

Prepared Testimony of the Pennsylvania Public Utility Commission

before a public hearing of the

Pennsylvania Senate Democratic Policy Committee

December 4, 2023



Pennsylvania Public Utility Commission

400 North Street

Harrisburg, Pennsylvania 17120

Telephone (717) 787-4301

<http://www.puc.pa.gov>

Introduction

Thank you, Chairwoman Muth, Senator Comitta, and members of the Senate Democratic Policy Committee for the opportunity to present testimony on behalf of the Pennsylvania Public Utility Commission (PUC) as you examine the proposed development of hydrogen infrastructure in Pennsylvania and present an overview of the PUC's involvement with hydrogen.

PUC/PHMSA and Pipeline Safety

The PA PUC's Pipeline Safety Division is certified and authorized by the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration, PHMSA, to apply and enforce the federal pipeline safety regulations upon intrastate operators in Pennsylvania. The federal pipeline safety statute allows states to assume safety authority over intrastate gas pipelines, hazardous liquid pipelines, and underground natural gas storage through certifications and agreements with PHMSA. Pennsylvania has a 49 U.S.C. § 60105 certification.

To participate in PHMSA's pipeline safety and underground natural gas storage programs, states must adopt the minimum federal pipeline safety regulations; however, states may pass more stringent state regulations for pipeline and underground natural gas storage safety through their state legislatures. If states do not participate in the pipeline safety or underground natural gas storage programs, the inspection and enforcement of these intrastate pipeline and underground natural gas storage facilities would be PHMSA's responsibility.

To support states participating in the pipeline safety and underground natural gas storage programs, PHMSA provides grants to states to reimburse up to 80% of the total cost of the personnel, equipment, and activities reasonably required by the state agency for conducting its pipeline safety or underground natural gas storage program during a given calendar year. State pipeline safety and underground natural gas storage programs provide a local presence for protecting the public from pipeline and underground natural gas storage incidents. PHMSA works closely with state pipeline and underground natural gas storage programs to improve safety across the nation.

Background of Hydrogen

Hydrogen gas has been regulated by PHMSA since the inception of the federal pipeline safety regulations in 1970 through 49 CFR Part 192. Hydrogen is defined as a "gas" in 49 CFR §192.3 as follows:

“Gas means natural gas, flammable gas, or gas which is toxic or corrosive.”

Hydrogen is a highly flammable gas with other properties different from natural gas that must be considered from a safety standpoint:

- The explosive range for hydrogen is much broader than natural gas. Hydrogen's explosive limit is 4%-77% gas in air while natural gas is 5%-15% gas in air.
- Hydrogen is the smallest element and lighter than both methane and air.
 - Hydrogen is 14 times lighter than air.
 - Hydrogen rises at a rate 6 times faster than natural gas.
- Hydrogen is odorless, colorless, and tasteless and adding odorant through mercaptans (the common additive to natural gas) proves difficult since the speed of dispersion of the hydrogen is much greater than the dispersion rate of the odorant additive.
- Hydrogen has a British thermal unit (BTU) value of 325 BTU/cubic foot while natural gas has a BTU value of 1,050 BTU/cubic foot.

Current Landscape

The regulations at 49 CFR Part 192 apply to natural gas and hydrogen with limited differences; however, the existing pipeline safety regulations set forth certain odorization exemptions for hydrogen and identify that materials used for pipelines must be compatible with any gas they transport. Additionally, the application of and procedures in the federal pipeline safety regulations apply to the product being transported. Operators must identify the inherent risks, properties, and differences of transported gases. The blending of hydrogen with natural gas is not currently captured or defined in the federal pipeline safety regulations.

As of the end of 2022, there were 1,586 miles of hydrogen pipeline registered, regulated, and operating in the U.S. out of a total of 2.8 million miles of regulated pipelines across the country. Approximately half of the 1,586 miles of hydrogen pipelines are interstate pipelines that fall under PHMSA jurisdiction while the other half are intrastate pipelines subject to the jurisdiction of the state in which they operate. The PA PUC currently regulates one operator in North Central Pennsylvania with 1.83 miles of jurisdictional hydrogen pipelines. Hydrogen gas is transported through jurisdictional piping serving industrial facilities in this instance.

PHMSA and other federal agencies and research arms are involved with research and development for emerging fuels and the safe transportation of hydrogen to ultimately reduce safety risks, mitigate climate change impacts, and provide economic and environmental benefits to our nation. PHMSA has stated it is planning to position the pipeline transportation network with the products and infrastructure of the future. It is understood that the current infrastructure may require upgrades and enhancements to safely transport hydrogen and blended hydrogen products.

Independent research and development is also underway for not only the transportation and blending of hydrogen in pipelines, but also for hydrogen production, storage, and separation. The existing gas and oil pipeline transportation infrastructure may not be designed to accommodate hydrogen in pure form and studies are underway to determine if methane/hydrogen blending can be safely and efficiently implemented.

Blended hydrogen is gaining attention as a potential option. Blending hydrogen with natural gas could be more economical than investing in a dedicated hydrogen gas infrastructure pipeline network. Some focus points of the research and development on these issues and the existing regulatory and technological challenges and potential gaps include:

- Hydrogen leak detection
- Hydrogen ventilation
- Integrity of steel and welds prone to hydrogen embrittlement
- Leakage rates may differ from standard natural gas
- Potential use of new materials such as composites, high strength polymers, alloys and stainless steel
- Odorant types, detection levels and thresholds
- In-line inspection technology and techniques
- Pipeline repair methods
- Steel embrittlement
- Meter accuracy
- BTU content of delivered blended product
- Appliance safety and burner tip effects
- Risk of consequences of failure
- Impact radius of events
- Emergency response needs and training
- Incident investigation protocol
- Applicability of industry standards

PHMSA is participating with the U.S. Department of Transportation, Research and Innovation Technology Administration (RITA), the U.S. Department of Energy (DOE), the U.S. Department of Commerce (DOC), the National Institute of Standards and Technology (NIST) and others to establish a National Hydrogen Energy Roadmap.

In its stakeholder communications related to hydrogen, PHMSA has noted the following:

“PHMSA has an important role in enabling a transition to a ‘hydrogen economy’ in the United States. Numerous technical, cost, and institutional challenges must be met if hydrogen is to significantly contribute to the nation’s energy requirements. Government agencies, many large and small private companies, and other organizations are making large investments with the intention of addressing these challenges. These investments are being made in the context of scenarios that hydrogen could be a competitive energy carrier with a growing share of major energy markets by the year 2020 or shortly thereafter.

To enable the introduction of hydrogen as an energy carrier, a key initial focus of PHMSA is on research challenges for hydrogen delivery through local distribution infrastructure for refueling stations and stationary power sites. In a parallel effort, the DOE, Office of Energy Efficiency and Renewable Energy (EERE) is conducting R&D [research & development] to improve the reliability and lower

the cost of hydrogen compression and to reduce the cost and footprint of hydrogen storage.”¹

Distribution operators in Pennsylvania are conducting independent hydrogen/methane blending studies in simulated distribution facilities. Depending on the results and findings of the active testing and research, additional independent testing by distribution operators is anticipated.

Additionally, hydrogen is the focus of substantial federal investment. Last month, President Biden announced \$7 billion in funding for seven regional hydrogen hubs in parts of 16 states, including a hub in Philadelphia and a hub in West Virginia which is expected to have an impact across the Appalachian region, including Southwestern Pennsylvania.

Conclusion

The PA PUC stands ready to address and regulate new and different energy sources, technology, and products. Should ongoing research and development prove that this alternative fuel is safe and will serve the public interest, the Commission will engage with other state agencies as well as federal agencies to assure hydrogen’s full integration into the fuel mix.

¹ PHMSA: Stakeholder Communications: Hydrogen (dot.gov) - <https://primis.phmsa.dot.gov/comm/hydrogen.htm>