

Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market Forecasts to 2034 - Global Analysis By Gas Type (Hydrogen, Methane, Carbon Dioxide, Oxygen and Other Industrial Gases), Material Type, Application, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market is accounted for \$0.9 billion in 2026 and is expected to reach \$4.1 billion by 2034 growing at a CAGR of 21.1% during the forecast period. Metal-Organic Frameworks (MOFs) & Gas Storage Materials represent innovative porous structures capable of efficiently storing, capturing, separating, and releasing various gases. Their adjustable pore networks and high surface areas make them valuable for hydrogen and natural gas storage, carbon dioxide capture, and gas purification. Research increasingly emphasizes higher storage capacity, improved durability, easier regeneration, and cost-effective production. Developments in synthesis techniques, material optimization, and composite formulations are expanding MOF applications across clean energy, environmental management, and industrial gas-processing technologies, enhancing their potential for broader commercial adoption.

According to the IEA, global hydrogen demand surpassed 100 million tonnes (Mt) in 2025, increasing by almost 3% from 2024. Hydrogen demand remains concentrated in industrial and refining applications, supporting the need for efficient hydrogen storage technologies.

Market Dynamics:

Driver:

Growing demand for clean hydrogen and natural gas storage

Rising requirements for hydrogen and natural gas storage are supporting growth in the Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market. MOFs offer exceptionally porous structures and extensive surface areas that facilitate effective gas adsorption and storage. Expanding investments in hydrogen infrastructure, fuel-cell applications, and low-carbon energy technologies are increasing interest in advanced storage solutions. Their adjustable pore dimensions and chemical characteristics can enhance gas-loading performance, positioning MOFs as promising materials for next-generation energy storage and contributing to wider commercial development across multiple applications.

Restraint:

High production costs and complex manufacturing processes

High manufacturing expenses and complicated synthesis procedures can restrict expansion of the Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market. Production often involves specialized equipment, precise reaction environments, costly chemical precursors, and additional purification steps. Maintaining uniform pore characteristics and consistent material performance during large-scale production may create further cost pressures. Such limitations can slow adoption in price-sensitive applications. Developing simpler synthesis routes, lowering raw-material expenses, improving scalability, and introducing standardized production techniques are therefore essential to make MOF-based gas storage materials more commercially competitive.

Opportunity:

Expansion of hydrogen storage applications

The increasing development of hydrogen storage technologies presents a strong opportunity for the Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market. Their adjustable pore networks and large surface areas provide useful characteristics for hydrogen adsorption. Rising interest in hydrogen as a cleaner energy carrier is stimulating efforts to develop efficient and practical storage solutions. Improvements in MOF engineering, lightweight frameworks, and composite structures could enhance performance and usability. This creates potential applications in fuel-cell transportation, stationary power systems, industrial hydrogen storage, and expanding hydrogen infrastructure worldwide.

Threat:

Competition from alternative gas storage technologies

The availability of competing gas storage technologies poses a potential threat to the Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market. Technologies such as compressed gas systems, liquefied storage, activated carbon, zeolites, and other porous materials have established industrial use. Their existing infrastructure, mature supply networks, and operational experience can provide competitive advantages. When alternative materials deliver similar storage capabilities with lower costs or easier operation, customers may favor established solutions. This competition could constrain MOF adoption, especially where affordability, reliability, and practical implementation are key considerations.

Covid-19 Impact:

COVID-19 negatively affected the Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market through disruptions to research programs, production operations, supply networks, and industrial projects. Laboratory closures and mobility restrictions delayed experimentation, development, and scale-up activities. Lower industrial output also reduced demand from gas processing, chemical manufacturing, and energy-related applications. As restrictions eased, research facilities and supply chains progressively recovered. Growing interest in resilient energy infrastructure and advanced materials later encouraged renewed activity in hydrogen storage, carbon capture, gas separation, and related clean-energy technologies.

The hydrogen segment is expected to be the largest during the forecast period

The hydrogen segment is expected to account for the largest market share during the forecast period because MOFs offer favorable characteristics for hydrogen capture and storage. Their porous structures, extensive surface areas, and customizable chemical functionalities allow material properties to be engineered for effective hydrogen adsorption and release. Growing interest in hydrogen-based clean energy solutions strengthens the segment's relevance. MOF-based hydrogen storage is being explored for fuel-cell technologies, transportation systems, stationary energy applications, and industrial processes, supporting continued material development.

The transportation segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the transportation segment is predicted to witness the highest growth rate, supported by increasing demand for cleaner mobility technologies and alternative fuels. MOFs provide highly adjustable pore networks and strong gas adsorption characteristics, supporting their investigation for hydrogen and methane storage in vehicles. Expanding fuel-cell vehicle development and low-emission mobility initiatives are stimulating research into compact, lightweight storage materials. Improvements in durability, gas capacity, and integration are further expanding potential transportation applications for MOF-based systems.

Region with largest share:

During the forecast period, the Asia Pacific region is expected to hold the largest market share, driven by expanding research capabilities, manufacturing infrastructure, and industrial applications. Countries including China, Japan, South Korea, and India are advancing MOF-related technologies for hydrogen storage, carbon capture, gas separation, and other applications. A strong chemical manufacturing base and growing investments in advanced materials further support regional commercialization. These factors contribute to the region's prominent position in the global MOF and gas-storage ecosystem.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR, driven by rising investments in hydrogen infrastructure, carbon capture, and advanced material technologies. China, Japan, South Korea, and India are strengthening capabilities in clean energy, gas processing, and porous-material research. Increasing requirements for efficient gas storage and separation, together with energy-transition programs and expanding industrial applications, are supporting greater research activity and commercialization. These developments are creating favourable conditions for broader deployment of MOF-based technologies throughout the region.

Key players in the market

Some of the key players in Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market include BASF SE, MOF Technologies Ltd., Framergy Inc., Immaterial Ltd., Mosaic Materials, NuMat Technologies, Inc., ProfMOF, Promethean Particles Ltd., Strem Chemicals, Sigma-Aldrich, MOFapps, novoMOF, Atomis Inc., Nuada, ACSYNAM, ACMOFS, SyncMOF Inc. and Svante Technologies.

Key Developments:

In November 2025, Numat Technologies, Inc and Milliken & Company announce a strategic supply relationship to deliver next-generation protective fabric solutions for defense, first responder, and industrial customers. The integration of Milliken's advanced textiles with Numat's Sentinel® MOF technology platform will create functional, reactive, and self-decontaminating fabrics that enhance protection, breathability, and comfort in extreme environments.

In October 2025, BASF SE and ANDRITZ Group have signed a license agreement for the use of BASF's proprietary gas treatment technology, OASE® blue, in a carbon capture project planned to be implemented in the city of Aarhus, Denmark. The project aims to capture approximately 435,000 tons of CO₂ annually from the flue gases of a waste-to-energy plant for sequestration; the city of Aarhus has set itself the goal of becoming CO₂-neutral by 2030.

Gas Types Covered:

Hydrogen

Methane

Carbon Dioxide

Oxygen

Other Industrial Gases

Material Types Covered:

Metal-Organic Frameworks (MOFs)

Covalent Organic Frameworks (COFs)

Zeolites

Activated Carbon

Porous Polymers

Other Gas Storage Materials

Applications Covered:

Energy Storage & Fuel Cells

Carbon Capture & Sequestration

Gas Separation & Purification

Catalysis

Sensors & Electronics

End Users Covered:

Oil & Gas

Chemicals & Petrochemicals

Energy & Power

Transportation

Environmental & Industrial Research

Regions Covered:

North America

United States

Canada

Mexico

Europe

United Kingdom

Germany

France

Italy

Spain

Netherlands

Belgium

Sweden

Switzerland

Poland

Rest of Europe

Asia Pacific

China

Japan

India

South Korea

Australia

Indonesia

Thailand

Malaysia

Singapore

Vietnam

Rest of Asia Pacific

South America

Brazil

Argentina

Colombia

Chile

Peru

Rest of South America

Rest of the World (RoW)

Middle East

Saudi Arabia

United Arab Emirates

Qatar

Israel

Rest of Middle East

Africa

South Africa

Egypt

Morocco

Rest of Africa

What our report offers:

Market share assessments for the regional and country-level segments

Strategic recommendations for the new entrants

Covers Market data for the years 2023, 2024, 2025, 2026, 2027, 2028, 2030, 2032 and 2034

Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)

Strategic recommendations in key business segments based on the market estimations

Competitive landscaping mapping the key common trends

Company profiling with detailed strategies, financials, and recent developments

Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Metal-Organic Frameworks (MOFs) & Gas Storage Materials Market Forecasts to 2034 - Global Analysis By Gas Type...

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

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