

# **Hydrogen Energy Storage Market by Form (Gas, Liquid, Solid), Technology (Compression, Liquefaction, Material Based), Application (Stationary Power, Transportation), End User (Electric Utilities, Industrial, Commercial) Region - Global Forecast to 2028**

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## **Abstracts**

The global hydrogen energy storage market is estimated to grow from USD 11.4 billion in 2023 to USD 196.8 Billion by 2028; it is expected to record a CAGR of 76.8% during the forecast period. The escalating implementation of environmental regulations and the prevailing global impetus toward sustainable practices drives the market. Technological innovation, hydrogen mobility, and decentralization further boost the growth of the hydrogen energy storage market.

“Gas: The largest segment of the hydrogen energy storage market, by storage form “

Based on storage form, the hydrogen energy storage market has been segmented into solid, liquid and gas. The gas segment is expected to be the largest segment during the forecast period. Hydrogen energy is efficiently storable and transportable in its gaseous form, eliminating the requirement for additional energy-intensive procedures such as liquefaction or conversion into solid form. Additionally, the presence of established infrastructure for gaseous hydrogen, encompassing pipelines and compression facilities, enhances its suitability for a wide range of applications.

“Compression segment is expected to be the largest segment during the forecast period based on technology.”

By technology, the hydrogen energy storage market has been split into three types: Compression, liquefaction, and material-based. The compression segment is expected to hold the largest market share during the forecast period. Compression technology excels in achieving a notably high energy density per unit volume, rendering it an efficient choice for storage and transportation, especially when hydrogen is stored at elevated pressures.

“By Application, Stationary power segment is expected to be the fastest growing segment during the forecast period.”

Based on the Application, the hydrogen energy storage market is segmented into stationary power and transportation. The stationary power segment is expected to be the fastest growing segment of the hydrogen energy storage market during the forecast period. Stationary hydrogen energy storage systems seamlessly integrate with the electricity grid, providing vital grid stability and support while efficiently responding to fluctuations in supply and demand. Additionally, stationary storage solutions can be designed to use green hydrogen produced from renewable energy sources, aligning with sustainability and decarbonization goals.

“Electric Utilities: The largest segment during the forecast period based on end-user segment.”

Based on end-user segment, the hydrogen energy storage market is segmented into electric utilities, industrial and commercial. The electric utilities segment is expected to be the largest segment of the hydrogen energy storage market during the forecast period. The demand for power generation continues to surge, driven by the rapid expansion of renewable energy sources like solar and wind, these sources introduce inherent challenges related to their intermittency. Hydrogen energy storage systems serve as a critical solution, enabling the capture and storage of excess renewable energy during periods of abundance, and subsequently providing it during high-demand periods or as grid backup.

“Europe is expected to be the largest region in the hydrogen energy storage market.”

Europe is expected to be the largest region in the hydrogen energy storage market during the forecast period. Countries in Europe are at various stages of development of their new energy policies, and the EU region has a binding EU target of at least a 40% reduction in greenhouse gas emissions by 2030 compared with 1990. Additionally, the region anticipates a swift uptake of fuel cells due to the growing number of fuel cell

projects and government efforts to implement them in residential and commercial settings. Fuel cells, recognized for their efficiency and environmental friendliness, offer a fitting remedy to address the region's energy-related issues. The key authority backing research and development in fuel cells and hydrogen technologies is the Fuel Cells and Hydrogen Joint Undertaking initiative. Increasing demand for electric vehicles is also expected to boost the fuel cells market in this region, thereby driving the hydrogen energy storage market as well.

#### Breakdown of Primaries:

In-depth interviews have been conducted with various key industry participants, subject-matter experts, C-level executives of key market players, and industry consultants, among other experts, to obtain and verify critical qualitative and quantitative information and assess future market prospects. The distribution of primary interviews is as follows:

By Company Type: Tier 1- 65%, Tier 2- 24%, and Tier 3- 11%

By Designation: C-Level- 30%, Director Level- 25%, and Others- 45%

By Region: North America- 35%, Europe- 25%, Asia Pacific- 20%, Middle East & Africa- 20%,

Note: Others include sales managers, engineers, and regional managers.

Note: The tiers of the companies are defined on the basis of their total revenues as of 2022. Tier 1: > USD 1 billion, Tier 2: From USD 500 million to USD 1 billion, and Tier 3: The hydrogen energy storage market is dominated by a few major players that have a wide regional presence. The leading players in the hydrogen energy storage market are Linde plc (Ireland), Plug Power Inc. (US), ENGIE (France), FuelCell Energy, Inc. (US), and Iwatani Corporation (Japan). The major strategy adopted by the players includes new product launches, partnerships, acquisitions, and investments & expansions.

#### Research Coverage:

The report defines, describes, and forecasts the global hydrogen energy storage market by , storage form, technology, application, and end-user. It also offers a detailed qualitative and quantitative analysis of the market. The report comprehensively reviews the major market drivers, restraints, opportunities, and challenges. It also covers various important aspects of the market. These include an analysis of the competitive

landscape, market dynamics, market estimates in terms of value, and future trends in the hydrogen energy storage market.

### Key Benefits of Buying the Report

Increasing demand for environmentally friendly and sustainable products and growing requirements for safety are few of the key factors driving the hydrogen energy storage market. Factors such as high initial cost and regulatory and permitting challenges restrain the growth of the market. The growing energy transition towards renewable energy sources and rapid urbanization are expected to present lucrative opportunities for the players operating in the hydrogen energy storage market. The high competition from batteries and low energy density as compared to other fuels poses a major challenge for the players, especially for emerging players operating in the hydrogen energy storage market.

**Product Development/ Innovation:** The hydrogen energy storage market is witnessing significant product development and innovation, driven by the growing demand for environmentally friendly, safe and sustainable products. Companies are investing in developing advanced hydrogen energy storage technologies for various applications.

**Market Development:** Plug Power Inc. acquired United Hydrogen Group Inc. and Giner ELX to enhance Plug Power's position in the green hydrogen solution sector.

**Market Diversification:** Iwatani Corporation founded the Iwatani Advanced Hydrogen Technology Center. The center will expedite the advancement of novel and exclusive technologies linked to decarbonization, encompassing the production of green hydrogen and associated hydrogen technologies.

**Competitive Assessment:** In-depth assessment of market shares, growth strategies, and service offerings of leading players, like include Linde plc (Ireland), Plug Power Inc. (US), ENGIE (France), FuelCell Energy, Inc. (US), and Iwatani Corporation (Japan), among others in the hydrogen energy storage market.

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