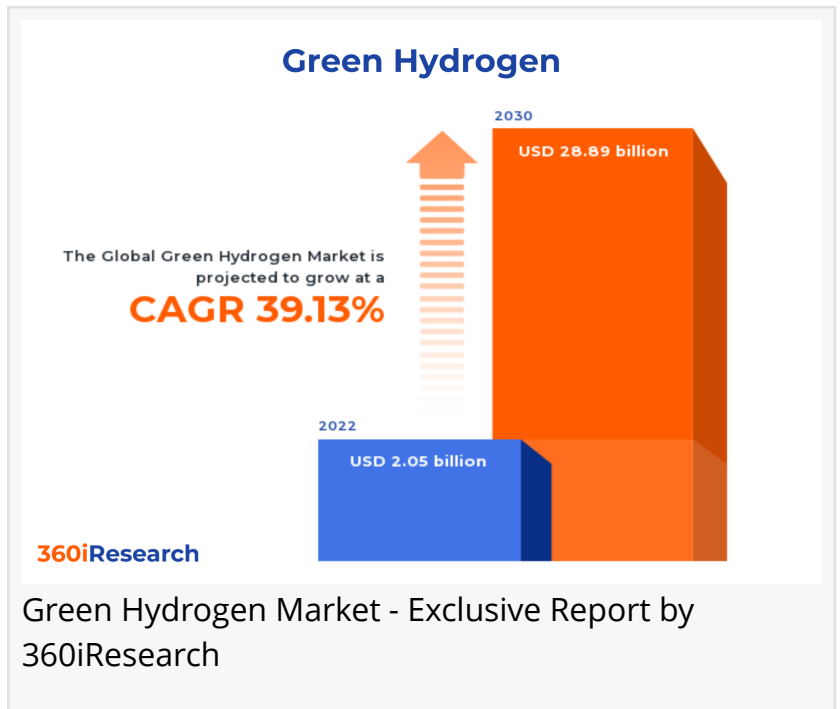


# Green Hydrogen Market worth \$28.89 billion by 2030, growing at a CAGR of 39.13% - Exclusive Report by 360iResearch

*The Global Green Hydrogen Market to grow from USD 2.05 billion in 2022 to USD 28.89 billion by 2030, at a CAGR of 39.13%.*

PUNE, MAHARASHTRA, INDIA ,  
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-- The "[Green Hydrogen Market](#) by Technology (Alkaline Electrolyzer, Polymer Electrolyte Membrane (PEM) Electrolyzer), Renewable Source (Solar Energy, Wind Energy), Distribution Channel, Application - Global Forecast 2023-2030" report has been added to 360iResearch.com's offering.



The Global Green Hydrogen Market to grow from USD 2.05 billion in 2022 to USD 28.89 billion by 2030, at a CAGR of 39.13%.

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Green hydrogen is made using renewable energy or low-carbon power sources; it exhibits significantly lower emissions than hydrogen derived from fossil fuels without carbon capture. Green hydrogen can be reserved and transported as a versatile energy vector for various applications across different sectors, including transportation, industry, and power generation. It is used directly in fuel cells to generate electricity for vehicles or combined with captured CO<sub>2</sub> to produce synthetic fuels. In enterprises such as steel and chemical manufacturing, where high-temperature heat is required, green hydrogen can serve as a low-emission substitute for fossil fuels traditionally used in these processes. Green hydrogen is experiencing increased demand due to the growing need for renewable energy resources. Manufacturers in the ammonia and fertilizer industry are increasingly adopting green hydrogen. The growth of green hydrogen is driven by mounting environmental concerns and regulations on carbon emissions. While safety

concerns are associated with handling and transporting green hydrogen, government investments and subsidies are promoting the use of clean fuel. Along with these, extensive research and development efforts are underway worldwide to harness the potential of green hydrogen as a sustainable energy carrier. As innovation continues to drive technological advancements and reductions in production costs, green hydrogen is expected to play a pivotal role in the transition toward a low-carbon future.

**Application: Increasing adoption of green hydrogen energy for power generation and transportation**

Green hydrogen is utilized for grid balancing and storage in the power generation sector, effectively incorporating solar photovoltaic (PV) and wind, variable renewable energy technologies. It enables the decarbonization of electricity production by substituting natural gas in gas turbines or combined-cycle plants with H<sub>2</sub>-blended fuels. Green hydrogen is observed as a promising alternative fuel for numerous modes of transportation, including cars, buses, trucks, trains, ships, and even aircraft. In transportation applications, hydrogen is used in fuel cell electric vehicles (FCEVs) and hydrogen internal combustion engine vehicles (HICEVs). FCEVs running on hydrogen emit water vapor, making them zero-emission vehicles and contributing to efforts to combat air pollution and reduce the transportation sector's carbon footprint. Harnessing green hydrogen's potential can revolutionize power generation and transportation sectors toward a more sustainable future while providing low-carbon solutions contributing to climate change mitigation efforts.

**Renewable Source: Growing uses of solar and wind energy sources providing operational flexibility in electricity generation**

Wind and solar energy generate electricity used in electrolysis to produce green hydrogen. Wind energy is a crucial renewable source for electrolyzers producing green hydrogen, as its intermittent nature can be managed through energy storage and grid-balancing technologies to ensure a stable electricity supply for hydrogen production. Moreover, solar energy is another significant renewable source used to power electrolyzers for green hydrogen production. Excess solar power generated during sunny periods can produce hydrogen for later use with the help of energy storage solutions. Solar energy capacity factors vary depending on location, time of day, and weather conditions.

**Distribution Channel: Wider availability of green hydrogen pipelines in large scale plants for convenient transmission**

Pipelines have been established as the conventional means of transporting gaseous substances such as natural gas. Using pipelines for green hydrogen transportation requires new infrastructure and retrofitting existing natural gas pipelines. This approach benefits from lower transportation costs per unit over long distances and continuous supply with minimal interruptions. However, in terms of capital expenditure, constructing new pipelines and retrofitting existing ones involve significant upfront investment. Cargo transportation involves shipping green hydrogen using carriers such as ships, trucks, and trains. For instance, liquid organic hydrogen carriers (LOHC) technology has emerged as an alternative to traditional

compressed and liquefied hydrogen storage methods due to its lower energy requirements and reduced transport costs compared to high-pressure storage tanks. Nonetheless, cargo transportation generally has higher operating costs due to the necessity for regular refueling and maintenance.

Technology: Pertaining advantage of alkaline and polymer electrolyte membrane (PEM) electrolyzers in large-scale projects

Alkaline electrolyzers are the most established and widespread technology for green hydrogen production. They split water into its constituent elements, oxygen, and hydrogen, using an alkaline solution as the electrolyte. In these systems, a current is passed through water containing dissolved potassium hydroxide or sodium hydroxide, leading to hydrogen gas formation at the cathode and oxygen gas at the anode. Alkaline electrolyzers have been commercially used for decades and offer several advantages, including low capital costs, high system efficiency, robustness, and extended operating lifetimes. However, they require large-scale installations for optimal performance and can be sensitive to variations in current density. Polymer electrolyte membrane (PEM) electrolyzers represent a recent advancement in green hydrogen technology. These systems utilize a solid polymer membrane as an electrolyte instead of an alkaline solution. PEM electrolyzers are more compact due to their higher current densities and exhibit faster response times to changes in load conditions. PEM technology has high proton conductivity, lower gas permeability, and lower proton exchange membrane thickness and allows flexible integration with intermittent renewable energy sources such as solar and wind power. Furthermore, PEM electrolyzers produce higher-purity hydrogen gas without requiring additional purification steps, majorly employed for applications requiring stringent quality standards, such as fuel cell vehicles or industrial processes.

Regional Insights:

Europe and the Americas are witnessing an increase in development across the production of green hydrogen. In recent years, both regions have witnessed increased investments in green hydrogen production and the development of supportive clean energy policies. Advances in research and development for green hydrogen have made it more cost-effective and widely available. The European Union has been particularly proactive in adopting green hydrogen. The European Commission has identified green hydrogen as a key element of its Green Deal agenda, setting ambitious targets for using renewable energy sources and supporting businesses willing to invest in green hydrogen technology. Additionally, several European countries have developed specific strategies to produce and use this energy source, committing significant resources to promote its growth. In the Americas, countries such as Canada, Mexico, Chile, and Brazil focus on exploring the potential of green hydrogen. Canada is investing heavily in infrastructure to produce electricity from renewable sources such as solar and wind power, which can then be used with electrolysis technology to produce green hydrogen. India and China are witnessing a significant increase in the adoption of green hydrogen for manufacturing ammonia and fertilizers. Their commitment to sustainable growth drives this shift across developing countries to reduce greenhouse gas emissions in line with global climate targets. Furthermore, several notable collaborations between key industry players have been observed to capitalize on the

market potential offered by green hydrogen technology. Other key partnerships are emphasized in research & development efforts and commercial-scale deployment strategies.

#### FPNV Positioning Matrix:

The FPNV Positioning Matrix is essential for assessing the Green Hydrogen Market. It provides a comprehensive evaluation of vendors by examining key metrics within Business Strategy and Product Satisfaction, allowing users to make informed decisions based on their specific needs. This advanced analysis then organizes these vendors into four distinct quadrants, which represent varying levels of success: Forefront (F), Pathfinder (P), Niche (N), or Vital(V).

#### Market Share Analysis:

The Market Share Analysis offers an insightful look at the current state of vendors in the Green Hydrogen Market. By comparing vendor contributions to overall revenue, customer base, and other key metrics, we can give companies a greater understanding of their performance and what they are up against when competing for market share. The analysis also sheds light on just how competitive any given sector is about accumulation, fragmentation dominance, and amalgamation traits over the base year period studied.

#### Key Company Profiles:

The report delves into recent significant developments in the Green Hydrogen Market, highlighting leading vendors and their innovative profiles. These include Adani Green Energy Limited, Air Liquide S.A., Air Products and Chemicals, Inc., Avaada Energy Pvt. Ltd., Ballard Power Systems Inc., Bloom Energy Corporation, Cummins Inc., CWP Global, ENAPTER s.r.l., ENGIE SA, Green Hydrogen Systems A/S, Hirlinga Energy Limited, HydrogenPro ASA, Iberdrola, S.A., ITM Power PLC, Iwatani Corporation, Kawasaki Heavy Industries, Ltd., Larsen & Toubro Limited, Linde PLC, McPhy Energy S.A, Messer SE & Co. KGaA, Nel ASA, NEOM Company, Ohmium International, Inc., Plug Power Inc., PowerCell Sweden AB, Reliance Industries Limited, Saudi Arabian Oil Company, Siemens AG, Thermax Limited, Topsoe A/S, Toshiba Corporation, and Uniper SE.

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#### Market Segmentation & Coverage:

This research report categorizes the Green Hydrogen Market in order to forecast the revenues and analyze trends in each of following sub-markets:

Based on Technology, market is studied across Alkaline Electrolyzer and Polymer Electrolyte Membrane (PEM) Electrolyzer. The Alkaline Electrolyzer commanded largest market share of 63.57% in 2022, followed by Polymer Electrolyte Membrane (PEM) Electrolyzer.

Based on Renewable Source, market is studied across Solar Energy and Wind Energy. The Solar Energy commanded largest market share of 53.65% in 2022, followed by Wind Energy.

Based on Distribution Channel, market is studied across Cargo and Pipeline. The Cargo commanded largest market share of 71.77% in 2022, followed by Pipeline.

Based on Application, market is studied across Power Generation and Transportation. The Power Generation commanded largest market share of 65.77% in 2022, followed by Transportation.

Based on Region, market is studied across Americas, Asia-Pacific, and Europe, Middle East & Africa. The Americas is further studied across Argentina, Brazil, Canada, Mexico, and United States. The United States is further studied across California, Florida, Illinois, New York, Ohio, Pennsylvania, and Texas. The Asia-Pacific is further studied across Australia, China, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. The Europe, Middle East & Africa is further studied across Denmark, Egypt, Finland, France, Germany, Israel, Italy, Netherlands, Nigeria, Norway, Poland, Qatar, Russia, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Turkey, United Arab Emirates, and United Kingdom. The Europe, Middle East & Africa commanded largest market share of 48.23% in 2022, followed by Asia-Pacific.

#### Key Topics Covered:

1. Preface
2. Research Methodology
3. Executive Summary
4. Market Overview
5. Market Insights
6. Green Hydrogen Market, by Technology
7. Green Hydrogen Market, by Renewable Source
8. Green Hydrogen Market, by Distribution Channel
9. Green Hydrogen Market, by Application
10. Americas Green Hydrogen Market
11. Asia-Pacific Green Hydrogen Market
12. Europe, Middle East & Africa Green Hydrogen Market
13. Competitive Landscape
14. Competitive Portfolio
15. Appendix

The report provides insights on the following pointers:

1. Market Penetration: Provides comprehensive information on the market offered by the key players
2. Market Development: Provides in-depth information about lucrative emerging markets and

analyzes penetration across mature segments of the markets

3. Market Diversification: Provides detailed information about new product launches, untapped geographies, recent developments, and investments

4. Competitive Assessment & Intelligence: Provides an exhaustive assessment of market shares, strategies, products, certification, regulatory approvals, patent landscape, and manufacturing capabilities of the leading players

5. Product Development & Innovation: Provides intelligent insights on future technologies, R&D activities, and breakthrough product developments

The report answers questions such as:

1. What is the market size and forecast of the Green Hydrogen Market?

2. Which are the products/segments/applications/areas to invest in over the forecast period in the Green Hydrogen Market?

3. What is the competitive strategic window for opportunities in the Green Hydrogen Market?

4. What are the technology trends and regulatory frameworks in the Green Hydrogen Market?

5. What is the market share of the leading vendors in the Green Hydrogen Market?

6. What modes and strategic moves are considered suitable for entering the Green Hydrogen Market?

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Mr. Ketan Rohom

360iResearch

+1 530-264-8485

ketan@360iresearch.com

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