



Say 'Aloha' to New Trend of Hydrogen Blending with Hawaii Gas

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With its miles of sun-kissed beaches, lush tropical forests and clear, azure waters, Hawaii fits many descriptions of an ecological paradise. The people of Hawaii feel a deep responsibility to protect the land they call home.

"E hele me ka pu'olo," teaches an ancient Hawaiian proverb – an admonition to make every person, place or condition better than it was found.

Isolated more than 2,000 miles (3,200 km) from the nearest continent, Hawaii is also a land of innovation, making the most of limited resources to improve the circumstances of this people. At the intersection of this responsibility to care for their home, and to provide the best resources to their people, is Hawaii Gas, which has brought energy to the islands for over a century.



"Hawaii Gas was started in 1904 by royal decree," explained Richard DeGarmo, director of Renewable Energy and Capital Projects for Hawaii Gas. Originally supplying town gas from oil sources, Hawaii Gas converted to synthetic natural gas (SNG) as oil refineries came online in Hawaii in the 1970s. Made from naphtha (considered a byproduct in the refining process), SNG is now a key component in meeting Hawaii's basic energy needs.

While most of the naphtha is converted to methane, some hydrogen is produced in the steam reformer process, resulting in hydrogen concentrations of up to 10% to 15%. As natural gas utilities around the world look to hydrogen as a potential solution to decarbonization, the decades of experience Hawaii Gas

already has with a hydrogen blend provide an insightful study into the performance of equipment using hydrogen blends.

For more than a decade, Mooney regulators have been used in the gas distribution system at Hawaii Gas. “We use [Mooney] Flowgrid regulators in most of our district regulator stations,” explained Adelia Colburn, head of the Pressure Control Department for Hawaii Gas.

Colburn pointed to ease of maintenance as one of the main reasons Hawaii Gas has selected Mooney regulators. “Hawaii Gas selected this design for the ease in maintenance,” said Colburn. “Instead of having to remove the regulator, you can leave it in place, shut the isolation valves ... you can do the maintenance by simply removing the top cover.”

In the Hawaii Gas network, Mooney regulators are typically used in district regulator stations fed by a gas supply of up to 50 psig (3.45 bar). The regulators deliver gas to the distribution system at 12 to 17 psig (0.83 to 1.17 bar).



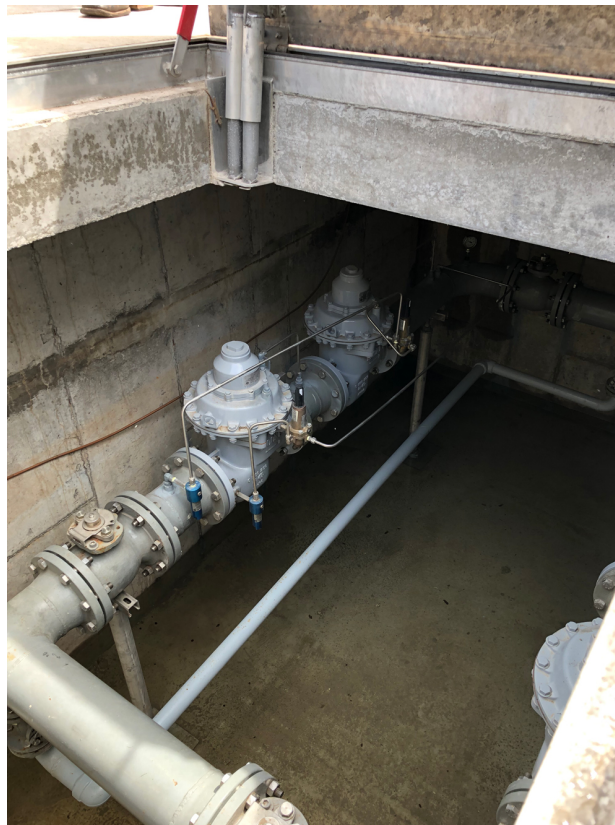
Ryland Kam, manager of Pipeline Operations for Hawaii Gas, stated that the 10% to 15% hydrogen concentrations in the gas have not shown adverse effects with the Mooney regulators. “With regards to our gas composition, we did not have any special requirements for material or design specifications,” he said.

Chris Jewell, senior product manager for Mooney Regulators at Baker Hughes, noted, “Blending hydrogen with natural gas is a growing trend we are seeing in our industry. We have many successful installations in this 10% to 15% blended hydrogen range worldwide where Baker Hughes products are enduring against hydrogen embrittlement and other concerns addressed by the NACE [National Association of Corrosion Engineers] standards.”

Colburn confirmed that maintenance cycles for Mooney regulators at Hawaii Gas are comparable to schedules for similar applications in traditional natural gas systems. Regulators are inspected annually according to regulatory compliance requirements. Typically, Hawaii Gas has replaced nonmetallic components each year when the regulators are inspected.

“We perform annual regulator maintenance and replace seals to ensure safe, reliable operations,” explained Colburn, emphasizing the commitment of Hawaii Gas to uphold safety and regulatory requirements.

Claude Transue, president of Tri-Pacific, which has been the manufacturer’s representative for Mooney regulators on the West Coast and in Hawaii since the 1980s, highlighted the long service life of the Mooney regulators.



“We sold the original regulators to them ... 40 to 50 pieces back about 20 years ago.” Ryland Kam confirmed that these regulators remain in service; they have not replaced any of the original valve bodies “during my time, in the past 20 years.”

Mooney regulators remain an important part of the plans of Hawaii Gas as they expand their existing network and branch into new sources of energy. “Our latest and greatest reg station – we’re running two legs, each with 6-inch FlowMax regulators,” said Colburn, “allowing Hawaii Gas to meet growing gas demand.”

DeGarmo spoke of plans for decarbonization and further expansion into alternative fuels. “We’re capturing the methane gas from the anaerobic digestion process at Honouliuli Wastewater Treatment Plant on the west side of O’ahu.”

He added that Hawaii Gas is “looking at getting landfill gas and additional wastewater treatment plant biogas from the city and county as well.”

Biogas and other renewable fuel sources could increase the concentration of methane relative to hydrogen, but DeGarmo emphasized the importance of hydrogen in their decarbonization plans.

“We are looking into additional hydrogen to add to our mix; adding to our hydrogen concentration will incrementally benefit our quest to decarbonize,” he said.

DeGarmo also focused on the importance of sustainability, pointing out that as much as 52% of the hydrogen produced by Hawaii Gas is from renewable sources.

Hawaii Gas remains tuned-in to the developments in hydrogen energy and decarbonization from around the world. A complete transition to hydrogen as a primary energy source may be in the future, but DeGarmo expressed that this is years away. In the meantime, natural gas blended with hydrogen will be an important intermediate step as the global economy moves away from traditional fossil fuel sources.

In addition to their own efforts, Hawaii Gas is closely monitoring results in the United Kingdom and other jurisdictions that have already begun blending hydrogen into their systems.

“We are following the progress of the British communities that are up to 20% hydrogen,” said DeGarmo,

“and that seems to be a success.”

Jewell spoke of the importance of continuing partnerships with Hawaii Gas and other utilities as the energy industry advances.

“Twenty years ago, when we started working with Hawaii Gas, nobody was talking about hydrogen blending. It was an afterthought, really, that Hawaii Gas was even using our regulators in elevated hydrogen conditions.”

What began as an afterthought, however, has become a key focus in energy transition. “This is where our industry is headed,” added Jewell. **P&GJ**

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