Policy Brief

A Series of Policy Papers on Renewable Energy

Policy Paper II

A Surf Through Egypt's Renewable Energy Projects (1998–2025)

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This short study is the first in a series of papers prepared by ECES as part of its renewable energy project.

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Executive Summary

Egypt's renewable energy sector has undergone a profound transformation over the past two decades, evolving from a small number of donor-funded pilot projects into a large-scale, investment-driven market with regional significance. This paper maps the major renewable energy projects implemented, under development, and proposed in Egypt between 1998 and 2025, highlighting key trends in capacity growth, technology choice, funding models, and sectoral integration.

The analysis shows that Egypt currently hosts 18 major renewable energy projects, of which the majority are operational. Installed capacity is highly concentrated, with a small number of utility-scale projects accounting for more than 60% of total renewable capacity. Wind and solar photovoltaic technologies dominate the portfolio, while hybrid systems and green hydrogen projects represent the next phase of sector evolution.

A clear shift in financing models is observed over time. Early projects relied heavily on concessional loans and international donor funding, whereas recent developments increasingly use Build-Own-Operate (BOO) structures supported by private capital and blended finance. This transition has enabled faster deployment, larger project sizes, and greater technological sophistication.

Egypt has also achieved globally competitive renewable energy tariffs, particularly in solar and wind power, positioning the country as one of the most cost-effective clean energy markets worldwide. Looking ahead, the project pipeline suggests continued expansion beyond 2025, with several large-scale hybrid and green hydrogen projects expected to become operational between 2026 and 2028. Together, these trends reinforce Egypt's strategic role as a regional hub for renewable energy and clean technology.

1. Introduction

The objective of this policy paper is to provide a structured mapping of major renewable energy projects in Egypt. Projects are categorized into three groups: (i) projects currently in operation, (ii) projects under development, and (iii) proposed projects. The analysis highlights trends in project scale, technology, funding models, and sectoral focus, reflecting the rapid evolution of Egypt's renewable energy sector.

A summary of the main projects is presented in **Annex 1**, while **Annex 2** provides detailed project-level information, including location, energy type, installed capacity, implementing entities, commercial operation dates (where applicable), supervising authorities, and key technical and financial characteristics.

Overall, Egypt's renewable energy sector is expanding rapidly in both scope and sophistication, with notable shifts toward larger-scale projects, diversified technologies, and increased private sector participation.

2. Overview of Renewable Energy Projects

2.1. Project Portfolio and Scale

As of 2025, Egypt has a total of 18 major renewable energy projects. Of these, 12 are operational, 3 are under development, and 3 are proposed. The portfolio spans solar photovoltaic (PV), wind, hybrid systems, and emerging green hydrogen projects.

A small number of large-scale projects dominate installed capacity. The three largest operational projects account for more than 60% of total renewable energy capacity, indicating a clear trend toward economies of scale and utility-scale development.

2.2. Technology Trends

The technological focus of renewable energy projects in Egypt has evolved significantly over time:

- **Early phase (1998–2015):** Predominantly large wind farms and simple solar PV installations.
- **Recent phase (post-2015):** Increasing adoption of hybrid systems combining solar, wind, and storage, as well as the emergence of green hydrogen and green ammonia projects.

This evolution reflects both global technological progress and Egypt's strategic objective to diversify its clean energy mix.

3. Temporal Development of Projects

The first major renewable energy project in Egypt was launched in 1998 with the Zafarana Wind Complex. Following this initial phase, limited large-scale development occurred until around 2010, when multiple wind energy projects were initiated.

From 2015 onwards, solar energy projects expanded rapidly, particularly following the launch of the Benban Solar Park. Between 2019 and 2025, Egypt experienced a wave of new projects across solar, wind, hybrid, and green hydrogen technologies.

The period between 2020 and 2023 saw fewer project completions, largely due to logistical and supply-chain disruptions associated with the COVID-19 pandemic. However, project timelines indicate a strong pipeline, with several major projects expected to become operational between 2026 and 2028, including the proposed Zafarana Hybrid Repowering project.

4. Funding Models and Investment Structure

Analysis of detailed project information (see Annex 2) reveals a clear shift in funding mechanisms over time:

- **Early projects (2000s–early 2010s):** Primarily financed through concessional loans and donor funding from European and Japanese development agencies.
- **Recent projects (late 2010s–2020s):** Increasing reliance on private sector investment, blended finance, and non-recourse project finance structures.

The Build-Own-Operate (BOO) model has become the dominant structure for large-scale renewable energy projects, while smaller or decentralized projects continue to benefit from grants and concessional financing.

Key private sector players include ACWA Power, Scatec, AMEA Power, Orascom Construction, and KarmSolar, alongside strong institutional support from entities such as EBRD, AfDB, IFC, and JBIC.

5. Sectoral Integration and Economic Impact

Several renewable energy projects in Egypt are designed to directly support strategic economic sectors:

- **Tourism:** Solar grid solutions for resorts, such as the Marsa Alam Solar Grid.
- **Agriculture:** Hybrid systems supporting farms in remote areas, such as the Farafra Hybrid project.
- **Oil and Gas:** On-site solar installations for refineries and industrial facilities to reduce fuel consumption.
- **Green Industry:** Emerging green hydrogen and green ammonia projects targeting export markets and sustainable fertilizer production.

These projects are typically smaller in capacity but strategically located close to end users, enhancing energy efficiency and resilience.

6. Cost Competitiveness

Egypt has achieved globally competitive tariffs in renewable energy, particularly in solar and wind projects. Notable examples include:

- **Kom Ombo PV:** Record-low solar tariff of 2.47 US cents/kWh.
- **Zafarana Hybrid (proposed):** Target tariffs of approximately 2.0 US cents/kWh for solar and 2.4 US cents/kWh for wind.

These cost levels don't position Egypt as one of the most competitive renewable energy markets globally, as other countries accept higher tariffs making it more appealing for investors securing higher returns

7. Conclusion

Egypt's renewable energy sector has transitioned from donor-led pilot projects to a mature, investment-driven market characterized by large-scale developments, advanced technologies, and diversified funding models. The project pipeline suggests continued growth beyond 2025, with a strong emphasis on hybrid systems and green hydrogen. This evolution reinforces Egypt's strategic role as a regional hub for renewable energy and clean technology.

Annex 1

Summary of Major Renewable Energy Projects in Egypt

Annex (1) provides a high-level overview of the main renewable energy projects covered in this paper, categorized by capacity, energy type, and implementation status.

Table A1.1. High-level Overview of the Main Renewable Energy Projects

Project Name	Capacity (MW)	Energy Type	Status
Benban Solar Park	1,465	Solar (PV)	Operating
Amunet Wind Farm	500	Wind	Operating
Zafarana Wind Complex	545	Wind	Operating
Gabal El Zeit Wind Farm	580	Wind	Operating
Gabal El Zayt – NREA I	220	Wind	Operating
Ras Ghareb Wind Farm	263	Wind	Under Development
Kom Ombo PV	200	Solar (PV)	Operating
Marsa Alam Solar Grid	10	Solar (PV)	Operating
Ras Ghareb Wind Farm 2	500	Wind	Operating
Assiut Refinery PV	10	Solar (PV)	Operating
EGPC PV	6.5	Solar (PV)	Operating
Scatec Obelisk	1,125	Solar + Storage	Under Development
Hurghada PV Plant	20	Solar + Storage	Operating
Farafra Hybrid	3.4	Hybrid	Operating
Scatec Green H2	100	Green Hydrogen	Under Development
Zafarana Hybrid Repowering	3,200	Hybrid	Proposed

Source: American Chamber of Commerce in Egypt (AmCham).

Annex 2
Detailed Project Information

This annex provides standardized, publication-ready profiles for each major renewable energy project in Egypt. Information includes location, technology, capacity, implementation structure, timelines, funding, and key impacts.

A. Benban Solar Park

- **Location:** North West of Aswan City (≈40 km)
- **Energy Type:** Solar (PV)
- **Installed Capacity:** ~1,800 MW (grid-connected in phases)
- **Implementing Entities:** Consortium of 39 local and international companies
- **Start Date:** 2015–2017 (phased)
- **Commercial Operation:** Gradual grid connection from 2019
- **Estimated Cost:** USD 2 billion
- **Supervising Authority:** New and Renewable Energy Authority (NREA)
- **Implementation Model:** BOO / BOT with 25-year PPAs
- **Key Notes:** One of the world's largest solar parks; located in one of the sunniest regions globally; significant employment creation; advanced GIS systems used for the first time in Egypt.

B. Amunet Wind Farm

- **Location:** Ras Ghareb, Gulf of Suez
- **Energy Type:** Wind
- **Installed Capacity:** 500 MW (77 turbines × 6.5 MW)
- **Developers:** AMEA Power (60%) and Sumitomo Corporation (40%)
- **Start Date:** 2022
- **Commercial Operation:** May 2025
- **Estimated Cost:** USD 700 million

- **Supervising Authority:** NREA and Ministry of Electricity
- **Implementation Model:** BOO with 25-year PPA
- **Key Notes:** Largest wind farm in Africa; supplies electricity to ~750,000–800,000 households; annual CO_2 reduction of ~1.1 million tons.

C. Zafarana Wind Complex

- **Location:** Zafarana, Gulf of Suez
- **Energy Type:** Wind
- **Installed Capacity:** 545 MW
- **Developer:** NREA with international partners
- **Implementation Period:** 2000–2010 (phased)
- **Operational Status:** Decommissioned in 2021 after 20-year lifespan
- **Funding:** Concessional loans from European and Japanese agencies
- **Key Notes:** Egypt's first large-scale wind project; foundation of national wind strategy.

D. Gabal El Zeit Wind Farm

- **Location:** South of Ras Ghareb, Red Sea Coast
- **Energy Type:** Wind
- **Installed Capacity:** 580 MW
- **Technology Provider:** Siemens Gamesa
- **Start Date:** 2010
- **Commercial Operation:** 2018
- **Estimated Cost:** USD 514 million
- **Supervising Authority:** NREA
- **Key Notes:** Large government-led project; first in Egypt to implement radar-based bird migration monitoring.

E. Ras Ghareb Wind Farm

- **Location:** Ras Ghareb, Gulf of Suez

- **Energy Type:** Wind
- **Installed Capacity:** 263 MW
- **Developers:** Toyota Tsusho, ENGIE, Orascom Construction
- **Construction Start:** June 2017
- **Commercial Operation:** 2019
- **Estimated Cost:** USD 380 million
- **Implementation Model:** BOO with 20-year PPA
- **Key Notes:** First BOO wind project in Egypt; completed ahead of schedule; strong safety record.

F. Kom Ombo PV

- **Location:** Kom Ombo, Aswan Governorate
- **Energy Type:** Solar (PV)
- **Installed Capacity:** 200 MW
- **Developer:** ACWA Power
- **Commercial Operation:** July 2024
- **Estimated Cost:** USD 165 million
- **Supervising Authority:** NREA and EETC
- **Implementation Model:** BOO with 25-year PPA
- **Key Notes:** Record-low solar tariff of 2.47 US cents/kWh; highly competitive financing structure.

G. Marsa Alam Solar Grid

- **Location:** Marsa Alam, Red Sea
- **Energy Type:** Solar (PV) + Grid Integration
- **Installed Capacity:** 10 MW
- **Developer:** KarmSolar
- **Commercial Operation:** 2022

- **Supervising Authority:** EgyptERA and EETC
- **Key Notes:** First regional solar grid for tourism resorts; reduces diesel dependence; decentralized energy model.

Annex 3

Summary Table of Major Renewable Energy Projects in Egypt

Annex 3 consolidates key project-level data for ease of reference. Detailed descriptions and technical information are provided in Annex 2.

Table A3.1. Key Project-Level Data

Project Name	Capacity (MW)	Energy Type	Status
Benban Solar Park	1,465	Solar (PV)	Operating
Amunet Wind Farm	500	Wind	Operating
Zafarana Wind Complex	545	Wind	Operating
Gabal El Zeit Wind Farm	580	Wind	Operating
Gabal El Zayt – NREA I	220	Wind	Operating
Ras Ghareb Wind Farm	263	Wind	Under Development
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Scatec Obelisk	1,125	Solar + Storage	Under Development
Hurghada PV Plant	20	Solar + Storage	Operating
Farafra Hybrid	3.4	Hybrid	Operating
Scatec Green H2	100	Green Hydrogen	Under Development
Zafarana Hybrid Repowering	3,200	Hybrid	Proposed MOU signed
Alcazar Energy	3,000	Wind	Proposed and MOU signed
Hassan Allam Utilities and Infinity Power	200	PV	Under implementation
Hassan Allam Utilities and Infinity Power	1000	PV	Under study
Scatec	1000	PV	For Egypt Alum Co. also in Nag Hamadi
Sactec	500	wind	Under development
Scatec	1700	PV	Under study in Alminya
AMEA Power	1000	stand-alone BESS	Under development in Benban

Source: CMS International Law Firm.

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