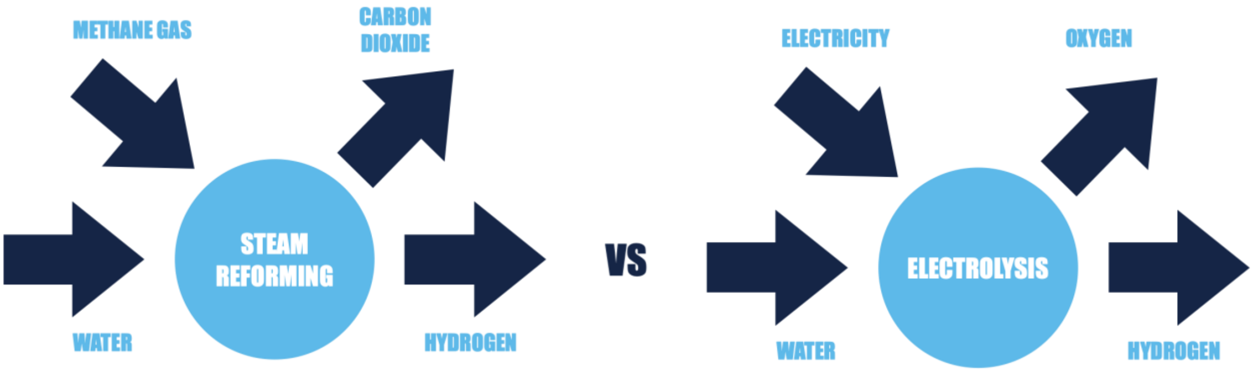
Hydrogen Factsheet

Hydrogen may be an important resource for decarbonizing heavy industry. But, without proper guardrails, it can have serious climate, cost, and air pollution impacts. With the right **hydrogen production pathways** and **end use applications**, Nevadans can benefit from green hydrogen.

Types of Hydrogen



There are two main chemical processes for producing hydrogen: steam methane reforming *(left)* and electrolysis *(right)*

Grey Hydrogen: In the US today, 95 percent of hydrogen is "grey hydrogen," produced via a carbon-intensive process called steam methane reformation ("SMR"). Most is used for oil refining (60 percent) and ammonia production (30 percent). Hydrogen production currently accounts for about 1.3 percent of US greenhouse gas (GHG) emissions.[1]

Blue Hydrogen: Like grey hydrogen, "blue hydrogen" is produced via SMR. However, some CO_2 emissions are captured using costly carbon capture and storage (CCS) technologies.[2]

Green Hydrogen: Green hydrogen is produced via electrolysis using 100% dedicated renewable energy. It is currently the only viable process for producing zero-carbon hydrogen at scale.

Best Uses of Hydrogen

Green hydrogen is an expensive, early-stage technology that is 6-14 times more expensive than fossil gas. Additionally, hydrogen produces significant NO_x emissions when burned, impacting air quality and community health. Hydrogen also has water use impacts: A minimum of 9kg of water is required for every kg of hydrogen produced by electrolysis, or more if using water for cooling.[3] Blue and Grey hydrogen also require 4.5 kg of water per kg of hydrogen, plus much more water for cooling, CCS and for

[1] Energy Innovation, "Assessing the Viability of Hydrogen Proposals." https://energyinnovation.org/wp-content/uploads/2022/03/Assessing-the-Viability-of-Hydrogen-Proposals.pdf.

[2] Existing carbon capture facilities only capture 55-72 percent of carbon emissions and are very expensive to install and operate. See "Assessing the Viability of Hydrogen Proposals".

[3] In water-stressed areas this could be supplied by desalination at minimal marginal cost.

upstream gas production. As a result, **hydrogen should only be used as a decarbonization solution for sectors where lower-cost and zero-emission solutions are not available.**

Best Uses: Marine shipping, long-haul aviation, and steel production.

Poor Uses: Applications where electricity produced with renewable energy provides a viable, cost-effective alternative, such as decarbonizing passenger vehicles and buildings.

Three Pillars of Green Hydrogen Production

To be truly zero-emission, green hydrogen must be produced with the **three pillars** of (1) new clean supply, (2) geographic deliverability, and (3) hourly matching.

1. Green hydrogen must be produced with new, dedicated renewable electricity
2. That renewable energy must be able to reach the green hydrogen production facility; i.e., it should be connected to the same load balancing area of the grid.
3. The renewable energy must be generated in the same hour as the hydrogen is being produced.

Absent these three pillars, the electrolysis process would produce "green" hydrogen using whatever electricity is available on the grid – including electricity produced by fossil fuels. As a result, "emissions from hydrogen production would increase by more than 100 million tons between 2023 and 2030 – the equivalent of the entirety of North Carolina's annual power sector emissions." *Read more about the three pillars of green hydrogen production here.*

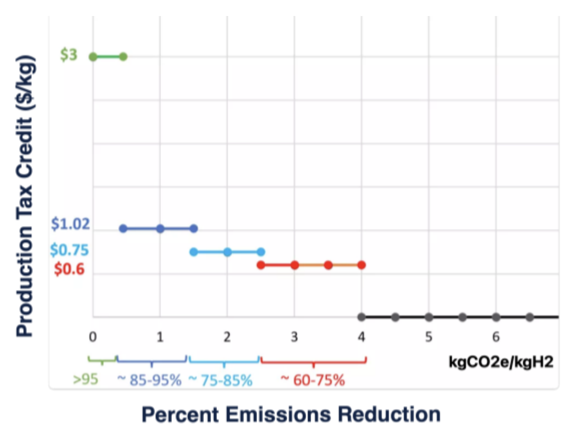
Federal Funding for Hydrogen

The Inflation Reduction Act (IRA) offers generous subsidies to kickstart the green hydrogen market.

Hydrogen Production Tax Credit (PTC): The PTC offers substantial subsidies to hydrogen that reduces emissions by 95% compared to today's grey hydrogen. Based on current and projected technology, only green hydrogen can qualify for the top tier PTC subsidies – which are nearly 3 times more generous than subsidies for any other type of hydrogen.

Hydrogen Hub Funding: States have applied for a share of $8B in "Hydrogen Hub" funding designed to boost clean hydrogen production, transportation and usage in the United States. This is the largest demonstration project in DOE history. Hubs that use clean hydrogen in hard-to-electrify end uses and demonstrate they will support emissions reductions are most likely to be selected.

Electrolysis R&D funding: DOE has $1B in R&D funding to distribute to help bring down the cost of electrolysis, in furtherance of the "Hydrogen Shot" goal of $1/kg green hydrogen by 2030.



The federal hydrogen tax credits are much higher for ultra-low-emissions green hydrogen than for other types of hydrogen.

The **Bipartisan Infrastructure Law (BIL)** also contains funding for hydrogen.