

# Digital Power Plants to Revolutionize GCC Market

BY BHANU SHEKHAR, CHIEF DIGITAL OFFICER, GE POWER IN THE MIDDLE EAST AND AFRICA

**T**he status quo of power plants and smelters in the Gulf faces major change as the intelligent and proactive digital technologies long associated with science fiction cut costs and boost operational efficiency to meet rapidly rising consumer demand. With infrastructure expansions underway, countries in the Gulf Cooperation Council (GCC) – Saudi Arabia, the UAE, Bahrain, Kuwait, Oman, Qatar – can be at the front of the pack of a new breed of power operators that seamlessly merge industrial, software and analytical expertise.

The GCC's power capacity needs to expand at an average annual pace of 8% between 2016 and 2020, which requires \$85 billion to add 69GW of new generating capacity over the next five years, said Saudi Arabia-based Apicorp last September. Swelling populations and intensifying urban development across the Middle East and North Africa (MENA) underpin the growing sense of urgency to get 'smart' infrastructure in place. Dubai's population is forecast to rise to 5 million by 2030, Qatar's population of 2.5 million could grow eight-fold by 2050, while another 500,000 people are expected to settle in Cairo, one of the world's fastest growing cities, this year alone.

As pressure to provide competitive energy security builds, one question drives conversations in boardroom across the Gulf: how to profitably tread the economic tightrope between growing demand on one side and costly maintenance and increasingly strict regulations on the other? The answer is a mixture of traditional common sense and modern know-how; using digital technologies to fine-tune operations and reduce waste.

A 1% improvement in efficiency across the global gas-fired power plant fleet over 15 years translates into savings of \$66 billion in fuel consumption and \$50 billion in maintenance costs. A 1% increase in efficiency of aluminium smelter operations – smelters use enormous

amounts of electricity – can contribute to annual global savings of \$970 million across the total cost of production, \$936 million in output increase, with \$464 million saved in operational and maintenance costs. In the GCC region alone, the same 1% increase translates into \$28 million in savings on operations and maintenance. This is a major cost-saving considering the region's aluminium smelting industry accounts for up to 10% of the world's total production.

Digitization is part of the emerging Industrial Internet, which brings together the advances of two transformative revolutions: the machines, facilities, fleets, and networks that arose from the Industrial Revolution with the recent powerful advances in computing and communication systems brought to the fore by the Internet Revolution. This is about connecting big data, machines and the people who operate them, so that the synergy between machinery and software at a power plant and smelter merge seamlessly.

Digital solutions operate in the cloud with virtual sensors facilitating immediate evaluations on the health and condition of power plants and smelter pots, which means real-time solutions can be made to adjust power usage and the consumption of raw materials. This flexibility and ability to trim operational waste supports the greener theme of Gulf countries' National Visions and their collective political support for the Paris Agreement, the global climate change agreement borne in the French capital in December 2015.

The UAE's Energy Plan 2050 aims to improve energy efficiency by 40% and cut carbon dioxide emissions by 70% by the middle of this century, for example.

Digital Twin technology heralds a new era of cost-saving and safety-enhancing innovation. Digital Twin is a collection of analytical models that create an exact and virtual representation

of a physical system, which enables operators to play out an endless number of scenarios on a real-time basis without any real-life consequences. Identifying the pros and cons via software, rather than through day-to-day operations, gives the power industry the confidence it needs to push the boundaries of what it thinks it knows.

Ongoing innovation lies at the crux of meeting demand in the GCC and beyond, which means the industry needs to shed old habits, such as passing data on a printed PDF page between traders, dispatchers and plant managers to get the job done. Integrating digitization at power plants and smelters means employees can download information at any time and location in the plant. They can send real-time pictures, video and audio to enhance their 'digital dialogue' – this needs to be common practice. There is clearly plenty of room to grow, with just 2% of data in the power markets typically used to better operations.

The threat of cyber-attacks loom in the background as the digital power market gains traction in the Gulf, Turkey, Japan and Pakistan, to name a few. The International Atomic Energy Agency (IAEA) confirmed in late-2016 that a nuclear power plant was the target of a disruptive cyber-attack in recent years. As the power industry evolves, time and investments need to be funnelled into research and development (R&D) to plug system gaps, detect vulnerabilities early and secure critical infrastructure to establish a sturdy wall of protection that can potentially mitigate against such threats. It is a case of change, or be changed.

His Highness Sheikh Mohammed bin Rashid Al Maktoum, UAE Vice President and Prime Minister and Ruler of Dubai, said it best: "Those who neglect the new will remain at the back of the line; those who wait for luck to make things happen will be disappointed." ■