

POWER

## Region aims to modernise power grids

To tackle growing electricity consumption and to free up more hydrocarbons for export, the Middle East is turning to smart meters that encourage end-users to moderate their energy usage

AUSTYN ALLISON

The Middle East, and particularly the GCC, is looking to smart meter technology to keep electricity consumption in check.

Pilot schemes in the UAE, Qatar and Saudi Arabia are already under way. The Kurdistan Regional Government is soon expected to award a \$1.5bn contract for the installation of a smart meter system across northern Iraq, and earlier this year, South Korea's LS Industrial Systems awarded Switzerland's ABB a deal to deliver a wireless communications system to serve a smart grid for Iraq's Ministry of Electricity.

Governments are struggling to provide enough electricity for growing populations and developing economies. In 2010, each person in the Middle East and North Africa (Mena) region consumed an average of 2.65 megawatt hours (MWh) of electricity, compared with a global average of 2.97MWh, according to UN statistics. However, GCC usage is much higher. Saudi Arabia used 7.97MWh per person, the UAE 11.04MWh and Qatar 15MWh. In the GCC, there are more than \$378bn-worth of power generation and transmission schemes planned and under way, according to regional projects tracker MEED Projects, to boost supplies.

### High usage

Power usage is high, with industrialisation drives across the GCC aimed at reducing economic reliance on oil and gas. But those hydrocarbons are still needed to produce the power that runs the factories. The region's growing population also uses a lot of electricity. A May 2013 study by UK consultancy Deloitte found that 47 per cent of energy consumption in the GCC is for residential use, compared with a global average of 25 per cent. In the US, it is 33 per cent. In Abu Dhabi, according to the Regulation and Supervision Bureau (RSB), air conditioning makes up about 65 per cent of total electricity demand in the summer months.

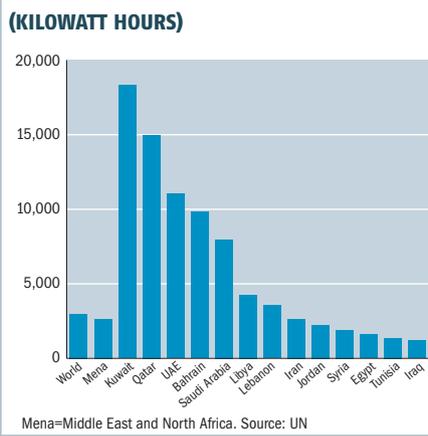
Producing electricity comes at the cost of the opportunity to export fossil fuels, and investment in generation facilities burdens national budgets. Heavily subsidised costs mean power

### KEY FACT

**By 2023, GCC countries will have a smart meter penetration of 80 per cent**

Source: Northeast Group

### AVERAGE PER CAPITA ELECTRICITY USAGE, 2010



sold domestically is a loss. Energy subsidies cost the UAE 2 per cent of its annual gross domestic product and Saudi Arabia 2.8 per cent, according to the Washington-based IMF.

It is expensive, inefficient and often impossible to store electricity for any length of time in high volumes, so the supply capacity required is dictated by peak demand. This occurs during the summer months, when millions of air conditioning units operate from afternoon to early evening. Much of the energy that is used must be taken from the grid during peak hours. But other draws – running washing machines, for example – are either unnecessary or could be scheduled earlier or later.

One way the Middle East can keep its electricity usage in check is by persuading people to change their habits. Education and incen-

tives are essential for this, and much can be done with smart meters that tell consumers how much power they are consuming and how that is affecting the grid.

A regular meter simply ticks up the numbers as electricity is drawn by end-users. Meter readings are taken at intervals to find out how much power has been consumed, and customers are charged accordingly. Smart meters, though, can provide to-the-minute feedback to end-users and utility providers, allowing the former to see how their consumption is affecting the nation's power supply and their wallets, and helping the latter predict, monitor and meet consumption. Smart meters can also help reduce labour costs for reading meters, connecting customers and detecting outages, and can help prevent losses from inefficiency, breakages and power theft.

### Modernised grid

“A smart grid is a modernised electrical grid that uses technology to gather information in an automated fashion to improve efficiency, reliability and sustainability of electricity production and distribution,” says Benoit Dubarle, country president for the UAE, Oman and Pakistan at France's Schneider Electric. The power distribution firm works with regional clients such as Abu Dhabi Municipality and Masdar.

“Current industry trends suggest smart meters provide benefits to three main stakeholders: the electric company, the customer and the environment,” says Dubarle.

A key benefit of smart meters is their ability to enable demand response programmes at utilities. “[These] programmes aim to reduce system peak demand and therefore avoid the need for costly infrastructure such as peaking power plants,” says Ben Gardner, president of the US' Northeast Group, a smart infrastructure market intelligence firm. “By addressing energy challenges from the demand side and not just the supply side, the overall market is more efficient. Demand response programmes do this by helping shift demand to off-peak times by using time-of-use rates, critical peak rebates and other dynamic pricing mechanisms.”

Experts say there is huge potential for growth in the GCC smart meter market, with key drivers being high power consumption per capita, which means changes in demand habits make more of a difference, adequate financing mechanisms, governments and providers eager to modernise infrastructure, and strong potential for renewable generation, mainly solar, which must be linked to consumption measured by meters.

“Due to rising demand for renewable energy to address growing concerns over environmental damage from fossil-fuelled power stations, there developed a need for more sophisticated control systems to facilitate the connection of sources to the otherwise highly controllable grid,” says Dubarle.

Usage of smart meters in the Middle East is low at the moment, but this is set to grow. Northeast Group estimates that there are now 279,000 meters across the region, of a total meter count of 37 million. That equates to just 0.75 per cent. “The US currently has a smart meter penetration rate of about a third, and by 2015 this will exceed 50 per cent,” says Gardner. “Other regions vary widely; for example, Italy and some Scandinavian countries already exceed 90 per cent penetration.”

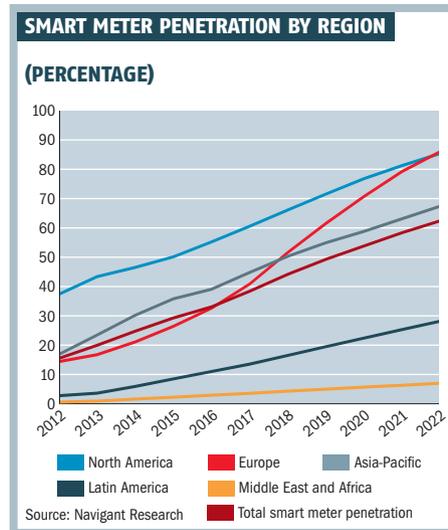
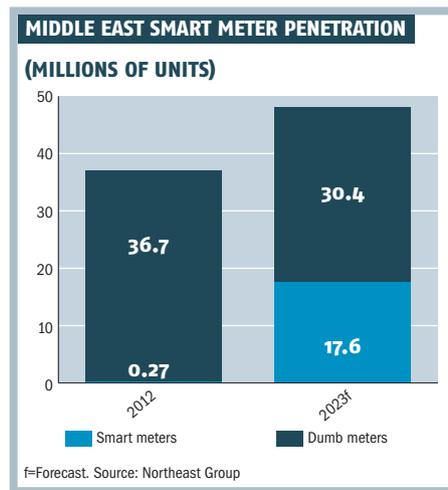
### Pilot programmes

Pilot schemes are under way in the region. In March 2012, Germany’s Siemens signed a \$13.3m deal with Qatar General Electricity & Water Corporation (Kahramaa) to provide 17,000 smart meters and 15,000 water meters for the Pearl Qatar real estate development.

Saudi Electricity Company (SEC) has also been running a pilot programme since 2012. “We are developing a pilot project for about 60,000 meters now for our big customers,” said Yahya Abdulrahman, executive director of information technology and communications at SEC, speaking to MEED earlier this year. “We have a flexible tariff so they can transfer the load from peak times to night time, especially in summer.” Smart meters have been installed at manufacturing plants, malls and hotels. Hospitality and retail clients are encouraged to freeze water at night on a cheaper tariff and use the ice to cool air conditioning units during the day.

In Abu Dhabi, meters have been installed in 400 households for a 16-month time-of-day trial. The project is being led by the RSB’s Powerwise department, in collaboration with Abu Dhabi Distribution Company.

Under the scheme, a smart meter has been installed at every participating villa. Although the average cost of generation per kilowatt hour was AED0.29 in 2011, according to the RSB, the



standard, subsidised, flat rate for power in Abu Dhabi is AED0.05 for UAE nationals and AED0.15 for expatriates. Participants keep paying their bills at this rate during the scheme.

However, by monitoring their own usage, and being shown what this would cost under a theoretical split tariff, they are encouraged to change their habits. They will not be penalised for failing to shift their electricity consumption, but will be rewarded with a refund at the end of the scheme if they would have saved money under the hypothetical rates. Peak price, between 2pm and 8pm, would be double; the off-peak tariff, 40 per cent less.

The trial will come to an end in August, and the results will be published at the end of the year. At this stage, a spokeswoman for the RSB says: “We can confirm early results are encouraging.”

### Technical challenges

The technical issues of installation and communication are also challenges. Meters must be able to communicate with monitoring units in individual homes and with data centres. As smart meters are rolled out, they must use a common protocol and be connected within buildings and to a wireless network that can handle the volumes of data they generate.

Another challenge comes when using meters in tower blocks. Air conditioning is often billed as a set charge by the building’s owners. This means there is little incentive for residents to cut back on their cooling, even if they can see how much electricity it uses. However, smart meters can also be linked to air conditioning systems, shutting them down or lowering their output when national demand is highest.

By 2023, the Northeast Group estimates the Mena region will have installed 17.6 million smart meters. This would represent 36.6 per cent of the 48 million meters in the region. GCC countries are expected to have a smart meter penetration of 80 per cent, driven primarily by the UAE and Saudi Arabia, with 6 million and 2.1 million meters respectively. Capital expenditure on smart meters will be about \$3.9bn, according to Northeast Group, but Gulf countries stand to save \$300m to \$1bn a year on oil and gas usage. This saved fuel can then be sold abroad.

In the future, smart meters may allow utility providers to not only bring online their own renewable generation resources, but also to buy back power from consumers. Individual solar panels and electric vehicles could feed back into the grid at peak times in return for more favourable supply rates off-peak. This will require additional legislation and agreements over buy-back fees and policies. But, the future of electricity monitoring could see much more participation from end-users and increased efficiency all around. 