



Role of Hydrogen in Industrial Processes

Oil

- Hydrogen is used to process and refine oil into fuels such as gasoline and diesel.
- Hydrotreating is a fundamental process that “cleans-up” fuels by removing contaminants, like sulfur, from fuels through the use of hydrogen.

Gas

- Natural gas is the most common source of methane used to produce hydrogen through steam-methane reforming.

Coal

- Coal is a mixture of two components: carbon-based matter and mineral matter. Carbon-based matter contains high amounts of hydrogen, which can be extracted through carbon gasification.

Mining

- Commercial copper and tungsten mining practices use hydrogen in ore reduction.
 - This method of ore reduction can also be used to produce silver, gold, and platinum.
- The direct reduction of iron can use hydrogen. This process can develop into an important part of steel production due to the low carbon impact.

Ammonia

- The production of industrial ammonia relies on the fusion of hydrogen molecules with nitrogen.

Miscellaneous

- In the food industry, hydrogen works as a hydrogenating agent to turn unsaturated fats into saturated fats and oils, such as margarine and butter.
- Hydrogen can be used as a protective gas in many industries including flat glass production and electronics.
- Methanol can be produced through a reaction of hydrogen and carbon dioxide.
- Hydrogen peroxide production also uses hydrogen in addition to oxygen to create a routine sterilizing agent.



Utah Hydrogen Projects

Hydrogen Production

- [Intermountain Power Project](#): The Intermountain power plant in Delta will be converted from a 1,800-MW coal plant to an 840-MW natural gas and hydrogen plant, with plans for the plant to solely produce hydrogen by 2045. This facility is already connected to the grid, so the infrastructure to distribute hydrogen is already intact.
- [Dominion Energy Utah and UIPA Partnership](#): The Utah Inland Port Authority and Dominion Energy Utah have signed a joint cooperation agreement to reduce air pollution. They will work on developing innovative technologies and programs for clean fuels, including hydrogen.
- [Big Navajo Energy \(BNE\) Reclamation of Methane](#): BNE has announced that with the help of Power Innovations they will be able to reclaim excess methane gas from petroleum drilling sites in Southern Utah and convert it to hydrogen gas. BNE expects to produce anywhere from 600 kg and 1,000 kg of hydrogen per day, which will be compressed, stored, used for transportation, and delivered as an energy source to their customers.

Hydrogen Distribution

- [Advanced Clean Energy Storage](#): Magnum Development is developing the world's largest renewable energy storage facility, with a storage capacity of 1,000-MW of renewable hydrogen, compressed air energy storage, large-scale flow batteries, and solid oxide fuel cells. Due to its proximity to the Intermountain Power Project, the existing grid connection, transportation infrastructure, and an already trained workforce, this storage system will successfully power upwards of 150,000 Utah homes per year.

Hydrogen Infrastructure

- [Hydrogen Fueling Infrastructure](#): Lancer Energy, a Salt Lake City based company, is on the cutting edge of hydrogen fueling technology equipment, installation, maintenance and management. The company is involved in a number of developing hydrogen fueling infrastructure projects in the state.

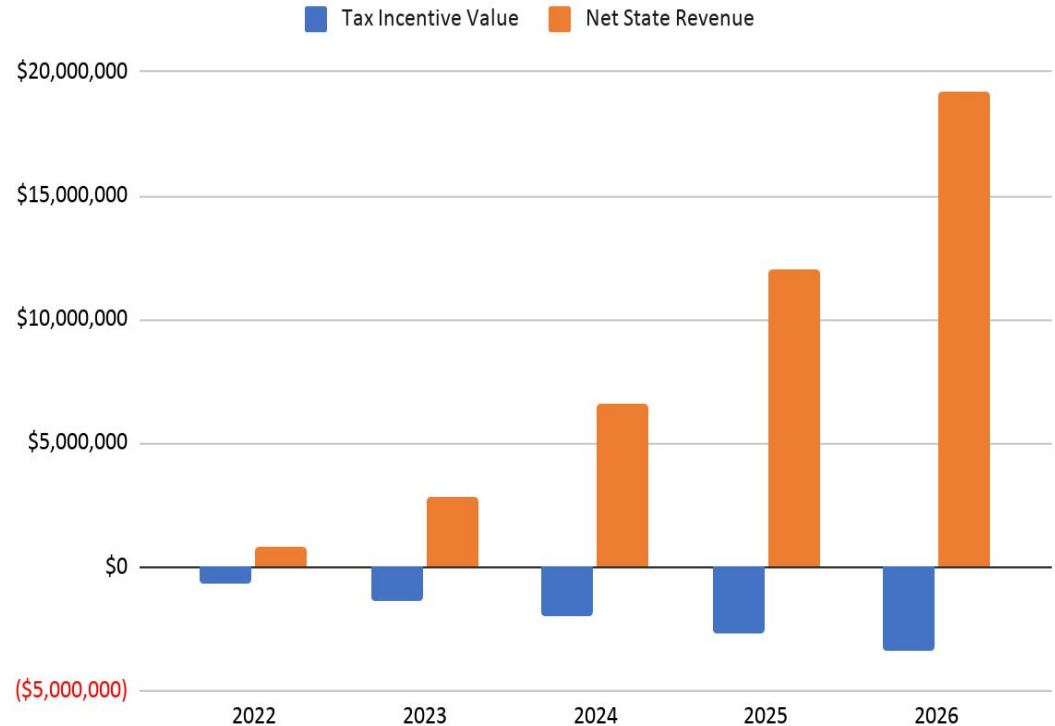
Hydrogen Transportation

- [The Alternative Fuel Vehicles and Emergency Plan](#): The Utah Governor's Office of Energy Development created this report highlighting the importance of alternative fuel vehicles for the future of Utah. In order to make the transition easier, there are tax credits of up to \$15,000 per hydrogen-powered vehicle for 2020. Grants to convert vehicles to run on alternative fuels are also available in this plan.
- [Solid Oxide Fuel Cell System](#): Chemtronergy, a Salt Lake City based company, is working on technology to create an advanced solid oxide fuel cell system to convert ammonia into electricity, which can be used in conjunction with hydrogen fuel cells to produce a carbon-neutral fuel for vehicles.

HB 223 S4 - Alternative Fuel Incentive Amendments

Dynamic Fiscal Analysis

- Incentive value: \$672,000 for 5,600,000 kg in hydrogen production at \$0.12/kg
- Fuel tax: \$475,000 to \$525,000 annually if 50% is used for transportation
- Sales tax on vehicles: \$97,000 to \$970,000 for 2 to 20 heavy-duty vehicles
- Sales tax on hydrogen fueling station of \$10 million: \$243,000
- Jobs: 47 direct/indirect/induced jobs per \$10 million investment
- Personal income/GDP: \$3 million in personal income and \$5 million in Gross Domestic Product
- Vehicle registrations, uniform fees



Alternative Fuel Incentive Amendments

Hydrogen Production: Corporate Income Tax Credits

Section 1 (59-7-614) of the bill creates a corporate income tax credit for hydrogen production from **renewable sources**. (\$0.12/kg of hydrogen; Max 5,600 metric tons/taxable year)

Section 2 (59-7-626) of the bill creates a corporate income tax credit for hydrogen production from **nonrenewable sources**. (\$0.12/per kg of hydrogen; Max 5,600 metric tons/taxable year)

Hydrogen Production: Individual Income Tax Credits

Section 3 (59-10-1106) of the bill creates an individual income tax credit for hydrogen production from **renewable sources**. (\$0.12/kg of hydrogen; Max 5,600 metric tons/taxable year)

Section 4 (59-10-1113) of the bill creates an individual income tax credit for hydrogen production from **nonrenewable sources**. (\$0.12/kg of hydrogen; Max 5,600 metric tons/taxable year)