



# Tabbre Research

## Global Hydrogen Market 2023

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# Abstract

The **Global Hydrogen Market 2023** report provides a comprehensive overview of the current state and future projections of the hydrogen industry. It highlights the global annual production of hydrogen, which reached 95 million tonnes (Mt) in 2022, with most of the production still reliant on fossil fuel technologies. Low-emission hydrogen production, while growing, constitutes a small fraction of the total output. The report also discusses the economic significance of the hydrogen market, with substantial investments projected, and the transition towards low-carbon pathways anticipated to dominate by 2050. Furthermore, the report examines the cost structure of hydrogen production, comparing traditional methods with emerging green hydrogen technologies, and explores the factors influencing these costs. Future projections suggest a significant decrease in the cost of green hydrogen, potentially making it cost-competitive with fossil fuel-based hydrogen by 2030. The document underscores the volatility of current market prices, driven by energy costs, policies, and technological advancements, and outlines the implications for end-users across different sectors.

## Table of Contents

Abstract.....	2
Global annual production of hydrogen.....	3
Production Volume.....	3
Production Methods.....	3
Low-Emission Hydrogen Production.....	3
Market Value.....	3
Future Projections.....	3
Citations:.....	4
The cost of hydrogen.....	4
Traditional Production Methods.....	4
Green Hydrogen Production.....	4
Future Projections.....	4
Factors Affecting Cost.....	5
Total Cost to End-Users.....	5
Citations:.....	5
Current Hydrogen Prices.....	5
Projected Future Prices.....	6
Citations:.....	6

# Global annual production of hydrogen

The global annual production of hydrogen has reached significant levels, with both traditional and low-emission production methods contributing to the total. Here's an overview of the current state and value of hydrogen production:

## Production Volume

Global hydrogen use reached 95 Mt (million tonnes) in 2022, representing a nearly 3% increase from the previous year<sup>1</sup>. This figure encompasses both traditional and low-emission hydrogen production.

## Production Methods

The majority of hydrogen production is still based on fossil fuel technologies:

- Approximately 70% of dedicated hydrogen production uses natural gas
- Around 30% uses coal (mostly in China, which accounts for 90% of global coal consumption for hydrogen production)<sup>[2]</sup>

## Low-Emission Hydrogen Production

Low-emission hydrogen production, while growing, still represents a small fraction of the total:

- Less than 1% of total hydrogen production in 2022 was from low-emission sources
- Low-emission production grew by 5% compared to 2021<sup>[2]</sup>

## Market Value

While an exact global market value for all hydrogen production is not provided in the search results, we can infer some information about the industry's economic significance:

- The global industrial hydrogen market value is projected to grow significantly in the coming years
- Investments in hydrogen production are substantial, with global expenditure on hydrogen production for energy purposes expected to reach USD 6.8 trillion by 2050<sup>[4]</sup>

## Future Projections

The hydrogen industry is poised for significant growth:

- Annual production of low-emission hydrogen could reach 38 Mt by 2030 if all announced projects are realized<sup>[1]</sup>

- By 2050, 85% of the world's hydrogen supply is expected to come from low-carbon pathways[4]

In conclusion, while the current global annual production of hydrogen is around 95 Mt, the industry is on the cusp of a major transition towards low-emission production methods. The economic value of this production is substantial, with trillions of dollars in investments expected over the coming decades.

## Citations:

[1] <https://www.iea.org/reports/global-hydrogen-review-2023/executive-summary>

[2] <https://www.iea.org/energy-system/low-emission-fuels/hydrogen>

[3] <https://www.statista.com/statistics/1220812/global-hydrogen-production-cost-forecast-by-scenario/>

[4] <https://www.dnv.com/about/statistics-and-insights/hydrogen/>

[5] <https://www.statista.com/statistics/1411810/global-market-value-of-hydrogen-industry/>

## The cost of hydrogen

The cost of hydrogen production varies depending on the production method and location. Here's an overview of current hydrogen production costs:

### Traditional Production Methods

- Gray hydrogen (from natural gas): \$0.98-\$2.93 per kilogram[4]
- Blue hydrogen (fossil fuels with carbon capture): \$1.8-\$4.7 per kilogram[4]

### Green Hydrogen Production

Current costs for green hydrogen (produced through electrolysis using renewable energy) are higher:

- \$4.5-\$12 per kilogram globally[4]
- In Europe (2022): 3.89-16.44 EUR/kg, with variations across countries[5]

### Future Projections

The cost of green hydrogen is expected to decrease significantly:

- By 2030, green hydrogen is projected to be up to 18% cheaper than gray hydrogen in some major economies[4]
- The ICCT estimates 2030 production costs of \$3.7 per kg in the United States and \$5.6 per kg in the European Union[2]

## Factors Affecting Cost

Several factors influence the final cost of hydrogen:

- Electricity costs for electrolysis
- Renewable energy connection costs (approximately \$0.7/kg)
- Storage, compression, and distribution costs (about \$0.8/kg or more)
- Transportation distance and method

## Total Cost to End-Users

When considering all factors, the total cost of green hydrogen to end-users is projected to be:

- \$3-7/kg (in 2022 dollars) by 2050 for typical end-users[3]
- Around \$3.5/kg for transportation and aviation sectors[3]
- Approximately \$3.0/kg for industrial users like steelmakers or green ammonia producers, assuming integrated production facilities[3]

It's important to note that these costs are for production only. The price paid by consumers "at the pump" will be higher due to additional costs for compression, transportation, and distribution[2].

## Citations:

[1] <https://www.sciencedirect.com/topics/engineering/hydrogen-production-cost>

[2] <https://theicct.org/the-price-of-green-hydrogen-estimate-future-production-costs-may24/>

[3] <https://sustainability.crugroup.com/article/energy-from-green-hydrogen-will-be-expensive-even-in-2050>

[4] <https://about.bnef.com/blog/green-hydrogen-to-undercut-gray-sibling-by-end-of-decade/>

[5] <https://observatory.clean-hydrogen.europa.eu/index.php/hydrogen-landscape/production-trade-and-cost/cost-hydrogen-production>

Based on the search results provided, here is a summary of the current and projected global market prices for hydrogen:

## Current Hydrogen Prices

- The current cost of producing hydrogen varies significantly depending on the production method and region:
- Green hydrogen (from renewable electricity):
  - \$4.5-6.5 per kg if built today[3]

- \$3-8 per kg (from 2021 estimates)[2]
- Blue hydrogen (from natural gas with carbon capture):
  - \$5-7 per kg in the US
  - \$7-11 per kg in Europe and Australia[4]
- Gray hydrogen (from natural gas without carbon capture):
  - \$0.5-1.7 per kg[2]
  - \$2 per kg in the US
  - \$5-6 per kg in Europe, Australia and Asia[4]
- Brown hydrogen (from coal):
  - Around \$2 per kg in India[4]

## Projected Future Prices

- Green hydrogen costs are expected to decline significantly:
  - To \$2.5-4.0 per kg by 2030[3]
  - As low as \$1.3 per kg by 2030 in regions with excellent renewable resources (range \$1.3-3.5 per kg)[2]
  - Potentially down to \$1 per kg in the longer term[2]
- Bloomberg New Energy Finance forecasts green hydrogen costs dropping to \$2 per kg by 2030 in India and Western Europe[4]

The key takeaway is that while green hydrogen is currently the most expensive option, its costs are projected to fall dramatically this decade, potentially becoming cost-competitive with fossil fuel-based hydrogen production methods by 2030 in favourable regions. However, current market prices remain volatile and highly dependent on factors like energy costs, policies, and technological advancements.

## Citations:

[1] <https://www.fticonsulting.com/insights/reports/green-hydrogen-global-market-price-model>

[2] <https://www.iea.org/reports/global-hydrogen-review-2021/executive-summary>

[3] <https://hydrogencouncil.com/en/hydrogen-insights-2023-december-update/>

[4] <https://www.sgh2energy.com/economics>

[5] <https://www.statista.com/statistics/1411810/global-market-value-of-hydrogen-industry/>