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Saudi Arabia Smart Grid Market Assessment, By Network Area [Home Area Network (HAN), Neighbourhood Area Network (NAN), Wide Area Network (WAN), and Long-Range Wide Area Network (LoRaWAN)], By Components [Hardware and Software], By Technology [Distribution Automation, Conservation Voltage Reduction (CVR), Substation Automation, and Advanced Metering Infrastructure (AMI)], By Application [Generation, Transmission, Distribution], By Region, Opportunities, and Forecast, 2016-2030F

Abstracts

The Saudi Arabia Smart Grid Market has experienced substantial progress and is expected that the market will expand significantly from its present value of USD 1.16 billion in 2022 and reach USD 1.9 billion by 2030, demonstrating a CAGR of 6.37%. The growth of the smart grid market in Saudi Arabia is driven by several key factors like the government's active promotion and support for smart grid technologies, modernization of the power infrastructure, rise in installation of smart meters, and enhancement of grid stability. Moreover, the integration of renewable energy sources into the grid requires smart grid solutions to efficiently manage and balance the fluctuating power supply. Furthermore, the need to reduce transmission and distribution losses is another driving factor, as smart grid technologies enable real-time monitoring and optimization to minimize energy wastage.

The installation of smart meters in Saudi Arabia's smart grid is essential for real-time

monitoring of energy consumption, accurate billing, and empowering consumers to make informed decisions. Smart meters enable efficient energy management, and reduction of wastage, and contribute to the overall reliability and sustainability of the grid.

For example, on 15th April 2021, despite the challenges posed by the COVID-19 pandemic, the Saudi Electricity Company SJSC made an announcement regarding the successful installation of 10 million smart meters in its service areas throughout Saudi Arabia. Notably, 4 million of these smart meters were domestically produced, demonstrating Saudi Arabia's commitment to reducing reliance on imported technology and fostering local job opportunities. Local manufacturing not only equips the population with essential skills for future technological advancements but also enhances the country's capacity to embrace emerging business opportunities and innovative technologies. As a result, the increasing adoption of smart meters in Saudi Arabia is significantly bolstering the growth of the country's smart grid market.

Rise in Preference of Smart Grids Over Conventional Grids

The preference for smart grids over conventional grids in Saudi Arabia has significantly increased due to various factors. Smart grids offer improved energy efficiency, reliability, and flexibility, making them ideal for integrating renewable energy sources like solar and wind power. The focus on sustainability and reducing greenhouse gas emissions has further boosted the adoption of smart grids. Additionally, the advanced capabilities of smart grids, such as real-time monitoring, predictive maintenance, and outage management, enhance grid resilience and ensure a reliable electricity supply. The government's initiatives and investments in smart grid infrastructure development have also played a vital role in driving this shift toward smart grids in Saudi Arabia.

According to the International Journal of Engineering Research and Technology (IJERT), smart grids, unlike conventional grids, incorporate digital technology that facilitates autonomous regulation and remote control. The integration of advanced sensors and actively controlled devices empowers the smart grid system to have precise command over electricity flow, from transmission to distribution stages for consumers. Consequently, the growing preference for smart grids over conventional grids is significantly propelling the market growth of smart grids in Saudi Arabia

Advanced Solar Technologies for Improvisation in Smart Grid Efficacy

The advent of highly advanced solar technologies is revolutionizing the effectiveness of

smart grid systems around the world. These cutting-edge solar technologies, including advanced photovoltaic (PV) panels, energy storage systems, and smart inverters, are paving the way for a more efficient and reliable smart grid ecosystem. Moreover, advanced PV panels are designed to capture solar energy with higher efficiency, utilizing innovative materials and designs to enhance power generation. On the other hand, energy storage systems, such as battery energy storage, enable the storage of excess solar energy for later use, thereby improving grid stability and allowing for better integration of intermittent renewable sources.

Smart inverters play a vital role in optimizing the flow of solar energy into the grid, ensuring optimal utilization, and minimizing power losses. The integration of these advanced solar technologies into smart grid infrastructure enables real-time monitoring, control, and optimization of solar energy generation, transmission, and consumption. This results in improved grid reliability, enhanced energy efficiency, and seamless integration of solar power into the overall energy mix, fostering a more sustainable and resilient energy future. Hence, it can be elucidated that advent of highly advanced solar technologies for the improvisation in smart grid efficacy is amplifying the market growth of the smart grids in Saudi Arabia.

Government Regulations

The government of Saudi Arabia has implemented comprehensive regulations to promote the development and deployment of smart grid technologies. These regulations aim to modernize the power infrastructure, improve energy efficiency, and integrate renewable energy sources into the grid. The government has set clear targets and policies to drive the adoption of smart grids, including the promotion of advanced metering infrastructure (AMI) and demand response programs. Additionally, regulations focus on ensuring grid stability, cybersecurity, and interoperability standards. The government's proactive strategies and supportive regulatory framework have played a crucial role in fostering the growth and implementation of smart grid technologies in Saudi Arabia.

For example, CESI collaborated with the Electricity & Co-generation Regulatory Authority (ECRA) in Saudi Arabia to devise the 'Smart Grid Strategy for Saudi Arabia.' This involved analyzing strategic and technical factors, considering the unique challenges of the country's electricity industry. The joint effort resulted in identifying suitable methods and strategies for implementing smart meters and enhancing the smart grid infrastructure. The main objectives of CESI were to address challenges that a smart grid strategy could tackle, review appropriate smart metering technologies for the

Saudi electricity industry, determine the requirements for smart meters and advanced metering infrastructure, develop a smart grid deployment strategy, and provide guidance for an efficient and timely rollout of smart meters. The government's introduction of the 'Smart Grid Strategy for Saudi Arabia' has significantly accelerated the growth of smart grid systems in the country.

Impact of COVID-19

The COVID-19 pandemic has had both direct and indirect impacts on the smart grid sector in Saudi Arabia. Directly, the pandemic has posed operational challenges and disruptions to ongoing projects and maintenance activities. Restrictions on movement, supply chain disruptions, and workforce limitations have slowed down the implementation of smart grid initiatives. However, the crisis has also highlighted the importance of resilient and reliable energy infrastructure, driving the need for smart grid solutions. Indirectly, the pandemic has accelerated the adoption of digital technologies and remote monitoring capabilities, which are integral to smart grid systems. Moreover, the increased reliance on remote work and virtual operations has emphasized the value of advanced communication and automation in ensuring the continuity and efficiency of the electricity grid. As a result, the COVID-19 pandemic has reinforced the significance of smart grid technologies and their role in supporting a more resilient, efficient, and sustainable energy future in Saudi Arabia.

Key Players Landscape and Outlook

The Smart Grid market in Saudi Arabia is witnessing substantial expansion as Saudi Arabian organizations acknowledge the importance of smart grid constructions for maintaining grid stability. These organizations are strategically positioning themselves to retain their market share and explore global expansion opportunities. Additionally, they are investing more resources in energy resilience, research and development, various forms of collaborations to promote the installation of smart devices, setting up of utility-scale hydrogen plants, and expanding their distribution networks through noteworthy mergers, acquisitions, and joint ventures. Furthermore, manufacturers are actively studying consumer behavior to gain valuable insights and continuously introducing new products to meet evolving demands.

On June 8th, 2023, Grid Solutions, a division of General Electric's Vernova energy business portfolio, secured a significant contract from Larsen & Toubro. The agreement involves providing 380 kV T155 gas-insulated substations (GIS) for the world's largest utility-scale hydrogen plant, located in Oxagon within the planned smart city Neom in

northwestern Saudi Arabia. This hydrogen plant, developed by the NEOM Green Hydrogen Company (NGHC), aims to generate carbon-free hydrogen exclusively from wind and solar power sources. By the end of 2026, the plant is projected to produce approximately 600 tonnes per day. To ensure seamless operations at the hydrogen plant and the wind and photovoltaic plants that will supply captive energy, GE's established GIS design, combined with the 1.5 breaker configuration, will be deployed. Furthermore, GE's switchgear will enhance the primary grid's reliability by strengthening power supply stability.

In December 2022, The Saudi Electricity Co. (SEC) secured two contracts valued at USD 720 million with China Electric Power Equipment and Technology Co. These contracts involve the supply and installation of 60,000 smart devices for Saudi Arabia's electricity distribution system. The main objective of the projects is to connect the country's distribution network with advanced control centers and to develop and enhance electrical networks. This initiative aligns with SEC's digital transformation strategy, focusing on the modernization and optimization of the electricity infrastructure in Saudi Arabia.

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