



RENEWABLE ENERGY OUTLOOK EGYPT

EXECUTIVE
SUMMARY



Based on Renewables
Readiness Assessment
and REmap analysis

Recommended actions

Renewable Energy Outlook: Egypt recommends seven key actions to accelerate the country's uptake of renewables:

- Update energy and power sector strategies to reflect the growing cost advantages and other benefits of renewables
- Reflect the potential of biomass in future updates of the energy strategy
- Streamline regulations and clarify institutional roles and responsibilities for wind and solar development
- Reform the current market framework to improve project bankability
- Bundle renewable energy projects to strengthen risk mitigation and ensure their financial viability
- Conduct comprehensive measurement campaigns for solar and wind potential
- Develop a master plan for enhancing local manufacturing capabilities and create a vibrant domestic renewable energy industry

EXECUTIVE SUMMARY

The Arab Republic of Egypt is the most populous country in North Africa and the Arab region and home to one of the fastest-growing populations globally. The rapidly swelling number of inhabitants has led to a rapid increase in energy demand, putting a strain on the country's domestic energy resources even amid substantial recent offshore natural gas finds. As fuel shortages heightened in 2014, the country's electricity generating capacity struggled to keep pace with rising energy demand.

Egypt's economic development hinges on the energy sector, which represents 13.1% of overall gross domestic product (GDP). To meet burgeoning energy demand, the Egyptian government has pursued an energy diversification strategy, known as the Integrated Sustainable Energy Strategy (ISES) to 2035, to ensure the continuous security and stability of the country's energy supply. This strategy involves stepping up the development of renewable energy and energy efficiency, in part through vigorous rehabilitation and maintenance programmes in the power sector.

Egypt is, therefore, committed to the widespread deployment of renewable energy technologies. To date, the country's total installed capacity of renewables amounts to 3.7 gigawatts (GW), including 2.8 GW of hydropower and around 0.9 GW of solar and wind power. As specified in the ISES to 2035, the Egyptian government has set renewable energy targets of 20% of the electricity mix by 2022 and 42% by 2035.

Egypt has ample potential to achieve these ambitious targets, as it enjoys an abundance of renewable energy resources with high deployment potential, including hydropower, wind, solar and biomass. The establishment of the New and Renewable Energy Authority (NREA) in 1986 was an important milestone in Egypt's efforts to enhance renewable energy deployment. While the NREA focuses particularly on wind and solar technologies, other institutions have devoted efforts to biomass development. Among those institutions are the state-owned electricity generation, transmission and distribution entities operated under the supervision of the Egyptian Electricity Holding Company (EEHC).

This study by the International Renewable Energy Agency (IRENA) provides an in-depth assessment of the policy, regulatory, financial and capacity readiness challenges that need to be overcome to achieve the targets set out in the ISES to 2035. In this respect, it follows the Renewables Readiness Assessment (RRA) methodology, whereby IRENA facilitates country-led consultations with multiple stakeholders, aiming to identify key challenges and highlight solutions to boost renewable energy deployment. It also provides an in-depth analysis based on IRENA's REmap analysis approach, identifying additional renewable energy potential and quantifying other factors, such as costs, investment needs and the effect on externalities related to air pollution and the environment.

Based on this REmap analysis, Egypt has the potential to supply 53% of its electricity mix from renewables by 2030. This amounts to doubling the renewable energy share that could be expected from pursuing existing plans and policies (known in this study as the Reference Case) as well as a significant rise compared to the 9% recorded in 2014 (the base year of the analysis). This assessment is in line with the results obtained for Scenario 3 of the ISES to 2035. With renewable power, heat and fuels all factored in, the REmap analysis shows that renewable energy could provide 22% of Egypt's total final energy supply in 2030, up from just 5% overall in 2014.

Renewable energy could provide 22% of Egypt's energy supply in 2030

The REmap analysis also finds that due to declining costs for renewable power technologies, their increased deployment results in a reduction in total energy costs of USD 900 million annually in 2030, equivalent to a cost reduction of USD 7 per megawatt hour (MWh). This is true even before the reduction in external costs from air pollution, which would bring broad social and health benefits worth as much as USD 8.1 billion annually in 2030. Investment in renewable energy capacity over the period would have to be raised, from USD 2.5 billion per year based on existing policies (the Reference Case) to USD 6.5 billion per year with accelerated deployment of renewables (the REmap Case).

Strategies and plans must be updated regularly to reflect new developments

However, the successful realisation of such deployment would require significant adjustments to Egypt's sustainable energy strategy. The present strategy, developed in 2014, does not reflect the rapid economic and technological changes taking place at the national and regional levels. Moreover, plans need to factor in the latest data to account for the cost of externalities, particularly with Egypt's highly subsidised energy prices. Eliminating such subsidies would relieve the government of a heavy financial burden, which has been a strain amid diminishing state revenues. For Egypt to capture the complete benefits of renewables, the government must consider both financial and technical challenges.

This study attempts to identify those challenges and highlight key actions to overcome existing limitations. Based on these recommended actions, Egypt can meet, and in due course exceed, the targets identified in its sustainable energy strategy.

Challenges and recommended actions

- **Update energy and power sector strategies to reflect the growing cost advantages and other benefits of renewables:** Egypt's sustainable energy strategy, ISES to 2035, is based on the least-cost approach, whereby energy subsidies are eliminated by 2022 and different energy sources would be able to compete within a free and fair market structure. The strategy developed in 2014 envisages a total share of 16% for coal, 3.3% for nuclear energy and 42% for renewable energy in the installed capacity mix by 2035.

The main driver for the introduction of coal in Egypt's energy mix was a result of the 2014 electricity shortages, with imported coal providing a rapid solution to reduce the dependency on imported gas. Today, the approach is subject to drastic change following falling costs for renewables, coupled with the recent natural gas discoveries and rising environmental concerns over coal generation.

Towards this objective, energy and power sector strategies and plans must be updated regularly to reflect new developments, which permit a share of renewables in power generation as high as 53% to be achieved by 2030. This would also reduce and even eliminate the need for coal and nuclear-related imports, thus strengthening the country's energy security. The overall cost-competitiveness and ease of access to finance for renewables, particularly in comparison to the strenuous planning processes required for nuclear technology, could be reflected in future strategy updates.

- **Reflect the potential of biomass in future updates of the energy strategy:** While the regulatory framework addresses electricity production systems using wind and solar, the strategy has not given sufficient focus to the exploitation of biomass potential. This is evident in the limited progress achieved on biomass mainly due to the shortage of local capacity, along with the considerable upfront costs associated with biomass-based electricity generation.

Investment in renewable energy capacity, currently set at around USD 2.5 billion per year until 2030, needs to increase further

Feasibility studies are necessary to assess the potential for developing a strong regulatory framework to enable appropriate policy support schemes. Furthermore, the application of biomass is limited by low awareness of the range of renewable energy technologies available to the end-use sectors. Therefore, the NREA is advised to develop an awareness-raising programme that includes publicity campaigns, along with education and training programmes, to ensure that all the benefits of renewable energy are realised.

- **Streamline regulations and clarify institutional roles and responsibilities for wind and solar development:** Wind and solar deployment is supported through laws, regulations and implementation schemes. Despite the enabling environment to encourage private-sector participation, project developers are discouraged by complex administrative procedures, including the unavailability of contractual documents for projects and multiple focal points for renewable energy deployment. To overcome these challenges, institutional roles ought to be further defined.

This can be achieved by establishing the NREA as the national renewable energy coordinator throughout the project lifetime, thus empowering the NREA as a "one-stop shop" to expedite processes under any renewable energy development scheme, enhancing both the private-sector contribution to renewable energy deployment and reinforcing its role as a facilitator rather than a project developer. In turn, this would allow for the clear definition of institutional responsibilities and prevent the overlap of roles under different procurement and market schemes.

The NREA has so far been given precedence as a developer, based on its current entitlement to land ownership for renewable energy projects, while also being the recipient of most of the soft loans attributed to these projects.

- **Reform the current market framework to improve project bankability:** Under the New Electricity Law of July 2015, direct contractual relations between suppliers and end users can exist, confirming the transition of the Egyptian Electricity Transmission Company (EETC), state-owned off-taker, to a conductor of system operations and dispatching procedures. With respect to the implementation of power purchase agreements (PPAs), EETC has faced difficulties addressing its financial obligations and securing bankable PPAs. This highlights the need to review the current terms and conditions of renewable energy PPAs to address concerns raised by investors, including putting in place standardised project document templates for renewable energy projects.
- **Bundle renewable energy projects to strengthen risk mitigation and ensure their financial viability:** Currently, local financial institutions do not perceive renewables as low-risk investments, despite their cost-competitiveness. The determining factor for renewables is the scale of the projects, such that smaller renewable energy projects are subject to high interest rates from local financial institutions, while larger renewable energy projects are able to obtain lower interest rates from institutions based outside Egypt, with a trade-off in currency exchange rate fluctuations.

Smaller-sized renewable energy projects, however, can be bundled to achieve the required scale, reduce transaction costs and bolster local financial institutions' confidence in projects. In turn, enhanced confidence would allow the domestic financial community to develop lending schemes tailored towards renewable energy projects using concessional resources, allowing renewable energy projects to flourish.

Smaller renewable energy projects can be bundled to achieve scale, reduce transaction costs and bolster the confidence of banks

- **Carry out comprehensive measurement campaigns for solar and wind potential:** Several wind and solar resource assessments have been conducted; however, they have not been supplemented with sufficient detail to ensure bankability of projects. The ISES to 2035 includes 52 GW of both large-scale and distributed on-grid renewable energy by 2035. The REmap analysis shows that already by 2030 similar on-grid renewable capacity could exceed 62 GW.

This necessitates zoning of cost-effective areas with a high potential for renewable energy, while aligning all grid operation and dispatch practices to accommodate the variability in supply that could be expected to follow large-scale solar and wind investments. The measurement campaigns, entailing site appraisal, could be conducted by the developer, thus reducing the burden on the NREA, which currently has the responsibility for resource assessment. In this context, a greater role for variable renewable energy sources will require from NREA to identify viable options for improved power system flexibility, including strengthening cross-border interconnections.

- **Develop a master plan for enhancing local manufacturing capabilities and create a vibrant domestic renewable energy industry:** The ISES to 2035 does not tackle the potential for renewable energy equipment manufacturing and related service sector development. Integrating local content requirements into renewable energy procurement processes is challenging. Most international finance institutions, who are the main funders of large-scale renewable energy projects, are reluctant to accept them on competition grounds.

Nevertheless, studies completed by IRENA highlight Egypt's comparative advantage in different segments of the renewables value chain, particularly in the downstream segments of project development, operation and maintenance. Leveraging this potential to increase the share of local content in manufacturing would facilitate an array of socio-economic benefits.

The current phase of renewable energy deployment has provided 6 000 direct and indirect jobs in total, with solar photovoltaic alone providing half of the jobs created. The government, therefore, is advised to elaborate a national master plan for the development of local manufacturing capabilities, specifically in order to promote knowledge and technology transfer, thus creating local jobs.

- This document summarises **Renewable Energy Outlook: Egypt** (IRENA, 2018 - ISBN 978-92-9260-069-3), a report prepared by IRENA in collaboration with the Government of Egypt, as represented by NREA

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○ About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.

○ About NREA

The New and Renewable Energy Authority (NREA) is a governmental authority that has served as both project developer and regulator. It was established as the national focal point for expanding efforts to develop and introduce renewable energy technologies to Egypt on a commercial scale, together with implementation of related energy conservation programmes.

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P.O. Box 236
Abu Dhabi, United Arab Emirates
Tel: +971 2 4179000
www.irena.org

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