

Utilities

Middle East

VOL12.
ISSUE5
MAY
2018

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can support decentralised
generation p11



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RENEWED ABILITY

Regional utilities are moving from a one-way system where power flows from centralised generation stations to consumers, to a platform that can detect, accept, and control decentralised consumption and production assets so that power and information can flow as needed in multiple directions.

Writes Baset Asaba

Recent technology trends around the world have set the GCC electric grid on the path for a complete overhaul. While the utilities industry has for long been known for resisting changes, even as everything else around it succumbed to them, the unremitting push for diversification of energy sources is prompting a paradigm shift.

Today, the grid is evolving in the wake of new industry realities that are pushing regional utilities to reassess their positioning for the digital future in a world of fast changing consumer tastes and ubiquitous interconnectivity.

Even as the GCC utilities plan investments to the tune of \$100bn in renewable energy over the next five years to boost current power supply, serious concerns remain over power intermittency especially in the absence of utility scale storage. This and several other considerations continue to make a strong case for smart grids.

Utilities are gradually moving from a one-way system where power flows from centralised generation stations to consumers, to a platform that can detect, accept, and

control decentralised consumption and production assets so that power and information can flow as needed in multiple directions.

This common industry vision is what has come to be widely known as the "intelligent grid." The intelligent grid builds on the industry's innovative heritage of increasing interconnectedness using sensors, smart devices, and networked operations. Achieving it will require a myriad of technologies, including numerous Internet of Things (IoT) applications.

At the heart of these advances are exponential technologies like sensors, robotics, and advanced analytics, which together form advanced, interconnected systems capable of quickly analysing large amounts of data. These critical systems are the sensory organs, nerves, and brains capable of giving electric systems the flexibility and agility necessary to enable ideas like a self-healing grid and plug-and-play generation – an intelligent grid.

"The world today has more machines than there are people, and a lot of useful information is coming out of





these machines," says Mostafa AlGuezeri, managing director, ABB, the United Arab Emirates.

"When you connect the two, you can unlock a huge amount of productivity that can take this industry to a whole new level."

As major utility companies chart the course to growth and returns through digital transformation, the global number of devices being managed by utility companies is projected to grow to 1.53 billion in 2020. But this is just the beginning of this industry's transformation.

"When delivering substations, ABB draws on decades of experience of building tens of thousands of substations, including more than 10,000 high-voltage substations. It has introduced substation innovations to enhance the performance and intelligence of substations while reducing their size."

Mostafa AlGuezeri, ABB

GCC utilities are determined to unlock the full potential of deploying digital solutions across the entire electric power eco-system. The deployment of smart grids in the GCC is expected to help the region save up to \$10bn in infrastructural investment by 2020, according to industry analysts.

Just last month, ABB won an order worth more than \$90mn from Dubai Electricity and Water Authority (DEWA), to build the Shams 400 kV substation that will integrate solar power from upcoming phases of the Mohammed bin Rashid Al Maktoum (MBR) solar park into the emirate's electrical grid.

The MBR solar park, located inland 50km south of Dubai, is a central part of Dubai's renewable strategy. When completed in 2030, the park will occupy 214km², generate 5,000MW and reduce carbon emissions by approximately 6.5 million tonnes.

ABB has been contracted for the design, supply, and installation and commissioning of the Shams 400/132 kV substation, which once completed, will have an overall capacity of more than 2,000 megavolt amperes (MVA). Once Phase 3 of the project is finished in 2020,

which is the same year that Dubai will host Expo 2020, the total solar power generated through Solar Photovoltaic will exceed 1,000MW, which is expected to help lower carbon emissions.

The ABB substation contract also includes supply of 400 and 132 kV gas-insulated switchgear, power transformers, protection, automation and control systems as well as surveillance and communication systems. The substation will also be IEC 61850 enabled, to support open and seamless communication with all intelligent devices.

This will be ABB's second substation for the park, with the first one launched last year and already supporting the current installed pv solar capacity of 213MW that is already connected to the transmission grid.

According to AlGuezeri, ABB has a long history of supporting power infrastructure in the Middle East. He says that the company has made success in Dubai with the world's highest substation, which lies on the 155th floor of the Burj Khalifa.

"When delivering substations, ABB draws on decades of experience of building tens of

\$100bn

Estimated GCC renewable energy investment over the next five years

thousands of substations, including more than 10,000 high-voltage substations. It has introduced substation innovations to enhance the performance and intelligence of substations while reducing their size," says AlGuezeri.

The company is already supporting Dubai to build the electrical infrastructure for the key sites of EXPO 2020.

Headquartered in Zurich, Switzerland, ABB has positioned itself as a pioneering technology leader in electrification products, robotics and motion, industrial automation and power grids, serving customers in utilities, industry and transport & infrastructure globally.

Continuing more than a 130-year history of innovation, ABB today is writing the future of industrial digitalisation and driving the Energy and Fourth Industrial Revolutions.

ABB operates in more than 100 countries with about 136,000 employees and generating about \$35bn revenues annually. The company has been very active in the UAE over the years, designing products and solutions to support initiatives in various sectors.

For instance, the UAE has announced ambitious plans to invest \$163bn to generate almost half the country's power needs from renewable sources by 2050, with the aim to increase clean-energy contributions to 50% by 2050.

As part of wider efforts to harness the power of the sun, ABB is supplying 600 UNO-DM-PLUS grid-connected single phase solar inverters to power new-build villas in Hatta, Dubai.

The high-profile installation is being sponsored by DEWA which is offering free solar panel installation across the 600 villas to all UAE nationals in Hatta. The project management, procurement, installation, testing and commissioning, along with subsequent operations and management is being undertaken by Dubai Carbon Centre of Excellence (DCCE) and Al Mostajed Technologies Co LLC (AMT).

The Hatta project spans 200km and falls under the Shams Dubai initiative, which is installing solar panels on buildings throughout Dubai to provide self-generated solar power in all homes and generate electricity that can be



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Mostafa AlGuezeri, ABB

fed into the electricity grid, ultimately reducing reliance on fossil-burning electrical generating plants. The project also meets with the Hatta Comprehensive Development Plan.

ABB will install 600 UNO-DM-4.0-TL-Plus-SB single phase string inverters, together with its Aurora web monitoring platform for effective monitoring and maintenance, on roofs of the state-of-the-art villas in Hatta, a popular vacation getaway to escape the heat of Dubai.

Last year, also as part of Shams Dubai, ABB inaugurated a 315 kilowatt (kW) solar rooftop power plant located at its office in the Al Quoz industrial area. The energy produced from the 1,213 solar panels at the plant supplies ABB offices with electricity while the surplus is transferred into DEWA's network.

"A variety of ABB string inverters have been used to convert current in this solar plant. ABB inverters with IP65 enclosure and fan less design are well suited for this environment and an appropriate pick for solar installations in the Middle East. All of the PVI, TRIO and PRO

33 inverters are connected to a state-of-the-art ABB building monitoring system (BMS) and can be monitored remotely," says AlGuezeri.

The BMS system controls and monitors the complete rooftop system, the i-bus® KNX system - temperature and lighting control - plus the power management with the Emax 2 air circuit breakers. This enables monitoring of the inverters, meteorological department data, power metering and analysis of the building's lighting and temperature settings as well.

"Ekip SmartVision connects the ABB solar rooftop to the Internet of Things, creating a digital profile of the photovoltaic installation, continuously analysing the power quality, as well as tracking trends in the site's energy production and demand," says AlGuezeri.

"Therefore, continuous diagnosis of the rooftop helps maximise the asset's productivity and makes maintenance more effective and intelligent. Ekip SmartVision uses cloud-based algorithms to monitor, optimise and control electrical systems."



New energy sources
ABB technology is helping to integrate renewable energy to the grid

Ekip SmartVision collects, part of the ABB Ability range of digital products and services, processes and stores data about a facility's low-voltage power network, using a cloud solution developed in close partnership with Microsoft

“A variety of ABB string inverters have been used to convert current in this solar plant. ABB inverters with IP65 enclosure and fan less design are well suited for this environment and an appropriate pick for solar installations in the Middle East. All of the PVI, TRIO and PRO 33 inverters are connected to a state-of-the-art ABB building monitoring system (BMS) and can be monitored remotely.”

Mostafa AlGuezeri, ABB

to ensure the highest possible performance, reliability and security.

In order to drive digitalisation, ABB has pulled its digital capabilities together under its ABB Ability technology platform. The ABB Ability portfolio comprises more than 180 digital solutions using the Industrial Internet to create digitally connected devices, systems and services that dramatically increase productivity, cut maintenance costs considerably and reduce energy consumption up to a third in today's digital age.

“ABB Ability's range of digital solutions comprises performance management solutions for industries that depend on plants and systems, control systems for process industries, remote monitoring services for robots, motors and machines, control solutions for buildings and offshore platforms along with charging infrastructures for electric vehicles,” AlGuezeri points out.

He says that one example of this approach

\$90mn

Value of the Shams 400 kV substation to be built by ABB at MBR solar park

could be applied to virtual power plants (VPPs), a term for the central control and optimisation of many distributed power generators. “Almost all generation and storage technologies can form part of a BPP, from biogas and biomass to combined heat and power (CHP), wind, solar and hydro, to diesel and fossil-fired plants,” says AlGuezeri.

He says that thousands of small individual units can be combined into a single VPP to gain the competitive advantage of a big player. ABB Ability enables VPP operators to monitor and plan loads, forecast deviation and participate in the energy market. The solution handles



Let's write the future.

Making the most out of every drop takes ability.
ABB Ability™

Aging infrastructure, new regulations, distributed energy resources and the convergence of Information Technology and Operations Technology (IT/OT) are just a few of the issues that are dramatically changing the utility landscape today.

ABB Ability provides tailored digital solutions and products for the differing needs of utility providers across water and water generation, transmission and distribution.

To know more, visit ABB stand at Booth 5120 at the Oman Convention and Exhibition Center for Oman Energy and Water Conference and follow us at @ABBMiddleEast on Twitter.



“ABB and Formula E are a natural fit at the forefront of the latest electrification and digital technologies. Together, we will write the next phase of this exciting sports activity and foster high-performance teams. Together, we will write the future - one electrifying race at a time.”

Mostafa AlGuezeri, ABB

real-time processing of large signal and data sets to manage and control assets.

Distributed Energy Resource Management Systems (DERMS) are another example of the potential of ABB Ability, says AlGuezeri. “Roof-top solar and battery energy storage are transforming power distribution networks. Operators need to keep the grid balanced while maintaining system reliability and power quality.”

“This has become more challenging as the number of renewable generation connections grows. ABB introduced DERMS to manage increased complexity and variability of loads. The software can help utilities manage the entire lifecycle of distributed energy resources from registration to optimisation.”

“The value lies in transforming the data into actionable information that helps customers derive maximum value from digitalising their assets.”

This offering is particularly relevant given the growing proliferation of decentralised energy actors in the marketplace.

“We are in a period of transition and moving from a position of more vertically integrated, to the more decentralised markets or tiered markets. The technology that helps us with that transition is really needed right now,” says AlGuezeri.

Early this year, ABB provided a brighter outlook for 2018 despite its 2017 fourth quarter earnings falling below expectations. The group

\$35bn

ABB annual revenue across all operations in 100 countries

said that improving markets around the world would drive profitability this year.

In the last three months of 2017, the company saw orders falling 3% to \$8.48bn compared to the same period in 2016. Net profit fell 8% to \$393mn during the three months ended December 31, missing the average estimate of \$424mn.

The figures were hit by a fourth-quarter charge of \$76mn from restructuring its business. Revenues rose 3% to \$9.28bn, short of the poll estimate of \$9.5bn, while orders rose to a weaker-than-expected \$8.48bn.

ABB pointed to strong growth in overall “base orders” - worth less than \$15m - as indicating an improvement in its underlying performance. Base orders rose 9% in the fourth quarter, and were up 5% for the full year, with increases in all regions and divisions.

The company spent much of 2017 reorganising as it battled a long-term downturn in industries like mining and oil and gas, where low prices have stalled customers’ investments. ABB also cut down costs, simplifying its structures and ditching fringe businesses like the high-risk and low-margin engineering, procurement and construction business it spun off in December.

The Middle East, which contributes 35% of the group’s earnings is expected to continue achieving double digit growth as the group focuses on higher growth markets and cost cutting.

“The momentum we have built in 2017 positions us for profitable growth as the global markets are improving. Today’s proposal to increase the dividend for the ninth consecutive year demonstrates our confidence in the future,” said ABB chief executive Ulrich Spiesshofer in a statement in January.

ABB has continued to expand its global footprint of remote service centres for variable speed drives (VSDs) with its latest facilities inaugurated in Dubai in March. The new facilities in the Middle East complement the network of service centres operating already in China, India and Finland by providing round the clock support to local and global customers.

The remote centres speed up identification of a customer’s potential problems. This helps to minimise the downtime of customer assets and, ultimately, provide savings to customers in operational costs.

“This new centre is a reinforcement of our commitment to support our customers in their digital journey,” says AlGuezeri. “The centre applies our expertise in digitally-enabled technology to benefit our customers in the UAE and partner with them to develop a range of future services that will allow customer assets to become digital ready.”

Drives offer an energy efficient option by working alongside a motor to control its speed based on current load, instead of running the motor continuously on full speed. Motors consume about 28% of the world’s electricity. Drives offer an energy efficient option by working alongside a motor to control its speed based on current load, instead of running the motor continuously on full speed.

This makes VSDs a key component of enabling energy efficiency and improving productivity. Only about 10% of all motors are equipped with a VSD, which presents a significant saving opportunity especially in applications such as pumps, fans and compressors.

The ABB Ability™ Condition Monitoring

service helps anticipate possible operational issues and maintenance needs by monitoring real-time information such as drives availability, environmental conditions and fault events.

The ABB Ability™ Predictive Maintenance service delivers actionable insight and improvements for installed high demand drives with regular monitoring and data analysed by machine learning and ABB’s experts in cloud. The network of drives remote service centres will continue to expand to other continents in near future.

As the solar market shifts towards new cost-effective platforms offering extreme high-power string inverters from 1,000 VDC up to 1,500 VDC, the market for inverters continues embrace new innovation.

The recently launched ABB PVS-100/120 platform maximises return on investment and aims to reduce CAPEX and OPEX costs for installers and developers.

Suitable for both large-scale commercial and industrial ground mounted and rooftop applications, the PVS-100/120 offers a six-in-one, sun-to-socket solution, proven to deliver scalability, flexibility, proactive plant management and ease of installation.

“Our new PVS-100/120 string inverter range offers the ability to interact with the solar plant

“ABB Ability’s range of digital solutions comprises performance management solutions for industries that depend on plants and systems, control systems for process industries, remote monitoring services for robots, motors and machines, control solutions for buildings and offshore platforms along with charging infrastructures for electric vehicles.”

Mostafa AlGuezeri, ABB

system like no other through high-power consolidation of physical parts and products along with digitalisation,” says Marco Trova, ABB Global Product manager, String Utility.

In supporting regional and global efforts towards sustainable mobility, ABB is now helping design, build and maintain the infrastructure needed to make the electric vehicle (EV) transportation revolution happen sooner.

With the global number of electric vehicles on the road rising to 2 million in 2016, the demand for powerful and energy efficient



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Mostafa AlGuezeri, ABB

vehicle charging stations is ever increasing. ABB recently launched its new Terra HP High Power Charge system at EVS30 in Stuttgart, Germany.

Ideally suited for use at highway rest stops and petrol stations, Terra HP's ultra-high current has the capacity to charge both 400 V and 800 V cars at full power. The 375 A output single power cabinet can charge a 400 V car at full 150 kW continuously.

The addition of Dynamic DC power sharing technology allows a two-power cabinet charging system to charge a couple of electric vehicles simultaneously, with up to 350 kW and 500 A, while dynamically optimising the available grid connection and the power delivery to the two vehicles.

As the world leader in electric vehicle infrastructure, ABB offers the full range of charging solutions for electric cars, electric and hybrid buses as well as electrification solutions for ships and railways.

ABB entered the EV-charging market back in 2010, and today has a fast growing global installed base of more than 6,000 fast chargers.

Recently, ABB and Formula E have teamed up in a ground-breaking partnership to champion e-mobility for a sustainable future. Since its first race in Beijing in September 2014, Formula E has established itself as the number one all-electric international motor sport.

In the next level of development, ABB is bringing its name and innovation as well as its technology leadership to the series, which will be now known as the “ABB FIA Formula E Championship.”

Formula E serves as a competitive platform



Digital substation built by ABB at MBR solar park in Dubai

to develop and test e-mobility-relevant electrification and digitalisation technologies, helping refine the design and functionality of electric vehicles and infrastructure as well as the associated digital platforms. By joining forces, ABB and Formula E will be ideally positioned to push the boundaries of e-mobility, according to AlGuezeri.

“ABB and Formula E are a natural fit at the forefront of the latest electrification and digital technologies. Together, we will write the next phase of this exciting sports activity and foster high-performance teams. Together, we will write the future - one electrifying race at a time,” says AlGuezeri.

ABB is determined to adapt itself to changing business dynamics, and continues to invest \$1.4bn in Research and Development (R&D) annually, with a team of around 30,000 R&D and application engineers.

Last month, the company announced plans to invest \$123mn in Austria to build a state-of-the-art innovation and training campus at the home of B&R in Eggelsberg, Upper Austria. It is the largest organic investment in industrial automation in ABB's more than 130-year history and lays the foundation for around 1,000 new high-tech jobs in Austria.

The 35,000m² campus will develop technologies for the factory of the future, based on

ABB's Ability platform, which allows production to be undertaken autonomously by smart and cloud-connected machines and robots.

ABB hopes to leverage its innovations to drive new demand trends in the UAE and the entire Middle East. The company is currently bidding for nearly \$700mn worth of power projects in the UAE alone. These include a 132kV substation project of the Dubai Electricity and Water Authority (DEWA), as well as a solar power plant project with ACWA Power.

“The increasing digitalisation of the power value chain is key to addressing new grid complexities” says AlGuezeri. “Our pioneering technology heritage, domain expertise and unparalleled global installed base, positions us as a partner of choice for enabling a stronger, smarter and greener grid.”

“Facilitating grid automation and the convergence of information and operational technologies are an integral part of our strategy and ABB's Internet of Things”

With nearly 8GW expected to be added annually to the existing 150GW installed capacity in the GCC, ABB believes that its expertise, built over more than a century in operation, and constant investment in new technologies, will significantly support ongoing initiatives in the GCC and also continue open up doors for new business prospects. [Utilities](#)

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Middle East

A SPECIAL REPORT FROM UTILITIES MIDDLE EAST



هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority

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SOLAR MOMENTUM

The pipeline for solar power projects in the Middle East and North Africa (MENA) is set to double this year, with the GCC region accounting for more than half of all projects

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DUBAI TAKES LEAD IN SOLAR

Dubai is emerging as a regional and global force in clean and cheap energy, with solar in the lead

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ABB INVERTERS FOR DUBAI SOLAR

ABB solar inverters are helping villa owners in Hatta reduce energy bills by up to 40%

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