



# RENEWABLE ENERGY IN AFRICA:

An opportunity in a time of crisis

## Egypt

### State of electricity

More than 90% of Egypt's electricity is powered by oil and natural gas. It has 'abundant renewables potential', particularly for solar and wind.<sup>1</sup> Since 2014, a year of significant shortages in electricity supply, government has sought to build out capacity quickly. Gas-fired generating capacity has expanded by 200% between 2010 and 2018, when Siemens completed its 'Egypt megaproject' to build three combined-cycle gas turbine plants totalling 14.4 GW. Development of the Zohr gas field continues into 2019.<sup>2</sup>

The state dominates the power market, with the Egyptian Electricity Holding Company (EEHC) and its subsidiaries owning more than 90% of the country's generating capacity. In 2015, the new Electricity Law prompted a gradual market liberalisation by encouraging energy efficiency and the generation of renewable energy, as well as the independence of activities of generation, distribution and transmission of electricity. The offtaker, the Egypt Electricity Transmission Company (EETC) would play the role of independent transmission system operator.

The economy is characterised by high growth, high unemployment, a high poverty rate and a low standard of living. According to Bloomberg analysts, Egypt is forecast to have the highest power demand in the region by the mid-2020s.<sup>3</sup> Egypt's Energy Strategy aims to install total electricity generating capacity of 147 GW by 2035, with an interim target of 125 GW by 2030. Of this, 52 GW (by 2035) and 42 GW (by 2030) is to be made up by large-scale, distributed, grid-connected renewable energy installations.<sup>4</sup>

A total of 99.8% of the population have access to electricity, with access evenly distributed across urban and rural areas. Less than 1 million people are without access to electricity.

### Relevant policy for renewable energy

Egypt aims to supply 20% of its generated electricity from renewable sources by 2022, with plans to install 3.5 GW of solar by 2027 and 7.2 GW of wind by 2020. Energy in Egypt is highly subsidised and as part of the Government of Egypt's major economic reform program introduced in 2016, government aims to phase out electricity subsidies completely by mid-2022. Energy subsidies currently consume a third of the national budget, of which 9% subsidise electricity prices. The 2018/2019 national budget cuts to subsidies raised electricity prices by an average of 26% from July 2018, with electricity costs for factories increasing by 42% and households by 21%.

Egypt's electricity regulator is enabled to take all necessary actions that it deems necessary to encourage renewable energy development in the country.

Egypt has five main mechanisms to reach its renewable energy targets: (1) competitive bidding for build-own-operate (BOO) contracts; (2) feed-in tariff; (3) state-owned projects with competitive bidding for

<sup>1</sup> <http://global-climatescope.org/en/country/egypt/#/enabling-framework>

<sup>2</sup> <https://dailynewsegypt.com/2018/11/20/eni-completes-production-tests-for-9th-zohr-field-well/>

<sup>3</sup> [http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Oct/IRENA\\_Outlook\\_Egypt\\_2018\\_En.pdf](http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Oct/IRENA_Outlook_Egypt_2018_En.pdf)

<sup>4</sup> <https://www.bloomberquint.com/business/egypt-draws-1-8-billion-investments-for-1-4-gigawatts-of-solar>



engineering, procurement and construction (EPC) contracts; (4) a merchant scheme according to which independent power producers can enter into bilateral contracts to sell power directly to consumers using the national grid against wheeling and grid-access charges payable to the grid operator, and (5) auctions, where suppliers bid to supply a determined amount of electricity for the lowest price. The electricity distribution companies (EDCs) are required to accommodate all renewable energy supply and purchase all electricity that has been produced from renewable energy power plants at the price set by the Cabinet of Ministers. Qualifying IPP projects will sign a take-or-pay power-purchase agreement with the distribution company which must then buy a specified minimum amount of electricity, regardless of whether it needs it or can pay for it. Furthermore, the qualifying IPPs will be eligible for priority dispatch whereby the electricity they generate is allowed straight to the market. This means that if there is oversupply of electricity to the grid, then the renewable supply will not be curtailed. Without priority dispatch it is commonly less costly to cut the renewable supply because of the relatively longer start up time for coal power plants.<sup>5, 6</sup>

Incentives to renewable energy developers include the provision of state-owned land at discounted prices or free of charge (much of which is desert), rules that allow developers to join multiple developer consortia, as well as tax and custom duty incentives. Clean energy policy includes utility regulation and diversity in mechanisms to attract renewable energy development.<sup>7</sup>

## Potential and ambition

Egypt has the potential to reach 44 GW of installed solar PV power by 2030, according to the IRENA 2018 report, “Renewable Energy Outlook: Egypt.

Egypt has one of the largest offshore wind potentials in the world.<sup>8</sup> The potential in the Mediterranean Sea is estimated to be around 13 GW, and by 2018, installed capacity was around 1 GW.<sup>9</sup> Technically, there is potential to be more ambitious in developing wind power. Natural gas is a relatively lower-cost investment opportunity because there is existing gas pipeline infrastructure, but deploying this would be controversial given that gas is a fossil fuel. There is no readily available assessment of the market potential for off-grid renewables installations in rural desert settlements.

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<sup>5</sup> <https://www.bloomberg.com/news/articles/2018-03-13/desert-sun-to-power-upper-egypt-with-2-8-billion-solar-park>

<sup>6</sup> <https://www.pv-magazine.com/2018/10/03/developers-alliance-helps-bring-egypts-1-8-gw-benban-pv-complex-online/>

<sup>7</sup> [https://www.ey.com/Publication/vwLUAssets/ey-recal-issue-51-may-2018/\\$File/ey-recal-51-may-2018.pdf](https://www.ey.com/Publication/vwLUAssets/ey-recal-issue-51-may-2018/$File/ey-recal-51-may-2018.pdf).

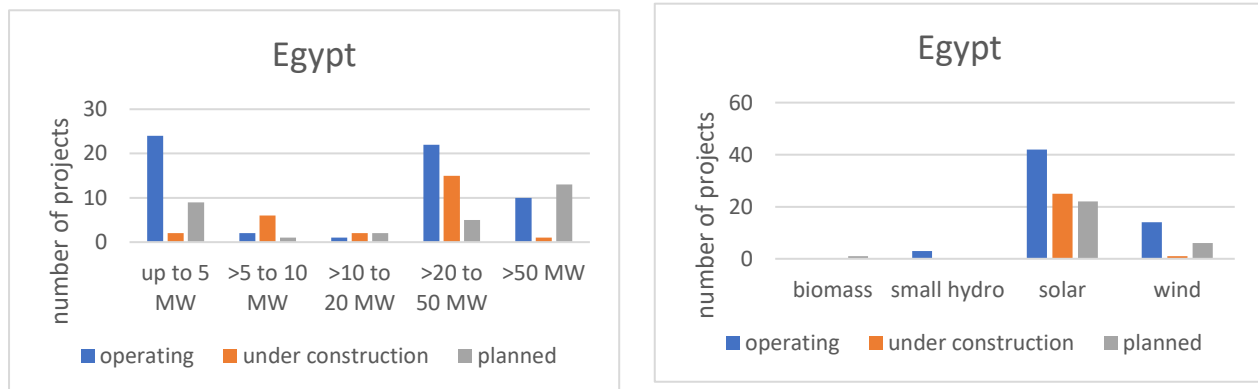
<sup>8</sup> A. Lashin, A. Shata. **An analysis of wind power potential in Port Said, Egypt**. *Renewable Sustainable Energy Review*, 16 (2012), pp. 6660-6667 in Mahdy, M. and Bahaj, A.S., 2018. Multi criteria decision analysis for offshore wind energy potential in Egypt. *Renewable Energy*, 118, pp.278-289.

<sup>9</sup> Mahdy, M. and Bahaj, A.S., 2018. Multi criteria decision analysis for offshore wind energy potential in Egypt. *Renewable Energy*, 118, pp.278-289



## Renewable energy projects

Egypt's feed-in tariff (FiT) programme promoted the development of renewables by guaranteeing that the government would pay a set price for privately produced clean power. The FiT programme is part of Egypt's plans for renewable energy to contribute 37% of its total power by 2035. Under the programme, the EETC contracted 150 MW of generating capacity in phase I, and 1.8 GW in phase II. Within the programme, the Benban Solar Park in Aswan is the most notable project because of its size. It is a USD 4 billion, 1.65 GW PV plant on a site of approximately 37.2km<sup>2</sup>. Construction of the Benban Solar Park started in the first quarter of 2018 and was completed by the end of 2019. The graphs shows the distribution of renewable energy projects by stage of development, where solar shows up as most distinctive in scale



*Distribution of renewable energy projects in Egypt by technology and scale, by stage of development ('operating', 'under construction', or 'planned'). Source: Authors' estimates from African Energy Live database, September 2019.*

The Egyptian government announced in 2017 that it would abandon the feed-in tariff approach and it has since moved to auction-based schemes to secure utility-scale renewables and at the same time drive down electricity tariffs. Under auctions, bidding for larger projects has included onshore wind and solar power proposals. The renewable energy market has been described as challenging and the Zohr natural gas reserves discovery is seen by some as a threat to renewable energy development.

## Off-grid

Examples of off-grid solar installations include the Red Sea Diver's Lodge, food industries, a shopping mall and remote locations.<sup>10</sup> Vodafone Egypt has over the past two decades installed 200 solar-powered sites across Sinai, the North Coast, the Red Sea Coast, Marsa Alam, Edfu, and the Western Desert Oasis (up from 167 in 2011).<sup>11</sup>

IRENA's assessment is that small-scale renewables projects receive limited interest from investors due to their rather small capacity and location in diverse regions across the country. Different biomass technologies have been demonstrated in Egypt, particularly in the production of biogas from animal waste for thermal uses in rural areas and the treatment of municipal solid waste in big cities. Bioenergy service provider companies have been established.

There is limited financial support schemes for off-grid solar and biomass electricity generation and thermal systems, the exception being EGY SOL, an Egyptian Government and United Nations Environmental

<sup>10</sup> <http://karmsolar.com/karmsolar-projects/>

<sup>11</sup> <http://www.vodafone.com.eg/vodafoneportalWeb/en/P32801015081484229795157>



Programme (UNEP) project, funded by the Italian Government for the rollout of solar water heater in Red Sea and Sinai hotels and resorts.

## Local market

The Integrated Sustainable Energy Strategy (ISES) to 2035 does not address the potential for creating local jobs, but does give localisation targets: 70% localisation for renewable energy plants by 2020, 50% for concentrated solar power (CSP) plants and 60% for solar PV including in construction works, mounting structures, cabling, etc. Egypt has localised 30% of overall wind farm requirements. Studies assess that Egypt has the potential to meet more than 80% local manufacturing content, and it can leverage its mature steel, glass and cable industries to produce solar and wind components locally. For example, the three international float glass companies active in Egypt - Saint Gobain, Sphinx and Guardian - all have production facilities that can produce high-purity silica sand used for different industries including PV module production.<sup>12</sup>

Proponents for localisation of renewable energy technology value chains suggest that steel companies can supply the necessary support structures for modules.<sup>13</sup> An example of local production includes Schneider Electric's largest electric distribution panel regional plant in Badr City<sup>14</sup> and Elsewedy for Wind Energy Generation (SWEG) joint ventures in wind turbine and tower manufacturing and the production of cables and transformers. In addition to the several types of equipment manufacturers and engineering firms in the wind, solar and small hydropower sectors, strengths in the value chain include a wide variety of financial and legal service providers. Analysts indicate that the current renewable energy context, where the National Renewable Energy Association (NREA) is the main developer of renewable energy projects in Egypt through funding from development partners, has constrained the development of R&D capacity to leverage local manufacturing potential. These same analysts propose that increased involvement of the private sector, within the framework of joint ventures, would improve this situation by catering towards an increased local content in renewable energy projects.

In terms of capacity building, NREA organises and conducts training programmes on renewable energy resource assessments, technologies and applications, and training for engineers and technicians for the newly established PV companies to obtain certification under the FiT regulation in accordance with both national and international standards. The RENAC-OASIS Solar Academy Egypt (ROSAE), a partnership between the Renewables Academy (RENAC), Germany, and Oasis Renewable Energy (ORE) provides practically orientated training courses and capacity building in renewable energy for decision makers, consultants, engineers, installers and technicians.<sup>15</sup> In 2018, the government launched a renewable energy curriculum at technical schools to encourage specialisation in renewable energy and training in solar and wind. The three-year certificate programme was developed by the Egyptian Ministry of Education and the US Agency for International Development (USAID).<sup>16</sup>

Government incentivises distributed solar PV systems by means of a net metering scheme. This scheme lets electricity users generate electricity to partly or fully offset their electricity bill through self-consumption from a renewable energy technology source, or by selling electricity to the grid. Systems are

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<sup>12</sup> EIB (European Investment Bank) and IRENA (2015), Evaluating Renewable Manufacturing Potential in the Mediterranean Partner Countries, IRENA, Abu Dhabi. Accessed from [www.irena.org/publications/2015/Dec/EvaluatingRenewable-Energy-Manufacturing-Potential-in-the-Mediterranean-Partner-Countries](http://www.irena.org/publications/2015/Dec/EvaluatingRenewable-Energy-Manufacturing-Potential-in-the-Mediterranean-Partner-Countries).

<sup>13</sup> <https://www.dw.com/en/cairos-makeover/av-45306984>

<sup>14</sup> [https://www.zawya.com/mena/en/business/story/Energy\\_sector\\_has\\_lions\\_share\\_of\\_Schneider\\_Electrics\\_investments\\_in\\_Egypt-SNG\\_129991466/](https://www.zawya.com/mena/en/business/story/Energy_sector_has_lions_share_of_Schneider_Electrics_investments_in_Egypt-SNG_129991466/)

<sup>15</sup> [http://www.cladglobal.com/CLADnews/architecture\\_design/Plans-for-a-mixed-use-green-development-in-Cairo-revealed/313792?source=related](http://www.cladglobal.com/CLADnews/architecture_design/Plans-for-a-mixed-use-green-development-in-Cairo-revealed/313792?source=related)

<sup>16</sup> <https://gulfnews.com/world/mena/egypts-new-capital-to-be-twice-the-size-of-cairo-1.60424883>



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typically limited to low voltage levels and analysts believe that the scheme would be taken up by more consumers if larger systems were included and if electricity tariffs increased.

### **Reflection on Egypt renewable energy investment**

Egypt has a vibrant policy space that promotes renewable energy under a variety of programs. The net metering scheme that allows customers to contract to supply the grid for solar power installations up to 20 MW may be stimulated by an increase in the net metering price. This might be a renewable energy investment incentive for commercial units like factories.

In relation to off-grid projects and community benefits, there is little in the media about off-grid projects. Remote locations (across desert) make these attractive, although with a limited market. It was not apparent what energy or off-grid support – apart from the energy subsidies – there is for poor communities.

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Visit the report webpage at <https://350africa.org/renewable-energy-report>.