

The #H2IQ Hour

Today's Topic: Regulation and Permitting of Hydrogen and Natural Gas Pipelines

This presentation is part of the monthly H2IQ hour to highlight hydrogen and fuel cell research, development, and demonstration (RD&D) activities including projects funded by U.S. Department of Energy's Hydrogen and Fuel Cell Technologies Office (HFTO) within the Office of Energy Efficiency and Renewable Energy (EERE).



HOUSEKEEPING

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Questions?

- There will be a Q&A session at the end of the presentation
- To submit a question, please type it into the Q&A box; do not add questions to the Chat





The #H2IQ Hour Q&A

Please type your questions in the <u>Q&A Box</u>

Open the Q&A panel				
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Select a question and then typ 256-character limit.	your answer here, There's a	
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Regulation and Permitting of Interstate Natural Gas Pipelines

H2IQ Webinar August 29, 2024

Joan Dreskin Sr. VP & General Counsel Interstate Natural Gas Association of America

Interstate Pipelines Are A Vital Link Between Producers and Consumers

- There are approximately 300,000 miles of natural gas transmission pipelines serving 75 million customers nationwide. 200,000 of these miles are interstate natural gas pipelines.
- Interstate pipelines <u>do not</u> own natural gas. They provide transportation and storage services and are a vital link between producers and consumers.





Interstate Pipelines Are A Vital Link Between Producers and Consumers

Map of U.S. interstate and intrastate natural gas pipelines



Source: U.S. Energy Information Administration, About U.S. Natural Gas Pipelines



Interstate Natural Gas Pipelines Are Heavily Regulated By Multiple Agencies



FERC is the primary regulator and oversees construction and operation.

- Authorizes construction only if required by "public convenience and necessity."
- Prohibits overbuilding (i.e., does not authorize construction of pipelines with excess or reserve capacity).
- Sets "just & reasonable" maximum rate for transportation.
- Approves tariffs—terms & conditions for service—only if "just & reasonable."
- Maintains "open access"; pipelines cannot discriminate by shipper or end use.



PHMSA oversees pipeline safety.

- Establishes national policy, sets and enforces standards, educates, and conducts research to prevent incidents.
- Prepares public and first responders to reduce consequences if incident does occur.



Interstate Natural Gas Pipelines Are Heavily Regulated By Multiple Agencies





FERC Regulates Interstate "Natural Gas" Pipelines Under the Natural Gas Act



The Natural Gas Act defines "natural gas" as "either natural gas unmixed, or any mixture of natural and artificial gas."

FERC has jurisdiction over interstate pipelines that transport

- natural gas (i.e., methane); or
- natural gas blended with minor amounts of other constituents.



FERC reviews and approves the "tariffs" that governs each pipeline's operations.

- All tariffs contain gas quality specifications that limit the concentration of specified "contaminants" in the pipe.
- Some tariffs establish limits for hydrogen.

Pipelines can blend gas from multiple "streams" to dilute the concentration of contaminants below the tariff limits.



There are Open Questions on the Regulation of Hydrogen



What statute governs the transportation of pure hydrogen?

What entity (or entities) have jurisdiction over pipelines that *solely* transport hydrogen?

- FERC?
- Surface Transportation Board?
- States?

How much hydrogen can be blended into a pipeline before the "natural gas pipeline" becomes a "hydrogen pipeline"?



Interstate Natural Gas Pipeline Permitting Process Overview

The planning, permitting and certification process takes over 4 years on average.

There are opportunities for public comment and engagement throughout the process.



Pipeline Permitting Process - Preliminary Work

Pipelines typically spend 12-18 months evaluating project need, feasibility, and effects.

Potential customers with interest in new Pipeline holds infor market needs.	approach pipeline or expanded capacity. mal inquiry to test	Pipeline reta develop cos open seasor	iins contractor to t estimates, hold n.	Pipeline holds p out to state and	ublic meetings, reaches local government leaders.	Pipeline continues outreach to local government leaders, landowners, and communities.
	Pipeline identifies potential corridors and Environmental Justice communities within corridors.		Pipeline engages regulators in preliminary discussions regarding permitting.		Pipeline identifies landowners within pipeline corridor, holds preliminary open house.	PIPELINE starts • Surveys • Preparation of resource reports
	•					Preliminary analysis of environmental effects



Pipeline Permitting Process - FERC Pre-Filing (for Larger Projects) Pipelines spend up to 12 months (minimum of 6 months) working with FERC

to analyze the viability and effects of a project.





Pipeline Permitting Process - FERC NGA & Environmental Review

FERC staff typically spends up to 18 months reviewing an application.





Pipeline Permitting Process - FERC Certificate & Outstanding Permits

FERC has no deadline to issue the certificate. FERC's certificate is not the end of the process. It can take up to 9 months to get authorization for construction.





Effects of Federal Permitting on Linear Infrastructure

The challenges facing interstate natural gas pipelines are not unique.

More frequent litigation increases delay, cost, and uncertainty for all linear infrastructure.



Permitting Roadblocks Bottleneck Infrastructure

- In 2023, the U.S. added the least interstate natural gas pipeline capacity since EIA began data collection in 1995.
- The U.S. added 0.9 Bcf/d of natural gas interstate pipeline capacity in 2023, about 3% less than in 2022.





The U.S. Needs Permitting Reform to Meet Energy Demand



All linear infrastructure projects face permitting challenges, which increase:

- uncertainty,
- delay,
- cost, and
- the risk that the project fails.

Key areas where reform would be beneficial include:

- Implementation of CWA and NEPA
- Development of predictable agency permitting timelines and enforceable judicial review schedules.





H2IQ Webinar: Regulation and Permitting of Hydrogen and Natural Gas Pipelines

Hydrogen Pipelines and FERC Regulations

August 29, 2024

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Disclaimers

The thoughts and opinions in this presentation are those of Commission staff. We do not speak for the Commission or any individual Commissioner.

We cannot discuss the merits of any pending, contested proceedings before the Commission.



Natural Gas Act of 1938

The Commission's jurisdiction under the Natural Gas Act (15 U.S.C. § 717) applies to:
o the <u>transportation</u> of natural gas in interstate commerce
o the <u>sale</u> in interstate commerce of natural gas for resale
o <u>natural-gas companies</u> engaged in such transportation or sale
o the <u>importation and exportation</u> of natural gas in foreign commerce, and persons engaged in such importation and exportation



Natural Gas Act of 1938

- Pursuant to 15 U.S.C. § 717f, the Commission issues certificates of public convenience and necessity for:
 - <u>Construction and operation</u> of facilities transporting natural gas in interstate commerce (NGA section 7(c)).
 - <u>Siting and construction</u> of LNG terminals, as defined by the NGA, and import or export facilities (NGA Section 3).
 - <u>Abandonment</u> of facilities engaged in interstate commerce subject to the jurisdiction of the Commission, or any service rendered by means of such facilities (NGA section 7(b)).
- Pursuant to 15 U.S.C. § 717c, the Commission regulates rates, charges, terms, and conditions for interstate pipeline transportation of natural gas.
 - <u>All rates and charges</u> in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission shall be just and reasonable (NGA Section 4).



The Goals and Purposes of the Natural Gas Act

- The impetus behind the Natural Gas Act was a 1935 Federal Trade Commission report finding that interstate pipelines exercised abusive market power. The Act conferred on the Commission the authority to set rates that were just, reasonable, and nondiscriminatory.
- In determining what constitutes "natural gas" the Commission has given primacy to the "goals and purposes" of the Natural Gas Act over the chemical makeup of a given substance.
- The Commission has only assumed jurisdiction over pipelines under the Natural Gas Act when doing so would advance the purpose of encouraging the orderly development of natural gas supplies at reasonable prices. Based on this analysis, the Commission has found that a pipeline transporting predominantly carbon dioxide in interstate commerce was not within its jurisdiction. *See Cortez Pipeline Co.*, 7 FERC ¶ 61,024, at 61,041 (1979).



Natural Gas Act and Hydrogen

- The Natural Gas Act does not expressly define "natural gas" to include hydrogen and the Commission has not explicitly addressed this question in any order.
 - However, the Commission has previously disclaimed jurisdiction over the interstate transportation of non-methane gases (e.g., carbon dioxide) and synthetic natural gas for not being "natural gas" under the Natural Gas Act.
- In 2020, the Commission vacated in part a certificate for four natural gas storage caverns so that two of the caverns could instead be used "for non-jurisdictional purposes," specifically hydrogen storage.
 See Order Vacating Certificate Authorization in Part, 171 FERC ¶ 61,069, at P 2 n.4 (2020).



Pipeline Safety

- The Commission's regulations require pipelines to certify that they will adhere to PHMSA's pipeline safety regulations under 49 C.F.R. Part 192 when applying for a certificate of public convenience and necessity under NGA section 7:
 - 0 "... The applicant shall certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facilities for which a certificate is requested in accordance with Federal safety standards and plans for maintenance and inspection or shall certify that it has been granted a waiver of the requirements of the safety standards..." (18 C.F.R. 157.14(a)(10)(vi))
- With respect to hydrogen blending, the ability for a pipeline to make such a certification will depend on the availability of relevant PHMSA safety standards.



Hydrogen Pipelines and FERC Regulations

- 1) Blending Hydrogen into FERC-Jurisdictional Interstate Natural Gas Pipelines
- 2) FERC's Limited Role regarding Repurposing Interstate Natural Gas Pipelines to Transport Pure Hydrogen
- 3) Outside of FERC's Jurisdiction: Constructing New Interstate Pure Hydrogen Pipelines



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Blending Hydrogen in Natural Gas Pipelines

The Commission's Policy Statement on Natural Gas Quality and Interchangeability embodies five principles:

(1) only natural gas quality and interchangeability specifications contained in a Commission-approved gas tariff can be enforced;

(2) pipeline tariff provisions on gas quality and interchangeability need to be **flexible** to allow pipelines to **balance safety and reliability concerns with the importance of maximizing supply**, as well as recognizing the evolving nature of the science underlying gas quality and interchangeability specifications;

(3) pipelines and their customers should develop gas quality and interchangeability specifications based on technical requirements;

(4) in negotiating technically based solutions, pipelines and their customers are strongly encouraged to use the Natural Gas Council Plus interim guidelines filed with the Commission on February 28, 2005, as a common reference point for resolving gas quality and interchangeability issues; and,

(5) to the extent pipelines and their customers cannot resolve disputes over gas quality and interchangeability, those disputes can be brought before the Commission to be resolved on a case-by-case basis, on a record of fact and technical review.



Blending Hydrogen in Natural Gas Pipelines

The Natural Gas Council Plus interim guidelines referenced in Principle #4 recommend:

- (i) use of the local average historical Wobbe Index average with an allowable range of variation of plus or minus four percent;
- (ii) subject to a maximum Wobbe Index level of 1,400;
- (iii) a maximum heating value limit of 1,110 Btu/scf;
- (iv) a limit on butanes and heavier hydrocarbons (butanes+ or C4+) of 1.5 mole%;
- (v) an upper limit on the amount of total inert gases (principally nitrogen and CO_2) of up to four mole%.



Blending Hydrogen in Natural Gas Pipelines

Takeaways:

- A natural gas pipeline company would need to file tariff revisions with the Commission to establish gas quality provisions for hydrogen blending.
- The Commission would evaluate proposed tariff revisions in accordance with the Policy Statement on Natural Gas Quality and Interchangeability.
 Such an evaluation is done on a case-by-case basis, on a record of fact and technical review.
 - 0 Shippers and other stakeholders may file comments in support or opposition to such a proposal.



- 1) Blending Hydrogen into FERC-Jurisdictional Interstate Natural Gas Pipelines
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Repurposing Natural Gas Pipelines for Transporting Pure Hydrogen

- The Commission has not previously received an application to repurpose an interstate natural gas pipeline to transport pure hydrogen.
- Should a company seek to repurpose its pipeline, it must first receive an abandonment authorization from the Commission (NGA section 7b).
 - After receiving authorization from the Commission to abandon service under the NGA, the pipeline would need to receive any necessary authorizations for transporting hydrogen (e.g., certificates of public convenience and necessity from state public utility commissions).
 - The pipeline may also need modifications prior to transporting hydrogen. Pipeline conversion typically would involve measures such as modifying compressors, valves, seals, meters, and other components; replacing pipeline segments or reworking welds with compatible materials; modifying leak detection systems; and installing new controls to monitor and manage hydrogen flows.
- The Commission's regulations regarding abandonment are laid out in:
 18 C.F.R. § 157.18 (Applications to abandon facilities or service; exhibits)
 18 C.F.R. § 157.216 (Abandonment)

Repurposing Natural Gas Pipelines for Transporting Pure Hydrogen

Typically, an application for abandonment must include (18 C.F.R. § 157.18):

- The reasons for the abandonment
- An Environmental Report (including resource reports on water use and quality, vegetation and wildlife, cultural resources, soils, air and noise quality, etc.)
 - o See FERC staff's Guidance Manual for Environmental Report Preparation for Applications Filed Under the Natural Gas Act
 - Note that this report must address the environmental impacts of the abandonment of the pipeline, but not the environmental impacts of the later non-jurisdictional use of the pipeline.
- Exhibit T—Related applications
- Exhibit U—Contracts and other agreements
- Exhibit V—Flow diagram showing daily design capacity and reflecting operation of applicant's system after abandonment
- Exhibit W—Impact on customers whose service will be terminated
- Exhibit X—Effect of the abandonment on existing tariffs
- Exhibit Y—Accounting treatment of abandonment
- Exhibit Z—Location of facilities

Repurposing Natural Gas Pipelines for Transporting Pure Hydrogen

The Commission must decide whether the abandonment of an interstate natural gas pipeline is warranted by the public convenience or necessity:

• "Continuity and stability of existing services are the primary considerations in assessing whether the public convenience or necessity allow the abandonment [of an interstate natural gas pipeline]. If the Commission finds that an applicant's proposed abandonment will not jeopardize continuity of existing natural gas transportation services, the Commission will generally find that the public convenience or necessity permits the abandonment." (emphasis added)



- 1) Blending Hydrogen into FERC-Jurisdictional Interstate Natural Gas Pipelines
- 2) FERC's Limited Role regarding Repurposing Interstate Natural Gas Pipelines to Transport Pure Hydrogen
- 3) Outside of FERC's Jurisdiction: Constructing New Interstate Pure Hydrogen Pipelines



New Hydrogen Pipelines

- As previously mentioned, the Natural Gas Act does not expressly define "natural gas" to include hydrogen and the Commission has not explicitly addressed this question in an order.
- No entity has filed either a Petition for Declaratory Order regarding the Commission's jurisdiction or an application with the Commission under NGA section 7c seeking a certificate of public convenience and necessity for the construction and operation of an interstate hydrogen pipeline which is why the Commission has not directly addressed this question in an Order before.

• In addition, Congress has not passed any legislation indicating that the Commission has jurisdiction over hydrogen pipelines.

- FERC staff is aware of an existing interstate hydrogen pipeline (Air Products' Gulf Coast Connection Pipeline in Texas and Louisiana)
 - We believe the Gulf Coast Connection Pipeline received certificates of public convenience and necessity from Texas and Louisiana.



Questions?





Pipeline and Hazardous Materials Safety Administration Office of Pipeline Safety

H2IQ Hour Webinar Hydrogen Pipelines and Safety



Pipeline and Hazardous Materials Safety Administration

PHMSA's Mission

To protect people and the environment by **advancing the safe transportation of energy and other hazardous materials** that are essential to our daily lives. To do this, the agency establishes national policy, sets and enforces standards, educates, and conducts research to prevent incidents. We also prepare the public and first responders to reduce consequences if an incident does occur.

PHMSA by the Numbers				
64%	1.6 Billion	16,700	1.2 Million	3.3 Million
Of U.S. Energy Commodities Transported by Pipelin	Tons of Hazardous Materials Shipped Annually by All Modes	Underground Natural Gas Storage Wells	Daily Shipments of Hazardous Materials	Miles of Regulated Pipelines
	Tons of Hazardous Materials Shipped Annually by All Modes	Underground Natural Gas Storage Wells	Daily Shipments of Hazardous Materials	Miles of Regulated Pipelines



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Hydrogen Gas Transmission Pipeline Map



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Current Regulations

- **49 CFR Part 190** Pipeline Safety Enforcement and Regulatory Procedures
- **49 CFR Part 191** Transportation of Natural and Other Gas by Pipeline; Annual, Incident, and Other Reporting
- 49 CFR Part 194 Response Plans for Onshore Oil Pipelines
- 49 CFR Part 196 Protection of Underground Pipelines from Excavation Activity
- **49 CFR Part 198** Regulations for Grants to Aid State Pipeline Safety Programs
- **49 CFR Part 199** Drug and Alcohol Testing

- 49 CFR Part 192 Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
- **49 CFR Part 193** Liquefied Natural Gas Facilities: Federal Safety Standards
- **49 CFR Part 195** Transportation of Hazardous Liquids by Pipeline



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Hydrogen Regulations

49 CFR Part 192 Regulations Unique to Hydrogen Gas Pipelines

- PHMSA has regulated the transportation of hydrogen gas by pipeline since 1970.
- There are limited regulatory differences between hydrogen and natural gas pipeline transportation.
- Blends are not currently defined or specifically captured in data.
- § 192.625(b): When hydrogen gas is intended to be used as feedstock for a manufacturing process, it does not have the requirement to be odorized in Class 3 and Class 4 locations.
- § 192.53 General: "Materials for pipe and components must be:" (...) "(b) Chemically compatible with any gas that they transport and with any other material in the pipeline with which they are in contact."



Safety Administration

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H₂ – Information Collection

Proposed Information Collection

- Published in the Federal Register on March 25, 2024
- Proposal to revise PHMSA forms to collect data on the blending of hydrogen gas with natural gas within gas pipelines, among other changes related to the Valve Rule
- Comment period extended until June 24, 2024
- Link to docket PHMSA-2022-0085 https://www.regulations.gov/docket/PHMSA-2022-0085/



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Incidents – 2010 to present

- Between 2010 and today, five reported incidents involved regulated hydrogen gas pipelines:
 - None attributed to the transportation of hydrogen gas.
 - None involved blended gas.
 - No injuries or fatalities.

Calendar Year	Operator ID	Operator Business Name	System Sub Type	Commodity	Cause	Sub-cause
2015	9171	MARKWEST JAVELINA PIPELINE COMPANY, L.L.C.	GAS TRANSMISSION	HYDROGEN GAS	EQUIPMENT FAILURE	NON-THREADED CONNECTION FAILURE (BLIND FLANGE CONNECTION FAILURE ON A TEMPORARY SEPARATOR FILTER INSTALLED AT ILI RECEIVER SITE)
2018	31023	CITGO REFINING & CHEMICAL CO. L.P.	GAS TRANSMISSION	HYDROGEN GAS	CORROSION FAILURE	INTERNAL CORROSION (AT THE BOTTOM OF THE PIPE AT LOW LYING AREAS; SATURATED LIQUID HYDROCARBON DROP-OUT)
2019	20044	LINDE	GAS TRANSMISSION	HYDROGEN GAS	NATURAL FORCE DAMAGE	LIGHTNING (ANOMALY IN THE VICINITY OF A GROUNDING ROD FOR A NEARBY ELECTRICAL TRANSMISSION TOWER)
2021	15485	PHILLIPS 66 COMPANY - SWEENY REFINERY	GAS TRANSMISSION	HYDROGEN GAS	EQUIPMENT FAILURE	OTHER EQUIPMENT FAILURE (HIGH FLOW INDUCED EROSION AT PIPELINE METER STATION)
2022	842	AIR LIQUIDE	GAS TRANSMISSION	HYDROGEN GAS	MATERIAL FAILURE OF PIPE OR WELD	DESIGN-, CONSTRUCTION-, INSTALLATION-, OR FABRICATION-RELATED (HYDROGEN INDUCED CRACKING (HIC) PIPE GIRTH WELD)



Safety Administration



Hydrogen R&D Initiative

BACKGROUND: Hydrogen

ISSUE: Pipeline and UGS integrity threats



Previous Research/Findings

- 10.5 M 11 projects funded
- Materials and Welding
- Leak Detection
- Repurposing
- Knowledge Transfer registered to standards bodies

Planned Research

H₂ **Pipeline Safety**: H₂ line repair technologies, and risk modeling of H_2 systems.

Leak Detection: Improving locating technology, improved speed ad quantification, and validation of existing technology.

Threat Prevention: Improving training methods for emergency response.

Anomaly Detection and Characterization: Pipe and weld toughness and improving repair coatings or liners.

Outputs

Knowledge/Technology project reporting about hydrogen safety in transporting/storing underground.

Outcomes

Revision of industry standards and PHMSA regulations regarding hydrogen.

Impacts on Strategic Goals

Safe transportation and underground storage of hydrogen, supporting the advancement of climate change timelines.



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Ongoing H₂ Pipeline Research

11 active projects totaling \$10.6 million in PHMSA funding + \$2.5 million in cost sharing

Project	Goals
Determining Steel Weld Qualification and Performance for H ₂ Pipelines Category: Materials	Review current codes and standards for gaps in qualification requirements for welds in pipelines intended for H2 transportation and provide the following: weld qualification requirements for new steel pipeline assets; performance evaluations for varying modern steel grades; and assessment parameters for evaluating the integrity of existing and vintage (pre-Code) assets.Researcher:National Institute of Standards andPHMSA: \$2,060,000
	Technology
Investigating the Integrity Impacts of H ₂ Gas on Composite/Multi-Layered Pipe	pressurized H ² gas. Identify and address safety hazards to the pipeline facilities, people, and the surrounding environment. Identify required design, material and construction specifications, maintenance procedures, and a roadmap for using alternative-steel and non-steel composite systems for composite pipelines.
Category: Materials	Researcher: Edison Welding Institute, Inc. PHMSA: \$450,078
Advancing H ₂ Leak Detection and Quantification Technologies Compatible with H ₂ Blends	Investigate the impact of H ² on leakage dynamics and existing leak detection equipment. This will inform new approaches for H ² sensing and integration into next-generation leak detection equipment.
Category: Leak Detection	Researcher: Gas Technology Institute PHMSA: \$749,446
Determining the Required Modifications to Safely Repurpose Existing Pipelines to Transport Pure H ₂ and H ₂ Blends	Determine practical methods for repurposing existing pipeline networks for the safe transport of H ² or H ² blends; and identify which existing gas transmission pipeline components may need modifications to safely introduce H ² gas or natural gas/H ² blends.
Category: Climate Change	Researcher: Engineering Mechanics Corp. of Columbus PHMSA: \$800,000



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Pipeline and Hazardous Materials Safety Administration



Ongoing H₂ Pipeline Research

11 active projects totaling \$10.6 million in PHMSA funding + \$2.5 million in cost sharing

Project	Goals		
Knowledge-guided Automation for Integrity Management of Aging Pipelines (KAI-MAP) for H ₂ <u>Transport</u>	Develop an artificial intelligence (AI) enabled automation fran integrity management for emerging fuels, such as H ² . Addition develop decision support tools using AI interfacing with goal- context-driven platform to recommend potential pipeline risk	nework for p nally, the res oriented opt mitigation m	pipeline searcher will imization and a neasures.
Category: Threat Prevention	Researcher: Arizona State University	PHMSA:	\$844,726
Development of Compatibility Assessment Model for Existing Pipelines for Handling H ₂ -Containing <u>Natural Gas</u>	Use data analytics-based modeling techniques to create a com which determines the capability of existing pipelines with bler Develop a publicly available software tool that operators can u of existing pipelines for pure H ² or blended gas and identify n	patibility ass ided and pur ise to detern eeded modif	sessment model re H ² gas. nine suitability ications.
Category: Threat Prevention	Researcher: University of Oklahoma	PHMSA:	\$1,000,000
Accelerating Transition towards Sustainable, <u>Precise, Reliable H₂ Infrastructure (Super-H₂):</u> <u>Holistic Risk Assessment, Mitigation Measures, and</u> <u>Decision Support Platforms</u>	Develop and implement a holistic framework for an AI-power software tool that will accelerate the transition of existing gas	ed, platform pipelines for	n-forward r H2 transport.
Category: Threat Prevention	Researcher: North Dakota State University	PHMSA:	\$1,000,000
Investigate Damage Mechanisms for H ₂ and H ₂ /Natural Gas Blends to Determine Inspection Intervals for In-Line Inspection (ILI) Tools	Analyze failure mechanisms related to H ² and H ² /natural gas b regarding critical flaw sizes and availability and accuracy of I changes to practices for determining reinspection intervals.	blends, devel	lop knowledge I recommend
Category: Anomaly Detection & Characterization	Researcher: Kiefner and Associates, Inc.	PHMSA:	\$1,200,000



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Ongoing H₂ Pipeline Research

11 active projects totaling \$10.6 million in PHMSA funding + \$2.5 million in cost sharing

Project	Goals
<u>Review of Integrity Threat Characterization</u> <u>Resulting from H₂ Gas Pipeline Service</u>	Identify differences between existing integrity threats and possible new threats resulting from the presence of H ² . Define a list of possible changes to the ASME threat assessment process to address H ² , or H ² blended service-based threats in new or existing pipelines.
Category: Climate Change	Researcher: Engineering Mechanics Corp. of Columbus PHMSA: \$240,000
Expanding H ₂ Storage to Porous Rock Formatic <u>A Framework for Estimating Feasibility and</u> <u>Operational Considerations</u>	Develop a framework to expand underground H ² storage beyond salt caverns to other formation types. Provide a set of operational considerations for selecting suitable porous rock formations. Establish guidelines for monitoring potential H ² movement or loss from geochemical reactions or multiphase H ² flow with formation fluids.
Category: Underground Natural Gas Storage	Researcher: Gas Technology Institute PHMSA: \$298,000
Establishing the Technical Basis for Enabling S and Reliable Underground H ₂ Storage Operation	Identify and understand existing PHMSA regulatory functions and needs as they relate to characterizing, permitting, and assessing underground gas storage (UGS) operations within the subsurface in order to define appropriate metrics relevant to underground H ² storage (UHS). Quantify the suitability of existing UGS facilities (which includes the well and subsurface geologic system) for storing pure and blended H ² . Characterize operational expectations with emphasis on quantifying risk for H ² resource loss processes, UGS asset degradation, and estimating transient behavior based on geologic and operational conditions.
Category: Underground Natural Gas Storage	Researcher: Fossil Energy and Carbon Management PHMSA: \$2,000,000



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B31.12 and B31.8 American Society of Mechanical Engineers (ASME)

- PHMSA participates in various stakeholder group meetings that are seeking to update ASME standards to include gaseous hydrogen pipelines.
- This effort was initiated and led by the Pipeline Research Council International (PRCI) Emerging Fuels Institute stakeholder group.
- Efforts are seeking to migrate existing technical requirements from ASME B31.12 over to ASME B31.8/B31.8S.
- It's anticipated that the proposed changes to the ASME standards be finalized and included in 2026 ASME version.







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R&D Links



Scan or click <u>here</u> to subscribe for email updates.



Scan or click <u>here</u> to learn more about PHMSA's Pipeline Safety Research Program.



Scan or click <u>here</u> to visit project pages Summarizing the funded research.







Scan or click here to learn more about PHMSA's grants and funding opportunities.



Scan or click <u>here</u> to learn more about the Office of Pipeline Safety.



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Thank You





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Questionnaire on Pipeline Permitting Process

Feedback by 9/14/2024 would be appreciated, but the form will remain open through September.

August H2IQ Hour: Regulation and Permitting of H2 and Natural Gas Pipelines Questionnaire



https://forms.office.com/g/eyGMX7wmVJ