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HYDROGEN ENERGY

An Informative Article From the Associated Students of the University of Wyoming



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THE FUTURE OF Hydrogen in wyoming

by Luke Macy, Director of Sustainability

Hydrogen energy and storage contain exciting technologies that will help aid Wyoming and the rest of the U.S. transition to net-zero carbon emissions. Wyoming is poised to be a dominant exporter of hydrogen because of our existing (and potential for new) infrastructure. The School of Energy Resources (SER) & the Hydrogen Energy Research Center (H2ERC) at the University of Wyoming are currently pursuing initiatives for diversifying the state's energy sector in collaboration with other state and private partners.



WHAT IS HYDROGEN ENERGY?

Hydrogen is the most abundant element in the universe! H2 is only found naturally as a compound on Earth, most often in water molecules (H20).

Unlike natural gas, hydrogen is not a source of energy, but rather a carrier of energy. In hydrogen fuel cells, energy is created by combining hydrogen and oxygen atoms. Similar to a battery, the chemical reaction produces electricity along with heat and pure water.

Hydrogen energy storage is a key technology which will support Wyoming (and the rest of the U.S.) transition to net-zero carbon emissions and will prolong investments in current powerplants. Hydrogen fuel cells are currently used in rocket ships because of their high energy content per unit of weight, meaning H2 is incredibly efficient to store. Development of hydrogen fuel cells is now advancing into planes, trains, and automobiles!

Hydrogen storage technology is currently addressing two renewable energy issues of excessive power generation and storage capabilities. Because weather is amenable, there may be days of more sun and wind that creates a surplus of energy. Having the flexibility to redirect underutilized energy from solar and wind into hydrogen storage could fill the gap between constant energy demands and variable energy resources.¹ Every day, scientific advances are making hydrogen production more efficient and cheaper.

Governments and large corporations are making a greater effort to decarbonize.

 ^{&#}x27;Green Hydrogen Production from Curtailed Wind and Solar Power.' Green Hydrogen Production from Curtailed Wind and Solar Power | Carnegie's Department of Ciobal Ecology. 20 July 2021. https://dge.carnegiescience.edu/news/2021/7/green-hydrogen-productioncurtailed-wind-and-solar-power.



Future Challenges:

- Supply chain constraints
- Creating consistent policies
- Solutions to transport hydrogen efficiently
- A need for large investments and infrastructure
- Lowering production costs

Wyoming's existing infrastructure is already well suited for hydrogen! Our abundant railway systems and natural gas pipelines perfectly poise Wyoming to be a dominant exporter of hydrogen.

In Wyoming alone, hydrogen could potentially create an annual average of up to 3,340 jobs over a 15-year period which would support carbon capture development. Retrofit of equipment and power facilities would capture an estimated 30 million metric tons of carbon dioxide (CO2).

WHY NOW? Why wyoming?

Recently, the University of Wyoming's School of Energy Resources (SER) met in Wamsutter to hear Governor Mark Gordon speak on Williams' 300million-dollar hydrogen initiative.

On a national level, the Infrastructure Investment and Jobs Act was recently signed into law:

- November 5, 2021
- Electrolysis research (\$1B)
- Clean hydrogen technology manufacturing and recycling (\$500M)
- Appropriations for Hydrogen Program (\$8B)
- Total: \$9.5B over 5 years

CURRENT INITIATIVES AT SER & H2ERC



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WILLIAMS SOUTHWEST WYOMING HYDROGEN HUB

The School of Energy Resources (SER) & the Hydrogen Energy Research Center (H2ERC) are supporting the creation of the Western Inter-States Hydrogen Hub (WISHH) initiative. Wyoming, New Mexico, Utah, and Colorado produce over 10% of the nation's energy. The four states have tremendous assets for lowcarbon intensity hydrogen production, compelling markets for hydrogen use within the region, and the connective infrastructure (both existing and potential for new infrastructure) for transporting hydrogen to markets within and across the nation.

H2ERC and SER are an integral part of this initiative. SER facilitates proposal preparation, administrative functions, help with industry engagement and other activities. If successful, this initiative will bring a substantial part of the total \$1-2 billion in funding per hub from DOE to the state of Wyoming and the region to develop clean energy projects and associated infrastructure.

BUILDING CAPACITY AT UW: REQUEST FOR PROPOSALS

The UW School of Energy Resources is seeking proposals from current UW faculty members on hydrogen energy. Topics of interest for the proposals include all levels of the supply chain, such as hydrogen production, use, transportation, and storage. Proposals will be considered that evaluate technology, policy, and/or economics for topics of interest. The funding opportunity will cover a full calendar year and project proposals may submit requests for a maximum budget of \$100,000.