


Powering clients to a future shaped by growth



F R O S T & S U L L I V A N

CLEAN ENERGY - GLOBAL AND GCC TRENDS

AUTHORED BY: NEERAJ SANJAY MENSE,
CONSULTANT – INDUSTRIAL PRACTICE,
FROST & SULLIVAN

FOR WORLD FUTURE ENERGY SUMMIT 2022

The energy and power sector is undergoing a major transformation globally. While the transformation was initially driven by the need to reduce emissions and mitigate the impact of climate change, reducing cost of technology, improved manufacturing capabilities and innovations have made some of the technologies as competitive as the traditional technologies & processes that relied on hydrocarbons as their source of energy.

These transformations are no longer restricted to the global environment and have percolated into the regional landscape. Within the Gulf Cooperation Council (GCC), countries like UAE and KSA are at the forefront in diversifying their energy mix and adopting solutions that are clean and have minimal climate impact. This paper highlights key trends that are shaping the future of energy in the GCC, technologies that are witnessing increasing penetration and opportunities that stakeholders can tap in this evolving landscape.



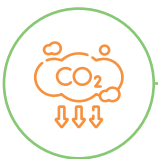
Global Trends:

The three Ds—decentralization, decarbonization and digitalization—are playing a key role in the global energy transition.



DECENTRALIZATION

Moving from large, centrally located power generation to dispersed generation across smaller power plants. Examples include combined heat and power units (CHP), rooftop solar photovoltaic (PV), and hybrid systems (diesel/gas and solar) with battery storage.



DECARBONIZATION

Reducing carbon emissions from power generation and the overall energy value chain. Examples include grid-based renewable energy capacity additions and energy efficiency implementations to reduce carbon emissions across generation assets and end users.



DIGITALIZATION

Technology improvements in existing electricity infrastructure for effective management and monitoring while successfully integrating variable renewable energy, battery storage, and demand-side technologies on industrial and commercial sites and electric mobility in transportation.

GCC TRENDS AND DEVELOPMENTS:

In the Gulf Cooperation Council (GCC), energy transition is underway. Governments in the United Arab Emirates (UAE) and the Kingdom of Saudi Arabia (KSA) are moving toward more sustainable forms of energy, like solar. All GCC countries have committed to emissions reductions as part of their individual Nationally Determined Contributions (NDCs).

The energy sector makes up 83% share of total emissions; 37% is attributable to power and heat generation.

Each GCC country has defined its own decarbonization pathway comprising of renewable energy integration, energy efficiency improvement, carbon capture and storage (CCUS), and developing a hydrogen-based economy.

Of these, renewables witnessed the highest effort and impact, resulting in a 69% compound annual growth rate (CAGR) in installed capacity between 2015 and 2020, and are expected to reach 39% of total installed power generation capacity by 2030 if the GCC countries can achieve their stated renewable energy targets.

The GCC has fast emerged as a hotspot for renewable energy investments, driven by the decline in technology costs and an improvement in the overall size and capacity of installed plants. The region has also seen a more than 73% drop in tendered tariffs for projects, with Saudi Arabia receiving the lowest bid at US\$ 10.4/MWh.

If each country realizes the true potential for renewable energy identified in their Vision and Strategy documents, the GCC region could witness installed renewable capacity reaching anywhere between 100 to 105GW by 2030. This, coupled with the localization mandates being propagated in the region, presents a significant opportunity for global engineering, procurement, and construction (EPC) players and original equipment manufacturers (OEMs), while also boosting economic diversification and employment creation opportunities in the region.

In addition to developments in grid scale renewable energy projects, distributed energy technologies like rooftop solar PV, PV diesel hybrid systems, and diesel and gas gensets will present a US\$ 3.5 billion opportunity by 2025. The Shams Initiative in Dubai and the Sahim Initiative in Oman are examples of regulations and policies that will positively impact the market for distributed energy in the region.



**THE DISTRIBUTED ENERGY MARKET IN THE GCC PRESENTS
UNIQUE OPPORTUNITIES, INCLUDING:**



BEHIND THE METER (BTM) ENERGY STORAGE

With developing rooftop solar PV projects, on-site energy storage is becoming a critical aspect for distributed generation. Battery-based storage, most typically used across residential end users, allows customers to store excess generation for night-time use or allows stable grid feedback of electricity. Most solar rooftop developers in the UAE offer battery-based energy storage as a part of their technology/system package, depending on customer requirements. The market for BTM energy storage is closely linked to the development of distributed solar PV in the GCC region, which is expected to generate revenues of over US\$150 million in 2025. **A cumulative opportunity between US\$450 million and US\$ 500 million is expected by 2025 for distributed solar PV.**



**DIGITAL GRIDS, SMART METERING, ENERGY MODELING
AND DISTRIBUTED ENERGY RESOURCE (DER) AGGREGATION**

Smart metering, energy modeling, forecasting and distributed energy (DER) aggregation, and the development of virtual power plants (VPPs) are all part of grid expansion, efficiency and reliability enhancements. Overall, with the proposed renewable energy capacity addition, the market opportunity for digital grids and associated solutions could be between **US\$ 35 billion and US\$ 45 billion**, which would be realized over the next 10 to 15 years across the GCC. Reliability-based digital solutions are already being implemented by the GCCIA for remote monitoring and maintenance of substations.



HYBRID SYSTEMS

These entail a combination of multiple energy sources that complement each other to provide electricity across locations where grid availability is limited. A typical hybrid system comprises a diesel generator with solar panels and battery storage. These can be employed across mining locations, military outposts and farming activities. The Themar Al Emarat microgrid cited below is an example of a hybrid system for power generation. **There is a cumulative opportunity of US\$ 300 million to US\$ 350 million by 2025.**



ELECTRICITY AS A SERVICE

Electricity as a Service or Energy as a Service is a concept wherein ESCO and rooftop solar PV project developers invest in the end users to save or generate electricity on site. Customers do not have to pay upfront capital investment; they repay this through the energy savings achieved from energy efficiency measures or savings achieved by not procuring electricity from the grid. This trend has already gathered pace in Dubai, where Etihad Super ESCO-empanelled ESCOs are undertaking energy efficiency retrofits on shared/guaranteed savings models.





IN ADDITION, THE GCC COULD WITNESS THE ACCELERATED DEVELOPMENT AND DEPLOYMENT OF THE FOLLOWING TECHNOLOGIES:



SOLAR HEATING IN INDUSTRIAL PROCESSES (SHIP)

UAE-based Ocean Rubber Factory has been operating a 240m² solar process heating system that produces process heat at 180 degrees Celsius, reducing the costs associated with producing steam from diesel boilers. **The estimated market opportunity in GCC: US\$ 400 million to US\$ 500 million over the next five to seven years.**



SOLAR COOLING

Agility Logistics in Kuwait currently operates a solar-driven cooling system to air condition its headquarters in Sulaibiya. The system uses high-vacuum solar thermal systems to produce the required cooling/air conditioning. **The estimated market opportunity in GCC: US\$ 450 million to US\$ 550 million over the next seven years.**



RENEWABLE DESALINATION

Al Khafji SWRO and Solar PV Project comprises a 60,000 m³/day RO desalination plant powered by a 15 MW solar PV plant. It supplies desalinated seawater to the city of Al Khafji in northeastern Saudi Arabia, providing a regular supply of water to the region throughout the year. **The estimated market opportunity in GCC: US\$ 300 million to US\$ 400 million over the next five to seven years.**



MINI AND MICROGRIDS

Themar Al Emarat has installed a 5.94MW off-grid microgrid for its hydroponic farm in the UAE. The off-grid microgrid combines solar photovoltaics and diesel generation, battery energy storage, and electrical gear and electronics with real-time microgrid management and controls to power the greenhouse operation. **The estimated market opportunity in GCC: US\$ 500 million to US\$ 600 million over the next five years.**



BUILDING-APPLIED PHOTOVOLTAIC (BAPV)

UAE-based ALEC Energy will provide solar PV solutions for DEWA's new headquarters, Al Shera'a, located in the Al Jaddaf area of Dubai. The multi-tiered solution includes the delivery of 21,139 square meters (sqm) of BAPV panels on the roof, 1,021 sqm of building-integrated photovoltaic (BIPV) panels for the façade, and 1,923 sqm of podium fins as well as fiber optic collectors, shaded structure PV and solar trees. **The estimated market opportunity in GCC: US\$ 300 million to US\$ 400 million over the next five to seven years.**

Increasing penetration of renewable energy in the GCC grid will necessitate investment in grid modernization and incorporation of digital technologies. Smart meters and digital substations are already being considered by utilities. Proposed investment in grid expansion and modernization, including digital technologies, is expected to entail an investment between US\$35 billion to US\$45 billion over the next 10 to 15 years.

While significant opportunities exist across the value chain, realization of these opportunities hinges on several factors, including:

1. Implementation of policies and regulations that allow a level playing field for alternative technologies.
2. Benchmarking energy and electricity prices with global prices and tariffs.
3. Creating customer awareness about benefits of distributed generation, energy efficiency, etc.





FROST & SULLIVAN

Is your organization prepared for the next profound wave of industry convergence, disruptive technologies, increasing competitive intensity, Mega Trends, breakthrough best practices, changing customer dynamics, and emerging economies?

Leverage visionary innovation that addresses the global challenges and related growth opportunities that will make or break today's market participants.

For more than 60 years, Frost & Sullivan has developed growth strategies for the Global 1000, emerging businesses, the public sector, and the investment community. Let us put our expertise to work for you!

DUBAI

2601, Swiss Tower, Cluster Y
PO Box 33372
Jumeirah Lake Towers
Dubai, UAE
Tel: +971 4 433 1893

RIYADH

F16, Level 1, Localizer Mall
2803 Prince Muhammad Bin
Abdulaziz Rd
Al Olaya, Riyadh 12222
Tel: +966 11 486 8463

To know more about how you can leverage the growth opportunities for your company, schedule a complimentary **Growth Pipeline Dialogue** with our executive team by clicking [here](#).

myfrost@frost.com

 877.GoFrost

 <http://www.frost.com>

FROST & SULLIVAN
Powering clients to a future shaped by growth