean energy transition to create opportunities in disadvantaged communities through outreach and workforce development initiatives engaging diverse populations," said Beyers.



A recent Southern Company demonstration project was the first to validate 20% hydrogen fuel blending on an advanced-class gas turbine in North America—and the largest test of this kind to date.

PHOTO COURTESY OF SOUTHERN COMPANY

Those community benefits are nothing new for Nicor Gas. The utility has long led or partnered in efforts to recruit and train job candidates from disadvantaged communities, while also supporting entrepreneurship, diverse businesses and Illinois-based, minority-owned clean tech startups. Now, pipeline delivery of hydrogen gas will create new and expanded jobs building on those skills and the expertise that Nicor Gas is instilling in the natural gas workforce.

For example, in April 2022, Nicor Gas and other MachH2 members co-hosted the inaugural Horizon Hydrogen Grand Prix Midwest race, convening 50 students to submit hydrogen fuel cell-powered cars for a two-hour "endurance race." Nicor Gas leaders and volunteers mentored participating students "while driving interest in the sustainable energy and hydrogen industry through this fun and educational STEM-

focused event," said Beyers. "At Nicor Gas, we believe building the future of energy includes building future generations of energy leaders."

As one effort within a comprehensive drive toward reducing net-zero greenhouse gas emissions in Southern Company operations by 2050, hydrogen is "a great example of the solutions that we can collaborate on with our customers and others to support broader economywide decarbonization," Beyers added.

To Nicor Gas, MachH2 and H2Hubs represent "a force multiplier for the clean hydrogen industry," she said. Unprecedented government and public-private investments are accelerating these efforts.

"At Nicor Gas, we are committed to being a part of the future of energy, and this is a great opportunity to highlight how we can work together to achieve our collective goals," Beyers said.

Xcel Energy: Take Two

According to Xcel Energy's Lyng, the utility's vision of providing net-zero natural gas and carbon-free electricity spans the three areas of customer usage: electricity power sector, gas use in buildings and transportation. With its long-standing efforts in hydrogen development and distribution, Xcel Energy is part of not one, but two hydrogen hub proposals, addressing hydrogen production, infrastructure, storage, offtake and public policy routes.

The two proposals cover nine states and incorporate 10 project partners:

- **Western Interstate Hydrogen Hub, or WIH2, in Colorado, Utah, New Mexico and Wyoming:** Xcel Energy is focusing on Colorado, capturing wind and solar power to produce clean hydrogen for use in electric generation and building dedicated hydrogen pipelines to serve its power generation facilities and large refining, transportation and industrial customers. Xcel Energy's work with the National Renewable Energy Laboratory on hydrogen-specific advanced leak detection and monitoring—an area ripe for development—is also built into the proposal.
- **Heartland Hydrogen Hub in Minnesota, North Dakota, South Dakota, Wisconsin and Montana:** The hub proposal delves into hydrogen's potential for agricultural uses, including Xcel Energy utilizing abundant wind resources to electrolyze water and use the resulting hydrogen as a feedstock for fertilizers such

as ammonia and urea. Xcel Energy further proposes using carbon-free electricity for hydrogen production for multiple end uses, including power generation.

"One thing the hub proposal has done is start a dialogue in many service territories," said Lyng. "These hubs represent different project partners coming together to create a sort of central set of infrastructure and assets."

For example, this May, Colorado Gov. Jared Polis signed HB23-1281, creating a framework for the Colorado Public Utilities Commission to review proposals from investor-owned utilities related to federal funding opportunities in clean hydrogen—in other words, the hubs.

The DOE is "well aware" that the H2Hubs project will defray expenses but also demand significant commitments from the selected partners and host states. Under a new Clean Fuels Division, much of Xcel's planning within its four operating enterprises for a hydrogen-supported future centers around approaching regulators. "There has to be a state-federal collaboration," said Lyng. "There has to be a recognition that both have done their due diligence, and both see this as a pathway."

Even if Xcel and other utilities are not successful with their hub proposals, all say that they are continuing to aspire to reducing carbon in their operations. "Those aspirations are durable," said Lyng. "Certainly, the DOE funds would help defray costs for our customers. They would allow us to go faster, but we're planning to follow through on those commitments regardless."

IN THE RUNNING

Who's in the hunt for Regional Clean Hydrogen Hubs funding?

The U.S. Department of Energy encouraged 33 applicants—out of 79 original concept papers—to submit applications last April. This fall, only six to 10 projects are expected to be selected for their share of up to $7 billion in Bipartisan Infrastructure Law funding.

As key players in many of the proposals, natural gas utilities will be among those waiting for word. While this is not a complete list, publicly disclosed final submissions with natural gas partners include:

Alliance for Renewable Clean Energy Systems, California: Accelerating development and deployment of clean hydrogen projects and infrastructure. PG&E, SoCalGas. *archesh2.org*.

Appalachian Regional Clean Hydrogen Hub, Kentucky, Ohio, Pennsylvania, West Virginia: Building a safe, sustainable clean hydrogen hub that can scale and integrate into a national clean hydrogen network. Dominion Energy Ohio, Hope Gas, GTI Energy. *arch2hub.com*.

HALO Hydrogen Hub, Arkansas, Louisiana, Oklahoma: Partnerships to deploy and develop an extensive hydrogen network. Sempra Infrastructure. *h2alo.net*.

Hawai'i Pacific Hydrogen Hub, Hawai'i: Aligning existing and new infrastructure to build a green hydrogen production, distribution and use network. Hawai'i Gas. *energy.hawaii.gov*.

Heartland Hydrogen Hub, Minnesota, Montana, North Dakota, Wisconsin: Regional clean hydrogen hub addressing clean energy, transportation and agriculture. Xcel Energy.

HyVelocity Hub, Texas, Southwest Louisiana, U.S. Gulf Coast: Rapidly scaling clean hydrogen supply and demand. GTI Energy, Sempra Infrastructure. *hyvelocityhub.us*.

Mid-Atlantic Clean Hydrogen Hub, Delaware, New Jersey, Pennsylvania: Production and distribution of clean hydrogen as an engine for regional growth. Chesapeake Utilities, PSEG, Philadelphia Gas Works. *mach-2.com*.

Mid-Atlantic Hydrogen Hub, Washington, D.C., Maryland, Virginia: Production, infrastructure, end-use and market operations to facilitate a commercially viable hydrogen ecosystem for decarbonization and to connect to other hydrogen hubs. Dominion Energy, Exelon, Washington Gas. *midatlantichydrogenhub.com*.

Midwest Alliance for Clean Hydrogen, Illinois, Indiana, Kentucky, Michigan, Missouri, Wisconsin: Growing the Midwest regional hydrogen value chain to

deliver positive climate and community impact. Ameren Illinois, ComEd, Exelon, Nicor Gas, NiSource. *machh2.com*.

Northeast Hydrogen Hub, Connecticut, Massachusetts, Maine, New Jersey, New York, Rhode Island, Vermont: Advancing clean electrolytic hydrogen production, consumption and infrastructure projects for hard-to-decarbonize sectors. Eversource, National Grid. *nyserda.ny.gov/all-programs/hydrogen*.

Pacific Northwest Hydrogen Hub, Washington: Creating a hydrogen center of excellence to develop and bring to market new solutions toward clean energy goals. Puget Sound Energy. *pnwh2.com*.

Port of Corpus Christi Horizons Clean Hydrogen Hub and Trans Permian Hydrogen Hub, Texas: Leveraging energy production through the Port of Corpus Christi energy gateway, including production and hydrogen derivatives from diverse feedstocks, mobility projects and distribution of blends via natural gas transmission pipelines. AVANGRID, Sempra Infrastructure. *transpermianh2hub.com, portofcc.com*.

Southeast Hydrogen Hub, Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee: Developing a regional energy ecosystem to allow deployment of green hydrogen as a decarbonization solution. Dominion Energy, Duke Energy, Louisville Gas & Electric Company and Kentucky Utilities Company, Southern Company.

Southwest Clean Hydrogen Innovation Network, Arizona, Navajo Nation, Nevada: Developing low-carbon economies in the Southwest. Southwest Gas. *azcarbonneutral.com*.

Western Interstate Hydrogen Hub, Colorado, New Mexico, Utah, Wyoming: Applying shared energy independence goals to coordinate and develop a regional clean energy hub. Xcel Energy.