S&P Global Commodity Insights Hydrogen Market Coverage

Creating transparency for a new pathway to decarbonization

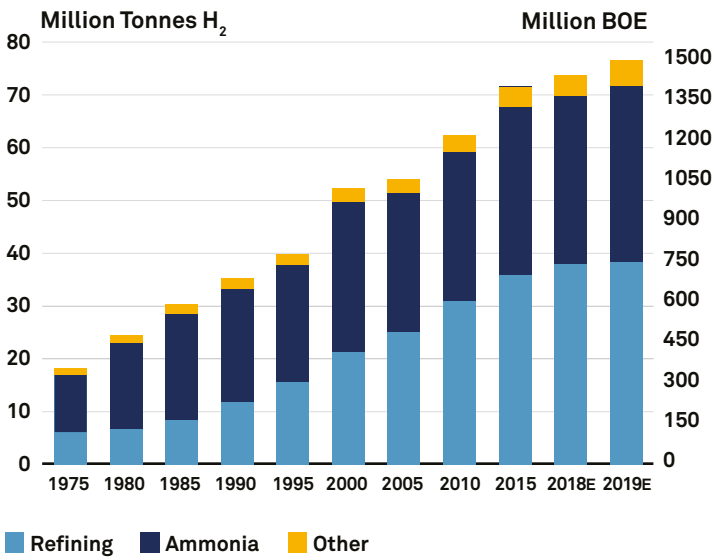
S&P Global
Commodity Insights

Why Hydrogen?

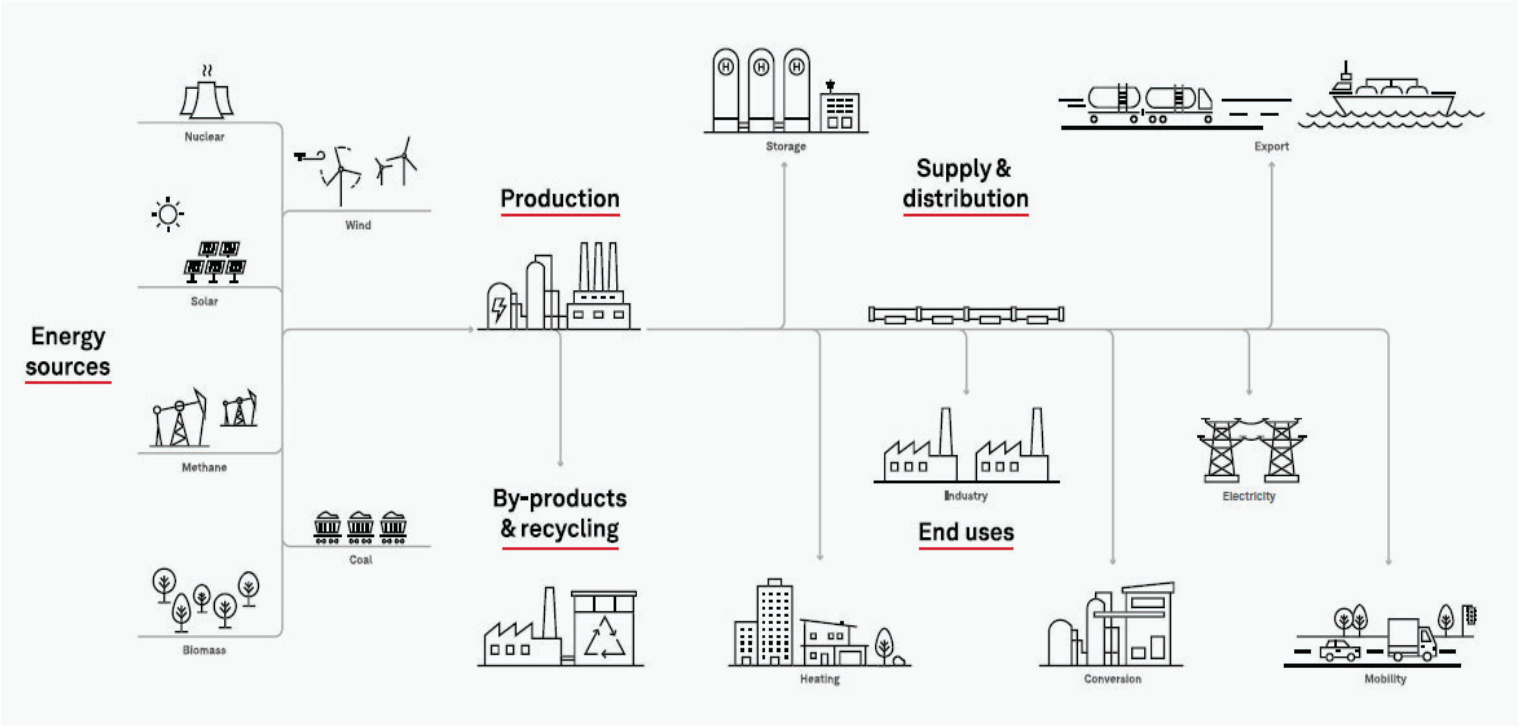
– Hydrogen is already used in industrial processes across the world, largely for oil refining and ammonia production. The vast majority of the world's current hydrogen production comes from fossil fuels, including natural gas and coal. Production is largely through Steam Methane Reforming (SMR) or gasification. These production pathways emit carbon into the atmosphere.

– Hydrogen is attracting interest as a decarbonization tool from investors, policymakers and energy market participants, who see the potential of hydrogen as a clean fuel for transportation, and a lower-carbon substitute for natural gas in industrial processes power generation and materials production, as well as for commercial and residential use.

Global Pure Hydrogen Demand



Source: Platts Analytics World Energy Demand Model; International Energy Agency



Fueling the Future

Hydrogen has one of the most exciting potentials of the Energy Transition fuels. It can be implemented in a variety of facets, such as power generation or transportation, and has the ability to tap into existing infrastructure. This versatility makes hydrogen an attractive and potentially disruptive fuel for the future.

Above is the potential for the hydrogen economy across the supply chain.

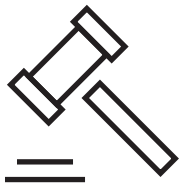
A market in need

The current market for hydrogen is opaque, with little opportunity for price discovery. To help provide transparency, Platts hydrogen assessments provide the market different ways to value the cost of hydrogen production in order to more accurately evaluate it as a fuel.

5 reasons why price assessments matter to your business

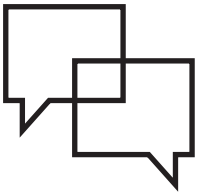
Protect your margins

Unclear pricing can badly affect margins.



Comply with regulations

Mark your books with respected information.



Negotiate from a position of knowledge

Be confident that the price you're using is the market value.

Spot prices are vital

Spot prices are the basis for term contracts, futures settlements and derivatives.

Benchmark your position

Set benchmarks for your business with impartial and independent information.

5 characteristics of a good benchmark

Adherence to international norms of trading

For a price to be relevant, the conventions of a free and open market place must be adhered to. Any distortion could see prices vary from the true market value.

Development of a forward market

When an actively-traded forward market forms around the benchmark, it's a strong indicator that it's gained market acceptance.

Market acceptance

The true definition of a good benchmark is when the market accepts it and utilises it in legally binding contracts.

High degree of transparency

Transparency leads to the confidence needed for an assessment to become a benchmark.

Chain formation

The market needs to be confident of on-selling a commodity further down the value chain based on a certain price. Therefore the benchmark is a marker for other materials which will be priced against it.

Hydrogen Price Assessments

Our hydrogen assessments reflect the cost of hydrogen production at hubs in North America, Europe, Japan and Australia using Platts daily gas and power assessments.

The assessments all include and exclude capital expenditure cost (CapEx) and will include a commodity price as well as a commodity plus production cost, for the following hydrogen production hubs:

Canada

Alberta (SMR w/o CCS, Alkaline Electrolysis, PEM Electrolysis

United States

(SMR w/o CCS, Alkaline Electrolysis, and PEM Electrolysis)

- Appalachia
- Gulf Coast
- Midcontinent
- Northeast
- Northern California
- Northwest
- Rockies
- Southeast Southern California
- Upper Midwest

Middle East

(PEM Electrolysis, Alkaline Electrolisis, SMR w/ CCS)

- Saudi Arabia
- UAE
- Oman
- Qatar

Australia

(All are published in A$/kg, $/MMBtu, $/kg)

New South Wales – Coal Gasification w/CCS, PEM Electrolysis, Alkaline Electrolysis

Queensland – Coal Gasification w/CCS, PEM Electrolysis, Alkaline Electrolysis

Victoria – Lignite Gasification w/ CCS, PEM Electrolysis, Alkaline Electrolysis

Western Australia – SMR w/ CCS, PEM Electrolysis, Alkaline Electrolysis

South Australia – PEM Electrolysis, Alkaline Electrolysis

Tasmania –PEM Electrolysis, Alkaline Electrolysis

The Netherlands

- SMR w/o CCS
- SMR with CCS
- PEM Electrolysis Alkaline Electrolysis
- ATR w/ CSS ATR w/CCS

Japan

- SMR w/o CCS
- PEM Electrolysis Alkaline Electrolysis

United Kingdom

- ATR w/ CCS
- PEM Electrolysis
- Alkaline Electrolysis
- SMR w/CCS (Both including and excluding carbon capture)

Hydrogen Pump Prices

- We publish monthly hydrogen refuelling station pump prices for California, Germany and Japan

California – A monthly price survey that considers representative high and low pump prices heard in the California market from hydrogen fuel station operators across the state

Japan – **5 locations:** A monthly republishing of posts pump prices from gas company Iwatani at five locations: Thoku, Metropolitan, Chubu, Kinki, Chugoku

Germany – A monthly repulsing of posted pump prices from H2 MOBILITY Deutschland, a consortium of hydrogen retail station operators.

Ammonia Assessments

- We publish daily ammonia assessments for **delivery into:**

- Far East Asia -Northwest Europe -The US Gulf Coast

And for **loading from:**

-The Middle East -The Black Sea.

These assessments are based on source data collected around the globe by our team of price reporters. They are published in USD per metric ton and in USD per MMBtu.

Carbon-Neutral Hydrogen Assessments

Daily CNH assessments represent the price of hydrogen incorporating the cost of avoided carbon emissions, where possible through the use of low emissions power generation, the removal of carbon through the use of carbon capture and storage and offset through the use of carbon credits or equivalent instruments.

The CNH assessments are published in six locations:

- Australia
- Far East Asia
- Middle East
- Northwest Europe
- California
- US Gulf Coast

Hydrogen Implied Origin Certificate Prices (h-OC)

h-OC represents a premium for hydrogen production using carbon-neutral pathways. The prices will be calculated as the difference between the cost of production of hydrogen produced via steam methane reforming without carbon capture and sequestration, and carbon-neutral hydrogen produced via proton exchange membrane electrolysis.

Carbon-neutral hydrogen costs will include renewable energy certificates, guarantee of origin and carbon offsets where applicable.

In Northwest Europe, h-OC is based on production costs in the Netherlands. In the US Gulf Coast, h-OC will consider production pathways in Texas and Louisiana.

One h-OC certificate represents the premium of using 1 MWh of energy from hydrogen produced using carbon-neutral sources. Prices will be reported in Eur/MWh in Europe and $/MWh in the US.

Research and Analysis

With hundreds of analysts globally, Platts Analytics offers a unique view of integrated energy markets, along with new and upcoming technologies.

Our offering covers hydrogen, alternative transport/electric vehicles (EVs), power storage, renewables outlooks and current news.

Hydrogen research and analysis includes:

- **Hydrogen Production Assets Database**

The Hydrogen Production Assets Database builds upon the expansive analytics offering already in place for the commodity. Updated daily, the Hydrogen Production Assets Database provides:

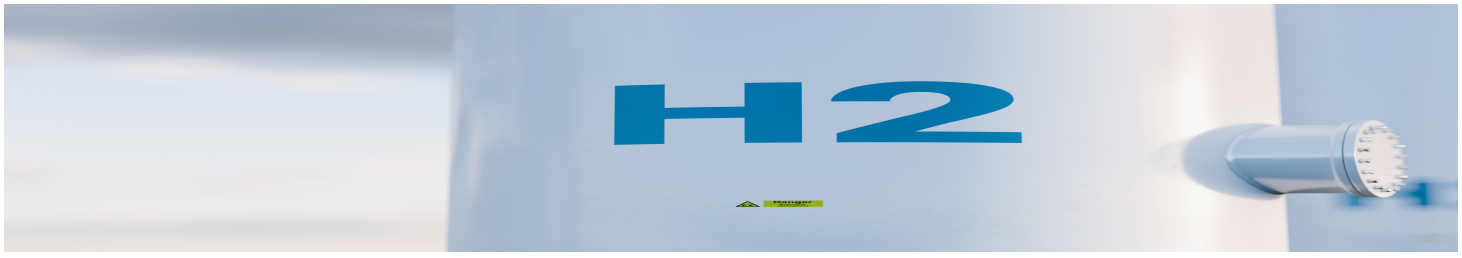
- A comprehensive list of over 500 existing, in-development and planned hydrogen production facilities
- The ability to filter by location, plant name, implied hydrogen color, plant capacity and more.
- API connectivity for seamless ingestion of data, allowing for efficient analysis.

- **Future Energy Outlooks**

The Future Energy Outlooks (FEO) service delivers an integrated outlook of the hydrogen market, with research and modeling that provides an understanding of both the supply and demand side fundamentals that will drive hydrogen uptake across production pathways and end-use sectors.

- **Hydrogen Market Monitor**

Included within Future Energy Outlooks, the Hydrogen Market Monitor provides a snapshot and update of the global hydrogen market. It covers supply and demand fundamentals through data on key markets, regulatory bottlenecks and production, as well as editorial content and news. Readers also get a forward-looking view of global hydrogen demand and relevant policy targets, plus summaries from the Hydrogen Production Assets Database for low-carbon hydrogen projects.



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