# Middle East & Africa Green Ammonia Market, By Production Method (Alkaline Water Electrolysis, Proton Exchange Membrane, and Solid Oxide Electrolysis), By End Use (Power Generation, Transportation, Fertilizers, Others), By Country, Competition, Forecast and Opportunities,  2019-2029F

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**Report description:**

Middle East & Africa Green Ammonia Market was expected to reach a significant value of USD 415.20 Million in 2023 and is anticipated to project robust CAGR growth of 6.87% in the forecast through 2029. The Middle East and Africa (MEA) region, renowned for its role as a global energy powerhouse, is now at the forefront of a paradigm shift towards green ammonia production. Green ammonia, produced through the synthesis of nitrogen and hydrogen using renewable energy sources, is emerging as a sustainable alternative to traditional ammonia production methods. With the world's growing concern for sustainability and the need to reduce carbon emissions, the MEA region, rich in renewable energy potential, is strategically positioned to become a key player in the green ammonia market. The collective investment in renewables for Africa and the Middle East accounted for just 1.6% of the global total, approximately USD 8.4 billion. Israel led the region with a 9.2% growth in investment, reaching USD 0.99 billion.

Historically, the MEA region has held a dominant position in the global energy landscape, primarily due to its abundant reserves of oil and gas. However, as environmental issues take center stage, there is a shift towards green ammonia production as a means to reduce carbon emissions. This historical dependence on fossil fuels is now being challenged as the region transitions towards more sustainable energy solutions.

The MEA green ammonia market is witnessing notable growth, with an increasing number of key players actively contributing to its development. Prominent industry leaders in the region include Qatar Energy, Yara International, and SABIC. These companies are driving advancements in green ammonia production and shaping the market's trajectory. The Middle East contributes approximately 8.5% to the global ammonia capacity, with QAFCO (Qatar), NPC (Iran), SABIC-Agri (Saudi Arabia), and Ma'aden (Saudi Arabia) holding the majority share of capacity in the area. Ranking as the third-largest exporter globally, the region

accounts for 15% of total exports, with a significant portion flowing to Asia, particularly India. Green ammonia finds diverse applications across various sectors, including agriculture, transportation, and industrial processes. It serves as a sustainable fertilizer in agriculture, a clean fuel for transportation, and a raw material for various industries. The versatility of green ammonia positions it as a critical driver of its adoption in the MEA region.

Key Market Drivers

Abundant Availability of Renewable Energy Resources is Driving the demand for Middle East & Africa Green Ammonia Market

The Middle East and Africa (MEA) region is experiencing a surge in the demand for green ammonia, and the primary driving force behind this demand is the abundant availability of renewable energy resources. Green ammonia, produced through the synthesis of ammonia using renewable energy sources, is gaining prominence as a sustainable and environmentally friendly solution in the field of energy storage and transportation. The MEA region, known for its vast renewable energy potential, is poised to become a key player in the global green ammonia market.

One of the central factors contributing to the growing demand for green ammonia in the MEA region is the availability of abundant and consistent renewable energy resources, particularly solar and wind energy. The region experiences some of the world's highest levels of solar irradiation, making it an ideal location for solar power generation. Solar photovoltaic (PV) panels, concentrated solar power (CSP), and other solar technologies are widely deployed, providing a surplus of clean electricity for various applications, including green ammonia production. Despite having ample solar and wind resources and facing increasing water scarcity, the Middle East still falls behind other regions in the adoption of renewable electricity. In 2023, the region's share of renewable electricity only reached 3.4%, comprising 1.7% from hydropower, 1.4% from solar power, and 0.2% from wind power.

The MEA region is also known for its strong and predictable wind patterns, especially along coastal areas. Wind farms have been established throughout the region, generating substantial amounts of renewable energy that can be harnessed for green ammonia production. The combination of abundant solar and wind resources positions the MEA region as a strategic hub for the large-scale production of green ammonia. Governments and policymakers in the MEA region are increasingly recognizing the strategic importance of green ammonia and are taking proactive steps to support its growth. Many countries in the region have set ambitious renewable energy targets and are investing in the necessary infrastructure and technology to facilitate green ammonia production. These initiatives are in alignment with global efforts to reduce carbon emissions, enhance energy security, and create economic opportunities within the clean energy sector. The industrial sector in the MEA region presents a significant opportunity for the adoption of green ammonia. Energy-intensive industries, such as petrochemicals, fertilizers, and heavy manufacturing, have traditionally relied on fossil fuels for their energy needs. Transitioning to green ammonia as a clean and sustainable energy carrier offers the potential to reduce carbon emissions, lower environmental impact, and support the region's commitment to a greener future.

The MEA region's role in global energy security is a compelling factor driving the demand for green ammonia. The region has historically played a vital role in the global energy landscape due to its vast oil and gas reserves. By diversifying its energy offerings and embracing green ammonia, the MEA region can secure its energy future and potentially export this clean energy carrier to international markets, contributing to the global transition towards renewable energy sources. Research and development initiatives in the MEA region are also contributing to the growth of the green ammonia market. Investments in cutting-edge technologies and innovations in ammonia synthesis processes, such as the Haber-Bosch method, are expected to enhance the efficiency and cost-effectiveness of green ammonia production. Collaborations between research institutions, universities, and industry players are actively exploring advanced solutions to accelerate the adoption of green ammonia. Therefore, the abundant availability of renewable energy resources, government commitments to sustainability, the potential for decarbonizing energy-intensive industries, and the region's role in global energy security are collectively driving the demand for green ammonia in the Middle East and Africa. As the MEA region harnesses its renewable energy potential and advances green ammonia technology, it is likely to emerge as a significant contributor to the global green ammonia market. Green ammonia is poised to play a pivotal role in the region's journey towards a sustainable and eco-friendly energy future.

Growing Demand for Green Ammonia from Key Industries is Expected to Propel the Middle East & Africa Green Ammonia Market

The Middle East and Africa (MEA) region is witnessing a notable rise in the demand for green ammonia, driven by a growing appetite for sustainable solutions across key industries. Green ammonia, synthesized using renewable energy sources to reduce

carbon emissions, is gaining significant traction as an eco-friendly energy carrier. The MEA region, well-endowed with abundant renewable energy resources, is poised to become a prominent player in the global green ammonia market, largely due to the increased demand from key industrial sectors.

One of the central drivers for the surging demand for green ammonia in the MEA region is the increasing interest and commitment from various key industries to transition to cleaner and more sustainable energy sources. Energy-intensive sectors such as petrochemicals, fertilizers, and heavy manufacturing are major contributors to the region's economic landscape. These industries have traditionally relied on fossil fuels to meet their energy requirements. However, with a growing global focus on sustainability and environmental responsibility, many of these sectors are now looking to adopt green ammonia as an alternative and cleaner energy source. Green ammonia's adoption is attractive to these industries as it not only helps them reduce their carbon footprint but also aligns with the global effort to mitigate climate change and reduce greenhouse gas emissions. The MEA region's ambition to decarbonize these energy-intensive sectors while maintaining their competitive edge on the global stage is a driving force behind the increasing demand for green ammonia.

The MEA region's role as a global energy provider is pivotal in boosting the demand for green ammonia. With its history of being a major player in the oil and gas sector, the region is strategically positioned to pivot toward green ammonia production. By diversifying its energy offerings and harnessing its abundant renewable energy resources, the MEA region has the potential to become a key supplier of green ammonia to international markets, meeting the growing global demand for clean energy carriers.

Brooge Energy's renewable energy subsidiary, based in the Cayman Islands, has completed a successful feasibility study for its green ammonia project in Abu Dhabi, UAE. The project by Brooge Renewable Energy (BRE) will include a green ammonia plant with a capacity of 1,950 tonnes per day, delivered in two phases. The initial phase of 300 tonnes per day will precede the full plant completion. Upon full commissioning, the BRE green ammonia plant is set to produce 685 kilotonnes annually.

Financial and Regulatory Support for Green Ammonia Projects is Expected to Propel the Middle East & Africa Green Ammonia Market Growth

The Middle East and Africa (MEA) region is witnessing a growing interest in green ammonia projects, and one of the key factors expected to propel the region's green ammonia market growth is the significant financial and regulatory support provided by governments and relevant authorities. Green ammonia, produced through the synthesis of ammonia using renewable energy, holds immense promise as a sustainable and environmentally responsible energy carrier. The MEA region, renowned for its abundant renewable energy resources, is well-positioned to harness this potential, thanks to the supportive financial incentives and regulatory frameworks in place.

Financial support and incentives play a pivotal role in accelerating the adoption of green ammonia in the MEA region. Governments in the region have introduced a range of measures to encourage investments in renewable energy and green ammonia production. These incentives include subsidies, grants, tax breaks, and low-interest loans for green ammonia projects. These financial incentives reduce the upfront capital costs associated with building green ammonia facilities, making such projects more economically viable and attractive to investors. On April 15, 2023, the Egyptian Cabinet issued three decrees facilitating the inclusion of green hydrogen and ammonia projects in promotional initiatives. Cabinet Decree No. 20 of 2023 mandates GAFI to collaborate with relevant ministries for a decree outlining conditions to categorize a project as strategic or national under Article 20 of the Investment Law. The decree explicitly recognizes the production, storage, and export of green hydrogen and green ammonia as integral to the state's economic development strategy.

The MEA region is witnessing an influx of foreign investments and partnerships in the green ammonia sector. These partnerships often involve international corporations and financial institutions that are committed to supporting the transition to sustainable energy solutions. Their investments contribute to the development and expansion of green ammonia projects in the region, while also fostering cross-border collaborations and knowledge exchange. In addition to financial support, regulatory frameworks and policies in the MEA region are being tailored to facilitate green ammonia production. Governments are developing specific regulations and standards for the production, transport, and utilization of green ammonia. These regulations ensure the safety and environmental compliance of green ammonia projects, while also creating a conducive environment for their growth. Moreover, regulatory bodies are streamlining the permitting process for green ammonia facilities, reducing bureaucratic hurdles and expediting project implementation. The commitment of MEA governments to sustainability and climate action is a fundamental driver of the supportive financial and regulatory environment for green ammonia projects. Many countries in the

region have set ambitious renewable energy and emissions reduction targets, and green ammonia is seen as a crucial tool in achieving these goals. Governments are dedicated to reducing carbon emissions and are actively promoting the transition to cleaner energy sources. Green ammonia's role in decarbonizing various industries, such as petrochemicals and heavy manufacturing, is a major driver behind these initiatives.

The industrial sector in the MEA region is a significant beneficiary of green ammonia and the financial incentives provided. Energy-intensive industries, which have historically relied on fossil fuels, are now transitioning to green ammonia as a cleaner and more sustainable energy source. By doing so, they can meet environmental regulations and contribute to the region's commitment to a greener and more sustainable energy ecosystem. This transition is supported by the region's financial and regulatory mechanisms, which reduce the financial burden of adopting green ammonia technologies. Research and development initiatives in the MEA region are also advancing the green ammonia sector. Investments in cutting-edge technologies and innovations in ammonia synthesis processes are expected to enhance efficiency and cost-effectiveness. Collaborations between research institutions, universities, and industry players are actively exploring advanced solutions to accelerate the adoption of green ammonia and improve its overall viability. Thus, the Middle East and Africa's green ammonia market is poised for growth due to the robust financial and regulatory support provided for green ammonia projects. Financial incentives, foreign investments, and partnerships are reducing the financial barriers to entry, while tailored regulatory frameworks ensure safety and environmental compliance. The region's commitment to sustainability and climate action, coupled with the transition of energy-intensive industries to green ammonia, positions the MEA as a key player in the global shift toward cleaner and more eco-friendly energy sources. As the region harnesses its abundant renewable energy potential and advances green ammonia technology, it is likely to contribute significantly to the realization of a sustainable and environmentally responsible energy future.

Key Market Challenges

Competition from Other Sustainable Alternatives Poses a Significant Obstacle to Market Expansion

Competition from other sustainable alternatives, combined with high upfront costs, is posing a significant obstacle to the expansion of the Middle East and Africa (MEA) Green Ammonia market. Green ammonia, produced through the synthesis of ammonia using renewable energy-generated hydrogen, is gaining attention as a clean energy carrier and a way to reduce carbon emissions in the ammonia production process. However, it faces competition from other sustainable energy carriers and storage solutions like hydrogen and methanol.

The initial investment required to establish green ammonia production facilities, including renewable energy infrastructure, electrolyzers, and ammonia synthesis equipment, can be substantial. This, coupled with competition from other clean energy carriers, makes it challenging for green ammonia to gain a foothold in the market. To foster the growth of the MEA Green Ammonia market, stakeholders must work collaboratively to reduce the upfront costs through financial incentives, grants, and investment frameworks, thereby making green ammonia more economically attractive. Additionally, raising awareness about the environmental benefits of green ammonia as a clean fuel and fertilizer in agriculture can help drive its adoption and market expansion in the region.

Lack of infrastructure

The lack of infrastructure is a significant hindrance to the development of the Middle East and Africa (MEA) Green Ammonia market. Green ammonia, produced using renewable energy-powered electrolysis to generate hydrogen, has gained attention as a sustainable fuel and feedstock for the future. However, the establishment of a comprehensive infrastructure for green ammonia production, distribution, and utilization remains a considerable challenge in the MEA region. The infrastructure for green ammonia involves the deployment of electrolysis facilities, ammonia synthesis plants, and transportation and storage networks. It also includes the integration of green ammonia into various industrial processes, energy systems, and transportation. The high capital investment required for building this infrastructure, coupled with the need for regulatory frameworks and technical standards, complicates its development and deployment.

To address this challenge and drive the growth of the MEA Green Ammonia market, governments, private sectors, and international organizations must collaborate to invest in the necessary infrastructure and create a conducive environment. Building a robust infrastructure network is essential for the widespread adoption of green ammonia and the realization of the region's sustainability and decarbonization goals.

Key Market Trends

Growing Demand for Sustainable Alternatives to Conventional Ammonia

The Middle East and Africa (MEA) Green Ammonia market is witnessing significant growth, driven by the growing demand for sustainable alternatives to conventional ammonia production methods. This trend highlights the region's commitment to environmental sustainability and the recognition of green ammonia as a pivotal solution in addressing the challenges of traditional ammonia production. Ammonia is a key chemical compound with numerous applications, including fertilizers, chemicals, and fuel. Conventional ammonia production relies on the energy-intensive Haber-Bosch process, which uses natural gas as a feedstock and emits substantial carbon dioxide ($CO_2$) emissions, contributing to climate change. The demand for green ammonia, produced using renewable energy sources through a carbon-free process, is rising rapidly. Green ammonia offers a sustainable and environmentally responsible alternative, addressing the need for eco-friendly ammonia production while reducing carbon emissions.

One of the major applications of green ammonia is in the production of carbon-free fertilizers. With the increasing emphasis on sustainable agriculture and reduced environmental impact, green ammonia-based fertilizers are gaining popularity. They allow farmers to enhance crop yields while minimizing the carbon footprint of agricultural practices. Additionally, green ammonia has potential as a clean energy carrier and a promising solution for energy storage. It can be used in fuel cells to generate electricity, serve as a clean energy source for transportation, and provide grid stability. The demand for sustainable alternatives to conventional ammonia is reshaping the MEA Green Ammonia market. Governments, industries, and agricultural sectors in the region are actively investing in green ammonia projects, supporting research and development efforts, and creating a favorable regulatory environment to promote its adoption. As the MEA region aligns with global sustainability goals and seeks to reduce carbon emissions, the growing demand for green ammonia represents a pivotal trend, fostering economic growth while advancing environmental responsibility and sustainability in the region.

Increasing Investment in Renewable Energy

The Middle East and Africa (MEA) Green Ammonia market is experiencing substantial growth, primarily driven by the increasing investments in renewable energy sources within the region. This trend underscores the region's commitment to sustainability, energy diversification, and the pivotal role that green ammonia plays in advancing these objectives. Green ammonia is produced through a process that utilizes renewable energy, such as solar and wind power, to generate hydrogen and subsequently convert it into ammonia. This eco-friendly approach significantly reduces carbon emissions associated with traditional ammonia production methods, aligning with the region's goals to combat climate change and transition towards cleaner energy sources. The MEA region, with its vast deserts and extensive coastlines, boasts abundant renewable energy resources. Governments across the region have recognized the potential of harnessing solar and wind energy for green ammonia production. As a result, there is a growing influx of investments in renewable energy infrastructure, including solar and wind farms, to power the production of green ammonia. One of the key drivers of these investments is the region's vision for a sustainable and diversified energy mix. As a major player in the global energy landscape, the MEA region is taking significant steps to reduce its dependence on fossil fuels and promote green hydrogen and green ammonia as essential components of the energy transition.

Green ammonia's versatility is a driving factor behind these investments. It can be used as a carbon-free fuel, an energy carrier, and a feedstock for various industries, including agriculture and chemicals. This flexibility makes green ammonia a strategic choice for the region's energy and industrial needs. The increasing investment in renewable energy is a central trend propelling the growth of the MEA Green Ammonia market. It not only enhances energy security and diversification but also advances the region's commitment to sustainability and green technologies, fostering economic growth while addressing environmental concerns and climate change mitigation.

Segmental Insights

Production Method Insights

Based on the production method, the Alkaline Water Electrolysis segment emerged as the dominant segment in the Middle East & Africa market for Green Ammonia in 2023. This can be driven by its cost-effectiveness, reliability, integration with renewable energy, strong demand for green ammonia, potential for hydrogen and ammonia export, government support, and its role in serving various industrial sectors.

Alkaline water electrolysis is known for its cost-effectiveness, making it an attractive option for green ammonia production in the MEA region. This cost advantage is especially important in regions where cost efficiency is a priority. Alkaline water electrolysis is

a well-established and proven technology with a history of reliable operation. This reliability instills confidence in investors and project developers, driving its adoption in the MEA region.Alkaline electrolyzers can effectively integrate with renewable energy sources like solar and wind power. The MEA region has abundant solar and wind resources, making it a strategic choice for green ammonia production via alkaline water electrolysis.

Green ammonia production relies on a source of green hydrogen. Alkaline water electrolysis is a reliable and efficient method for producing green hydrogen, which is then used as a feedstock for green ammonia synthesis. The MEA region has significant demand for ammonia, particularly in sectors like agriculture for fertilizer production and in various industrial applications. The ability to produce green ammonia locally is a key driver for the adoption of alkaline water electrolysis. Green hydrogen and green ammonia are valuable commodities for export. The MEA region's geographic location and access to global markets position it as a potential exporter of green ammonia produced through alkaline water electrolysis. Some governments in the MEA region have taken proactive steps to promote the development of green ammonia projects. Policy support, financial incentives, and regulatory backing have favored the adoption of alkaline water electrolysis for green ammonia production.

End Use Insights

Based on the end use, the power generation segment is the fastest growing segment in the MEA market for green ammonia is driven by its role in energy storage, renewable energy integration, decarbonization efforts, energy export potential, and its contribution to grid stability and energy security.

Green ammonia has the potential to be used as an energy carrier and storage medium. It can help stabilize energy grids, especially in regions with intermittent renewable energy sources like solar and wind. Power generation applications benefit from the flexibility of green ammonia in ensuring a stable and reliable energy supply. The MEA region has significant renewable energy potential, including abundant sunlight and wind resources. Green ammonia can play a crucial role in storing excess energy generated from renewables during peak production and releasing it during periods of high energy demand. This integration supports the growth of the power generation sector and enhances its reliability.

Many countries in the MEA region have set ambitious decarbonization targets and are seeking to reduce greenhouse gas emissions from power generation. Green ammonia, as a clean energy carrier, aligns with these goals and serves as a key element in transitioning to a low-carbon power generation sector. Green ammonia can be converted back into hydrogen, which can be used in fuel cells or gas turbines for power generation. The flexibility of green ammonia to produce hydrogen for power generation applications is a driving factor for the dominance of the power generation segment.

Some countries in the MEA region are exploring the export of green ammonia as a form of energy carrier. The power generation sector is integral in the production and export of green ammonia, which positions the segment as a dominant player in the global green ammonia trade.

Country Insights

Based on the country, Saudi Arabia's dominance in the MEA market for green ammonia is driven by its abundant renewable resources, strategic location, government support and investments, ambitions for hydrogen and ammonia export, research and development efforts, and alignment with sustainable development goals. These factors collectively establish Saudi Arabia as the dominant player in the green ammonia market in the Middle East & Africa. Saudi Arabia benefits from abundant renewable energy resources, particularly in terms of solar energy. The availability of these resources is a fundamental advantage for green ammonia production through renewable energy-based electrolysis. Saudi Arabia's strategic location provides proximity to key global markets and trading routes. This makes it well-positioned to export green ammonia, enhancing its prominence in the global green ammonia trade.

Saudi Arabia's Vision 2030 plan includes a strong commitment to economic diversification and sustainability. Green ammonia production aligns with these objectives and is a central component of the country's strategy for the future. The Saudi government has actively promoted the development of green ammonia projects through policy support, investments, and incentives. This support has accelerated the growth of the green ammonia sector in the country. Saudi Arabia aims to become a significant exporter of green ammonia. Its geographic location, commitment to green ammonia production, and access to global markets position it as a dominant player in the export of green ammonia. Saudi Arabia has invested in research and development to advance green ammonia production technologies and enhance the efficiency of its production processes. These efforts have contributed to its leadership in the green ammonia market. Green ammonia has applications in various industries, including

agriculture, energy, and chemical manufacturing. The diversity of applications ensures strong and sustainable demand for green ammonia in the country. Saudi Arabia's focus on transitioning to a more sustainable and low-carbon energy system has driven the adoption of green ammonia as an essential component of the transition. This aligns with global efforts to reduce greenhouse gas emissions.

Key Market Players

- AMEA Power
- Hynfra and Amarenco MENA
- ACME Group
- Hive Energy Ltd
- TAQA and AD Ports Group
- NEOM Green Ammonia Co.

Report Scope:

In this report, the Middle East & Africa Green Ammonia Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

- Middle East & Africa Green Ammonia Market, By Production Method:
  - Alkaline Water Electrolysis
  - Proton Exchange Membrane
  - Solid Oxide Electrolysis
- Middle East & Africa Green Ammonia Market, By End Use:
  - Power Generation
  - Transportation
  - Fertilizers
  - Others
- Middle East & Africa Green Ammonia Market, By Country :
  - Saudi Arabia.
  - UAE
  - Egypt
  - South Africa
  - Qatar
  - Kuwait
  - Bahrain
  - Morocco
  - Algeria
  - Turkiye

Competitive Landscape

Company Profiles: Detailed analysis of the major companies presents in the Middle East & Africa Green Ammonia Market.

Available Customizations:

Middle East & Africa Green Ammonia market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

- Detailed analysis and profiling of additional market players (up to five).

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