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Refinery Electrification Market - Global Industry Size, Share, Trends, Opportunity, and Forecast Segmented By Technology (Renewable Energy Sources, Energy Storage and Power Electronics), By Refinery Type (Crude oil Refineries, Petrochemical Refineries and Biorefineries), By Application (Process Heating, Electric Motors and Others), By Region & Competition, 2021-2031F

https://marketpublishers.com/r/RD9F2375785EEN.html
Date: January 2026
Pages: 181
Price: US$ 4,500.00 (Single User License)
ID: RD9F2375785EEN

Abstracts

The Global Refinery Electrification Market is projected to expand significantly, rising from USD 21.65 Billion in 2025 to USD 37.81 Billion by 2031, reflecting a compound annual growth rate of 9.74%. This growth entails the strategic replacement of fossil-fuel-driven combustion processes and steam turbines with electrical technologies, such as electric process heaters, e-boilers, and electrified compressors. This transition is primarily driven by strict environmental regulations aiming for sector-wide decarbonization and the operational necessity to enhance energy efficiency within downstream operations. Additionally, the declining cost of renewable energy generation acts as a critical economic catalyst, incentivizing refineries to integrate low-carbon power sources. In 2024, the International Renewable Energy Agency reported that 91% of newly commissioned renewable power capacity was more cost-effective than the cheapest fossil fuel-fired alternatives, highlighting the increasing financial viability supporting this industrial shift.

However, the market faces a significant challenge regarding the capacity and reliability of existing electrical grid infrastructure. Refineries require a massive, consistent power load, which often necessitates substantial capital expenditure for grid modernization and

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on-site substation upgrades to handle increased demand without disrupting critical operations. This financial and logistical obstacle is compounded by the complexity of retrofitting legacy facilities, where integrating modern electrical systems into aged infrastructure presents acute engineering difficulties. Consequently, despite favorable economic and regulatory drivers, these infrastructural constraints pose a formidable barrier to the rapid expansion of electrification across the global refining sector.

Market Driver

The implementation of stringent decarbonization mandates and environmental regulations serves as the primary catalyst for the Global Refinery Electrification Market. Governments are enforcing stricter emission limits, compelling downstream operators to replace carbon-intensive combustion processes with electrified alternatives to maintain their license to operate. To facilitate this transition, public entities are providing financial mechanisms to lower adoption barriers. For instance, in March 2024, the U.S. Department of Energy announced under the 'Industrial Demonstrations Program Selections' that the administration had allocated up to USD 6 billion to fund projects focused on decarbonizing energy-intensive industries, including refining. This regulatory pressure forces companies to prioritize electrification strategies to align with national net-zero trajectories.

Advancements in industrial electric process heating and steam generation technologies are also driving market expansion. Engineers are deploying high-capacity electric cracking furnaces and e-boilers that generate extreme temperatures for hydrocarbon processing without direct emissions, validating the feasibility of electrification for core refining units. According to a press release by BASF SE in April 2024, the company began operating the world?s first demonstration plant for large-scale electrically heated steam cracking furnaces, utilizing 6 megawatts of renewable energy to process hydrocarbons. Furthermore, broader capital reallocation supports these shifts; the International Energy Agency noted in 2024 that the oil and gas industry?s investment in clean energy technologies reached nearly USD 30 billion during the prior year, reflecting a pivot toward low-carbon infrastructure.

Market Challenge

The critical constraint impeding the Global Refinery Electrification Market is the inadequacy of existing external electrical grid infrastructure combined with the logistical complexity of retrofitting legacy refining assets. Refineries operate as continuous-

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process facilities that demand an exceptionally high and stable baseload power supply; however, current utility grids in many industrial regions lack the transmission capacity and reliability to support the large-scale electrification of energy-intensive equipment such as process heaters and steam turbines. This infrastructure deficit creates significant operational risks, as even minor power fluctuations can trigger safety shutdowns and production losses, forcing operators to delay electrification initiatives in favor of established fossil-fuel systems.

This challenge directly hampers market growth by creating a bottleneck where the external power supply cannot match the pace of industrial demand. According to the International Energy Agency in 2024, grid infrastructure weaknesses resulted in a global backlog of over 3,000 gigawatts of renewable power projects waiting in connection queues, highlighting the severe lack of available capacity to support new industrial loads. Consequently, until the grid modernization gap is bridged, refinery operators face a formidable barrier to securing the consistent, high-volume electricity required to decarbonize their downstream operations.

Market Trends

The on-site integration of Green Hydrogen Electrolysis Systems is fundamentally reshaping refinery energy balances by replacing natural gas-fed steam reforming with electrolytic pathways. This trend is characterized by the direct coupling of large-scale electrolyzers with renewable power sources to decarbonize the hydroprocessing units central to fuel upgradation. Operators are increasingly securing dedicated renewable energy supplies to ensure the continuous, high-load operation required for these assets, effectively substituting fossil-fuel-based hydrogen feedstocks with electron-derived alternatives. For example, in November 2025, Shell announced it had signed long-term power purchase agreements to secure renewable electricity for its 100-megawatt REFHYNE 2 electrolyzer in Germany, ensuring the facility contributes to significant Scope 1 emission reductions at the Rheinland park.

The Electrification of Steam Methane Reforming (e-SMR) processes is emerging as a critical technological avenue for refineries seeking to mitigate emissions from hydrogen production without abandoning existing methane feedstocks. Unlike traditional reforming, which burns gas for heat, e-SMR utilizes electric resistance heating within the reactor catalyst beds, thereby eliminating combustion flue gases and concentrating the carbon dioxide stream for easier capture. This technology allows downstream facilities to leverage grid electricity for process heat while maintaining high throughputs in syngas generation. In October 2025, European Energy confirmed plans to deploy a

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commercial 10-megawatt electrified steam methane reforming unit, validating the scalability of this technology for industrial applications in its press release on next-generation green methanol technology.

Key Market Players

%li%ABB Limited

%li%Siemens AG

%li%Schneider Electric SE

%li%Rockwell Automation Inc.

%li%ExxonMobil Corporation

%li%Shell plc

%li%BP International Limited

%li%NextEra Energy, Inc.

Report Scope

In this report, the Global Refinery Electrification Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

%li%Refinery Electrification Market, By Technology

%li%%li%Renewable Energy Sources

%li%%li%Energy Storage

%li%%li%Power Electronics

%li%Refinery Electrification Market, By Refinery Type

%li%%li%Crude oil Refineries

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%li%%li%Petrochemical Refineries

%li%%li%Biorefineries

%li%Refinery Electrification Market, By Application

%li%%li%Process Heating

%li%%li%Electric Motors

%li%%li%Others

%li%Refinery Electrification Market, By Region

%li%%li%North America

%li%%li%%li%United States

%li%%li%%li%Canada

%li%%li%%li%Mexico

%li%%li%Europe

%li%%li%%li%France

%li%%li%%li%United Kingdom

%li%%li%%li%Italy

%li%%li%%li%Germany

%li%%li%%li%Spain

%li%%li%Asia Pacific

%li%%li%%li%China

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%li%%li%%li%India

%li%%li%%li%Japan

%li%%li%%li%Australia

%li%%li%%li%South Korea

%li%%li%South America

%li%%li%%li%Brazil

%li%%li%%li%Argentina

%li%%li%%li%Colombia

%li%%li%Middle East & Africa

%li%%li%%li%South Africa

%li%%li%%li%Saudi Arabia

%li%%li%%li%UAE

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Refinery Electrification Market.

Available Customizations:

Global Refinery Electrification 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

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

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