

Gas finds and reforms spur revival in Egypt's power fortunes

Egypt's energy sector is on the upturn, as the government plots an ambitious diversification programme taking in gas, renewables, hydro, coal and nuclear. **James Gavin** reports.

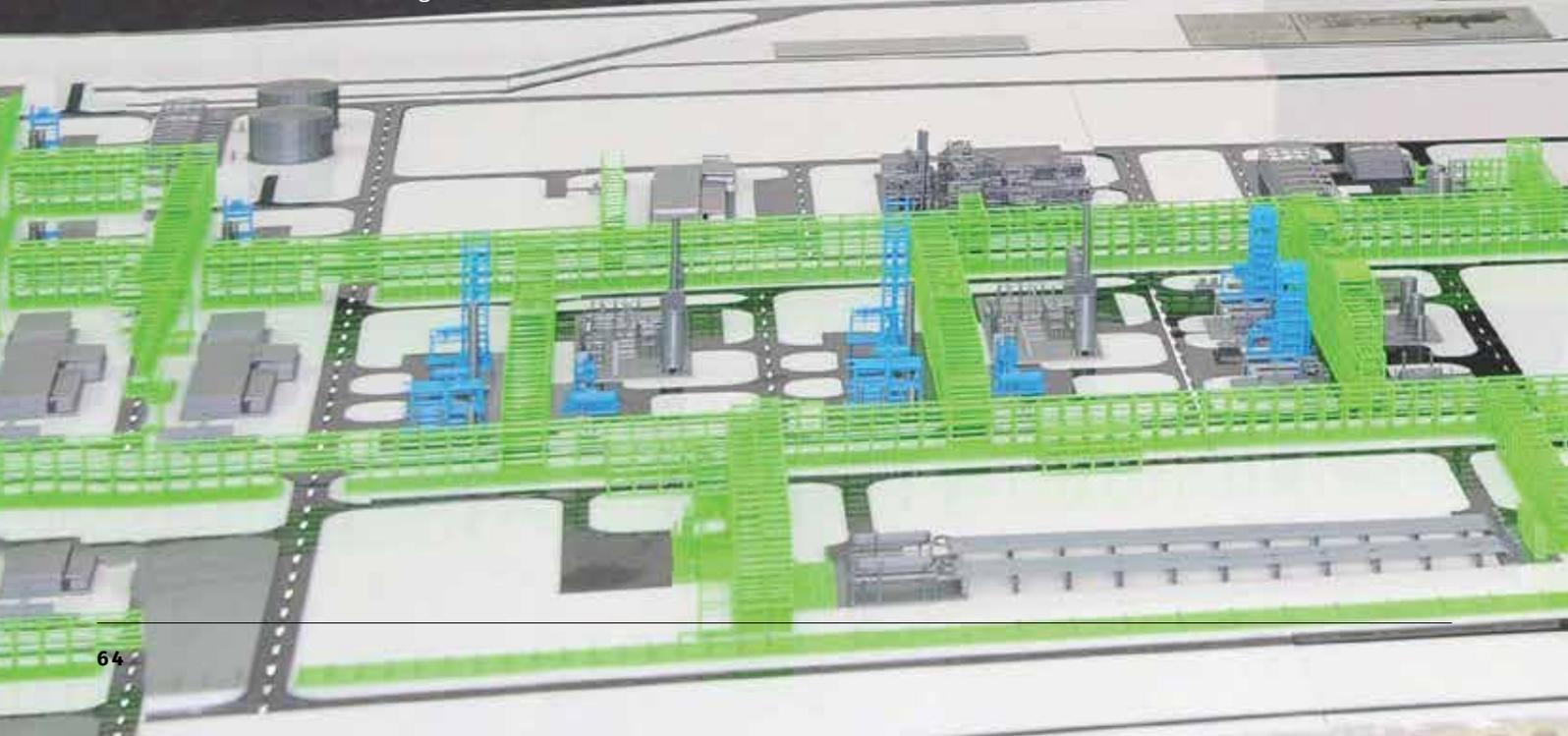
After the turbulence of the post 2011 period, Egypt is regaining a measure of political and economic stability – and that is good news for the country's energy sector, whose fortunes have ebbed and flowed in tandem with the country's ups and downs.

The past few years have been challenging for the country. From being one of the world's most significant natural gas exporters, with two liquefied natural gas (LNG) facilities and pipelines to Israel and Jordan, by 2014, Egypt had become a net importer of gas, experiencing a hydrocarbons-related external deficit of \$3.6bn, compared with a surplus of \$5.1bn in 2010.

The post-2011 experience has undermined what had been a rosy outlook at the start of the decade. Having boosted natural gas production more than three-fold between 1999 and 2009, Egypt appeared to be in full control of its prodigious hydrocarbons resource endowment, able to meet growing domestic demand and generate hard currency revenues via its LNG and piped gas exports.

However, natural gas production began to slip in 2012, with output of four of Egypt's major offshore gas fields commencing a steady decline. Meanwhile, state-owned Egyptian General Petroleum Corporation (EGPC) began to rack up sizable arrears to upstream investors – in excess of \$6bn worth. With exports curtailed in order to meet demand from

President Sisi inspects a mockup of extraction facilities for the Zohr gas field.





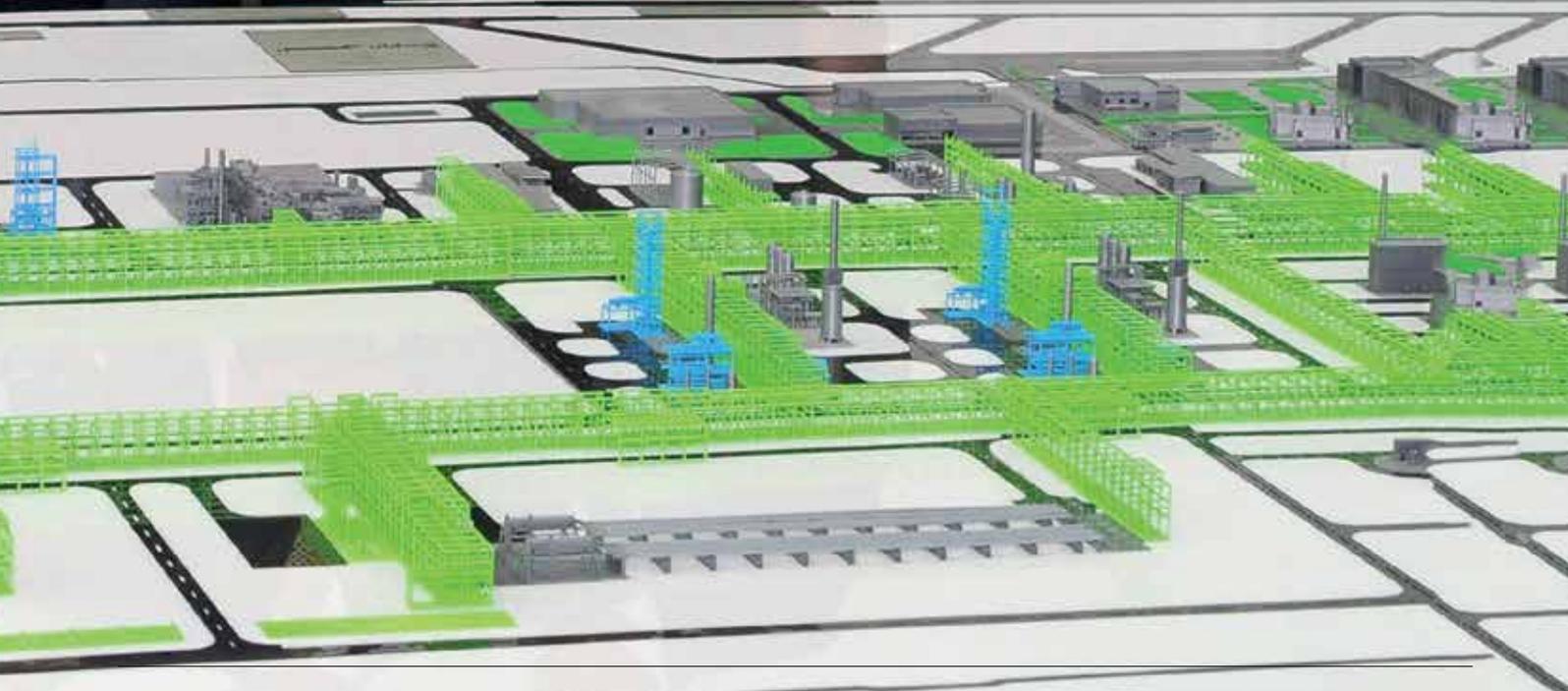
industry and local power generation plants, the situation looked bleak.

Relief was close at hand however. The following year (2015) marked a dramatic turning point in the country's fortunes, with the discovery of the giant Zohr gas field by Italy's Eni, yielding recoverable reserves of a massive 30 trillion cubic feet of gas. Virtually at a stroke, this replenished Egypt's total gas resources by one-third, as Eni pioneered a fast-tracking of the field to ensure first gas production in late 2017.

Together with BP's Atoll gas field, coming on stream at the same time as Zohr, and the West Nile Delta (WND) expansion, this equated to substantial volumes of daily gas supply that could find its way into the domestic grid.

By June of this year, Zohr is likely to be producing 1bn cubic feet per day (bcf/d), before reaching a peak of 2.7 bcf/d by end-2019. In combination with the other production increments, Egypt's total gas production could reach 9 bcf/d by 2020, compared to just over 5 bcf/d in 2017. This additional capacity is highly prized, as the government seeks to meet a 6% annual increase in demand.

The power sector has the clear priority for the new gas supplies. The govern-



ment has indicated that all the Zohr and WND output will be prioritised for the national grid for domestic purposes. This should help put a halt to the country's damaging electricity blackouts, which have had a negative economic impact.

The new gas is also complemented by the country's investment in substantial new power generation capacity, chiefly via three new 4.8 GW combined-cycle gas-power plants being built by Germany's Siemens in Borollos, Beni Suef, and the New Administrative Capital, which combined stand to increase electricity generating capacity by up to 50%. The Siemens plants will be among the largest in the world when they are commissioned later in 2018.

The country's total conventional power plant capacity is just shy of 40 GW, of which less than 1 GW is accounted for by renewable energy sources.

But plans call for a substantial increase in this volume, in order to compensate for the sector's past poor performance and put Egypt's energy sector on a much firmer footing for future expansion. The ambition is to add 20 GW in

total by 2029, in order to reach capacity of 58.1 GW. Of this, some 34.4 GW will be sourced from combined cycle stations, with almost 7 GW of wind power, and 2.75 GW from solar plants.

All told, Saudi-based energy investment bank APICORP estimates that 25 GW of capacity is in execution in Egypt and ready for commissioning, meaning the country should be on track to meet its power requirements by 2022. This means some substantial spending; APICORP estimates that Egypt will need to invest \$28bn in power generation and a further \$18bn in transmission and development in order to meet that target.

Good progress on renewables

The renewable energy effort in Egypt has serious momentum behind it, with March 2018 seeing the first unit in a cluster of 40 solar power plants with a combined capacity of 1.8 GW come on stream in Benban, north of Aswan.

That will help the government meet its target of having 20% of its electricity needs sourced from renewable energies

such as solar and wind power by 2022. By 2035, the government has set a more ambitious target of 35% of its energy being produced from renewable sources.

That has required a focus on ensuring that renewables are bankable for investors in Egypt. The Benban solar scheme was based on feed-in tariffs that offer private investors guaranteed US dollar-based payments over the 25-year concession period. In future such projects' tariffs will be set through a process of competitive tendering.

Egyptian officials have previously said the country's targets would be achieved via a mixture of competitive bidding schemes, a merchant scheme and the FIT programme.

The Ministry of Electricity's next big renewables scheme is a 600 MW solar plant to be located west of the Nile Delta. The Egyptian Electricity Transmission Company (EETC) is now prequalifying bidders for the plant.

Alongside solar are some sizeable wind projects, which will absorb some \$900m in investment from international partners. A consortium of the UAE's



Masdar, Japan's Marubeni and Egypt's Elsewedy Electric signed an agreement to develop 800 MW of wind capacity in Egypt, after President Abdel Fattah Al Sisi's visit to Japan in 2017.

Egypt is also looking seriously at coal-fired power expansion, as part of the diverse energy mix. Egypt Electricity Holding Company (EEHC) is considering proposals for a proposed clean coal power plant with a 6.6 GW capacity at Hamrawein, which is to be developed under an engineering, procurement and construction (EPC) plus finance model. The EEHC received proposals for this project, one of a clutch of clean coal schemes planned for the country, in February 2017. The project is to have an initial capacity of 2,640 MW, and has been under negotiation since 2015.

Developing nuclear energy

In tandem with the wider move to diversify away from fossil fuel sources, Egypt is finally close to realising its long-held ambition to have its own nuclear energy capability. The country has signed deals

with Russia for the development of four nuclear reactors in El Dabaa that should be fully commissioned at the end of the next decade.

Egypt's nuclear pitch underscores the importance of diversification to the Egyptian authorities – not just through renewable projects, but with coal-fired power also figuring prominently in the wider mix. This requirement is also compelled by the need to cope with reduced flows through the Nile from Ethiopia, which have reduced generation at the Aswan High Dam, where a 2 GW hydroelectric plant is located.

The memorandum of understanding (MoU) that was signed with Russia in April 2013 has been followed with progress towards building the nuclear plant at El Dabaa. In December 2017, the head of Russia's nuclear provider, Rosatom, Alexey Likhachev, and Egypt's Electricity and Renewable Energy Minister, Mohamed Shaker, signed notices to proceed with contracts for the construction of four VVER-1200 units at El Dabaa.

The El Dabaa reactors will be dual-purpose; some of the heat produced by the reactor will be used for desalination. Most of the heat will be used to generate electricity.

The nuclear plants will come online in 2026, if all goes to plan, with the first 1.2 GW of capacity at El Dabaa. The second, third, and fourth reactors will be added to the plant subsequently, producing a total of 4,800 MW by 2028.

Pushing ahead with reform

All this requires substantial spending, which in turn will underpin the need to persist with reform of the country's energy subsidy regime. The government has pushed for reforms in domestic subsidies, in order to soften the financial burden on the EETC.

This has forced consumers, both individual and business, to pay more for their electricity supplies than was the case before. In July 2016, the government raised electricity tariffs by an average of 30%, and then hiked them by another 40% in July 2017. More tariff increases are on the way.

Such improvements make Egypt's task of attracting financing for its power plants that much easier. Various projects

have attracted more than \$1bn in financing from international institutions with the World Bank-linked International Finance Corporation and the European Bank for Reconstruction and Development prominent among them.

The government is also looking to boost interconnectivity, for example by activating long-standing plans to build a cross-border power line with Saudi Arabia – the Gulf state with which Egypt has built close relations in recent years.

In June 2013, the governments of Saudi Arabia and Egypt reaffirmed their commitment to the project, signing an MoU to build an estimated \$2.1bn interconnection cable to transport 3 GW a day of electricity. The first phase of the project is expected to launch in 2021.

Egypt already boasts electricity connections with neighbour Libya, and with Jordan. The ministry is currently studying increasing the capacity of electricity links with the latter to 3 GW, as well as establishing two new converter stations in both countries.

The authorities are also seeking to promote competition and complement the legislative reforms aiming to liberalise the energy market. One plan means restructuring the EEHC to ensure its financial soundness and allow it to engage in commercial transactions without government guarantee and/or support.

Such reforms fit into a wider programme of change in Egypt aimed at making the country a regional energy hub, as both a transit route and an importer and exporter of energy. The plan envisages much more private sector engagement in the energy sector. In 2015, a new Electricity Law paved the way for sizeable private investments (worth \$1.8bn) in renewable energies through the FIT scheme. A new Gas Law passed in July 2017 enables private sector involvement in downstream activities.

The good news is that the days when ordinary Egyptians had to labour under almost daily electricity blackouts appear to be coming to a close. The country's good fortune in the discovery of vast new offshore reserves of natural gas, combined with a well-thought-through reform programme that lays a solid basis for a broad-based investment in new capacity, should ensure that its targets will be met. ●

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