New & Renewable Energy Authority
هيئة الطاقة الجديدة والمتجددة

ANNUAL REPORT
2018

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Executive Chairman›s Speech


Dr. **Mohamed El Khayat**

The annual report this year is issued while our country is witnessing bright future for renewable energy generation. At the end of the year, renewable energy investments exceeded US$ 3 billion, with the private sector participation accounting for about 90% of it through 32 local and international companies operating in the Benban Solar Complex with capacity of 1500 MW, in addition to the wind power project in the Gulf of Suez which is the first to be constructed under the BOO system with capacity of 250 MW, and two wind power projects implemented by the government, represented by NREA with a capacity of 340 MW in Gulf of El Zayt area on the Red Sea coast.
The prices and bids also give a positive indicator of investors' attraction to the Egyptian market as a safe destination for investments lasting more than 20 years with unprecedented energy prices of 2.5 US $ cent / kWh for solar energy and about 3 US $ cent / kWh for wind power projects; not to mention the high capacity of projects reaching 500 MW. This confirms the ability of renewable energy to attract foreign investments with a positive impact on the economic front and emphasizes the role of national institutions in the creation of investment climate enjoys low risks and the positive interaction with the funding institutions and development partners.

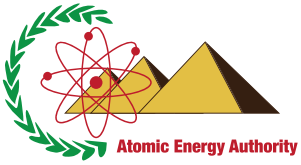
On the other hand, the great development of small and medium renewable energy projects, especially solar energy, is justified by the measurement mechanism that allows the various sectors of consumers (commercial, industrial, tourism, etc...) to establish their own power stations and then there will be set-off between their consumption and production which will lead to reducte of their electricity bill, especially with the application of rationalization and improvement of energy efficiency programs. In this context, the Authority has established mechanisms for the accreditation of solar panels installation companies to ensure compliance with technical standards. In addition, NREA has established specific mechanisms for accrediting PV installers to ensure compliance with technical standards. In addition, NREA has established a laboratory for testing the components performance.

The economic and social dimensions of the investment in the renewable energy sector are also proving to be of great value. The Benaban Energy Complex offers about 10,000 jobs, in addition to the other projects which lead to the development of the neighboring areas. This led to more focus on teaching renewable energy at vocational schools, universities and postgraduate levels.

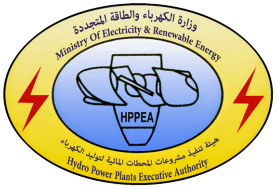
NREA also shares in qualifying specialists in the fields of renewable energy and energy efficiency and continues its pioneering role in training and qualifying national, African and Arab candidates, which gives renewable energy an additional dimension as a soft - power in dealing with countries and international institutions, led by IRENA.

The future still carries many prospects for the renewable energies especially in energy storage technologies, which will enable us to provide electricity according to demand profile. Its low cost will also provide part of the required energy for the transportation sector and to develop biofuels which will lead to reduce carbon footprint. A country with high rate of sunshine can make renewable energy sources a major contributor to its energy mix.

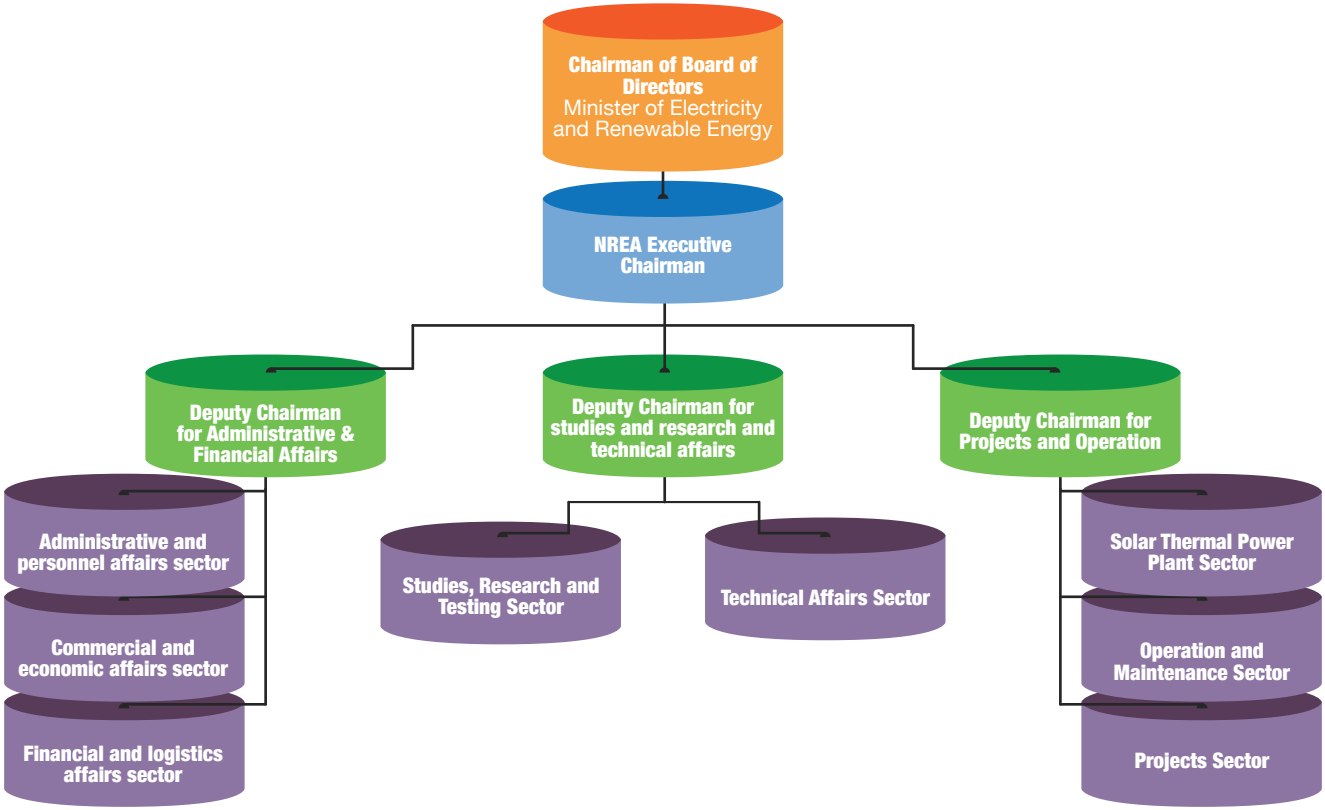
Ministry of Electricity and Renewable Energy its subsidiaries

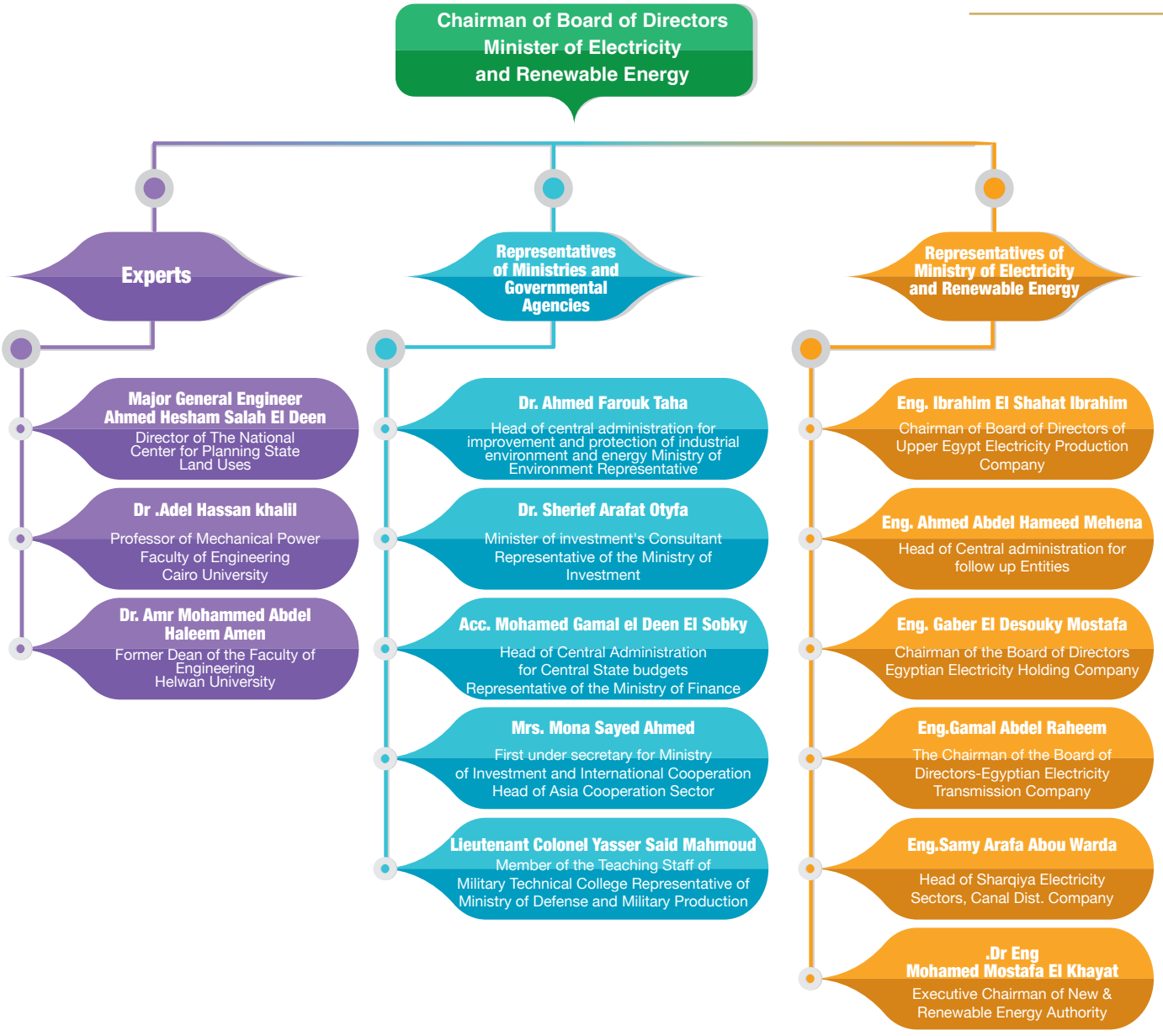


Ministry of Electricity and Renewable Energy



Organizational chart





Names according to alphabetical order

Introduction

Energy generation, diversification and ease of handling are regarded the main axes of development. With the increase of interest in the environmental issues on local and international scales, the renewable energy role acquires increased importance every year in its contribution to energy fabric which leads to its development and increased investments.

Interacting with the mechanisms of the economic development in Egypt, the Egyptian energy policies and legislation conform to the consumption pattern and encourage the implementation of solar and wind power plants, aiming at producing 20% of electricity generation in Egypt by 2022 from renewable sources with the active participation of the private sector in this program.

On the level of the private sector, the government opted for the Build, Own & Operate (BOO) system and the reverse auctions. The government offered very competitive prices for the electricity generated from wind power turbines which led to the attraction of many investors. Also, the price for the electricity generated from solar power station is very competitive which attracted many investors and encouraged the international institutions to finance them- that also offered many new job opportunities.

On the level of governmental projects, NREA implemented wind farms in Gulf of El Zayt area, on the Gulf of Suez, through governmental financing agreements, which was recently inaugurated by H.E. the President. There is also another project with a capacity of 120 MW in progress, planned to be operated by the end of this year. NREA also signed a contract for a PV project to be implement in the Kom Ombo area, which will be to operate by mid of 2019. Also we do expect more similar projects in the nearest future.

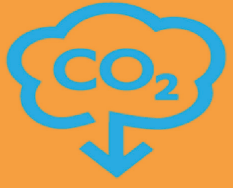
To guarantee the high quality of photovoltaic components and SWHs, NREA established two labs for the testing according to the ISO procedures. This also aligned with NREA's efforts in testing the household appliances such as fridges, air-conditioners, dishwashers, etc.

NREA also keeps the dialogue with the local, national and international institutions involved in developing renewable energy projects in order to facilitate their integration in the domestic market and enhance the role of renewable energy.

In addition, planning for the future, through specific studies, for the enhancement of the utilization of the renewable energy to cover part from the electricity needed for electrical vehicles and technical standards required for ensuring the grid stability. Also, NREA plans for the renewable energy to be one of the main player in the energy field in the next decade.

Fuel saving
+4600
Million Tone of Oil
Equivalent

8.4 Million Ton Co_2
Co_2 Emission Reduction

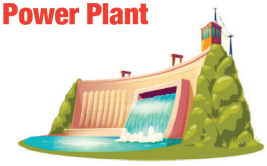


+15600
Million kWh
Total Energy Produced

+4100 MW
Total Installed Capacity

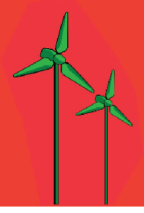
12850 Million kWh
Hydro Power Plant

2832 MW
Hydro Power Plant

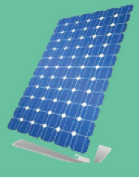


+2200
Million kWh
Wind Energy

+ 1000 MW
Wind Energy

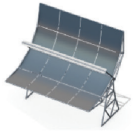


.3
Million kWh
PV

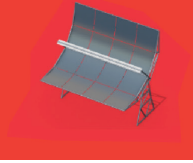


172 MW
PV

+480
Million kWh
CSP



140 MW
CSP

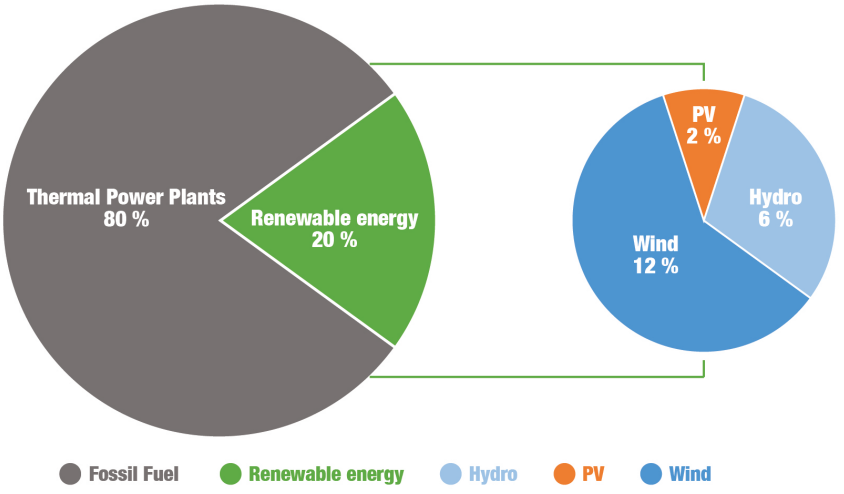


Electricity Statistics

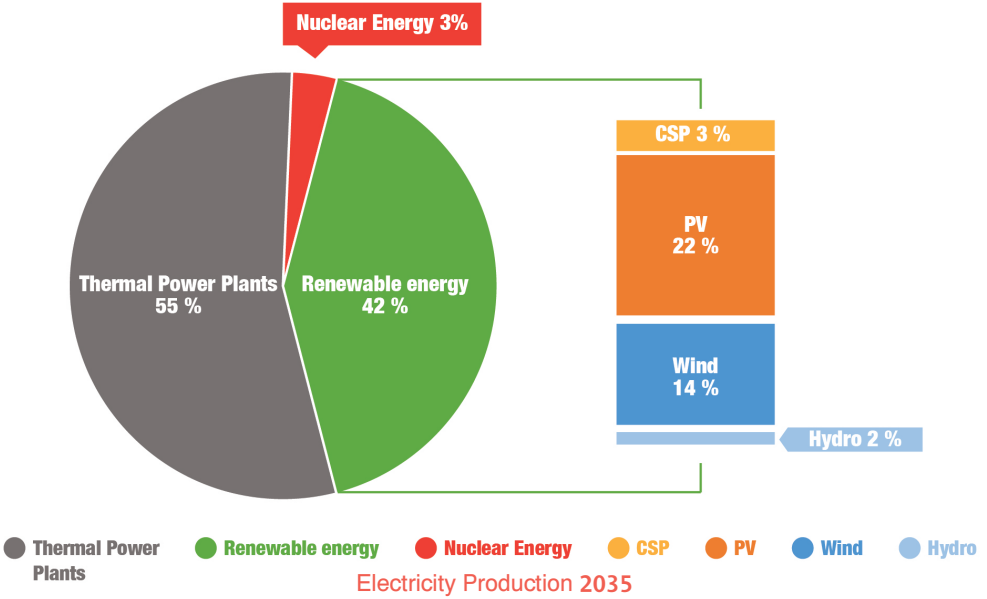
Data		2015 / 2016	2016 / 2017	Developement %
Total Nominal Capacity[1]	**MW**	**38857**	**45008**	**15.8**
Hydro	MW	2800	2800	0
Thermal Affiliated Companies	MW	29486	30037	1.9
Fast Track Plan	MW	3636	3636	0
SiemensPlants	MW	--	5600	--
New and Renewable Energy (Wind & Solar) [2]	MW	887	887	0
Private Sector BOOT's (Thermal)	MW	2048	2048	0
Peak Load	**MW**	**29200**	**29400**	**0.7**
Total Power Generated	**GWh**	**186320**	**189550**	**1.7**
Hydro	GWh	13545	12850	5.1
Thermal (Including Fast Track Plan and Siemens Plants)	GWh	157056	161617	2.9
New & Renewable Energy [3]	GWh	2225.5	2780	25
Independent Power Producer (IPPs)	GWh	42.4	35	17.5
Power Generated from Private Sector (BOOT)	GWh	133.7	12145	8.7
Power Generated from Isolated Plants	GWh	144.1	123	14.6
Energy Dispatched from Production Companies (without BOOT, Purchased from IPPs)	**GWh**	**167714**	**172053**	**2.6**
Total Fuel Consumption [4]	K toe	36189	36487	0.8
Production Companies (including FT Plan and Siemens)	K toe	33436	33978	1.6
H.F.O	K toe	8842	7148	19.2
N.G	K toe	23349	26249	12.4
L.F.O	K toe	1245	581	53.3
Private Sector (BOOT)	**K toe**	**2753**	**2509**	**8.8**
Fuel Consumption rate of Production companies	gm/KWh	212.8	210.2	1.2
Fuel Consumption rate including BOOT	gm/KWh	212.4	210	1.1
Thermal Efficiency (including private sector BOOT)	**Z**	**41.3**	**41.8**	**1.2**
N.G ratio to total fuel including BOOT	Z	72.1	78.8	9.3
N.G ratio for power plants connected to gas grid including BOOT	Z	74.1	80.2	8.2
Total transmission lines and cables for HV and extra HV	Km	44904	46317	3.1
Total transmission transformers capacities for HV & extra HV	MVA	110656	120160	8.6
Total Length of Distribution MV & LV lines and cables	Km	460898	476885	3.5
Total capacities for Distribution transformers MV & LV	MVA	71103	76600	7.7
No. of Customers at Distribution Companies	M	32.4	33.7	4
No. of Customers at EETC	C	120	125	4.2
No. of Employees at EEHC and its subsidiaries [5]	Th	169.9	165.4	2.7

Source : Egypt Electricity Holding Company - Annual Report 2016 - 2017

1 There are Isolated plants with a total installed capacity of 215 MW
2 The Solar component of Kurimat Solar / Thermal Plant is 20 MW
3 Connected to the national grid (wind & solar)
4 In addition to the total consumed fuel at the Isolated plants amounting to 24.9 K toe
5 In addition to 1940 working on emergency plan projects and Siemens



Electricity Production 2022



Electricity Production 2035

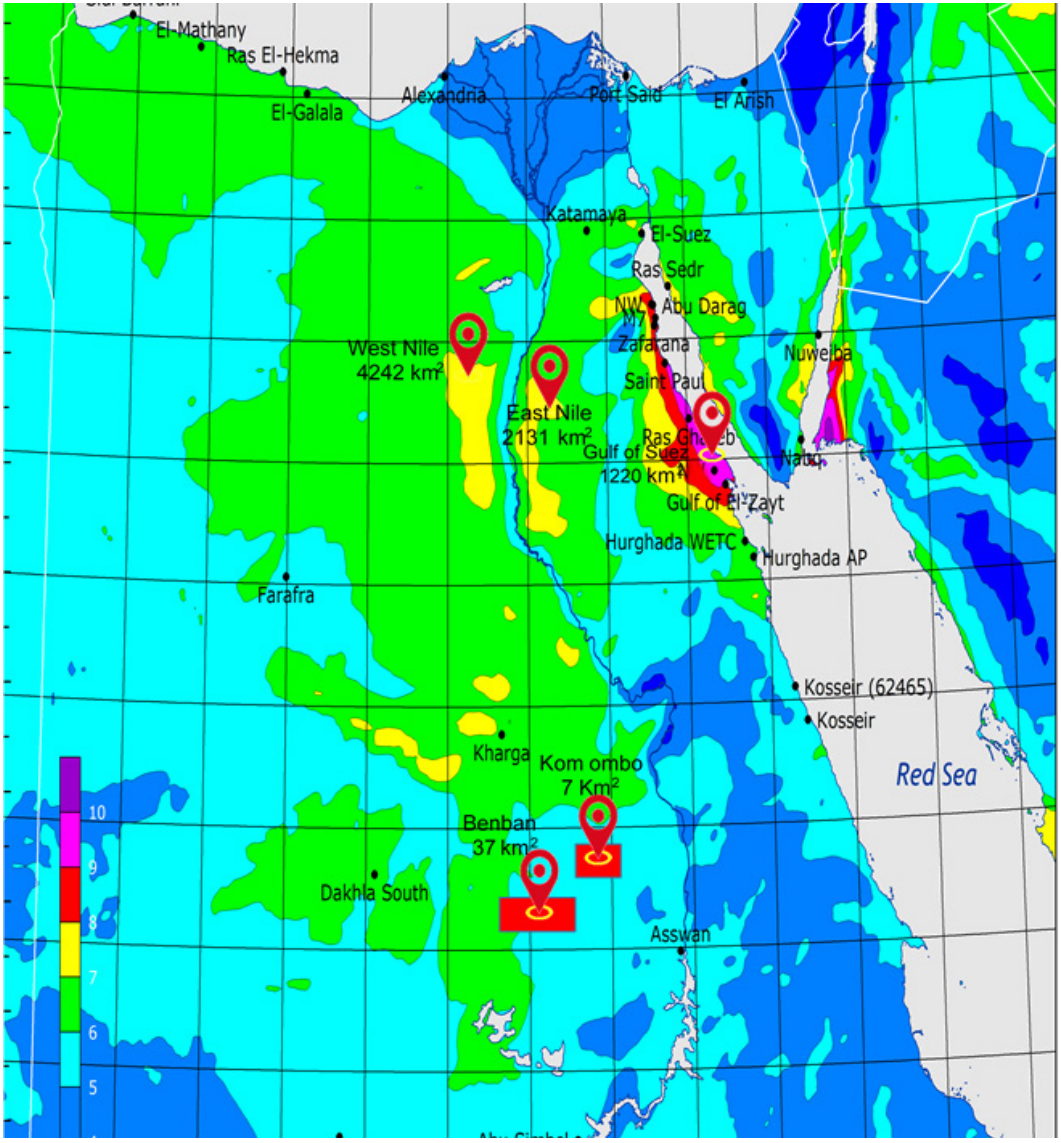
Source: tares scenario 4b

Renewable Energy Regulations

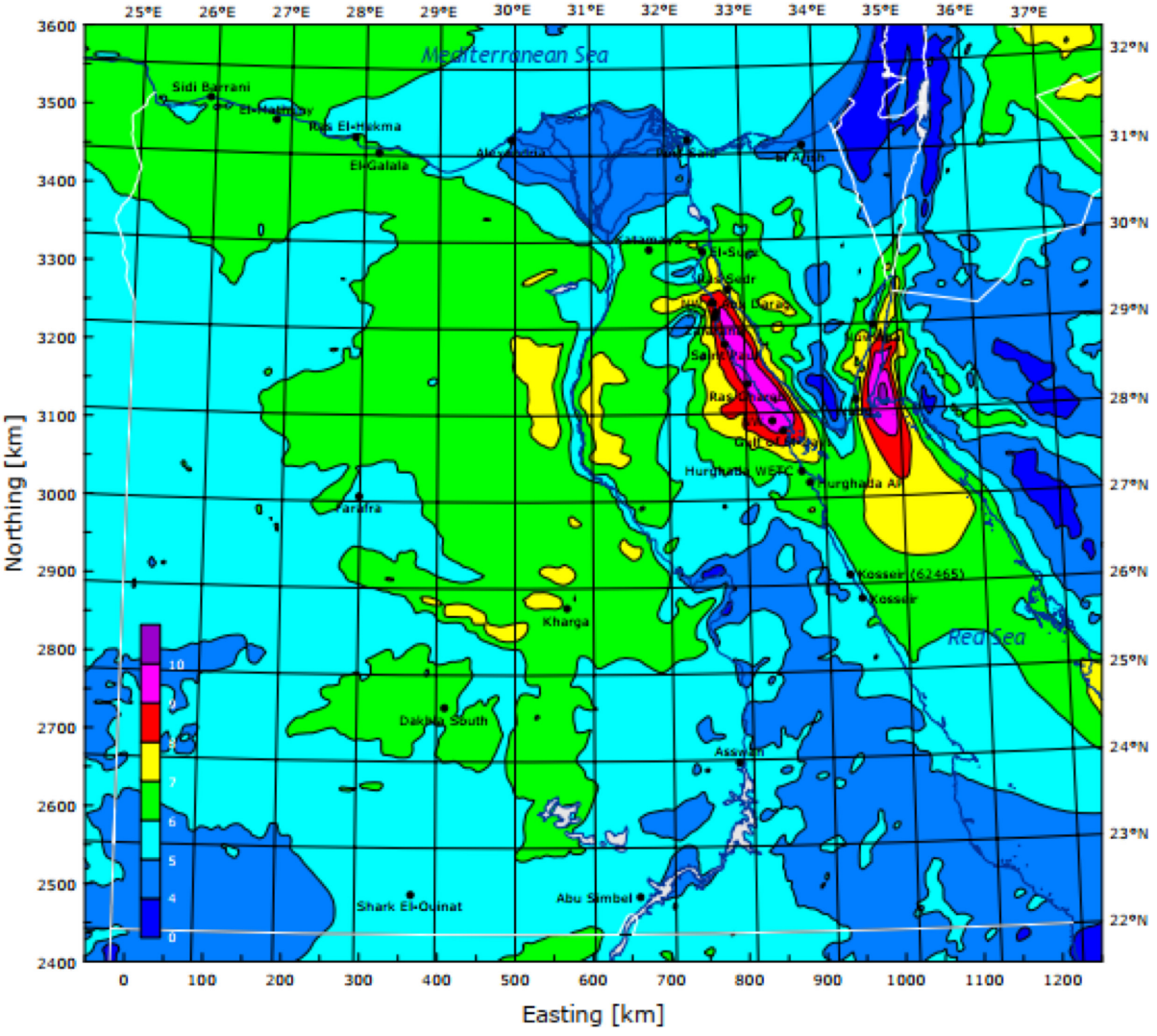
Wind Farm at Gulf of el Zayt 220 MW

Renewable Energy Investment Mechanisms

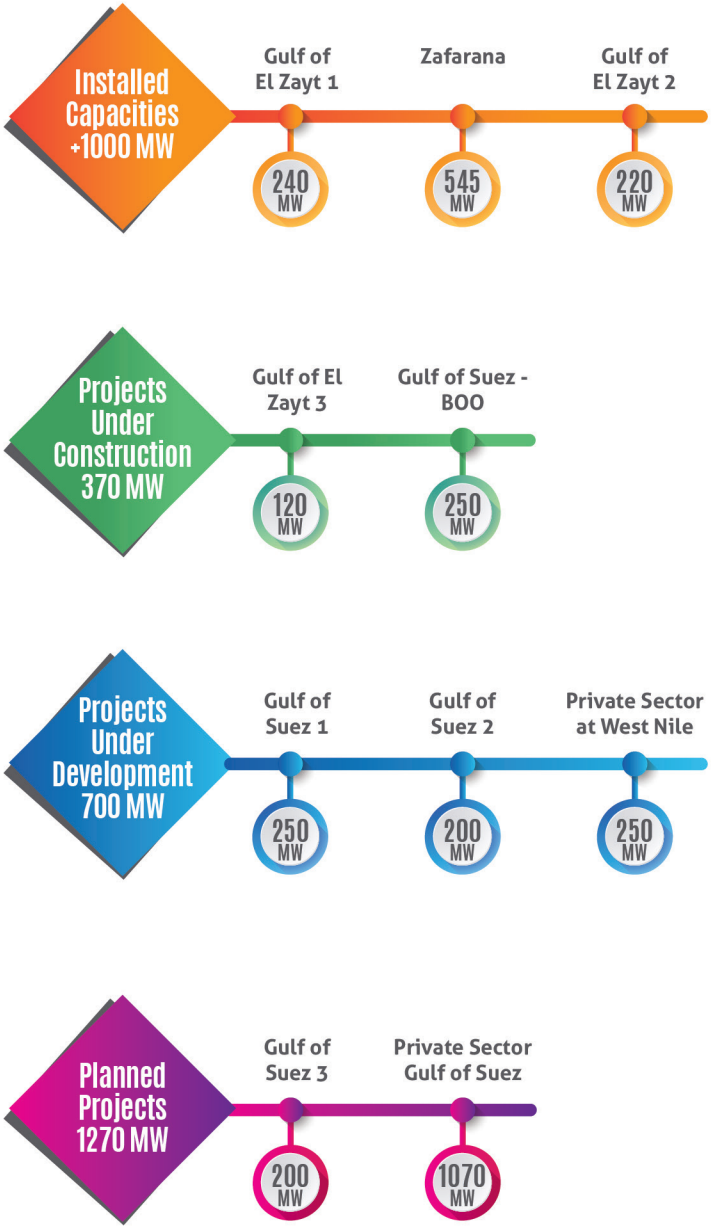
Tenders EPC	Governmental projects tendered and owned by NREA for design-supply and construction of projects.
Build-Own-Operate Projects BOO	EETC invites private investors to submit their offers for specific capacities and the award will be made to the lowest kWh price.
Feed in-tariff	EETC invites private sector company to bid for projects and sell electricity to the grid.
Auctions	Projects announced by the state and the award will be made according to the lowest price.
Net metering	Grid-connected solar PV projects up to 20 MW.
Independent Power Producers IPP	Projects implemented by private sector investors either to feed their own loads or to sell it to their own consumers.


El-Mathany
Ras El-Hekma
El-Galala
Alexandria
Port Said
El Arish
Katamaya
El-Suez
Ras Sedr
Abu Darag
Zafarana
Saint Paul
Nuweiba
West Nile
4242 km²
East Nile
2131 km²
Gulf of Suez
1220 km²
Gulf of El-Zayt
Hurghada WETC
Hurghada AP
Farafra
Kosseir (62465)
Kosseir
Red Sea
Kharga
Kom ombo
7 Km²
Benban
37 km²
Dakhla South
Asswan
10
9
8
7
6
5

Wind Atlas

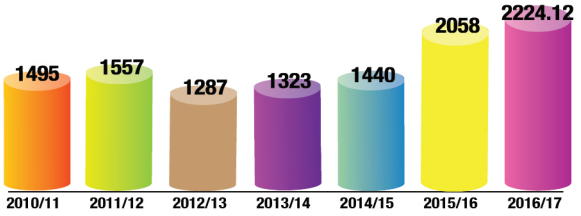


The map shows the mean wind speeds in [ms-1] at a height of 50 m over the actual (model) land surface. The horizontal grid point resolution is 7.5 km.


Installed Capacities +1000 MW
Gulf of El Zayt 1
240 MW
Zafarana
545 MW
Gulf of El Zayt 2
220 MW
Projects Under Construction 370 MW
Gulf of El Zayt 3
120 MW
Gulf of Suez - BOO
250 MW
Projects Under Development 700 MW
Gulf of Suez 1
250 MW
Gulf of Suez 2
200 MW
Private Sector at West Nile
250 MW
Planned Projects 1270 MW
Gulf of Suez 3
200 MW
Private Sector Gulf of Suez
1070 MW

Renewable Energy Statistics

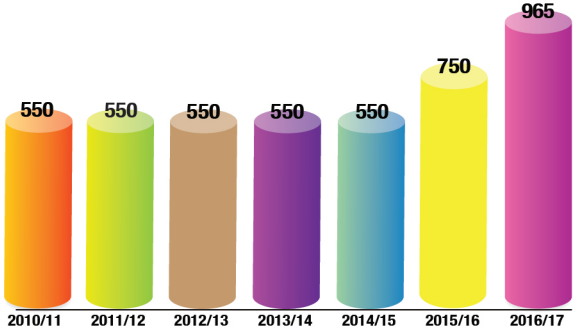
Giga Watt hour (GWh)



Years

Energy Production

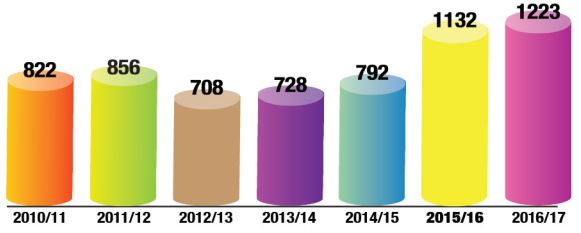
Mega Watt (MW)



Years

Installed Capacities

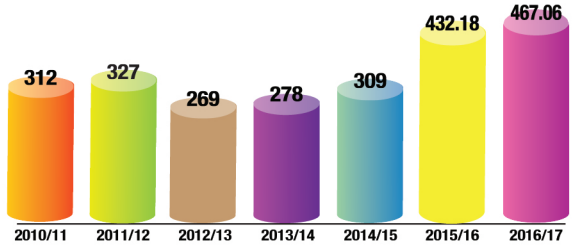
1000 ton carbon dioxide (k-tCo2)



Years

Emissions Reductions

1000 ton oil equivalent (k-toe)

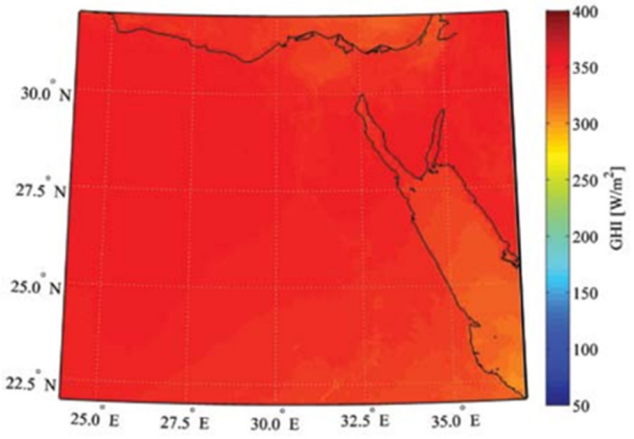


Years

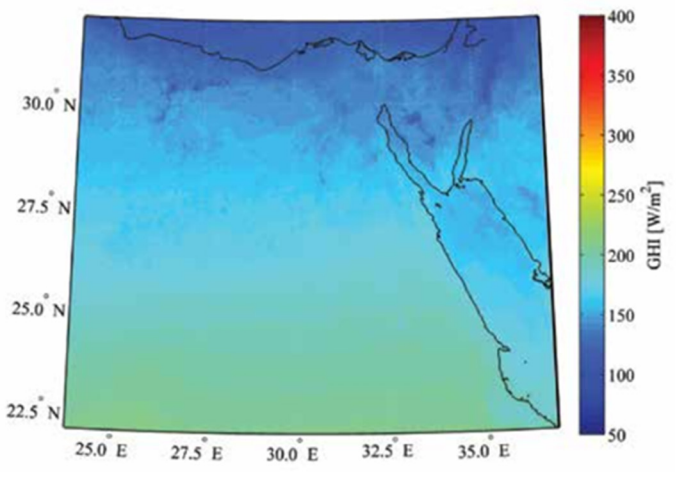
Fuel Saving


THE SOLAR ATLAS OF
EGYPT
THE
SOLAR
ATLAS
OF EGYPT

Average Solar Radiation



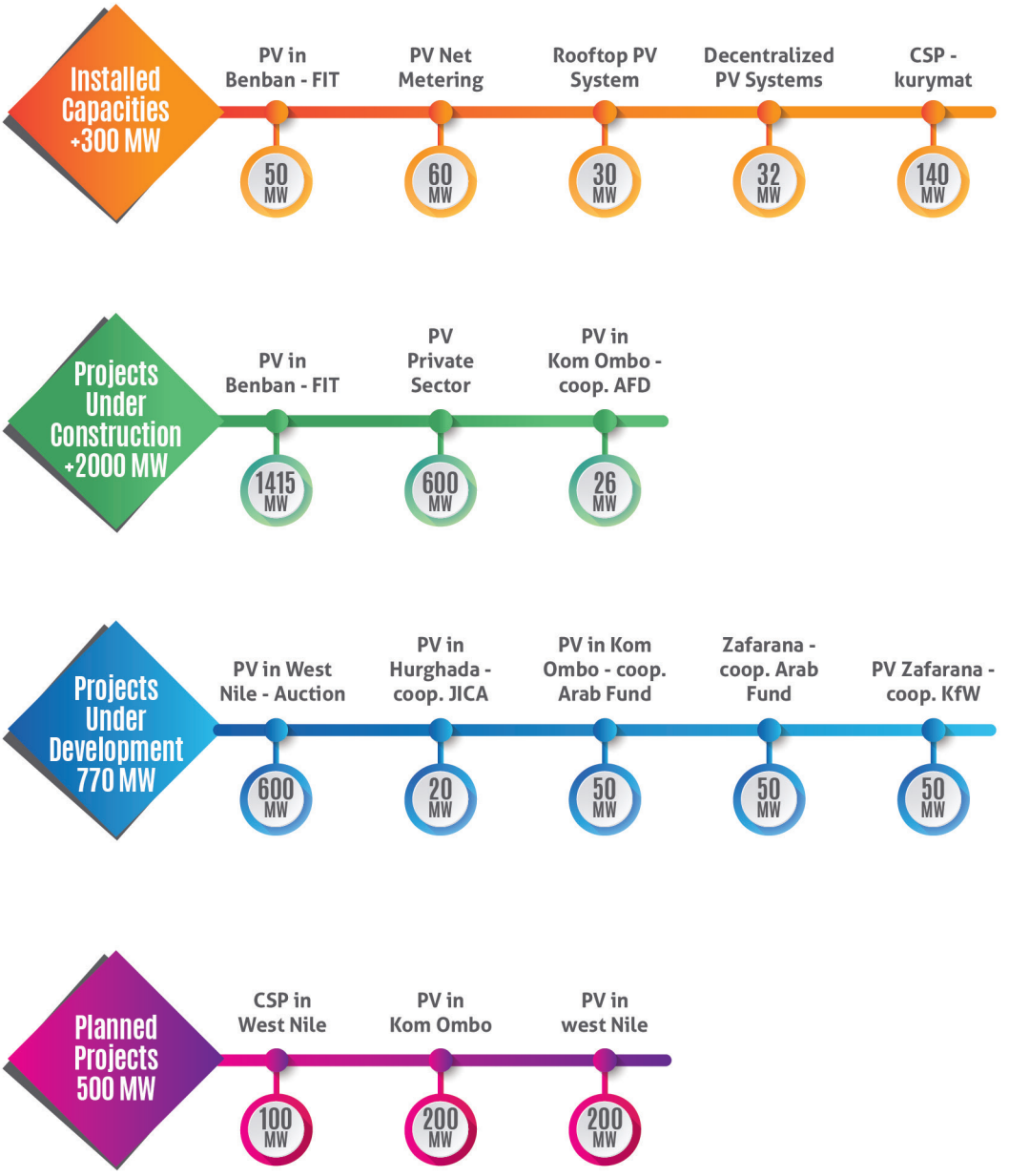
Average of solar irradiance in July
Max. radiation



Average of solar irradiance in December
Min. radiation

Solar Thermal Power Plant at Kurymat 140 MW

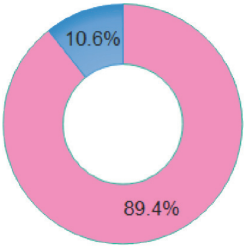
Solar Energy Projects

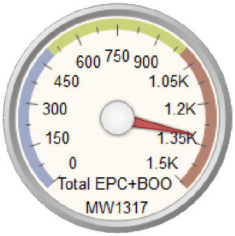


		Implemented Projects			Projects Under Construction		Projects Under Development		Planned Projects
		Wind	Solar		Wind	Solar	Wind	Solar	Wind
			CSP	PV		PV		PV	
1	Project	Zafarana	Solar thermal power plant in kurymat	Decentralized Systems	Gulf el Zayt	Kom Ombo	Gulf of Suez 1	20 m. in Hurghada	Gulf of Suez 3
	Installed Capacity	545 MW	140 MW	32 MW	120 MW	26 MW	250 MW	20 MW	200 MW
	Development Parties	Germany - Spain - Denmark - Japan		UAE	Spain	France	Germany – EIB-AFD- EU	Japan	France
2	Project	Gulf of Zayt 1 wind Farm						PV plant in Kom Ombo	
	Installed Capacity	200 MW						50 MW	
	Development Parties	Germany-EIB-European Commission						Arab fund for economic and social development	
3	Project	Extension of Gulf of El Zayt 1						PV Plant at Zafarana	
	Installed Capacity	40 MW						50 MW	
	Development Parties	Germany- EIB- European Commission						Arab fund for economic and social development	
4	Project	Gulf of El Zayt 2						PV Plant Zafarana	
	Installed Capacity	220 MW						50 MW	
	Development Parties	Japan						Germany	
	Total M.W	1005	140	32	120	26	250	170	200
	Total M.W	1177			146		420		200

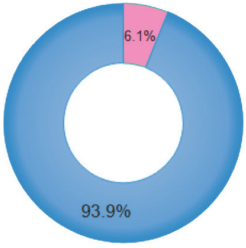
Private Sector Projects

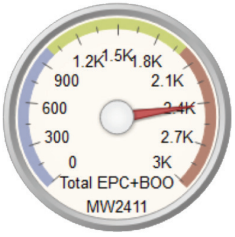
		Implemented Projects (Private Sector)		Projects under Construction (Private Sector)			Projects under Development (Private Sector)		Planned Projects (Private Sector)	
		Solar		Wind	Solar		Wind	Solar	Solar	Wind
		Net Metering	FiT (PV)	BOO	FiT (PV)	PV BOO	BOO	PV BOO	Solar	BOO
1	Project	Net Metering scheme	Benban	Gulf of Suez (Private Sector)	Benban	PV Power Plant - private sector	Gulf of Suez 2	West Nile through auction scheme	CSP – West Nile	Private Sector Gulf of Suiz
	Installed Capacity	60 MW	50 MW	250 MW	1415 MW	600 MW	200 MW	600 MW	100 MW	1070 MW
2	Project		PV Systems (rooftops)				Private Sector Wind Farm at West of the Nile		PV Plant – Kom Ombo	
	Installed Capacity		30 MW				250 MW		200 MW	
3	Project								PV Plant -West nile	
	Installed Capacity								200 MW	
	Total M.W	60	80	250	1415	600	450	600	500	1070
	Total M.W	140		2265			1050		1570	



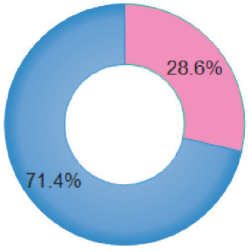


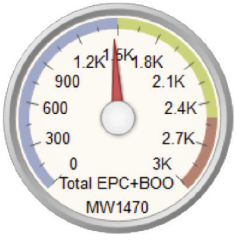
Total implemented projects: **1317** MW



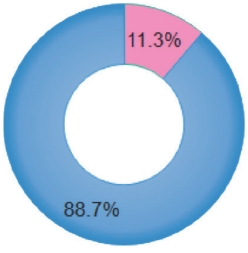


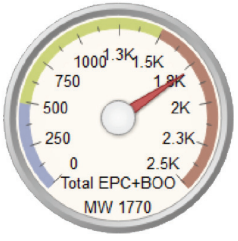
Projects under construction : **2411** MW





Projects under Development: **1470** MW

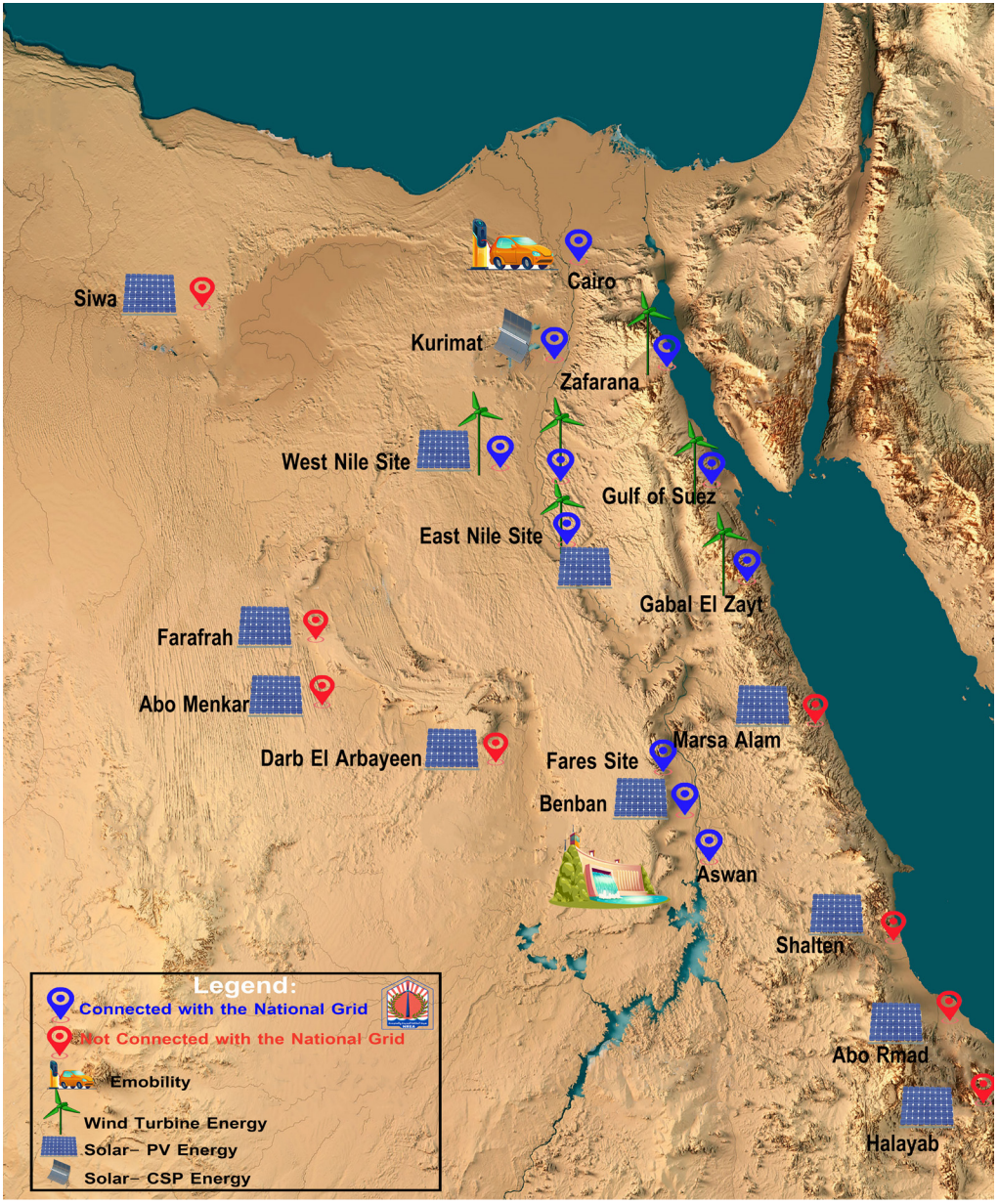




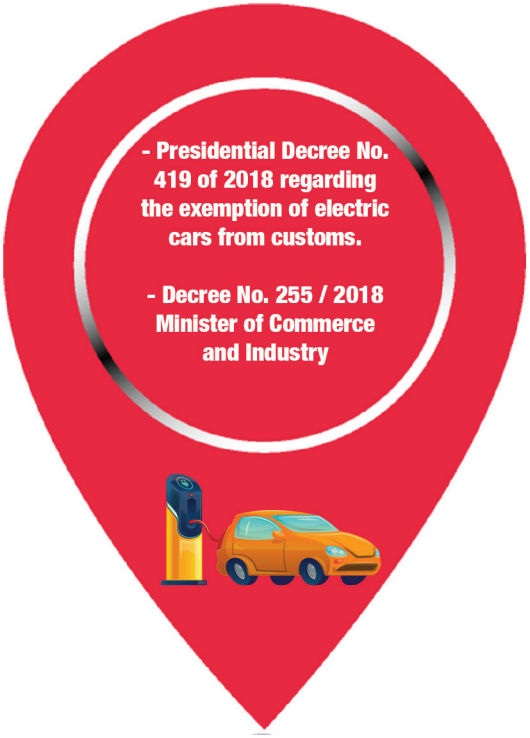
Planned projects : **1770** MW

NREA (EPC) Private Sector

Renewable Energy Projects Sites



Electrical Vehicles (E-Mobility)



Studying the possibility of having a share from RE projects to feed the electrical vehichles and grid stability.

Geothermal Energy

An economic and technical feasibility study for one of the promising sites in Egypt is being conducted to implement a geothermal pioneering project in the region.

Energy Efficiency

Energy efficiency Procedures in different sectors

More than 24 energy efficiency improvement procedures in different sectors (Building - Tourism - Industry - Lightening - Education)

Energy efficiency in supply

- reliance on natural gas and renewable energy.
- improve performance of distribution grids.
- distribution of 20 Millions smart meters within 10 years.

Training and capacity

Professional diplomas and masters with different universities.
- Energy efficiency improvement training programs
- All entities governed by electricity law implementing capacities 500 K.W and above are required to develop training programs for their employees.

Restructure of electricity tariff

- Expected saving due to tariff structure is 12935 Millions L.E./Year
- 17177 Giga Watt hour.

Awareness campaigns, seminars and manuals

Public outreach plans.

Funding mechanisms for energy efficiency activities

- Establishment of energy efficiency fund.
- Development of a database to support energy efficiency.

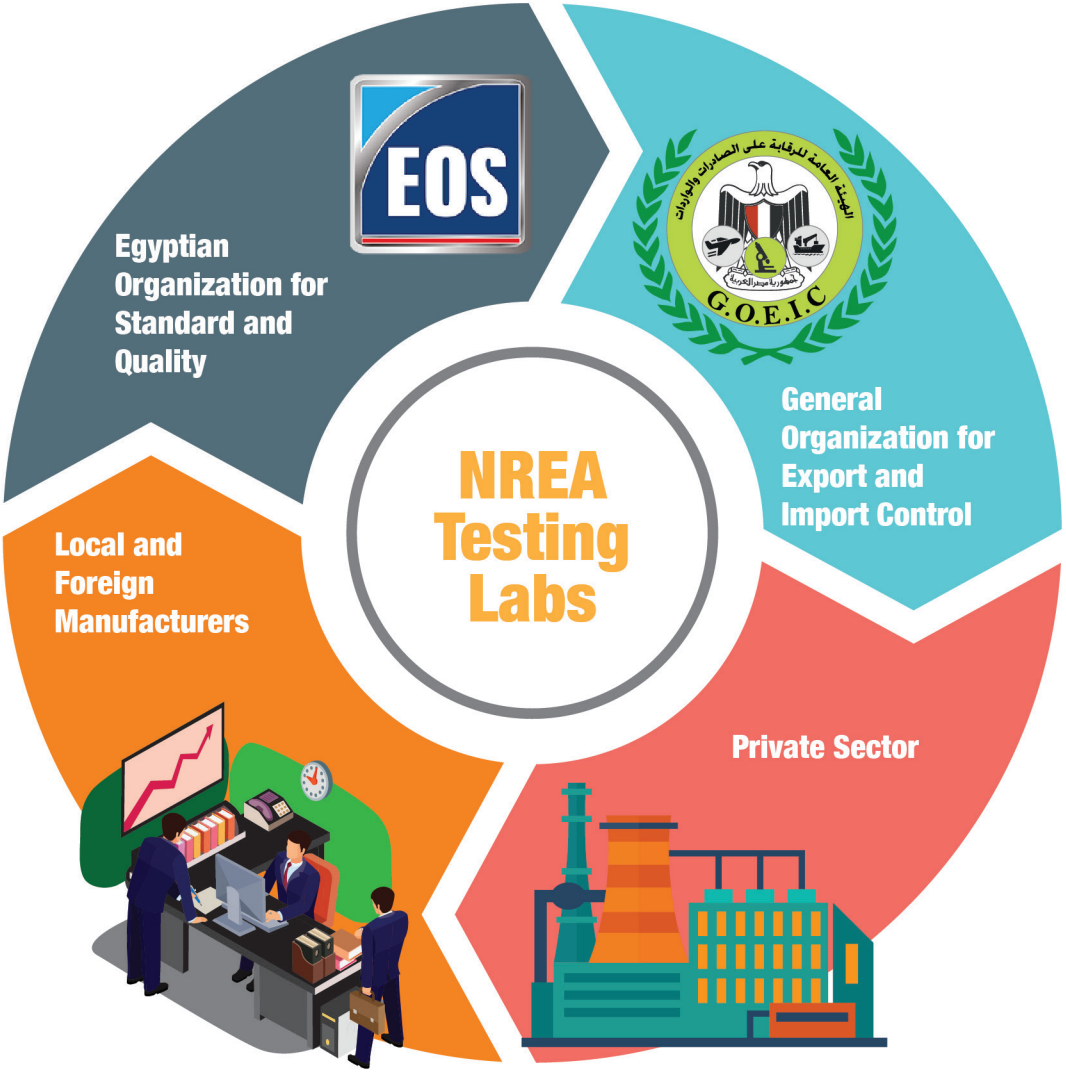
Cooperation with civil society

Awareness through Seminars, Media and initiatives.

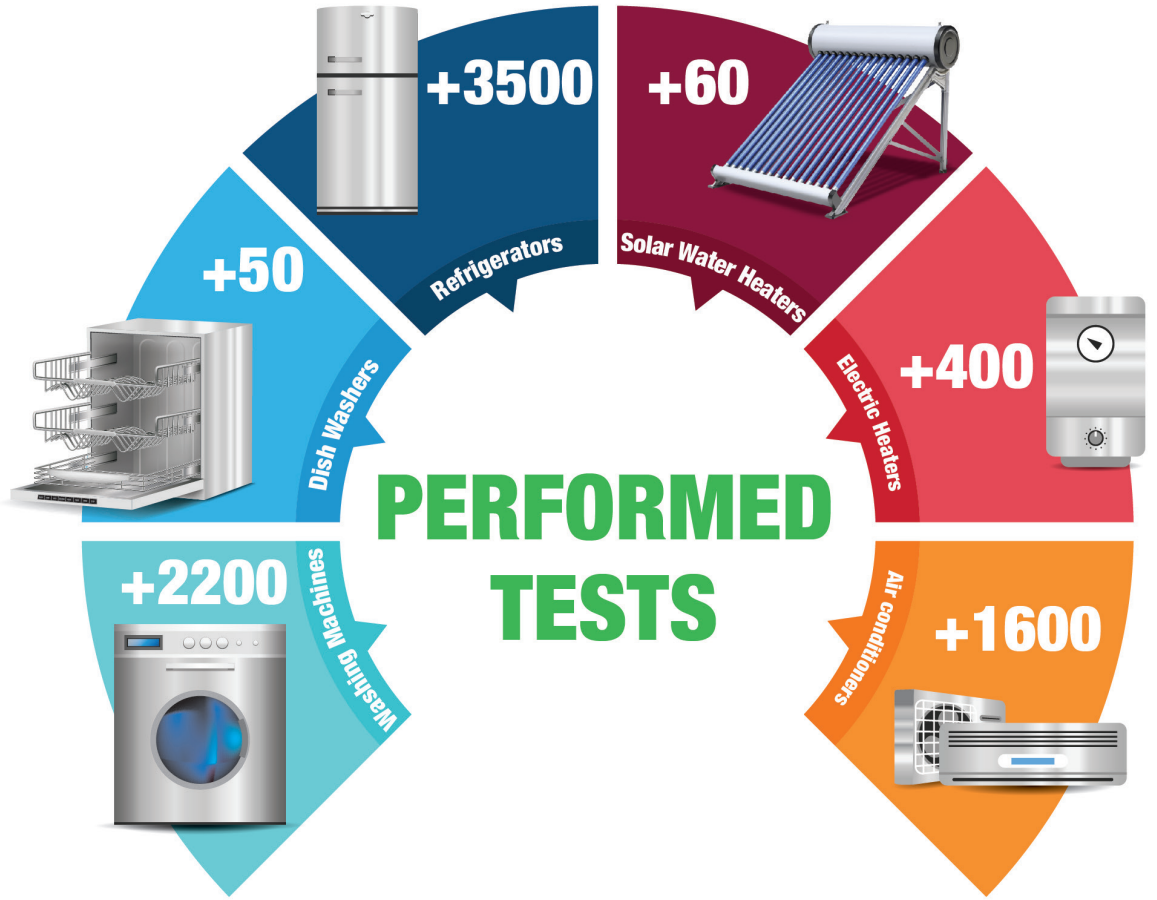
Completion of the institutional buildup of energy efficiency in Egypt

- Complete the establishment of EE units in all ministries.

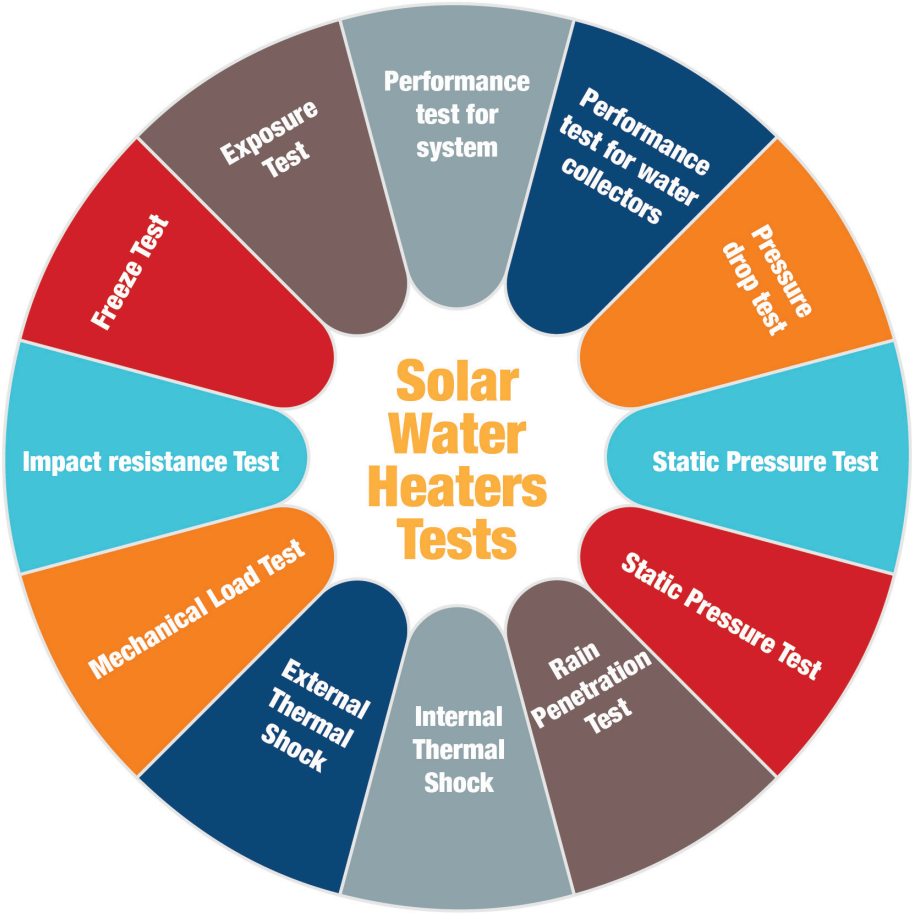
- Develop monitoring, verification and follow-up system


EOS
Egyptian Organization for Standard and Quality
G.O.E.I.C
General Organization for Export and Import Control
NREA Testing Labs
Local and Foreign Manufacturers
Private Sector

Home appliances testing labs



The SWH Testing Lab was established in January **2017** to be aligned with the latest international standards ISO **9806** and ENI **279**. It is one of the biggest labs in MENA region. It participates in The Solar Heating Arab Mark and Certification Initiative (SHAMCI) and also participates in an initiative to use of solar water heaters in industrial sector in cooperation with UNIDO. The lab provides technical service for local companies working in that field.



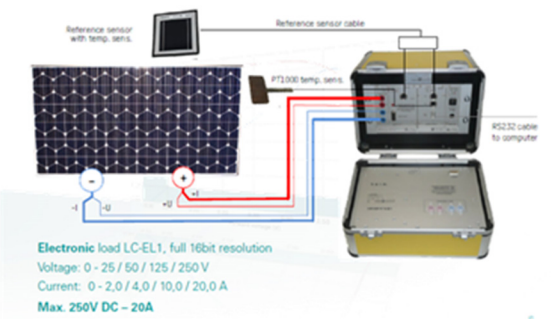
Pv Testing Lab

PV lab tests the efficiency of PV components ; whether locally manufactured or imported in accordance to the latest Standards IEC **61215**. It also provides consultancy services to the installed PV solar power plant, in addition to conducting Research and Development.

Some of PV Lab Devices

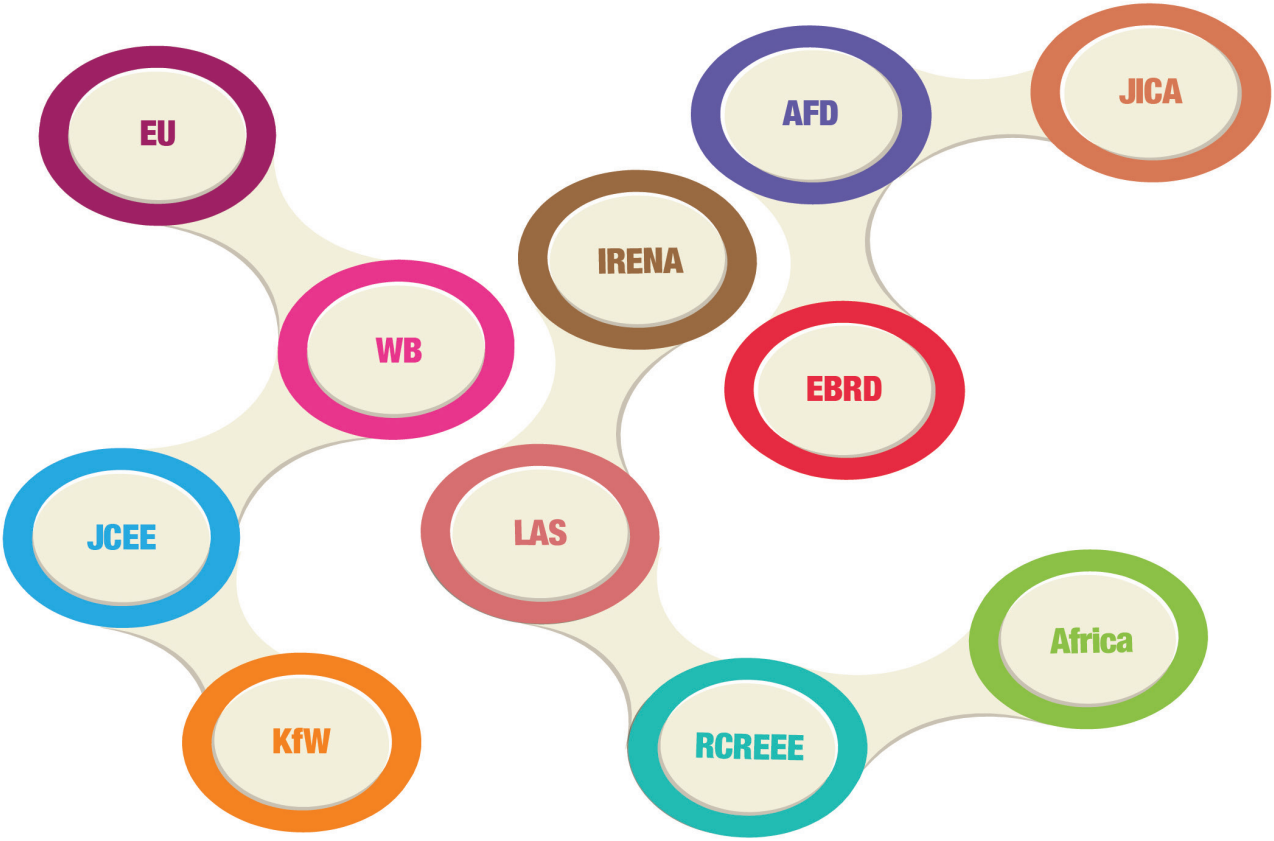
Sun Simulator

Electroluminenance test



Measuring the electrical character of the module .drawing the I.V curve

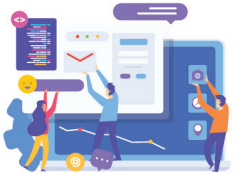

Maximum of temperature coefficient
Outdoor exposure test
Visual Inspection
Maximum power determination
Insulation Test
Thermal cycling test
Humidity- freeze test
Performance at STC and NMOT
Damp heat test
Performance at low irradiance
Peel off test
Battery tester
Resistance of earthing measurment
Electrolum inescence test
Wet leakage current test
Thermal infraed test for testing PV modules in the field
Measurement of AC electrial paramaters
Potential induced degradation test
Measurement of IV curve & electrical paramterers in the field
spectrometer test


EU
AFD
JICA
IRENA
WB
EBRD
JCEE
LAS
Africa
KfW
RCREEE

Training programs for Nile Basin countries
more than 300 trainees since 2011 till now.

- Promotion of NREA Testing labs
- Visits
- Training Programs
- Awareness Campaigns
- Update NREA Web site

Building of NREA employees capacity around
3000 employees since 1999 till now.



Training programs for universities students
more than 3500 student since 2006 till now.

NREA web Page
www.nrea.gov.eg/media/news

Contact on facebook
facebook.com/NREAegy

Abbreviations

NREA	New and Renewable Energy Authority
AfD	L'Agence Française de Développement
BOO	Build , Own and Operate
CSP	Concentrated Solar Power
EBRD	European Bank for Reconstruction and Development
e-Mobility	Electro Mobility
EPC	Engineering Procurement & Construction
EU	European Union
FIT	Feed in Tariff
GWh	Gega Watt hour
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
JCEE	Egyptian-German Joint Committee on renewable energy, energy efficiency and environmental protection
JICA	Japan International Cooperation Agency
KfW	German government-owned development bank
k-tco2	1000 ton carbon dioxide
k-toe	1000 ton oil equivalent
LAS	League of Arab States
MW	Mega Watt
PV	Photovoltaic
RCREEE	Regional Center for Renewable Energy and Energy Efficiency
WB	World Bank

New & Renewable Energy Authority

Address: Dr. Ibrahim Aboulnaga St., Ext. of Abbas El Akkad St., Nasr City, Cairo, Egypt
P.O.Box: 4544 Masakin Dobat - Elsaff, ElHay El-Sades, Nasr City, Cairo
Fax: (202) 22717173 - 22717172
Tel. switch: 22725891,2,3,4
e-mail: chairperson@nrea.gov.eg
Website: www.nrea.gov.eg