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BACKGROUND

The Clean Hydrogen Future Coalition (CHFC) was founded to bring together a diverse group of stakeholders under a shared vision to promote clean hydrogen as a key pathway to achieve global decarbonization objectives while also increasing U.S. global competitiveness. Modeling by the Intergovernmental Panel on Climate Change (IPCC) and others predicts that global climate mitigation efforts will fall short of the 2°C target unless the world's energy system – from power generation to all end-use sectors – undertakes substantial technological changes. One of the most viable technology pathways that international climate modeling authorities have identified for meeting those climate targets is clean hydrogen.

Clean hydrogen has the ability to accelerate decarbonization across all sectors of the U.S. economy, as well as transition existing - and create new - skilled, high paying jobs needed to support the clean energy transition. Multiple domestic industries have identified clean hydrogen as a critical component of their strategy for achieving net-zero greenhouse gas emission targets. In addition to the wide range of applications and potential for significant future demand, clean hydrogen can also be used to store energy over long periods of time, as well as move and deliver energy to where it is needed, making it a highly versatile, clean energy resource

The Coalition is identifying specific actions that the U.S. can undertake to scale the ecosystem for clean hydrogen production, transport, storage, and use, as well as the technology development and infrastructure needs across multiple sectors.

The CHFC supports policies that will catalyze investments in the full value chain of clean hydrogen economy, as well as those that address the technology development and infrastructure needs that will scale a clean hydrogen economy in the U.S.

MEMBERSHIP

To date, the CHFC is pleased to have the following members:

Chevron
ClearPath
Duke Energy
Gas Technology Institute
GE Gas Power
International Brotherhood of Boilermakers
International Brotherhood of Electrical Workers
LanzaTech
Linde
Nikola
North America's Building Trades Union
North Slope Borough
Sempra Energy
Siemens Energy
Tennessee Valley Authority
The Williams Companies
University of Wyoming
UND Energy & Environmental Research Center
Voice of the Arctic Inupiat
Wabash Valley Resources

FACT SHEET

Hydrogen is an Energy Superstar

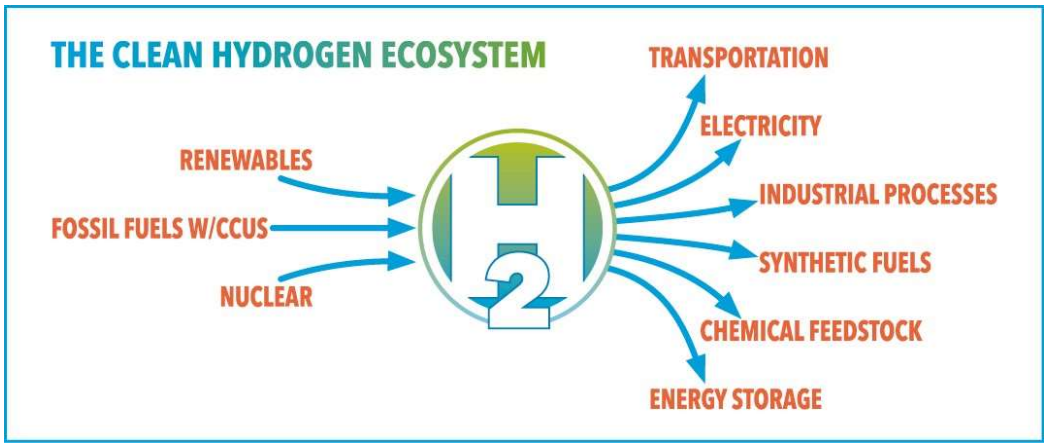
Hydrogen is the most abundant element in the universe and occurs on earth as a molecule of two hydrogen atoms as well as in compound form with other elements in liquids, gases, or solids. Hydrogen combined with oxygen is water (H_2O). Hydrogen combined with carbon forms different compounds—or hydrocarbons—found in natural gas, coal, and petroleum.

Hydrogen allows for the transport of energy in a usable form from one place to another. Hydrogen, like electricity, is an energy carrier that must be produced from another substance. Hydrogen can be produced—separated—from a variety of sources including water, fossil fuels, or biomass and used as a source of energy or fuel. Hydrogen has the highest energy content of any common fuel by weight (about three times more than gasoline).

Categories of Hydrogen

Hydrogen can be categorized according to the carbon intensity of its production method. Clean Hydrogen is produced using renewable sources (wind, solar, hydro, biomass), fossil fuels with CCS (carbon dioxide capture and sequestration), or nuclear energy. Currently, 95% of global hydrogen production is made from natural gas without CCS.

Why Clean Hydrogen is a Game Changer – The Clean Hydrogen Ecosystem



Where hydrogen comes from is important. At the moment, it's mostly produced from natural gas, and the process generates carbon dioxide (CO_2) emissions. When these CO_2 emissions are captured and stored, or if the hydrogen is produced with electrolysis from non-emitting sources of electricity, you get Clean Hydrogen. Clean Hydrogen allows you to transform one energy source into an entirely different, effective, efficient, and powerful energy source that can be used as a replacement fuel source or a feedstock in a number of industries, including metals and steel manufacturing, electricity generation,

ammonia for fertilizer production, food and pharmaceutical production, and in nearly all forms of transportation, including air, ship and rail. Hydrogen can be converted to energy through engines, turbines, and fuel cells, or through hybrid approaches such as integrated combined cycle gasification and hydrogen turbines. Clean hydrogen is one of the leading, lowest cost options for storing energy from renewables, as it can be stored onsite and electricity from Clean Hydrogen can be dispatched on demand over long durations and can extend through seasonal demand needs.

Scaling Clean Hydrogen

The technical potential for clean hydrogen to be a solution for decarbonization is being recognized worldwide, with investments by government and industry ramping up in many countries. According to the International Energy Agency (IEA), clean hydrogen has never enjoyed so much international and cross-sectoral interest, even in the face of recent progress of other low-carbon energy technologies.

The key challenges for scaling clean hydrogen are cost, lack of dedicated hydrogen infrastructure and market demand for its use. Widespread commercialization will require cost reductions in clean hydrogen production, leveraging of existing infrastructure as well as new infrastructure, and incentives to utilize clean hydrogen in several market applications.

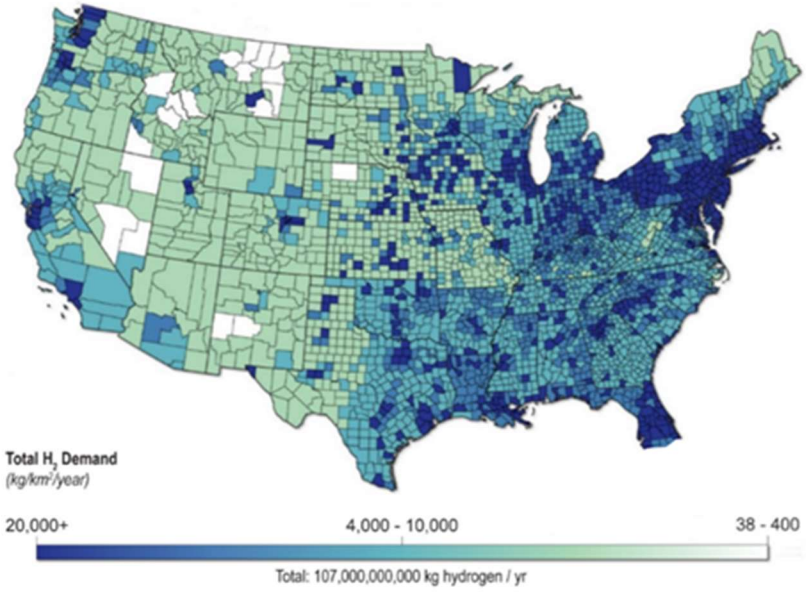
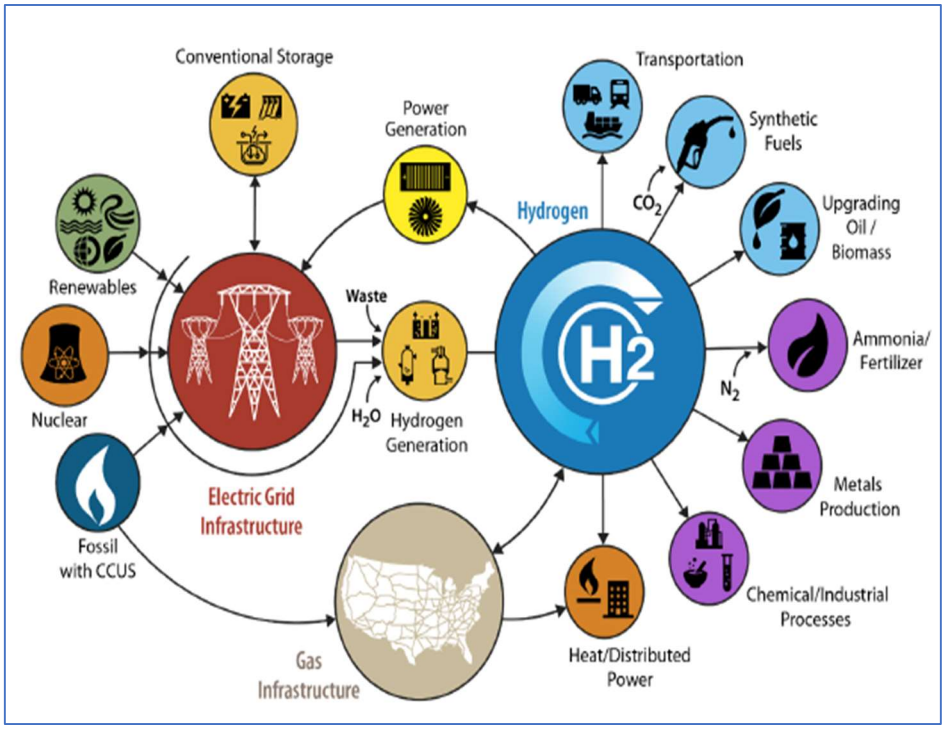


Figure 14. Serviceable consumption potential for hydrogen in the industrial and transportation sectors, natural gas, and storage[41]

Source: U.S. Department of Energy's 2020 Hydrogen Program Plan

The U.S. Department of Energy has assessed the availability of domestic resources for hydrogen production across the country, and determined the nation's energy resources are geographically widespread, such that fossil with CCS, nuclear, and renewable feedstocks are each sufficient to support at least a doubling of domestic hydrogen consumption. In addition to abundant and diverse energy resources to fulfill this demand, there are many CO_2 storage site opportunities to enable clean hydrogen production from fossil fuels.

Current U.S. hydrogen policies primarily target hydrogen utilization in the transportation sector, with incentives and programs available for fuel cells, fueling infrastructure, or hydrogen produced using renewable energy. These initiatives make important contributions, but as you can see in the below graphic, all forms of clean hydrogen will be needed to achieve U.S. and global climate goals, and there are multiple sectors that will rely on clean hydrogen to fully decarbonize.



Source: U.S. Department of Energy's 2020 Hydrogen Program Plan