Testimony of Dr. Holly Krutka
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before the
U.S. Senate Committee on Energy & Natural Resources
on
"Federal Hydrogen Pipeline Regulatory Authorities"
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Good morning, Chairman Manchin, Ranking Member Barrasso, and Members of the Committee. I am Dr. Holly Krutka, Executive Director of the University of Wyoming School of Energy Resources. The School's mission is to focus on energy-driven economic development for the state. Wyoming exports over 90% of the energy it produces. Our economy and way of life are dependent on the energy and extractive sectors. Wyoming is, and plans to remain, an all-of-the-above energy state.

The School leads and supports research programs focused on energy technology development. This remit covers existing energy resources such coal; oil and gas – including enhanced oil recovery; economic geology; and more. We are also responsible for researching new energy opportunities for Wyoming, including carbon capture, use and storage; advanced nuclear; rare earth elements and critical minerals; wind and much more. We see hydrogen as an important component of the energy future and envision Wyoming becoming a "hydrogen headwaters" state.

Today, I will share some examples of early Wyoming hydrogen projects. I will also explain why I believe Wyoming is an ideal location to demonstrate and commercialize hydrogen technologies. Finally, I will discuss the positive attributes of Wyoming natural gas and why it is critical that hydrogen regulations do not negatively impact natural gas production, transportation and consumption.

When it comes to standing up a hydrogen industry, Wyoming is building on a strong foundation. In addition to being a leading energy producer, the state hosts a robust and expansive rail system.[1] This existing infrastructure could be used to transport clean ammonia. The state also offers an extensive natural gas pipeline network.[2] Given the nascent state of the hydrogen industry, blends of hydrogen and natural gas are likely to be transported in these pipelines initially.

Midstream companies in Wyoming are active in the hydrogen space.[3] For example, the School is collaborating with Williams on a renewable-produced hydrogen project – our role is to identify suitable

[1] Numerous major railroads operate in Wyoming, including the BNSF Railway Company and the Union Pacific Railroad. "Wyoming Railroads and Related Links", Wyoming Department of Transportation: available at https://www.dot.state.wy.us/home/engineering_technical_programs/railroads/rr_related_links.html.
[2] Approximately 100 companies operate about 30,000 miles of pipelines in Wyoming, not including all gathering systems or all inactive or abandoned pipelines. Pipelines are located in all of Wyoming's 23 counties and carry crude, natural gas, natural gas liquids, carbon dioxide and petroleum products. "Oil and Gas Facts and Figures 2021", Petroleum Association of Wyoming, 2021, https://pawyo.org/facts-figures/
[3] http://www.uwyo.edu/uw/news/2021/09/uw-school-of-energy-resources,-williams-cos.-join-forces-on-hydrogen-project.html; https://oilcity.news/community/2021/09/10/uw-williams-look-to-use-existing-pipeline-to-move-store-energy-rich-hydrogen/ ("The company says it is seeking to leverage its existing pipeline network to bring clean hydrogen to market. William[s'] plan is to use excess energy produced by wind farms to produce hydrogen through hydrolysis, or the 'splitting' of water"); https://www.williams.com/2021/04/15/harnessing-the-power-of-hydrogen-for-clean-energy/ ("'Our ability to blend hydrogen into our existing system is a significant advantage and has the potential to accelerate the use of hydrogen in reducing carbon emissions,' said Hlavinka").

water resources, which will be of paramount importance in the arid west.[4] The School is also supporting a Department of Energy-funded project led by Tallgrass Energy – our role is to evaluate CO_2 storage opportunities to support a hydrogen project.

In 2020, Wyoming was the ninth-largest natural gas producer, accounting for almost 4% of U.S. marketed gas production.[5] Wyoming's natural gas is particularly promising for clean hydrogen production. It is produced in close proximity to characterized CO_2 storage sites.[6] The School's Center for Air Quality and Wyoming producers have long collaborated to reduce methane emissions. Today, Wyoming natural gas has one of the lowest upstream carbon footprints in the western United States, measured in methane intensity.[7] Jonah Energy has achieved the Gold Standard in the United Nations-sponsored Oil and Gas Methane Partnership.[8] Similarly, PureWest, the largest natural gas producer in Wyoming, is working with Project Canary to verify 90% of production.[9]

The School recently established the Hydrogen Energy Research Center, H_2ERC – with support from the state of Wyoming, The Anschutz Corporation[10] and Williams.[11] This center is focused on evaluating hydrogen as an economic development opportunity – and how that development can be carried out most efficiently.[12,13] Preliminary work on a new Department of Energy-funded project suggests that hydrogen production could have significant economic benefits and job creation implications for Wyoming.

Regarding research on hydrogen demand, the Wyoming Energy Authority has funded Black Hills Energy to study modifications needed for conventional gas generators fueled by hydrogen or hydrogen-methane blends.[14]

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[4] "U.S. Department of Energy Selects 12 Projects to Improve Fossil-Based Hydrogen Production, Transport, Storage and Utilization", https://www.energy.gov/fecm/articles/us-department-energy-selects-12-projects-improve-fossil-based-hydrogen-production

[5] Wyoming State Profile and Energy Estimates", U.S. Energy Information Administration, March 18, 2021, https://www.eia.gov/state/?sid=WY

[6] With funding from DOE, two major saline geologic storage sites have been characterized in Wyoming: (1) the Rock Springs Uplift in the southwest under the "Wyoming Carbon Underground Storage Project" (https://www.uwyo.edu/cegr/research-projects/project-wy-cusp.html); and (2) a series of stacked reservoirs near Gillette in the northeast under the "Wyoming CarbonSAFE Project", https://www.uwyo.edu/cegr/research-projects/wyoming-carbonsafe.html. Work under "Wyoming CarbonSAFE Project" is continuing.

[7] Burns, D., Grubert, E., Environ. Res. Lett. 16 (2021) 044059, https://iopscience.iop.org/article/10.1088/1748-9326/abef33/pdf

[8] https://www.prnewswire.com/news-releases/the-international-methane-emissions-observatory-announces-jonah-energy-is-first-us-company-to-achieve-gold-standard-emissions-rating-301425507.html?tc=eml_cleartime.

[9] Source: Enverus ESG platform, PureWest summary included in testimony supporting materials.

[10] https://www.wyomingpublicmedia.org/natural-resources-energy/2021-09-23/anschutz-corp-looks-to-jumpstart-the-school-of-energy-resources-hydrogen-energy-research-center

[11] https://www.h2-view.com/story/university-of-wyoming-to-receive-500000-to-support-development-of-a-hydrogen-energy-research-center/

[12] https://www.uwyo.edu/uw/news/2022/07/uw-school-of-energy-resources-seeks-proposals-across-hydrogen-energy-supply-chain.html

[13] http://www.uwyo.edu/ser/news/2022/07/uw-school-of-energy-resources-seeks-proposals-across-hydrogen-energy-supply-chain.html

[14] https://www.wyoenergy.org/wp-content/uploads/2021/07/2021-07-09-PR-RFP-Finalists.pdf.

In addition to these Wyoming-specific efforts, Wyoming has joined a four-state coalition that includes Colorado, New Mexico and Utah. The coalition is focused on competing for hydrogen hub funding appropriated in the Infrastructure Investment and Jobs Act.[15] These hubs will provide a tremendous opportunity to understand how a US clean hydrogen industry will develop and the necessary transportation infrastructure.

The School is also a member of the Clean Hydrogen Future Coalition (CHFC). The 35 members of the Coalition represent the entire hydrogen ecosystem and are at the forefront of their industries in advancing a clean hydrogen economy. [16] CHFC members advocate federal policy designs that will stimulate demand of hydrogen across the full supply chain of production, transport, storage and end uses. The CHFC is currently investigating various approaches for interstate pipeline regulation of hydrogen, but has not yet reached any conclusions. The CHFC looks forward to working with Congressional policymakers on an effective approach once consensus is reached.

Wyoming producers are leaders in lowering the methane emission intensity of the natural gas they produce. Unfortunately, despite these efforts and the value of natural gas generally, it remains difficult and time-consuming to construct new natural gas infrastructure that the United States needs both for heating and electricity. If, for example, new natural gas infrastructure would also have to comply with new FERC-imposed mandates related to transporting blends of natural gas and hydrogen, I worry that that infrastructure would never be built. In that case, the economy and the environment would lose out. Therefore, I and others in Wyoming are concerned that the imposition of new federal standards could have unintended consequences on natural gas production and transportation.[17] Governor Gordon recently testified before the House Select Committee on the Climate Crisis about the critical role that natural gas will play in the evolving energy system.[18] Similarly, the Wyoming Energy Authority filed comments that expressed Wyoming's concerns with pending FERC policies that may slow the build-out of necessary natural gas infrastructure.[19]

Wyoming, and thus the School of Energy Resources, is fully committed to becoming a leading hydrogen producer and exporter. I understand there is a question as to when and how to regulate this emerging industry. Between the research, hydrogen hubs, and Coalition consensus building I've mentioned, much work is underway that could inform future regulations needed to ensure safety, security and

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[15] https://governor.wyo.gov/media/news-releases/2022-news-releases/coalition-of-mountain-west-states-sign-mou-to-develop-a-clean-hydrogen-hub; Pub. L. No: 117-58 (Nov. 15, 2021) (https://www.congress.gov/bill/117th-congress/house-bill/3684/actions)

[16] https://cleanh2.org/

[17] Wyoming is a major U.S. producer of natural gas and exports nearly all of it. Wyoming ranks among the top 10 states in both natural gas reserves and marketed natural gas production. Wyoming has 16 of the Nation's 100 largest natural gas fields, including the Pinedale and Jonah fields that rank amount the top 10. Wyoming produces more natural gas from federal leases than any other state and two-thirds of the state's natural gas production is on federal lands leased by energy companies. Several interstate pipelines converge at Opal, Wyoming, a major interstate natural gas trading hub. Some of the natural gas that remains in the state is placed in underground storage. Wyoming has nine natural gas underground storage sites that can hold a combined 140 billion cubic feet of gas, which is about 1.5% of U.S. total storage capacity. "Wyoming State Profile and Energy Estimates" (U.S. Energy Information Administration, March 18, 2021) (https://www.eia.gov/state/analysis.php?sid=WY).

[18] https://climatecrisis.house.gov/committee-activity/hearings/state-perspectives-cutting-methane-pollution-0

[19] See, e.g., "Comments of the Wyoming Energy Authority," FERC Docket Nos. PL18-1-001, PL21-3-001, April 22, 2022, https://elibrary.ferc.gov/eLibrary/docinfo?accession_num=20220422-5256

sustainability. We will learn a tremendous amount over the next few years as these projects become increasingly public in nature.

Thank you for this opportunity to share a Wyoming perspective on hydrogen and related federal regulatory authorities and thank you for tackling such an important topic for Wyoming and the Nation.