



Renewable Energy Strategy for 2020 and Regulatory Framework

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*Egyptian Electric Regulatory and Consumer
Protection Agency*



Objectives of the Agency

- **Regulate, supervise, and control all matters related to the electric power activities, whether in generation, transmission, distribution, or consumption, in a way that ensures:**
 - **Availability and continuity of electricity supply**
 - **Satisfy considerations for environmental protection**
 - **Satisfy interests of the electric power consumers as well as the interest of the producers transmitters and distributors.**
 - **The Agency aims also at preparing for lawful competition in the field of electricity generation, transmission, and distribution, and avoiding any monopolization within the Electricity market**
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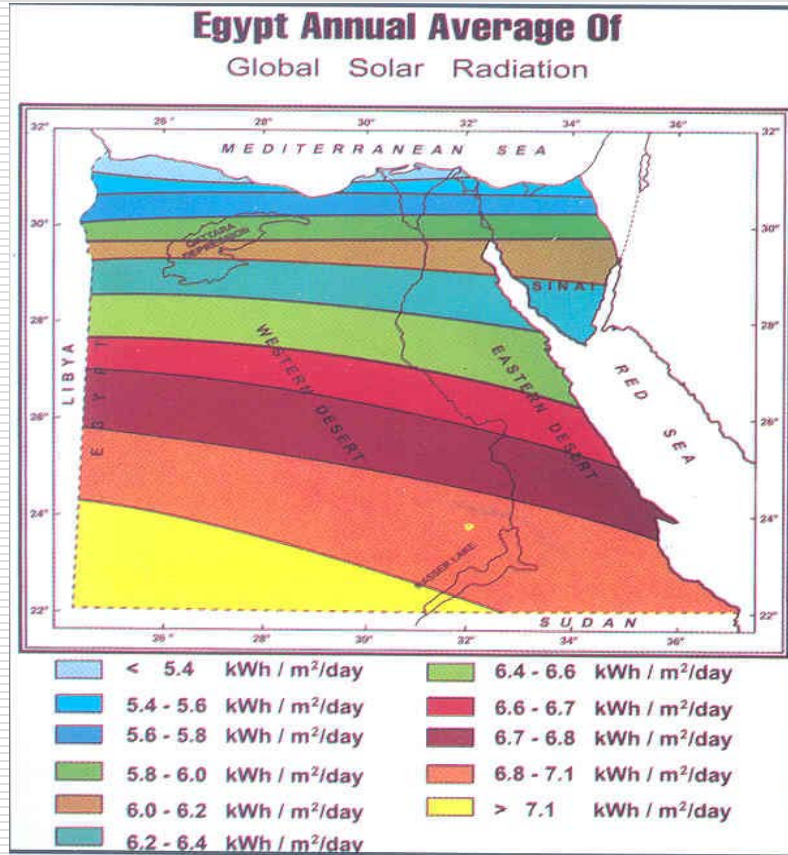
Potential of Electricity Generation from Renewable Resources in Egypt

- Egypt is a rich country with renewable resources which can be used for power generation on commercial scale. These resources include; wind, solar and biomass

 - Atlases for both wind and solar energies have been developed
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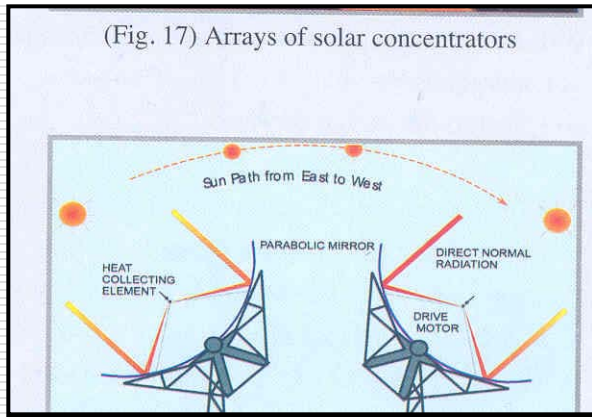
Potential of Solar Energy in Egypt



- Two third of the country area has a solar energy intensity more than 6.4 kWh/m² day (an annual global solar radiations of 2300 kWh/m² year)

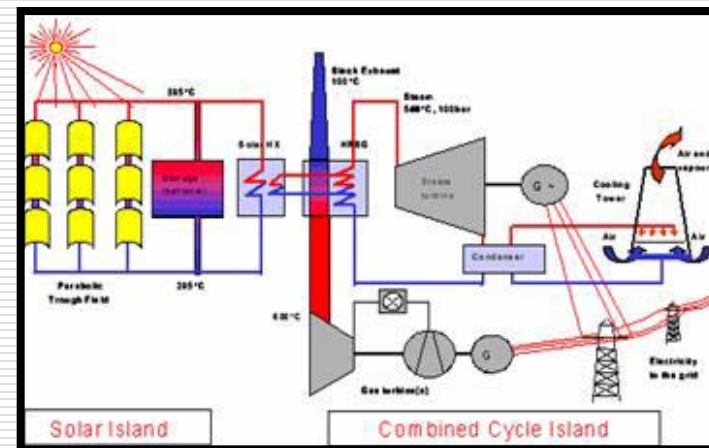


Power Generation Using Solar Thermal Power Plant



(Table-4) Summary of Technical Parameters of Baseline Design

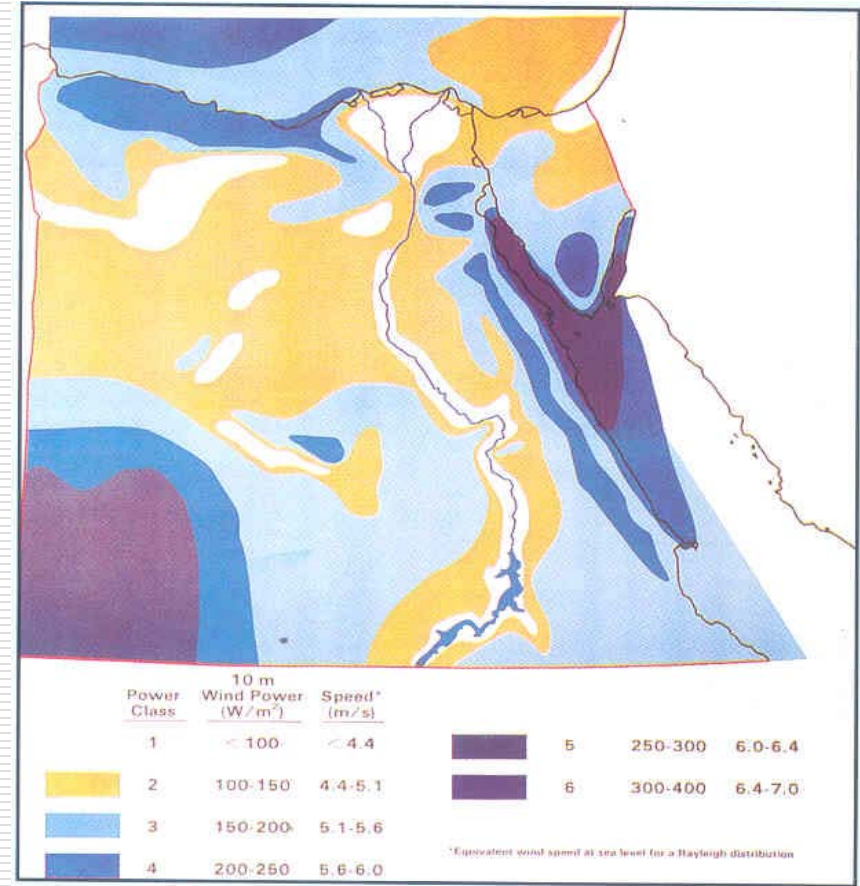
Capacity of Solar portion (MWe)	30
Capacity of gas turbine (MWe)	2X41.5
Capacity of steam turbine (MWe)	68
Net electric energy (GWhe/a)	985
Exegetic solar generation (GWhe/a)	65
Solar share	6.6%
Fuel saving due to the solar portion (T.O.E / a)	14000
CO ₂ reduction (T / a)	38000





Potential of Wind Energy in Egypt

In some areas especially on the Red sea coast the wind speed approaches 10 m/sec or even higher





Wind Energy Potential Sites

- ❑ According to the Wind Atlas in Egypt published by NAREA in cooperation with the National Laboratory RESO (Denmark), the major areas with sufficient wind energy resources have been identified.
 - ❑ Most of the sites where high wind speed exists in state owned lands
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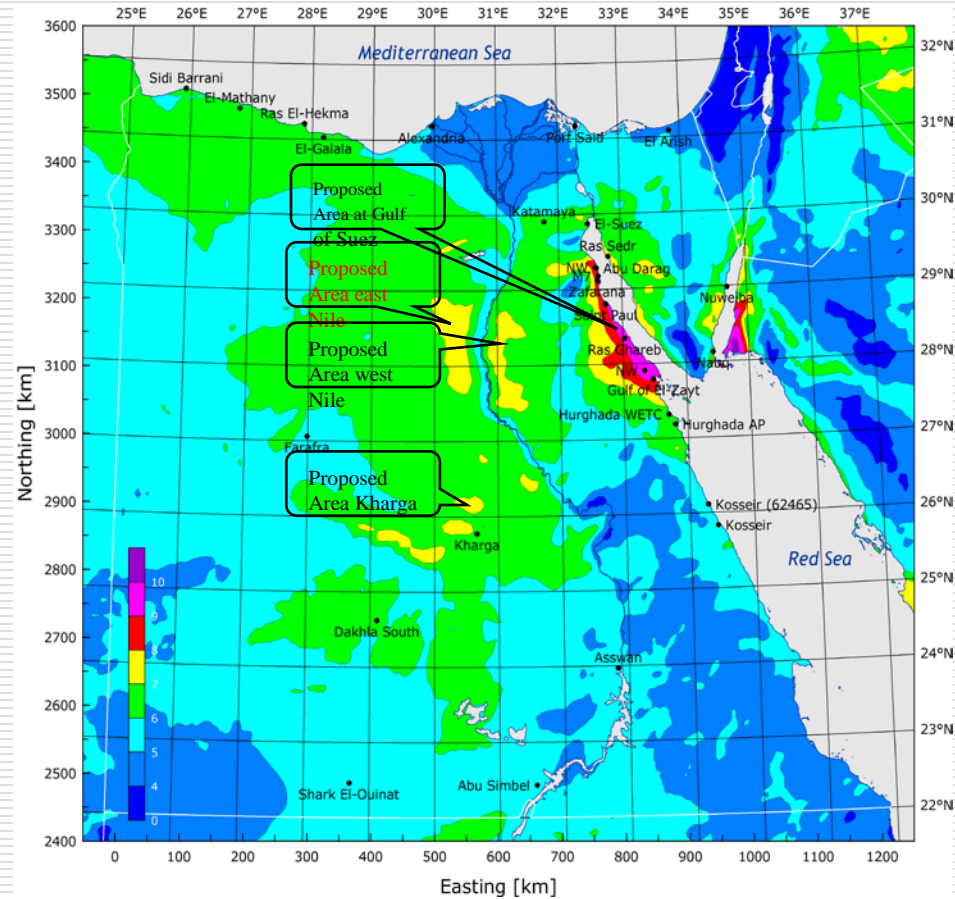
Wind Energy Potential Sites

□ These areas include:

- Gulf of Suez area-Class 1 at the height of 50 m above ground level is between 400 and 800 W/m²- wind speed (> 9 m/s)
 - Western Egypt Domain at the west bank of the Nile-Class 1 at the height of 50 m above ground level is between 300 and 400 W/m² - wind speed (7-8 m/s)
 - Areas close to Kharga -Class 1 at the height of 50 m above ground level is between 300 and 400 W/m² -with wind speed (7-8 m/s)
 - Eastern Egypt domain at the east bank of the Nile-Class 1 at the height of 50 m above ground level is approx. 300 W/m² - wind speed (6-7 m/s)
 - Gulf of Aqaba area Class 1 at the height of 50 m above ground level is between 400 and 600 W/m². (national reserve so restricted site)
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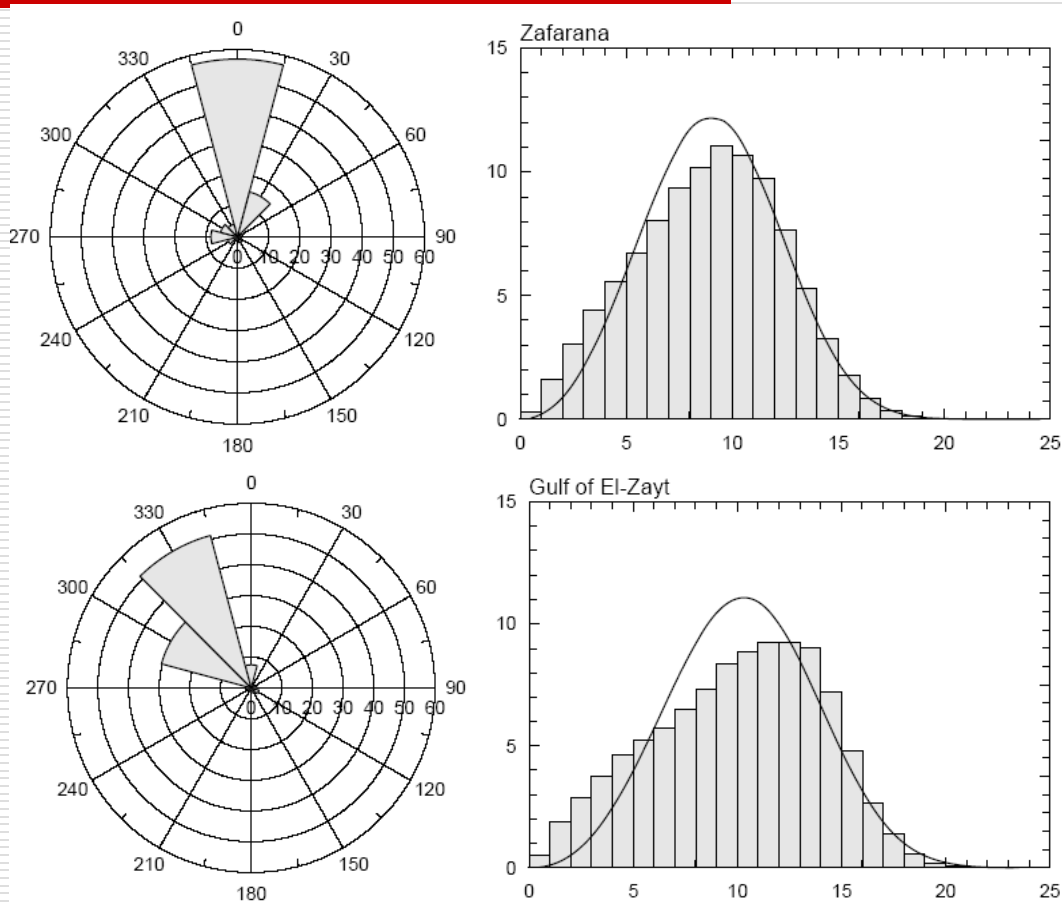


Wind Atlas of Egypt and Areas of High Wind Energy





Wind Speeds at Gulf of Suez



Source: NREA and Risø National Laboratory (DK): Wind Atlas for Egypt. December 2005



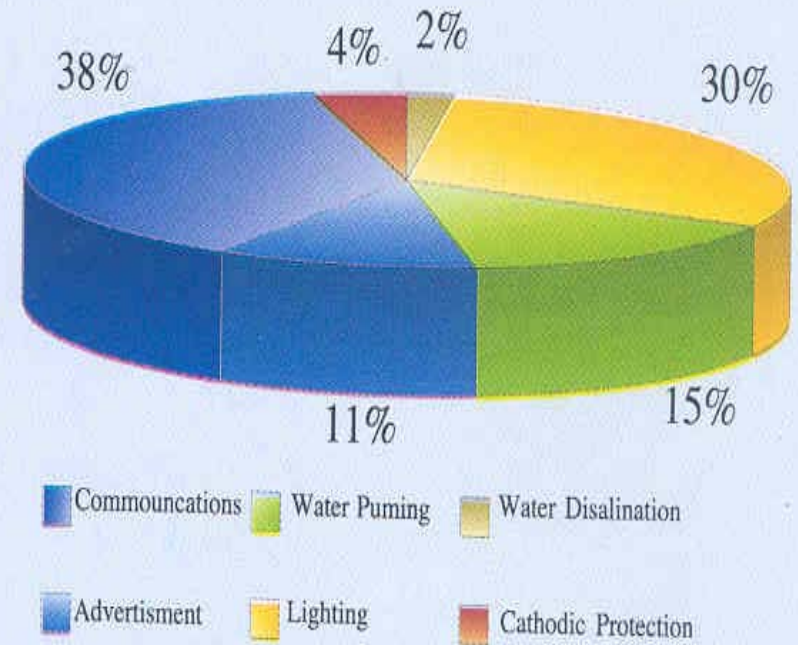
Main Features of Wind Energy in Egypt

- Main features of wind energy in Egypt:**
 - High wind speed resources but concentrated in some areas**
 - Most of the sites with high wind speed are in remote areas**
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Other renewable Energy Projects

- Power generation from the gasification of sewage sludge in waste water treatment plants (EL-Gabal El-Asfer 23 MW plant) is already been used.
- High potentials projects for power generation based on gasification or direct combustion of organic solid wastes or agricultural wastes are under considerations
- Expansions in the applications of Photovoltaic.
- Solar water heaters for domestic use



(Fig. 22) Distribution of PV applications in Egypt.



Barriers for Promoting Renewable Energy Suppliers

- ❑ **Most of the renewable power sources are not competitive in price with electricity produced from fossil fuels in Egypt**
 - ❑ **This is attributed on one hand to electricity subsidy and on the other hand to the intensive capital cost of these projects, since the equipment needed is not locally manufactured**
 - ❑ **Most renewable sources have low power intensity which requires the power system, which is current structured on the centralized plants, to adopt the concept of distributed generation**
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Renewable Energy Strategy

- ❑ **In February 2008 the supreme council of energy has set a target to have 20% of the electrical energy mix from renewable sources including hydro by the year 2020**
 - ❑ **The current hydro installed capacity represents 12% this will become 8% by the year 2020**
 - ❑ **This means that 12% contribution from renewable source other than hydro need to be added by 2020.**
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Renewable Energy Strategy

Solar

Large pilot implementations based on soft financing (e.g. Korimatte solar thermal).

Electrification of rural areas.

Regional Initiatives (Mediterranean Solar Plan “MSP”)



Renewable Energy Strategy

Biomass

1000 MW potential primarily from

Agricultural waste

Municipalities waste

Cooperation with Ministry of Environment and municipalities



Renewable Energy Strategy

Geothermal

Assessment and identifying potential

Hydro

Mini and Micro plants with total capacity less than 100 MW (not including Katarah depression).

This will be done in cooperation with Ministry of Irrigation and Water Resources



Local Manufacturing of RE Equipment

- ❑ A parallel approach to increasing RE generation capacity is the local manufacturing of RE equipment. This will increase the added value to the economy.
 - ❑ This programs necessitates:
 - ❑ Large scale technology transfer program
 - ❑ Large scale program to support research and development program for RE technologies similar to that considered in China and India.
 - ❑ Incentives to local activities supporting localization of RE technologies
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Justification for Relaying of Wind

- ❑ Electricity generated from wind resources represent a near reach opportunities where it has the closest price to electricity generated from oil and gas.
 - ❑ The Set Target of 20/20 will be met principally relying on Wind Resources
 - ❑ Considering the available wind speed and capacity factor, the set target is equivalent to 7200 MW
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Renewable Energy Implementation Plan

- ❑ **New electricity law “under ratification” has adopted three mechanisms for power generation from renewable sources these mechanisms are:**
 - ✓ **Plants built by NAREA**
 - ✓ **Plants built through Competitive bidding**
 - ✓ **Plants built through the Feed-in Tariff**
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Implementation Plan for Renewable Energies

- In addition to the market reform which guarantee third party access, power generation from renewable sources will enjoy priority in dispatching whenever they are available.
- The proposed polices consists of two phases
- **Phase 1:** Competitive Bids
 - According to this approach the grid will issue tenders requesting supplying power from renewable energies resources

This will be done within the scope of the following criteria:

- Control the increase in RE capacities with reference to the capacity of transmission system and capacity of the market to absorb.
 - Increase local manufacturing
 - Increase private investment
 - Achieving the lowest possible prices.
 - Provide the investors with guarantees through long term power purchase agreements
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Measures Adopted for Renewable Energies in the New Electricity Law (Contd.)

□ Phase 2

- Increase the chances to the market forces through the implementation of feed-in-tariff taking into consideration the prices achieved in phase 1.
 - The agency is studying a formula for calculating the feed-in –tariff in cooperation with a German consultant.
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Renewable Energy Fund

■ *Establishment of RE fund:*

- The fund will cover the deficit between the RE cost and market prices as well as provide financial support to pilot projects.
 - The main sources of finance of the fund will come the subsidy currently given to the to the fossil fuels used in power generation.
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Renewable Energy Development Business Models

Item	NAREA	Competitive Bidding	Feed-In-Tariff
Program size	2200 MW	2500 MW	2500 MW
Single Wind Farm Size	Large (100-400 MW)	Large ten Modules each (250 MW)	Medium and Small below 50 Mw
Developer	NAREA	Private (most probably international)	Private (focus on local)
finances	Governmental and soft financing from international development agencies	Commercial finance	Commercial finance
Tariff Setting	Proposed by Egypt era and approved by the cabinet of ministers	According to the bid outcome	proposed by Egypt era and approved by cabinet of ministers
Contracting	20 years	Long term PPA mostly for 20 years	15 years
Off taker	Grid		Grid or distribution system
O/M	NAREA	Developer	Developer
Construction Responsibility	NAREA through EPC	Developer	Developer



NAREA Share in the Plan

- ❑ **Projects in the pipelines till 2014 900 MW, by 2014 NAREA will reach 1270 MW)**
 - ❑ **Current installed capacity is 400 MW**

 - ❑ **There is a plan to add another 200MW every year (2015-2020) to reach 2200 MW.**

 - ❑ **Added capacity after 2014 will developed either through the current business model, which relies on soft financing or through partnership with other governmental entities**
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Competitive Bidding

- ❑ **2500 MW to be executed by private sector through long term power purchase agreement with the grid**
 - ❑ **The 2500 MW will be issued in blocks each of which of 250 MW**
 - ❑ **The program will include 5 bids each will consists of more than one block except the first one which will be restricted to one block.**
 - ❑ **It targets to attract highly qualified international developer with strong financial status and high capacity for technology transfer.**
 - ❑ **Promotion of local manufacturing where bid evaluation will be based on points system which offers advantages for proposal having higher share of locally manufacture components.**
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Competitive Bidding

The bidding process consists of two Phases

- ❑ **Phase1: Pre-Qualifications based on experience and financial status (1-Year Period). It will also include**
 - ❑ **Wind measurements**
 - ❑ **Bird Migrations & environmental impact assessment**
 - ❑ **Soil testing**
 - ❑ **Phase2: Short listed bidders submit proposals to construct, own and operate the wind plant**
 - ❑ **By the year 2017 the last tender will be solicited for achieving the targeted energy by the year 2020**
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Feed in Tariff

- ❑ **Goal is to reach 2500 MW**
 - ❑ **Support medium and small developer**
 - ❑ **Projects with capacities of 50MW and less**
 - ❑ **Tariff will be set for 15 years taking into consideration the wind speed and capacity.**
 - ❑ **An international consultant has been already hired to design the feed-in Tariff as well as the PPA contract template.**
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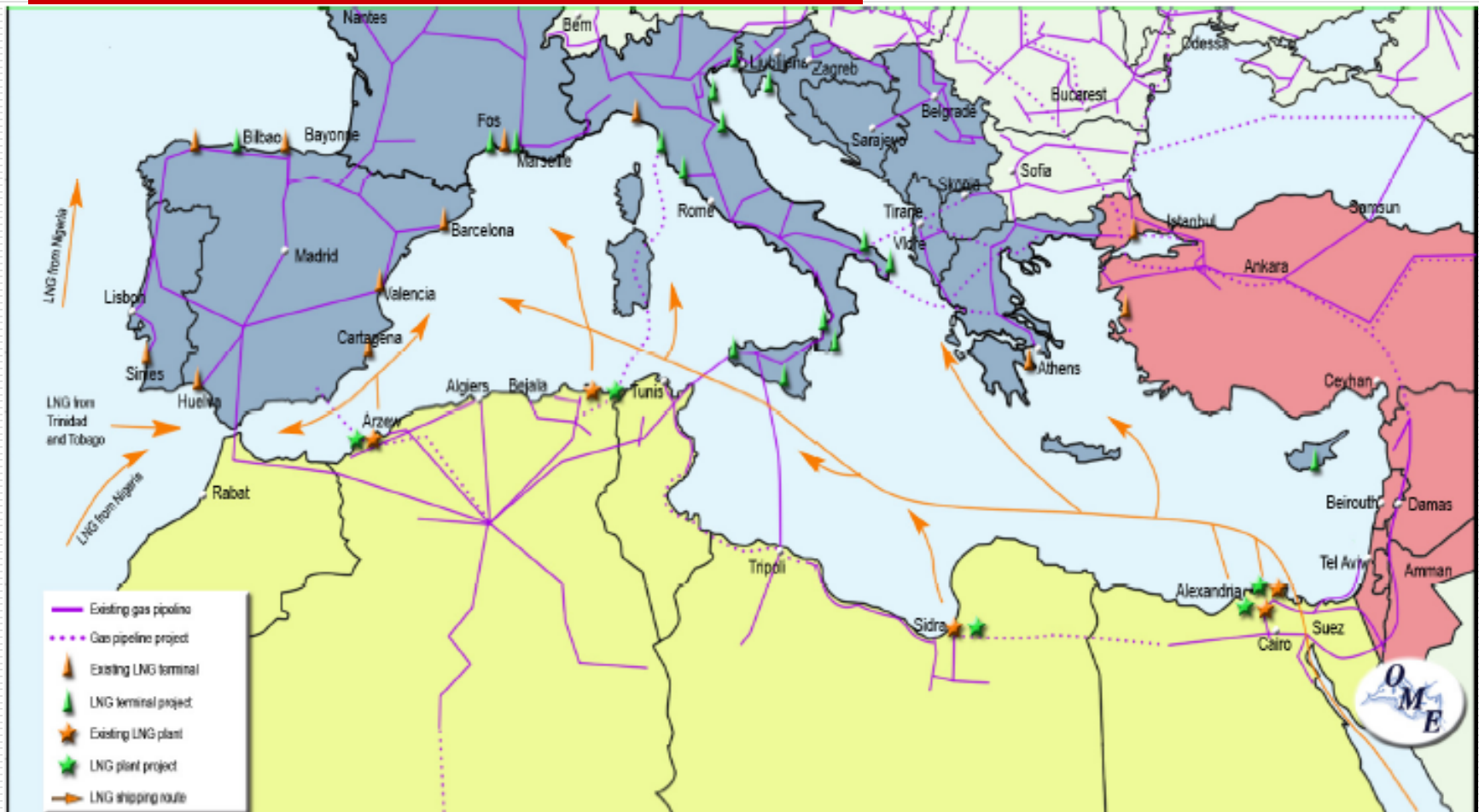


Integrated Energy Scope (IES)

- ❑ There is a lack in electricity Interconnection capacity between Egypt and EU, which limits Egypt capacity to export renewable energy to EU.
 - ❑ On the short and medium terms direct interconnection between EU and Egypt has no priority compared with other interconnections due to technical and financial challenges.
 - ❑ On other hand Egypt gas interconnection with EU is well developed.
 - ❑ Egypt could apply an IES through exporting RE in NG equivalent.
 - ❑ Accordingly Egypt will export NG necessary to generate an equivalent quantity to the electricity generated from RE sources, while using the generated electricity from RE domestically.
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Existing and Future Gas Routes in Mediterranean





Advantages of IES

- ❑ Overcome the limitations on attracting investments for RE projects development, since Egypt will be ready to transmit an equivalent quantity of clean fuel to EU matching with the schedule set in MSP, without waiting for future infrastructure development.
 - ❑ Multiple injection points in EU which overcome potential congestion as quantity of RE energy exported increased, if standard electricity interconnections is considered.
 - ❑ This will not have an adverse impact on Egypt security of supply, where the exported gas will be equivalent to the gas which would be burned locally to generate electricity.
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Role of Electricity Regulatory Agency in Promoting Renewable energies projects

- The previous period of the agency activities were concentrating on capacity building and establishing its activities including licensing, cost of service modeling, benchmarking program and preparing the market to accept the agency role
 - During the coming phase of the agency activities several measures for promoting renewable energy service providers are under considerations. These measures include both regulatory as well as stimulatory measures
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Regulatory Measures

- ❑ Obliging the utilities to purchase a certain amount of its supplied energy from renewable sources. This amount should be variable to accommodate the economics of generation.
 - ❑ Interconnection of the distributed source with the grid and adopt a standard power purchase agreements
 - ❑ Request the electricity service providers to establish energy efficiency programs. These programs are financed through allocating defined percentage of their revenues. These programs could be used to support initiatives for renewable sources such as Solar water heaters
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Stimulatory Measures

- ❑ Adopt a cost reflecting electricity tariff
 - ❑ Encourage private sector participation. This could include:
 - ❑ Developing necessary contracts for public private partnerships for service providers to encourage private sector to invest in wind farms
 - ❑ Developing the necessary guide lines for power wheeling on transmission and distribution grids and approve the necessary tariff.
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Stimulatory Measures (contd.)

- As a part of its Integrated Resource Management Plan the Oil and gas sector together with the electricity sector have developed a fund which subsidizes the renewable energy, this subsidy is equivalent to the cost of the fuel saved

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Conclusions

- ❑ Egypt has established its Electricity Regulatory Agency as a part of its plan to reform its power sector to become more competitive, market oriented and attractive to private investments.
 - ❑ Potential of renewable energy power providers in Egypt is high due to the richness of the country of these resources.
 - ❑ Some of renewable energy technologies become close to compete with conventional fossil fuel sources such as wind, solar and biomass technologies especially if their environmental advantages are taken into consideration.
 - ❑ The Regulatory Agency has a crucial role in promoting such providers through both regulatory and stimulatory measures. Many of these measures are currently under consideration by the Egyptian Electric Utility and Customer Protection Regulatory Agency in Egypt.
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An aerial night view of a city, likely Singapore, featuring a river, a large highway interchange, and numerous illuminated buildings. The text "Thank You" is overlaid in a large, white, italicized font with a red outline.

Thank You