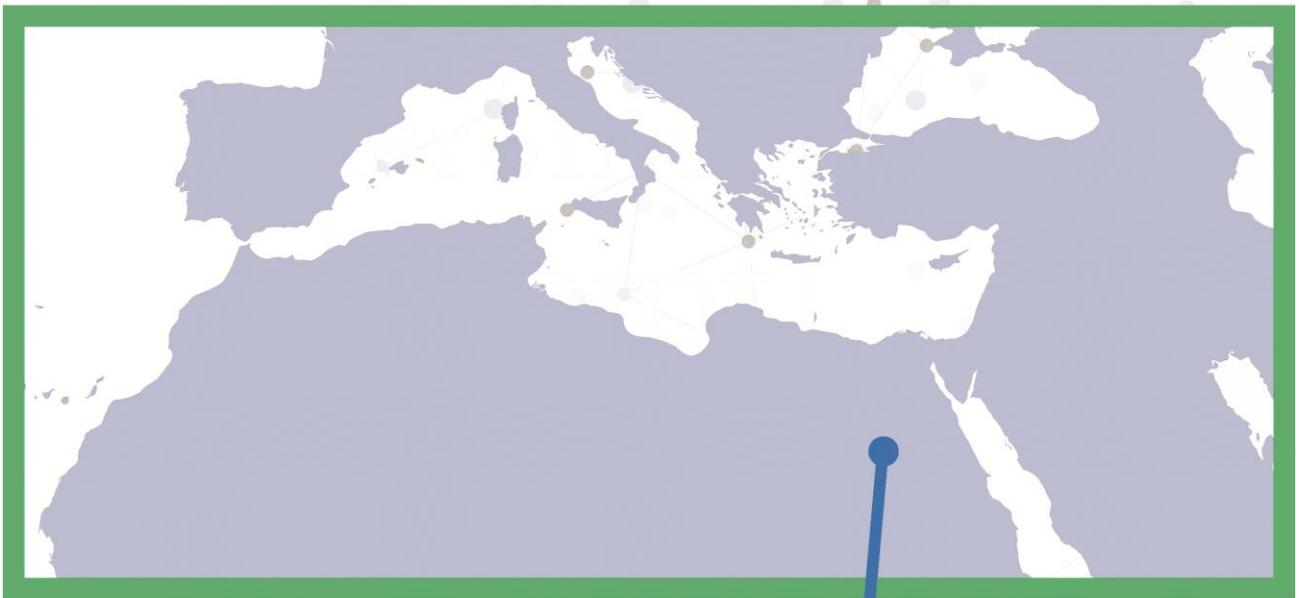


# RES4 MED

## Country Profiles

RENEWABLE ENERGY SOLUTIONS  
FOR THE MEDITERRANEAN



# Egypt

November  
2015

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## **Abbreviations**

AFD	Agence Française de Développement
BOO	Build Own Operate
BOOT	Build Own Operate Transfer
CAPMAS	Central Agency for Public Mobilization and Statistics
CCGT	Combined Cycle Gas Turbine
CSP	Concentrated Solar Power
DSO	Distributor System Operator
EC	European Commission
EDC	Egyptian Distribution Company
EEA	Egyptian Electricity Authority
EEHC	Egyptian Electric Holding Company
EEPC	Egyptian Electricity Production Company
EETC	Egyptian Electric Transmission Company
EgyptERA	Egyptian Electric Utility and Consumer Protection Regulatory Agency
EIB	European Investment Bank
EPC	Engineering Procurement Construction
EU	European Union
FiT	Feed-in-Tariff
GAFI	General Authority for Investment and Free Zones
GDP	Gross Domestic Product
GW	Gigawatt
IPP	Independent Power Purchase
JICA	Japan International Cooperation Agency
kWh	Kilowatt Hour
MOEE	Ministry of Electricity and Renewable Energy
MoU	Memorandum of Understanding
MW	Megawatt
NREA	New and Renewable Energy Authority
O&M	Operation and Maintenance
PPA	Power Purchase Agreement
PV	Photovoltaic
RE	Renewable Energy
RFP	Request for Proposal
SPV	Special Purpose Vehicle
TPA	Third Party Agreement
TSO	Transmission System Operator
TWh	Terawatt Hour

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## Abstract

Over the last year, Egypt has emerged as one of the hotspots for renewable energy developments. From the shadow of the vast power shortages of 2012/13, emerged a **strong political commitment to reform the country's energy policy** and accelerate the expansion of its power generation capacity, to meet a power demand growing at 5-6% p.a. With 90 million inhabitants, Egypt is the most populous country in the MENA region and is the second largest economy in Africa and so by **opening the power market for competition, a huge market was unlocked** for private and foreign investors.

Key to the energy plan in Egypt is the emergence of a potentially huge market for renewable energy generation. Despite being the largest non-OPEC oil producer and the second largest natural gas producer in Africa, Egypt is currently a net importer of fossil fuels, depending on oil and gas for 94% of its electricity mix. Thus, with ever-increasing demand and government subsidies to fossil fuels and electricity, power production represents a real burden on an economy already hampered by political and structural challenges. Henceforth, Egypt has set an **ambitious target of generating 20% of its electricity mix from renewable energy sources by 2022**.

Egypt is endowed with impressive renewable energy sources and the government has set out to utilise them through a set of regulations and schemes designed to attract private and foreign investments, which is also crucial in the context of an economy in much need of **foreign capital and direct investments**. The introduction of the FiT scheme in September 2014 was a real statement of intent by the government that it was ready to open up the market for private investors and the huge interest that followed was crucial in marking Egypt as one of the most attractive emerging renewable energy markets.

This country profile aims to show how Egypt has managed to attract the attention and interest of the renewable energy world, demonstrating how the government's legislative and institutional efforts are changing the structure of the power sector in the country.

A **full picture of the current renewable energy market and planned projects** is given as well as a view of how it will develop over the next years as the country's renewable energy plan continues to take shape. The document provides detailed information on the regulatory framework for renewable energy (laws and regulations) and data on the main market operators active in Egypt.

## 1 Egyptian macroeconomic context

Egypt has a very particular geographical position, being the only country situated on both the African and Asian continent. The country's proximity to Europe, direct access to the Suez Canal and the Suez-Mediterranean (SUMED) Pipeline boost its role in international trade and key energy markets.

With **89.8 million<sup>1</sup> inhabitants**, Egypt has **the third-largest population in Africa**, after Nigeria and Ethiopia, and the largest in the Arab world. With population **growth rate currently at around 2.5%**, Egypt represents one of the biggest and most important consumer markets in the Middle East and North Africa (MENA) region and further. Moreover, it has an encouraging demographic distribution since 27.6 million of inhabitants are considered as a labour force, one of the largest and youngest labour forces in the region.

Egypt has the **third highest Gross Domestic Product (GDP) both in Africa** (after Nigeria and South Africa) and among the **Arab countries** (after Saudi Arabia and United Arab Emirates). According to the country's Ministry of Planning, the main sectors contributing to the GDP are agriculture (17%), manufacturing (17%) and mining (13%).

On the macroeconomic stage, Egypt has been performing better since the presidential elections, held on June 8, 2014, when Abdel Fattah El-Sisi was elected with almost 97% of the votes. Before that, in 2011, Egypt had a steep decline, when GDP growth rates dropped from 5.1% to 1.8% in 2011<sup>2</sup>. This had negative consequences on almost every economic parameter including fiscal balance, public debt, tourism revenues, total investment growth etc. The growth rates still haven't recovered but forecasts are optimistic particularly since 2014. According to the International Monetary Fund (IMF), **Egypt will reach a growth of 4% in 2015**, compared to 2.2% in 2014, and will continue to grow gradually to 4.3% in 2016. The continuous growth is expected to be reinforced by prospects of political stability, initiation of the Suez Canal expansion and improved business basis resulting from major reforms<sup>3</sup>.

During the **Egypt Economic Development Conference (EEDC) of 2015**, the government released a report outlining 'Egypt's Five Year Framework and Strategy' up to the fiscal year 2018/19.<sup>4</sup> The report stressed the importance of large infrastructural projects in setting the foundations for the desired growth, of which the power sector and especially the renewable energy market are a crucial part. Further, the reduction of energy subsidies and liberalization of the generation, transmission and distribution activities in the power sector were presented as 'bold a decisive' steps by the government in its current economic plan, emphasizing the significance of reforming and developing this particular sector in the wider macroeconomic context of the country.

**Table 1 - Key macroeconomic figures as of 2014**

Item	Value
Area	1,001,450 km <sup>2</sup>
Population	89.8M (as of 2015)
Population Growth	2.52%
GDP	\$286.5B
GDP per capita	\$3.200
Real GDP growth rate	3.7%
Inflation	10.1%
Unemployment	12.9%

Source: Central Agency for Public Mobilization and Statistics (CAPMAS) and the World Bank

<sup>1</sup>Central Agency for Public Mobilization and Statistics (CAPMAS)

<sup>2</sup>The World Bank (WB)

<sup>3</sup>African Development Bank (AfDB)

<sup>4</sup>Egypt's Five Year Framework and Strategy- (FY 14/15-FY 18/19)

## 2 Power market overview

The Egyptian electricity market is moving towards a design reforming process in terms of market liberalization and medium-term subsidy reduction. In this context, support to renewables has become a priority in the government's agenda, with the issuance of a robust incentive scheme grabbing the attention of international investors towards the Egyptian power market.

Table 2 - Power market figures as of 2014

Item	Value (2014)
Electricity Demand	168 TWh
Electricity Demand Growth Rate	5.3%
Total Power Generation	168 TWh
Total Generation Capacity	32 GW
Peak Demand	26 GW
Peak Demand Growth Rate (2012/2013)	5%

Source: Ministry of Electricity and Renewable Energy of Egypt, Poyry, PwC and Enerdata

### 2.1 Legislative and regulatory framework

The main laws that have been issued so far for improving the Egyptian electricity sector are presented in the following table.

Law	Content
Law No 12 (1976)	Establishing the Egyptian Electric Authority (EEA) (law amended by Law No 36 in 1984, Law 100 in 1996 and Law 18 in 1998). The EEA was established with the aim of producing, transmitting and distributing electricity throughout Egypt.
Law No. 100 (1996)	Allowing private sector to Build, Own, Operate, and Transfer (BOOT) electricity generation. According to this scheme, private developers are allowed to generate and sell electricity to EEA for 20 years. The assets are owned by EEA.
Presidential Decree No. 326 (1997)	Establishing the Electric Utility and Consumer Protection Regulatory Agency (EgyptERA), under the Ministry of Energy and Electricity, responsible for the issuance of permits and licenses for generation, transmission and distribution of energy.
Law No. 18 (1998)	Introducing provisions for the electricity distribution companies, power plants and transmission grid and amending some provisions of Law No. 12 of 1976. According to this Law, the government decided to set up different distribution companies according to the geographical generation zones.
Law No. 164 (2000)	Modifying the EEA establishing law (Law No 12-1976) which became a joint stock company under the name of "Egyptian Electricity Holding Company" (EEHC).
Law No. 87 (2015) Electricity Law	Aiming at raising the performance efficiency and service level of the companies operating in the field of generation, transmission, distribution and sale of electricity. It intends to create an appropriate atmosphere that attracts investments to the electricity sector to face the increasing demand for electric power.

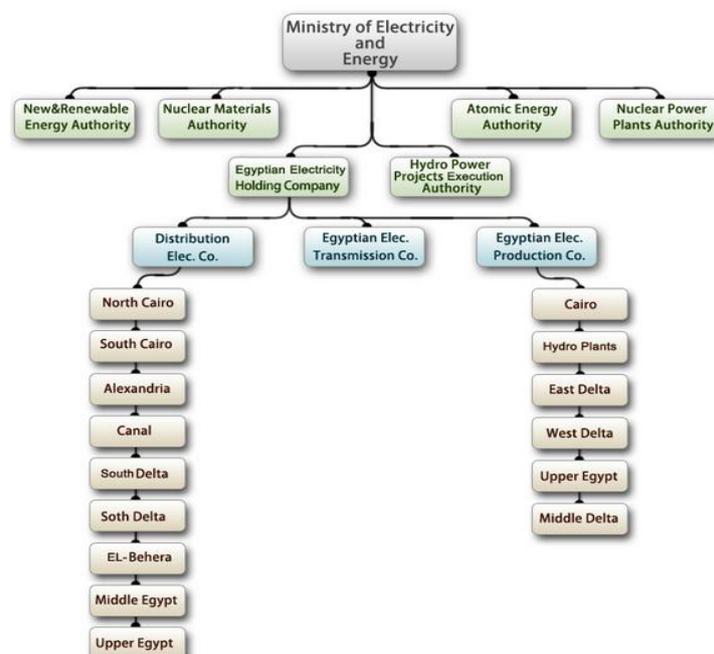
## 2.2 Electricity key stakeholders

Institution	Role
<b>Ministry of Electricity and Renewable Energy (MOERE)</b>	The Ministry develops and implements the national energy strategy and governs and gives inputs to EEHC, EgyptERA and New and Renewable Energy Authority (NREA).
<b>Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA)</b>	National Regulatory Agency regulating and supervising all electricity generation, transmission, and distribution. EgyptERA licenses to private actors, monitors and sets electricity tariffs and is responsible for ensuring supply security.
<b>Egyptian Electricity Holding Company (EEHC)</b>	State-owned company which owns and operates almost the entire generation as well as transmission and distribution grids through its subsidiaries.
<b>Egyptian Electric Transmission Company (EETC)<sup>5</sup></b>	Affiliate company of EEHC in charge of managing, operating and maintaining the transmission network across the country.

## 2.3 Current market structure

Egypt has legally unbundled its former vertically integrated Egyptian Electricity Authority (EEA) in phases. The major phase was in year 2000, when EEA was restructured in the form of a shareholders cooperate, according to law 159/1981 for shareholders companies. It became the Egyptian Electricity Holding Company (EEHC). The generation, transmission and distribution retailing segments have been functionally separated within the EEHC with 6 regionally-based generation companies and 9 distribution companies (see Figure 1).

Figure 1 - Electricity authorities and market companies



Source: Ministry of electricity of Egypt

<sup>5</sup> The Ministry announced a tender for an advisor to evaluate the EETC restructure to a “Transmission System Operator”. This procedure is a part of a general reform of the “Energy and Social Safety Nets Sector Reforms Technical Assistance Project”: [http://www.moee.gov.eg/english\\_new/images/images\\_tenders/SPN-1.1new.pdf](http://www.moee.gov.eg/english_new/images/images_tenders/SPN-1.1new.pdf)  
<http://www.worldbank.org/projects/P144305/egypt-energysocial-safety-nets-sector-reforms-technical-assistance?lang=en&tab=overview>

The Egyptian national electricity system is therefore dominated by the incumbent operator EEHC, which has established 16 affiliated electricity companies, including:

- Egyptian Electricity Production Company (EEPC) which owns 6 generation companies;
- Egyptian Electricity Transmission Company (EETC);
- Egyptian Distribution Company (EDC) which owns 9 distribution companies.

At present, EEHC owns 90% of the installed generation capacity. Private sector participation is allowed by three long term BOOT<sup>6</sup> contracts. These three private companies contribute with 9% of the installed generation capacity and are contracted by EETC as a sole off-taker for their full dependable capacity through PPAs for 20 years (around half of these PPAs' lifetime has elapsed).

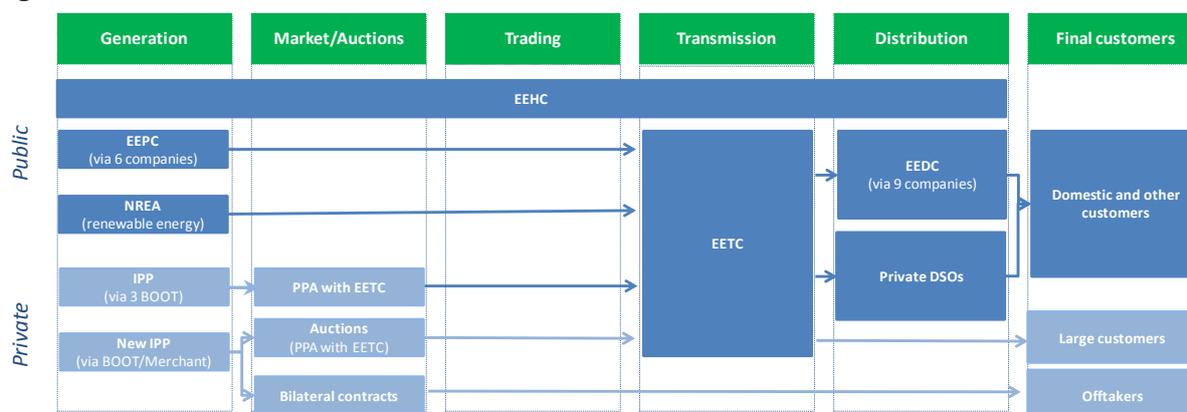
The remaining 1% is generated by wind farms and small IPP's procured by NREA (for details on NREA power plants see paragraph 1). According to the reforming proposals, generation is expected to be provided by more private companies.

The current electricity market is organized in a single buyer form. The EETC, which is the only company licensed for EHV and HV electricity transmission, purchases electrical energy from all generation companies. EETC in turn sells the electrical energy to the nine distribution companies. EETC also directly handles contracts with about 100 consumers connected to the EHV and HV networks. Furthermore EETC is exchanging energy with neighbouring countries over the present interconnections.

The electrical energy is sold to about 30 million consumers on both the medium and low voltages by distribution companies. At present, the share of the private distribution companies does not exceed 1% of the market.

The Egyptian market design is currently lacking a power trading platform, so the wholesale trade is provided directly to EETC, which is the network owner and operator. Distribution is guaranteed by local companies and the retail sale is not unbundled so EETC supplies large customers and the DSOs supply the residential ones (see Figure 2).

**Figure 2 - Power market structure**



Source: RES4MED on Pöyry Management Consulting, 2015

## 2.4 Future market structure

Since 2000, Egypt is experiencing a market liberalization and unbundling reforming process, accelerated in 2015 when a new Electricity Law was issued to strengthen the sector's commercial orientation and to boost the liberalization process, including competition aspects. In particular, the new Electricity Law (N. 87) issued in July 2015 intends to guarantee a proper competition based on bilateral contracts and on the adoption of the concept of eligible customers, to create an attractive environment for investments in the electricity sector. Thus the main features of the law are:

- Establishment of a competitive electricity market based on bilateral contracts;
- Introduction of Third Party Access (TPA) by removing the single buyer market;
- Grant more independence to EETC, converting it to an independent transmission system operator (TSO) with open access for bilateral trading between generation and consumers;

<sup>6</sup> BOOT: Build-Own-Operate-Transfer. According to this structure, private developers are entitled to produce and sell the electricity to EEHC for 20/25 years and required to transfer back the assets to EEHC at the end of the operating period.

- Enhancement of the role of EgyptERA in tariff management and regulation;
- Encourage competition by promoting the introduction of a competitive end-user market and allowing a limited number of large consumers to directly deal with generators;
- Supporting renewable energies and cogeneration;
- Introduction of demand side management principles and electricity consumption rules, including measurement.

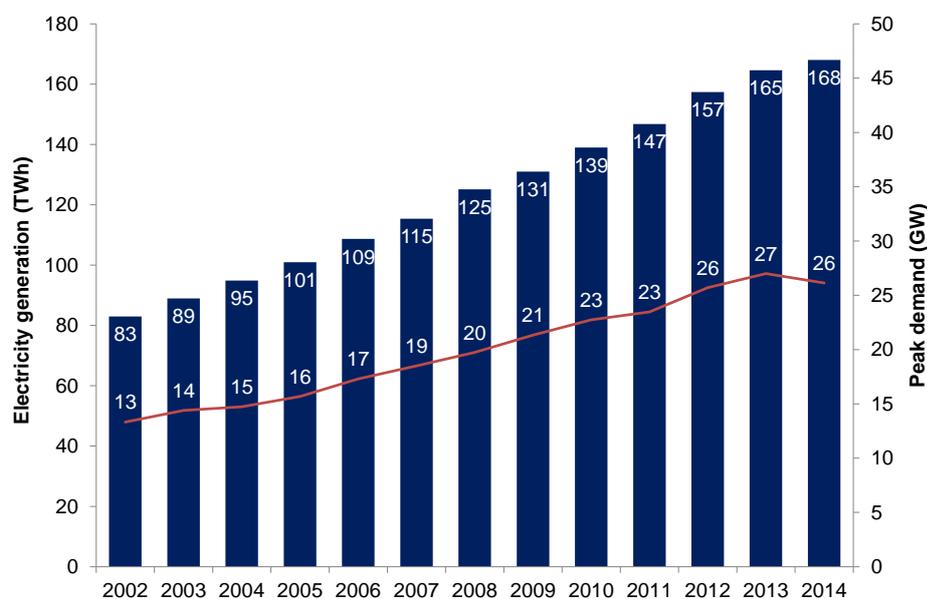
The Minister of Electricity will issue the executive regulations of the Electricity Law within six months from the date of its issuance (approx. January 2016). All electricity related entities must work in line with the law within six months from the date of issuance of its executive regulations (approx. July 2016). The law also gave EETC a transition period of three years to coordinate certain activities (Planning, Interconnection Projects and EHV and HV Systems R&D) with EEHC before it is fully transferred to TSO/MO at the end of the period.

At the time of writing this paper, the Electricity Law issued in July 2015 is still awaiting Parliament approval.

## 2.5 Electricity demand

Electricity demand in the country has grown rapidly in the last years, with gross **demand rising from 83 TWh in 2002 to 168 TWh in 2014** (CAGR +6, 4%), as shown in Figure 3.

Figure 3 - Evolution of electricity and peak demand



Source: Pöyry Management Consulting on EEHC data

The main drivers of the increased electricity demand have been **industrial development** (+5.3% average **annual growth of GDP** in the period 2002-2014), population growth (from 65.9 million in 2002 to 89.8 in 2015) and an **increase in urbanization levels**<sup>7</sup>.

Simultaneous to the increase of electricity demand, the peak demand has grown rapidly reaching 27.0 GW in 2013 from 13.3 GW registered in 2002. Despite the **peak demand decrease between 2013 and 2014**, according to EgyptERA, it is **expected to grow at an average rate of 6%** up to 2035 in the medium scenario<sup>8</sup>, as shown in Table 3.

<sup>7</sup> Pöyry Management Consulting, Wholesale electricity price projections for Egypt, 2015.

<sup>8</sup> The projections derive from Energy Strategy modeling "TIMES-Egypt"

<http://egyptera.org/Downloads/events/%D8%A3%D8%B3%D8%AA%D8%B1%D8%A7%D8%AA%D9%8A%D8%AC%D9%8A%D8%A9%20%D8%A7%D9%84%D8%B7%D8%A7%D9%82%D8%A9%20%D9%81%D9%89%20%D9%85%D8%B5%D8%B1.pdf>

**Table 3 - Peak demand projections to 2035**

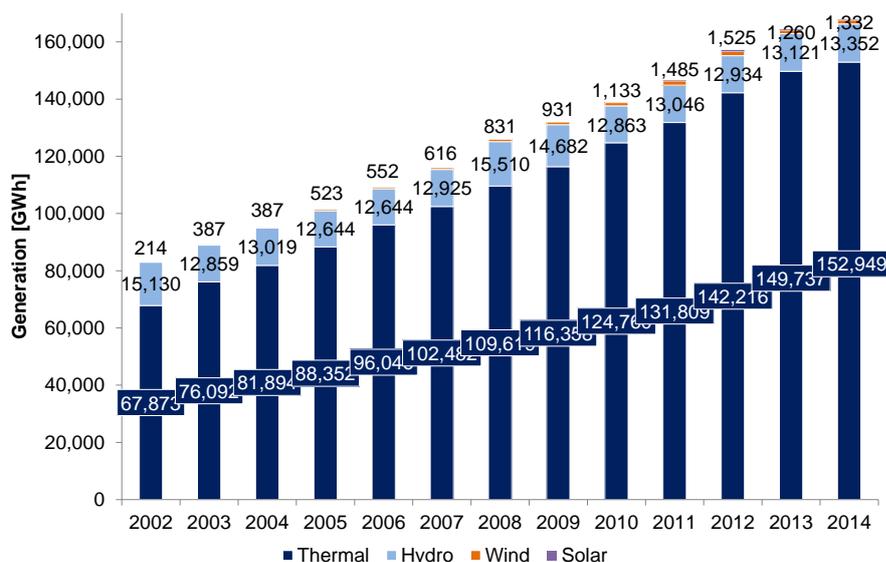
Scenarios	Peak load projections (GW)					
	Average growth (%)	2013	2018	2020	2030	2035
Low	5.2	27	35	42	59	71
Medium	6.2	27	35	43	52	76
High	7.1	27	36	46	68	86

Source: EgyptERA

## 2.6 Electricity Supply

As to electricity generation, a total of **168 GWh has been produced in 2014** (Figure 4).

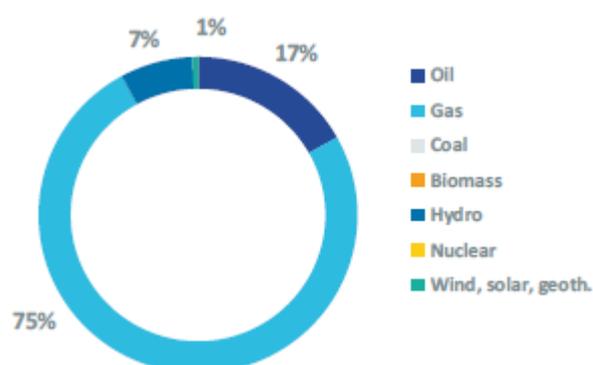
**Figure 4 - Electricity generation (2002-2014)**



Source: Pöyry Management Consulting on EEHC data

About **75% of Egypt's electricity is produced by natural gas**, with the remainder being fuelled by **oil (17%)** and renewable energy (**mostly hydro, 7%**)<sup>9</sup>. Despite the high potential for renewable energy sources, in particular wind and solar (described in paragraph 3.1), their weight in the Egyptian generation mix is currently fairly limited to **1.7%**<sup>10</sup> in 2014 (Figure 5).

**Figure 5 - Power generation by source (2014)**



Source: Enerdata

<sup>9</sup> Source: Enerdata.

<sup>10</sup> Source: NREA presentation at RES4MED event (Cairo 28 September 2015).

In the last years (2002-2014) the Egyptian power market has been characterized by a stable growth of generation capacity. Egypt's **generation capacity in 2014 was approximately 32 GW** (see Figure 6).

**Figure 6 - Evolution of installed capacity (2002-2014)**



Source: Pöyry Management Consulting on EEHC data

**Coal and nuclear power are not part of the current generation capacity**, but coal and nuclear power plants are expected to be commissioned in order to achieve a diversification of a generation mix able to guarantee system security<sup>11</sup>. Gas-fired technologies (especially CCGT) are expected to remain the main source of power generation and by far the most relevant “price setting” technology, also thanks to the recent offshore **natural gas field discovery** in August by ENI in the Mediterranean off the Egyptian coast, which is expected to satisfy Egypt’s natural gas demand for decades<sup>12</sup>.

Rising power demand, current natural gas supply shortages, out-of-date infrastructures and inadequate generation and transmission capacity have led to **frequent blackouts in Egypt**. At the forefront of Egypt’s efforts to solve its energy issues and develop renewable energy sources, has been the work on regulations and laws to liberalize the energy sector, paving the way for private and foreign investments in the hope of increasing capacity and efficiency. Recent political and social unrest in Egypt has impeded the government’s plan to expand power generation capacity. As a result, **Egyptian electricity consumption is increasing much faster than capacity expansions**. The **Generation Expansion Plan 2013-2017**<sup>13</sup> defines the pipeline for the development of new capacity for conventional and renewable sources. The new projects being constructed reflect Egypt’s plan to diversify its energy generation mix and include power plants that will be fuelled by coal, solar and wind. In addition, the country is targeting a boost in its renewable energy usage and it has proposed that renewable energy account for 20% of its power generation capacity by 2022, of which 12% would be wind, 6% hydro, and 2% solar. The government is thus pursuing plans to expand power generation from new fossil fuel sources, especially from Combined Cycle Gas Turbine (CCGT). In addition, Egypt recently signed deals for the construction of coal-fired power plants, which if built would be the first in the country.

## 2.7 Subsidy reform

The Egyptian power market has **historically been heavily supported by subsidies** both to commodities (oil and gas) and to the electricity sector, leading to low retail prices for electricity and making it harder for renewable energy to be cost competitive. Plans launched in 2010 to reform domestic energy prices in order to manage fiscal budget were interrupted due to the political instability of the country.

<sup>11</sup> A few nuclear power plants are currently under evaluation and Memorandums of understanding have been signed with foreign countries (e.g. Russia) in order to start the development phase. However, timeline is still uncertain

<sup>12</sup> ENI press release [http://www.eni.com/en\\_IT/attachments/media/press-release/2015/08/PR\\_EniEgypt\\_eng.pdf](http://www.eni.com/en_IT/attachments/media/press-release/2015/08/PR_EniEgypt_eng.pdf).

<sup>13</sup> Issued by the Ministry of Energy in 2011

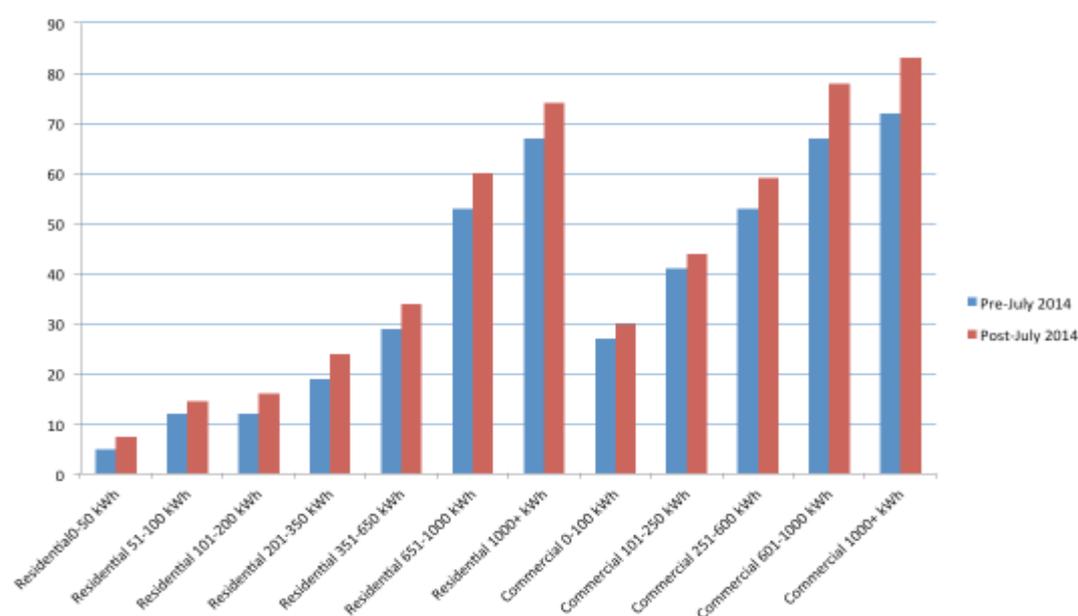
In recent years, due to the increase in gas demand and limited correlation between exported natural gas prices and imported oil cost, the amount of subsidies increased, reaching USD 5.9 billion in 2009<sup>14</sup>. Since 2011, the energy deficit got much worse as foreign reserves were depleted, energy demand continued to grow and economic growth levels slowed down in the midst of political instability. In turn, the government decided to launch reforming processes of the Egyptian electricity sector. Thus, the government announced that energy subsidies would be progressively removed by 2019 and a new electricity law would open the electricity market to competition and investments in the electricity sector will be promoted.

A huge reform in the fuel and **electricity subsidy programs** (with a duration of 4-5 years, until 2019) is under way and is being followed through, slowly steering the market towards global prices and standards, lifting the great burden of subsidies on the country's budget and crucially making RES more competitive. The reforming process was built around two main drivers:

1. **Annual reduction of subsidies to electricity prices**, bringing them to a competitive level;
2. **Removal of subsidies to commodities** (oil and gas) by 2019.

The first step in price adjustments was implemented in July 2014 as fuel prices took a sharp rise after the government decided to slash its fuel subsidies allocation from E£144bn (\$20bn) to E£100bn<sup>15</sup> in the new budget.

**Figure 7 – Electricity prices before and after price adjustments in July, 2014**



Source: Ministry of Petroleum (2014)

Figure 7 shows the rise in electricity prices after the government cut subsidy spending in July 2014, displaying larger increases for the highest consumers of electricity particularly in the commercial sector. In July 2015, a new electricity tariff was issued signalling a further increase in prices (excluding households consuming less than 200 kWh per month), and confirming the government's commitment to the gradual removal of subsidies. Meanwhile, fuel prices were also heavily affected by the government's measures in July 2014, as **92 octane** and **80 octane gasoline** prices rose **40%** and **78%** respectively, while the price of **diesel** went up by **63%**.

### 3 Renewable energy

In February 2008, Egypt announced an ambitious National Strategy to generate **20% of the country's electricity from renewable sources by 2020**, including a **12% contribution from wind energy** (approx. 7.200 MW of grid-connected wind farms). The political and social unrest that followed the January 2011 revolution pushed this initial 20% target to **2022**. However, a **30-40% target has been set for 2035 and 65% by 2050**, demonstrating Egypt's long term commitment to growing its share of power

<sup>14</sup> Source: Pöyry Management Consulting, Wholesale electricity price projections for Egypt, 2015.

<sup>15</sup> <http://africanbusinessmagazine.com/sectors/finance/investment/qalaa-bets-on-egyptian-reform-and-recovery/>

generation from renewable energy sources. In order to put solar energy within the National Strategy, Egypt has approved the **National Solar Plan in 2012, to be started in 2015**. The initial Solar Plan announced in 2012 aimed at installing **3.500 MW solar capacity by 2027 divided into 2.800 MW CSP and 700 MW PV**<sup>16</sup>. However, with the introduction of the **FiT in 2014** (see paragraph 4.3), the focus has swung in favour of **Solar PV**, with nearly **3 GW** of projects in the current renewable energy plan, including **2.300 MW** under the **FiT** scheme alone.

RE target is expected to be achieved through two distinct project development approaches;

- one third (approx. 2.400 MW) will be implemented through public investments by NREA in cooperation with different international financing institutions;
- two thirds (approx. 4.800 MW) by private investments

For both wind and solar, two phases will be put in place:

- **Phase 1**  
Competitive bids issued by EETC (in cooperation with NREA), requiring private developers to build own, operate wind farms and solar power plants and selling electricity to the company with prices agreed between the company and the investor
- **Phase 2**  
Feed-in-Tariff (FiT) taking into consideration the prices and experience gained in phase 1.

In addition to the implementation mechanisms in place for phases 1 and 2 (described in details in Paragraph 2.4), since 2009, several instruments have been implemented by the Egyptian government in order to **incentivize the private sector to develop RE projects**. These instruments include:

- **Reducing project risks:** through long term Power Purchase Agreement (PPA) for 20-25 years;
- **Sovereign Guarantees for projects over 20 MW:** investors proposing installations >20MW can benefit from sovereign guarantees under PPA agreements (under competitive bidding schemes and FiT);
- **Currency regime:** the selling price for energy generated from renewable energy projects will be in foreign currency in addition to a portion that covers operation and maintenance costs, in local currency;
- **Fiscal incentives:** a tax of 2% of the value or the prevailing customs tariff, whichever is less, is obtained for environmental monitoring equipment and its spare parts, equipment and components for new and renewable energy (wind energy, solar energy) and its spare parts subject to the terms and conditions issued by the decision of the Minister of Finance<sup>17</sup>.

Such instruments, combined with the supporting schemes for solar and wind projects aim at making the Egyptian business environment stable and attractive.

In 2014, Egypt made substantial improvements to its renewable energy policy framework and attracted the attention of private investors. In **December 2014, Egypt fine-tuned the Renewable Energy Law**, which establishes different mechanisms for the development of renewable energy projects, including the **IPP public competitive bidding process, feed-in tariffs (FiT), and private-to-private sale of electricity from renewables**.

With the adoption of this law and the introduction of the FiT scheme, Egypt made an important step in shifting away from only state-led renewable energy projects to privately financed projects. It is important that Egypt concentrates efforts on **streamlining its administrative procedures**, ensuring the functionality of these schemes and strengthening the institutional support to facilitate the deployment of private renewable energy projects. This requires commitment from all concerned state authorities and effective coordination among all participants, including financiers, government and supporting institutions.

### **3.1 Renewable energy potential**

Egypt is an attractive market for the development of renewables due to its market size and strong natural resource potential, in addition to its strategic positioning as an industrial hub for the MENA region.

<sup>16</sup> [https://www.iea.org/media/workshops/IEA\\_Ehab\\_Egypt.pdf](https://www.iea.org/media/workshops/IEA_Ehab_Egypt.pdf). The target has been confirmed by Eng. Lamya Youssef (Ministry of Energy) during RES4MED event in Cairo on the 28<sup>th</sup> September 2015.

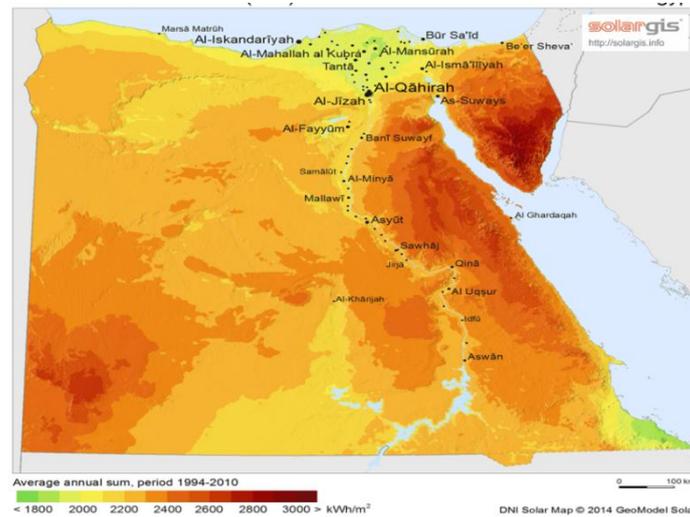
<sup>17</sup> Article 5, Law 184 of 2013, Issuance of Customs Tariff ([http://www.mof.gov.eg/MOFGallerySource/Arabic/Customs/bdf/Dec\\_184\\_2013.pdf](http://www.mof.gov.eg/MOFGallerySource/Arabic/Customs/bdf/Dec_184_2013.pdf)).

### 3.1.1 Solar Energy

Direct solar radiation ranges between 2000-3200 kWh/m<sup>2</sup>, with roughly two thirds of the country enjoying an annual global solar irradiation of 2.300 kWh/m<sup>2</sup>.

There is an average of 9-11 hours of sun activity, making Egypt a genuine hotspot for solar development, with the government particularly targeting the Eastern and Western banks of the Nile in the centre of the country and Kom Ombo and Benban in the south (Figure 8), suitable also for CSP applications.

Figure 8 - Direct normal irradiation - Egypt



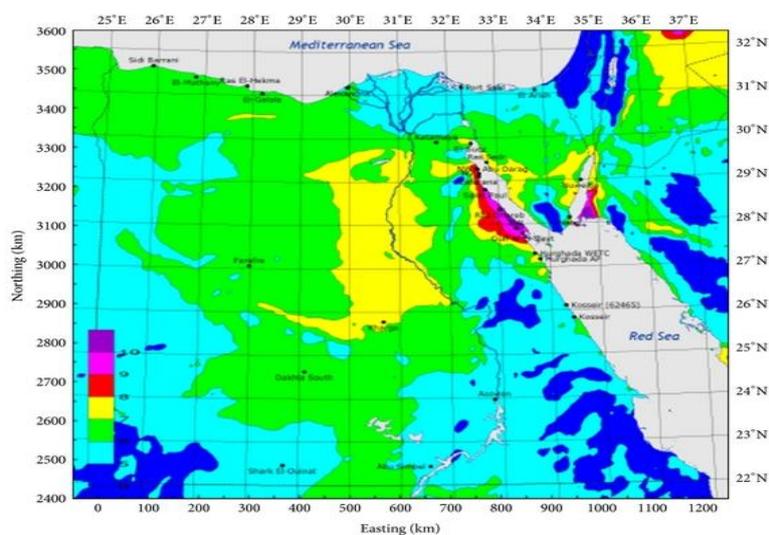
Source: Solar GIS

By the end of 2014, there was only 20 MW of installed CSP capacity installed in the grid connected solar sector<sup>18</sup>.

### 3.1.2 Wind energy

The Wind Atlas published by NREA, identified major areas with high wind energy potential including the Red Sea Coast (average wind speed higher than 10 m/s), Gulf of Suez (9 m/s), Western Egypt Domain at the west bank of the Nile (7-8 m/s), areas close to Kharga (7-8 m/s), Eastern Egypt domain at the east bank of the Nile (6-7 m/s) (Figure 9).

Figure 9 - Wind Energy potential



Source: NREA

<sup>18</sup> 20 MW Solar CSP portion of the 140 MW Integrated Solar Combined Cycle Plant in Kuraymat developed by NREA and Orascom. In operation since 2011.

Today, the total wind energy installed capacity is 750 MW, of which 550 MW in operation in Zafarana at the Suez Gulf coast (the largest wind farm in Africa and the Arab region) and 200 MW under testing (since February 2015). Electricity generation from wind resources on a large scale is a real possibility for Egypt as it has the closest price to electricity generated from oil and gas.

## 3.2 Renewable energy policy

### 3.2.1 Legislative and regulatory framework

The main laws and regulatory measures supporting renewable energy development issued so far are presented in the following table.

Law	Content
<b>Law No. 102 (1986)</b>	Establishing the New and Renewable Energy Authority (NREA). NREA is a public body implementing national renewable energy policy through tenders or own investments. NREA closely interacts with EgyptERA in the implementation of the FIT and with EETC in the implementation of competitive bidding and developing solar and wind projects under an EPC tender scheme.  (further details in Paragraph 1)
<b>Prime Ministerial Decree No. 1947 (2014)</b>	Setting the Feed-in Tariffs (FiT) for electricity generated from renewable sources.  (further details in Paragraph 3.3.1)
<b>Law No. 203 (2014)</b>	Renewable energy law setting out the rules applicable to the allocation of lands for such projects, the connection to the national grid and the sale of the electricity generated from such projects in accordance with the FiT.  (further details in Paragraph 3.3.1)

### 3.2.2 Renewable energy key stakeholders

Institution	Role
<b>Ministry of Electricity and Energy (MOEE)</b>	Develops and implements the national renewable energy strategy through EETC, EgyptERA and NREA.  A central FiT Unit has been established at the Ministry for evaluation of proposals submitted under FiT scheme.
<b>Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA)</b>	For renewable energy, EgyptERA defines the requirements and procedures for the implementation of the FIT program.
<b>Egyptian Electric Transmission Company (EETC)</b>	For renewable energy, EETC is the main off-taker and PPA counterparty for wind and solar power under the FIT.  EETC is also responsible for issuing tenders under the BOO scheme.  (further details in paragraph 3.3.1)
<b>New and Renewable Energy Authority (NREA)</b>	Public body implementing national renewable energy policy through tenders or own investments and also acts as a think tank providing industry data. NREA is closely interacting with EgyptERA in the implementation of the FIT and with EETC in the implementation of competitive bidding and developing solar and wind projects under an EPC tender scheme.

Institution	Role
	NREA is also responsible for the process of land allocation in the FiT scheme. (further details in Paragraph 1)
<b>General Authority for Investment and Free Zones (GAFI)</b>	Principal governmental authority concerned with regulating and facilitating investment. Especially relevant with regards to the FIT scheme as it must approve the establishment of SPVs.

### 3.3 Renewable energy implementation mechanisms

#### 3.3.1 How the mechanisms work

Egypt has approved a number of implementing measures for reaching the announced target. These mechanisms include:

1. Competitive bidding, split into:
  - a. State-owned power plants, to be developed by NREA through EPC model;
  - b. Private power plants through a Build Own and Operate (BOO) scheme, which requires investors to build and operate renewable energy power plants;
2. Feed-in-tariff (FiT) system, by setting a fixed price for RE energy producers;
3. Merchant scheme.

A summary of the implementing schemes for RE projects is provided below.

**Table 4 - Overview of RE implementation mechanisms**

	Competitive Bidding (EPC)	Competitive bidding (BOO)	Feed-in-Tariff (FiT)	Merchant scheme
<b>Planned Capacity (2023)</b>	3.217 MW	1.200 MW	4.300 MW	920 MW
<b>Plant size</b>	Medium/Large	Large	Small/Medium	Medium /Large
<b>Developer</b>	NREA	Private (local and international)	Private (local and international)	Private (local and international)
<b>Finance</b>	Multilateral and bilateral financing institutions or government	Commercial finance Subject to standard Project Finance requirements	Commercial finance Subject to standard Project Finance requirements	Lending via Global Loans available Commercial finance
<b>Tariff</b>	Proposed by EgyptERA and approved by the Cabinet of Ministers	According to the bid outcomes	Proposed by EgyptERA and approved by the Cabinet of Ministers	Negotiated bi-laterally between IPP and off-taker
<b>Contracting period</b>	20 years Wind/ 25 years Solar (PPA)	20 years Wind/25 years Solar (PPA)	20 years Wind/25 years Solar(PPA)	PPA negotiated bi-laterally between IPP and off-taker; 25 years for land usufruct or 20 years from start of operations
<b>Off-taker</b>	EETC	EETC	EETC or Distributors	Consumer

	Competitive Bidding (EPC)	Competitive bidding (BOO)	Feed-in-Tariff (FiT)	Merchant scheme
<b>O&amp;M</b>	O&M operators	Developer	Developer	Developer
<b>Construction</b>	EPC	Developer	Developer	Developer

Source: RES4MED on NREA presentations

The details of the above supporting schemes are reported in the following section.

#### **Competitive bidding for State-owned power plants (NREA through EPC)**

<b>Description</b>	NREA is both the National Agency for developing renewable energy and public investor, as requested by a Presidential Decree in 2009, requiring building wind power plants either by NREA or through usufruct system.
<b>Eligible technologies</b>	Wind-PV-CSP
<b>Implementing model</b>	The governmental wind, CSP and PV projects are developed, owned and operated by NREA. The projects are financed by multilateral and bilateral financial institutions or governments and are open to public bidding for project development phase and construction phase. The international or governmental financing from donors allows NREA to act as project developer. Competitive bidding from NREA for EPC services.
<b>Implementing Authority</b>	NREA, as project developer
<b>Stakeholders involved</b>	Multilateral financing institutions National and international firms for feasibility study, environmental assessment, financial and economic study etc. EPCs for construction phase O&M operators
<b>Value</b>	The tariff is defined by EgyptERA and approved by the Cabinet of Ministers
<b>Duration</b>	20 years Wind 25 years Solar
<b>Strength points</b>	<ul style="list-style-type: none"> <li>– Planning and centralized public management of large scale power plants for long-term strategy</li> <li>– Attractive for international multilateral banks financing</li> <li>– Huge market for EPC companies at guaranteed conditions</li> <li>– Improvement of capacity and skills</li> </ul>

#### **Competitive bidding through Build Own and Operate (BOO) scheme**

<b>Description</b>	In place since 2009, the BOO scheme foresees the tendering process including a prequalification round and a qualification phase in which bidders (national and international) will submit technical and commercial proposals on large scale RE power plants.
<b>Eligible technologies</b>	Wind – PV – CSP
<b>Implementing model</b>	The produced electricity is purchased by EETC on the basis of a Power Purchase Agreement (PPA) to be signed with the

<b>Competitive bidding through Build Own and Operate (BOO) scheme</b>	
	developers. The land for the projects will be made available by NREA on a usufruct basis for the duration of the projects.
<b>Implementing Authority</b>	EETC (in cooperation with NREA) for issuing tendering process and for purchasing the electricity produced.
<b>Stakeholders involved</b>	NREA for land allocation EgyptERA for issuing license
<b>Value</b>	Lowest bid price
<b>Duration</b>	PPA agreement
<b>Strength points</b>	<ul style="list-style-type: none"> <li>- Long term PPA Agreement (20-25 years)</li> <li>- Guaranteed regime for all financial obligations from EETC under the agreement through Central Bank of Egypt</li> <li>- Better control of the system as to the balance between the RE supply and the capacity of the grid.</li> <li>- Enhancing of private sector investments</li> </ul>
<b>Feed in Tariffs (FiT)</b>	
<b>Description</b>	<p>In order to speed up the needed investments, in 2014 the Ministry of Electricity issued a FiT scheme as part of the national strategy to increase the renewable energy capacity for both Solar PV and Wind.</p> <p>The purpose of the FiT is to guarantee a fixed price for energy producers (25 years for solar projects and 20 years for wind projects) to encourage investments in the renewable energy sector.</p>
<b>Eligible technologies</b>	<p>Total target: 4.300 MW for the first period (2015-2017)</p> <ul style="list-style-type: none"> <li>- 2.000 MW – Solar PV ( 500 kW to 50 MW)</li> <li>- 300 MW – Solar PV (&lt; 500 kW)</li> <li>- 2.000 MW – Wind (20 MW to 50 MW)</li> </ul>
<b>Implementing model</b>	The EETC or Distribution System operators (DSOs) are committed to purchasing the produced electricity from RE power plants at the prices announced by the Ministry through PPA for 25 years for the PV projects, and 20 years for the Wind projects.
<b>Implementing Authority</b>	<p>EgyptERA sets rules and procedures for executing the Renewable Energy Feed-in Tariff</p> <p>A central FiT Unit has been established at the Ministry of Electricity and Renewable Energy for evaluation of proposals.</p>
<b>Stakeholders involved</b>	<ul style="list-style-type: none"> <li>- GAFI for SPV establishment</li> <li>- NREA for land allocation</li> <li>- EETC for connection and PPA agreement and for purchasing the electricity produced</li> </ul>
<b>Value</b>	<p>The value of the tariff will be revisited once the target is achieved and/or for the second regulatory period.</p> <p><b>Solar PV tariffs</b></p>

<b>Feed in Tariffs (FiT)</b>			
	<i>Capacity</i>	<i>Value</i>	<i>Finance</i>
	<200kW	90.1 P.T./kWh	Self-finance or/and soft loan from the Ministry of Finance (4% interest rate)
	200kW – 500kW	97.3 P.T./kWh	Local finance with local currency and soft terms from the Ministry of Finance (8% interest rate)
	500kW – 20 MW	13.6 \$.Cent/kWh	Foreign finance
	20 MW – 50 MW	14.34 \$.Cent/kWh	Foreign finance
<b>Wind tariffs</b>			
	<i>Full Operating Hours (FOH)</i>	<i>1<sup>st</sup> tariff segment (5-year period)</i>	<i>2<sup>nd</sup> tariff segment (15-year period)</i>
	2500 - 3000	11.48 \$.Cent/kWh	Min. 11.48 \$.Cent/kWh Max. 7.51 \$.Cent/kWh
	3100 - 4000	9.57 \$.Cent/kWh	Min. 8.93 \$.Cent/kWh Max. 4.60 \$.Cent/kWh
<p>Recipients of the FiT support are also eligible to profit from the renewable tax incentive provided by the government of Egypt.</p> <p>Under the framework, long-term leases of state-owned land will be provided to private investors charged at 2% of the electricity produced.</p> <p>The PV projects' feed-in tariff, for installed capacities more than 500 kW, is being paid in Egyptian pounds according to the following equation:</p> $PV\ Projects'\ Feed-in\ Tariff\ (L.E.) = [15\% \text{ of Feed-in Tariff } (\$.Cent) \times 7.15(L.E.)] + [85\% \text{ of Feed-in Tariff } (\$.Cent) \times \text{exchange rate on the bill issuance day, as stated in the contract}]$ <p>The WIND projects' feed-in tariff is being paid in Egyptian pounds according to the following equation:</p> $Wind\ Feed-in\ Tariff\ (L.E.) = [30\% \text{ of Feed-in Tariff } (\$.Cent) \times 7.15(L.E.)] + [70\% \text{ of Feed-in Tariff } (\$.Cent) \times \text{exchange rate on the bill issuance day, as stated in the contract}]$			
<b>Revision of FiT values</b>	<p>Wind: FIT guaranteed until the earliest of the next milestones occurs:</p> <ul style="list-style-type: none"> <li>- Achievement of 2,300MW contracted WIND IPP projects or</li> <li>- Two years from 27 October 2014.</li> </ul>		
	<p>PV: FIT guaranteed until the earliest of the next milestones occurs:</p> <ul style="list-style-type: none"> <li>- Achievement of 2,000MW contracted PV IPP projects or</li> <li>- Two years from 27 October 2014.</li> </ul>		

<b>Feed in Tariffs (FiT)</b>	
<b>Duration</b>	PPA for Solar PV: 25 years PPA for wind: 20 years
<b>Strength Points</b>	<ul style="list-style-type: none"> <li>- International benchmarking on the effectiveness of the instrument in stimulating quick growth of RE projects</li> <li>- Economies of scale, technology development and capacity building</li> <li>- Long term investments guaranteed by a flat tariff</li> <li>- The grid, either transmission or distribution depending on the case, is committed to offer priority on dispatch for renewable energy, and offers PPA based on take or pay.</li> </ul>
<b>Merchant scheme – Commercial projects</b>	
<b>Description</b>	<p>In addition to the supporting schemes described above for private sector project development, there is the possibility to develop wind power projects bilaterally on a merchant scheme basis.</p> <p>In place since 2012, it is a typical third party access mechanism which foresees a bilateral agreement between the IPP wind power project and its direct customer (Off-Taker) or other eligible customers.</p>
<b>Eligible technologies</b>	Wind
<b>Implementing model</b>	<p>EETC provides the third party access to transmit the energy produced from the power plants to the customer (*)</p> <p>EETC will eventually purchase any excess produced and provide the customer with the needed electricity during low peak (*)</p>
<b>Implementing Authority</b>	NREA for setting the rules for the private foreign investments and land use agreement.
<b>Stakeholders involved</b>	<p>EgyptERA for licensing</p> <p>EETC for grid access</p> <p>Customer/Off-Taker for purchasing electricity produced</p>
<b>Value</b>	Contractual price
<b>Duration</b>	25 years from the land usufruct agreement signature or 20 years from start of operations
<b>Strength points</b>	<ul style="list-style-type: none"> <li>- Enhancement of FDIs participation to Egyptian power market</li> <li>- Helping to satisfy the growing electricity demand from industrial sector</li> <li>- Guaranteed investment through <ul style="list-style-type: none"> <li>- Third party access agreements</li> <li>- Permit to transfer excess energy from one billing period to another with end of year settlement mechanism</li> </ul> </li> <li>- Long term investment guarantee through usufruct agreement</li> </ul>

(\*) Under discussion and to be ratified by Executive Regulation performed by local Authority

In the next session a state of play as of September 2015 of the four RE implementation mechanisms is reported.

### 3.3.2 Analysis of planned installed capacity

The renewable energy supporting mechanisms currently in place aim to **add over 9.5 GW** of installed capacity by 2023, with the vast majority coming from EPC projects through NREA and the FiT scheme. Table 5, provided by NREA, demonstrates that in order to fulfil that plan, **investments of 13.5 billion USD are required**. Most of that amount will have to be provided through commercial finance, emphasising the pivotal role of banks and financial institutions, both local and international in the development of RES in Egypt.

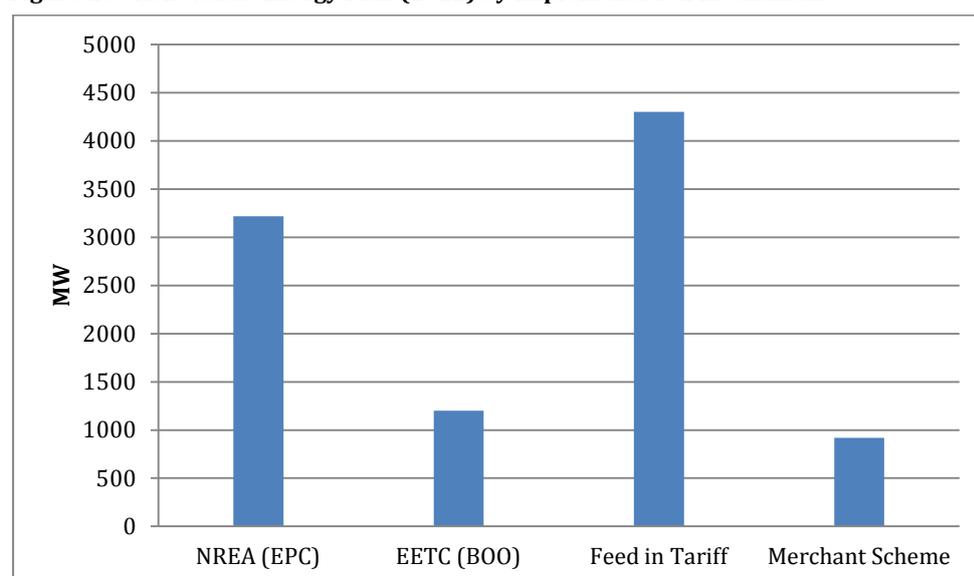
**Table 5 - Total Capacity and Investment cost by 2023**

Development mechanism	Capacity (MW)	Investment Costs (Million USD)
NREA (EPC)	3.217	4.200
EETC (BOO)	1.200	1.650
Feed in Tariff	4.300	6.450
Merchant scheme	920	1.200
<b>Total</b>	<b>9.637</b>	<b>13.500</b>

Source: NREA presentation RES4MED Event (Cairo 28 September 2015)

Confirming the significant role of the introduction of the FiT scheme in stimulating the renewable energy market and attracting private investments, Figure 10 shows that **FiT will be the biggest contributor to additional installed capacity up to 2022**, while NREA dominates the current installed capacity and will continue to build on that by providing over 3 GW of additional capacity in the current plan. The **BOO and merchant schemes do not have a major share in the current plan but there is great potential for growth if current tenders and developments are successful and commercially competitive**, even more so if the Egyptian economy picks up and industrial demand grows at higher levels. Finally, as the first regulatory period of the FiT scheme comes to an end (2017), it will become clear whether the authorities choose to go for a second round and really push on further with FiT or alternatively shift their focus towards competitive bidding and merchant schemes.

**Figure 10 - Renewable Energy Plan (2022) by implementation mechanism**

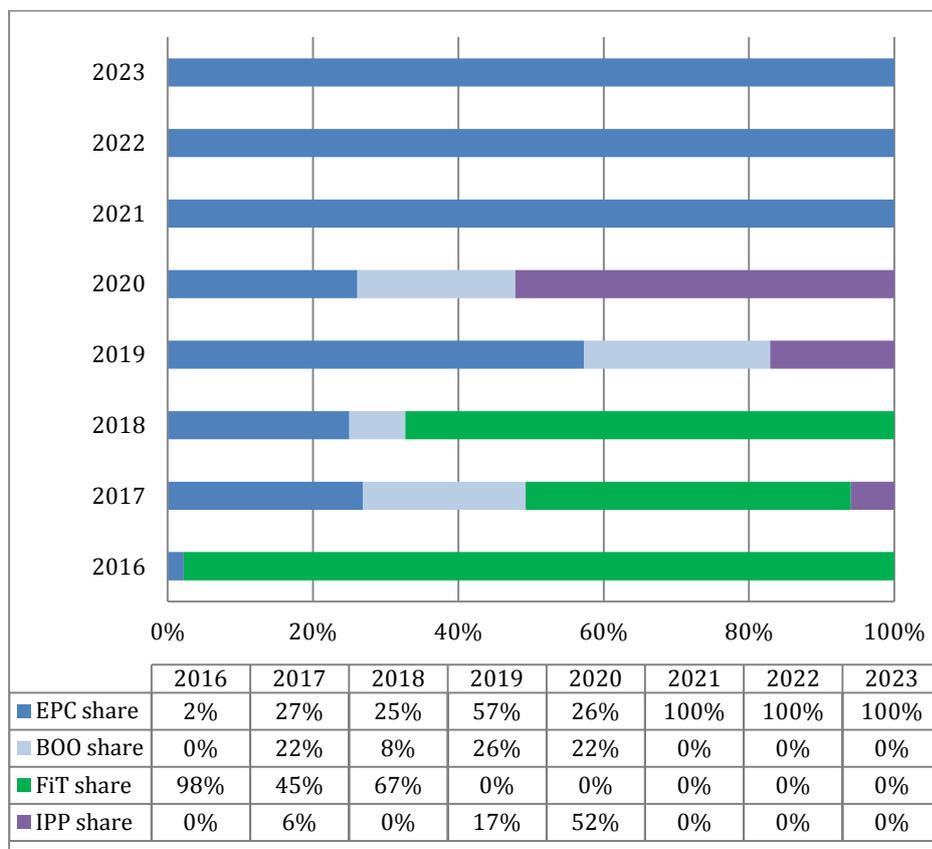


Source: RES4MED on NREA presentation at RES4MED event (Cairo, 28 September 2015)

Figure 11 shows the evolution of each implementation mechanism in the current plan. While FiT dominates up to 2018, it disappears with the end of the first regulatory period and the focus shifts entirely towards NREA/EPC projects, given that it has the capacity to plan long term. The current picture emphasizes the importance of the next 2-3 years in terms of success of BOO and FiT schemes as well as the expansion of merchant projects as the market moves towards more liberalization. Smooth

negotiations, land allocation processes and efficient construction and operation will result in even higher private sector activity and accelerate the growth of RES at an even higher pace.

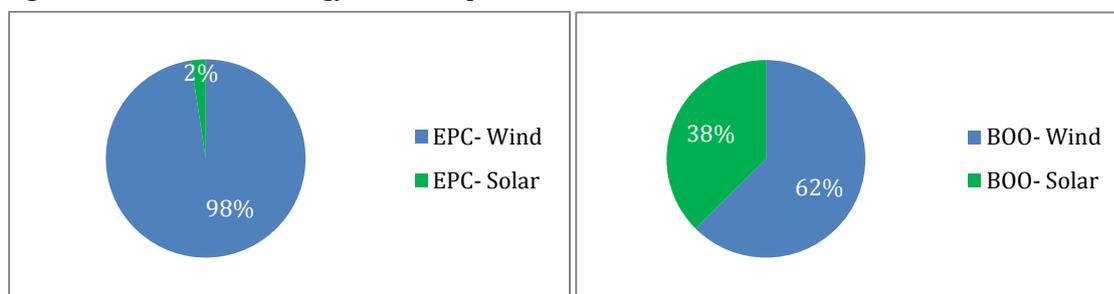
**Figure 11 - Share of implementation mechanism in additional capacity (2016-2023)**

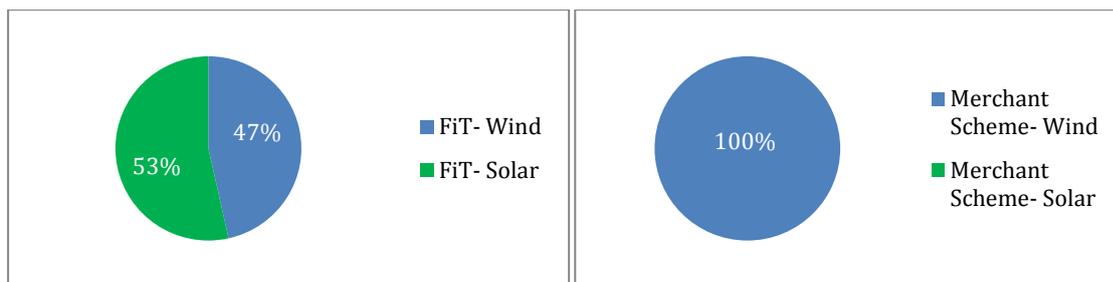


Source: RES4MED on NREA presentation at RES4MED event (Cairo, 28 September 2015)

Moving to a technology-oriented analysis, Figure 12 and Figure 13 demonstrate that of **NREA’s 3.2 GW in the current plan, 98% will be assigned to wind projects** through EPC contracts confirming that NREA intend to build on their current experience in that particular field with 750 MW of wind projects already installed. Equally, commercial projects are fully geared towards wind projects as industrial demand tends to favour wind due to better intermittency and closer proximity. Again in BOO, there is a higher share of wind projects highlighting the attractiveness of that particular market for private and foreign investors. On the other hand, **FiT is the only scheme where there is a higher share of solar projects** as the focus is largely on medium and small developments through the private sector.

**Figure 12 - Share of technology in each implementation mechanism**

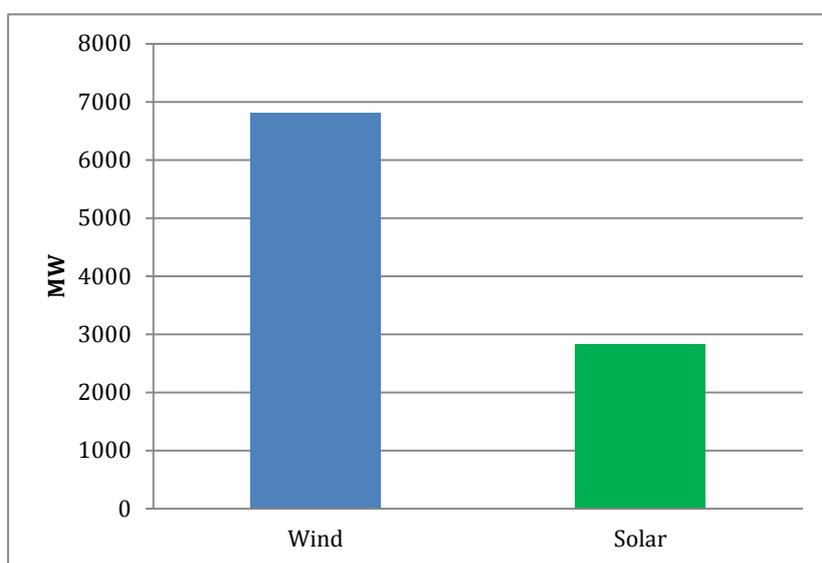




Source: RES4MED on NREA presentation at RES4MED event (Cairo, 28 September 2015)

Looking at the share of wind and solar projects in the 9.6 GW of total added capacity, Figure 13 points to **just less than 7 GW** of wind energy projects, proving **Egypt’s commitment to its 7.2 GW** wind target by 2022. Meanwhile, solar projects make up nearly 3 GW. These figures will continue to evolve overtime particularly as the second phase of FiT unravels, which might well be geared towards further increasing solar capacity.

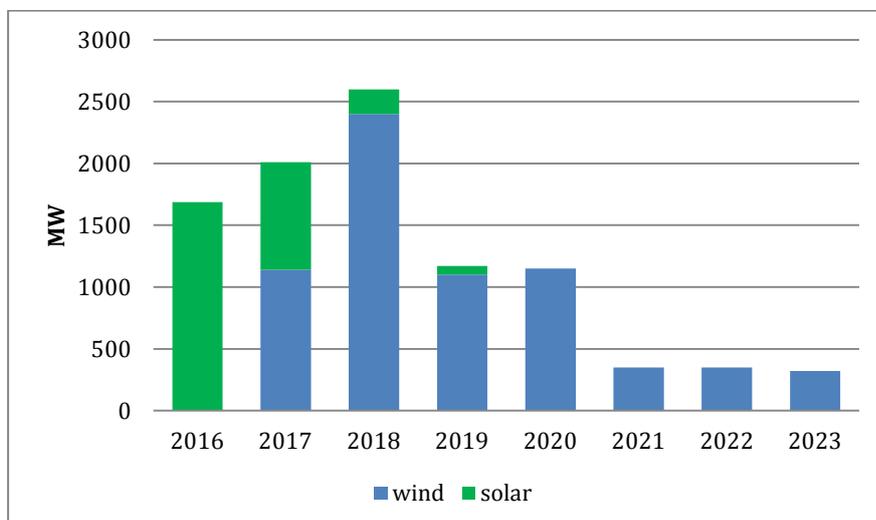
**Figure 13 - Total capacity added by technology (2016-2023)**



Source: RES4MED on NREA presentation at RES4MED event (Cairo, 28 September 2015)

Figure 14 presents a timeline of additional capacity through each year from 2016-2023, illustrating diminishing capacities for solar projects as FiT projects from phase one are completed.

**Figure 14 - Capacity added (2016-2023)**



Source: RES4MED on NREA presentation at RES4MED event (Cairo, 28 September 2015)

Whether a second FiT phase comes into effect or instead more focus is given to BOO projects, **it is expected that the amount of solar projects picks up again**. Similarly if ongoing wind projects achieve financial closure without major problems and start operation in expected dates with expected efficiencies, the upward trajectory should continue after 2018, helping Egypt meet and in fact exceed its renewable energy target for 2022.

## 4 Current and planned projects

The vast potential of Egypt's wind and solar energy sources coupled with the considerable steps taken by the government over the last year to open up the market managed to attract numerous **private investments both local and international**. These movements make Egypt arguably the most dynamic market in the region<sup>19</sup>. The obvious challenge of increasing the power generation capacity and reducing subsidy spending meant that the government had to be assertive in its efforts, realizing the great potential of injecting much needed Foreign Direct Investments (FDIs) into the economy.

The introduction of the FiT scheme in particular sent out a clear message that Egypt is seeking private investments in medium sized projects, committing to 20-25 year contracts at very attractive prices. Yet, by permitting for an EPC model through NREA, a BOO competitive bidding scheme as well as a merchant scheme, they also allow for greater manoeuvrability and flexibility, giving investors different avenues to enter the market while allowing the authorities the time to assess and monitor the results of each of the different schemes. The following paragraphs present a view of the market dynamics through each of the implementation mechanisms by providing a state of play as of September 2015 and planned projects up to 2022.

### 4.1 State-owned power plants (NREA through EPC)

Total capacity installed is 750 MW of Wind (of which 200 MW are under testing phase) and a 20 MW CSP capacity as part of a 140 MW Integrated Solar Combined Cycle plant.

**Table 6 - NREA installed RE power plants**

Project	Technology	Capacity (MW)	Features
Hurghada	Wind	5	The farm includes 42 units with different technologies and capacities from US, Denmark and Germany (pitch control, stall control, lattice & tubular towers, 100 and 300 kW units). Some components were locally manufactured such as blades, towers, mechanical and electrical joints that represent about 40% of the wind turbine. The farm has been connected to the local grid of the city in stages since 1993.
Zaafarana	Wind	545	Currently the largest wind farm in Africa, established in cooperation with Germany (KfW), Denmark (DANIDA), Spain and Japan (JICA). The plant generates roughly 6.6 Billion kWh of electricity.
Gulf El Zayt	Wind	200*	Umbrella Agreement between Egyptian government, German government, European Investment Bank and European Commission to finance the project for a total value of 340 Million Euros. The Development of the project was divided into 4 Lots, one of which foresees to supply and install 100 wind turbines (with a capacity of 2 MW each). In February 2015 installation was completed and currently in testing phase.
Kuraymat	CSP	20	On October 2007 NREA signed an EPC contract and a two year operation and maintenance services contract with

<sup>19</sup> Indeed, according to the Ernst & Young's Renewable Energy Attractiveness Index of March 2015, Egypt was deemed to be the market with the 'hottest' momentum and made it into the index (39<sup>th</sup> place) for the first time since May 2013. In fact, in the June report Egypt rose to 38<sup>th</sup> before another climb up the index to reach 36<sup>th</sup> in September 2015, maintaining Egypt's upward trajectory.

Project	Technology	Capacity (MW)	Features
			Orascom (an Egyptian Construction & Industries Company) for 140 MW Integrated Solar Combined Cycle plant in Kuraymat, of which the solar CSP portion is 20 MW. NREA contracted a consultant for the project execution and two warranty years in Feb. 2008. The Global Environmental Facility (GEF) has granted \$ 49.8 million. The agreement was signed with the Ministry of International Cooperation on December 16th, 2007. In operation since 2011.

*\*Under testing phase since February 2015*

Source: NREA Annual Report, April 2015

A total of **3.217 MW of RE projects through EPC contracts is under construction** or under development by 2022, of which **3.1 GW are wind projects**.

**Table 7 - NREA planned RE power plants**

Project	Technology	Capacity (MW)	Status	Features
Gabal el Zayt II (Japan-JICA)	Wind	220	Under construction	NREA and the Japanese government through JICA raised finances and issued a tender to identify an EPC contractor. According to NREA, Gamesa offered the best technical and financial offer and in February 2015 signed a contract, with a planned operation date of 2017.
Gabal el Zayt III Coop. Spanish Gov.	Wind	120	Under construction	NREA and the Spanish government raised finances and issued a tender to identify an EPC contractor. According to NREA, Gamesa offered the best technical and financial offer and in December 2014 signed a contract, with a planned operation date of 2016.
Gulf of Suez, with kfW, EIB, AFD, EU	Wind	200	Under development	In the process of financing with European partners. Feasibility study completed. Targeting a contract agreement in 2016 and a planned operation date of 2018.
Gulf of Suez, with Masdar	Wind	200	Under development	Feasibility study completed. Ongoing SPV establishment.
West Nile (Japan)	Wind	200	Under development	Environmental assessment and Bird Migration studies completed. Feasibility study due to start at the end of 2015. Planned operation date of 2018.
Gulf of Suez, with AFD & kfW	Wind	200	Under development	Finalizing contract with consultant to proceed with feasibility study. Planned operation date of 2018.
Siemens	Wind	2.000	Under development	12 wind farms in Gulf of Suez and West Nile with a total installed capacity of 2 GW.
Hurghada (Japan-JICA)	PV	20	Under development	Initial feasibility study of December 2012 is being updated as of May 2015.

Project	Technology	Capacity (MW)	Status	Features
Kom Ombo, with AFD	PV	20	Under development	800 Million EU grant by the French Agency. Feasibility study completed in December 2014. Planned Operation date of 2017.
PV off-grid	PV	37	Under development	Design, supply, installation and operation of efficient Solar PV systems to provide electricity, covering 167.000 people over 264 villages, towns and cities in a total of 9 governorates.

Source: NREA Annual Report, April 2015

## 4.2 Build Own and Operate (BOO) scheme

Three BOO tenders have been launched since 2009. Below are the latest tender statuses.

Table 8 - BOO ongoing tenders

BOO round	Capacity (MW)	Steps	Main companies involved
2009 Wind Gulf of Suez	250	<ul style="list-style-type: none"> <li>- May 2009 - RFP issued in (34 offers received)</li> <li>- January 2011 - Site Measurement Framework Agreement and Consultancy Contracting</li> <li>- January 2013 - 7 bidders shortlisted</li> <li>- April 2013 - RFP issued - 4 consortiums submitted proposals</li> <li>- April 2015: Selection of qualified companies by EETC</li> <li>- Ongoing evaluation of qualified companies by EETC</li> </ul>	<ul style="list-style-type: none"> <li>- 4 consortiums submitted proposals to RFP (2013)</li> <li>Lekela, GDF, Enel Green Power and Terna</li> <li>- Qualified consortium</li> <li>GDF/Orascom/Toyota submitted the lowest tariff price at \$0.041 kWh.</li> </ul>
2013 PV Kom-Ombo	200 (20*10)	<ul style="list-style-type: none"> <li>- July 2013 - RFP issued</li> <li>- January 2014 - 15 bidders shortlisted and kick off Meetings/Site Visits</li> <li>- Contracting Consultants ongoing</li> <li>- Planned Operation 2017-2018</li> </ul>	<ul style="list-style-type: none"> <li>15 bidders shortlisted in 2015 among which:</li> <li>Building Energy, Scatec, First Solar, ACWA Power, SunEdison, Sun Power, Enel Green Power</li> </ul>
2015 Wind PV CSP West Nile	500	<ul style="list-style-type: none"> <li>- August 2015 - RFPQ issued</li> <li>- 250 MW Wind - ongoing pre-qualification evaluation</li> <li>- 200 MW PV - ongoing pre-qualification evaluation</li> <li>- 50 MW CSP - ongoing pre-qualification tendering process</li> </ul>	<ul style="list-style-type: none"> <li>44 Companies have obtained the PV tender conditions among which:</li> <li>Sterling and Wilson, Enel Energy, FAS, Abdul Latif Jameel, ACWA Power, Orascom, SunEdison, First Solar, Lekela Power, Al Tawakol, Elsewedy Electric, Gigawatt Global, Terra Sola, Sun Power, and Scatec Solar<sup>20</sup></li> </ul>

<sup>20</sup> <http://www.dailynewsegypt.com/2015/10/05/44-companies-obtain-tender-conditions-for-200-mw-solar-power-plant/>

Source: RES4MED on NREA presentation at RES4MED event (Cairo, 28 September 2015)

**A total of 250 MW is going to be launched in the next months.**

**Table 9 - BOO planned tenders**

BOO round	Capacity (MW)	Steps	Main companies involved
Tbd	250	To be launched Power plants to be operated by 2022	Na
Wind			
West Nile			

Source: RES4MED on NREA presentation at RES4MED event (Cairo, 28 September 2015)

### 4.3 Feed in Tariff (FiT)

The first FiT round covering the 1<sup>st</sup> regulatory period (2015-2017) was launched in 2014 for both wind and PV projects. No information is available on the 2<sup>nd</sup> regulatory period. Below the FiT 2014 results.

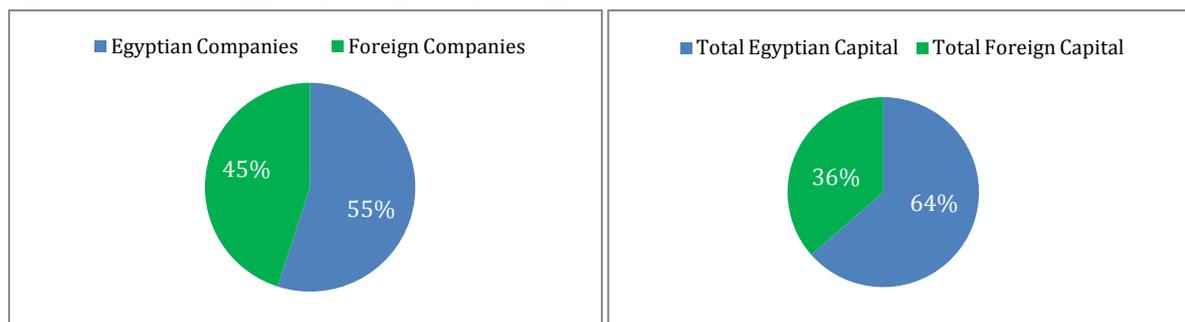
**Table 10 - FiT results**

FiT round	Size	Status	Capacity (MW) reached
2014 – FiT round (2015-2017) Wind PV	Large scale >500 kW	<p>A total of 187 applications have been received for Wind and Solar PV projects</p> <p>On the 6th of January the short list of 136 consortiums was announced (total capacity of 4.550 MW), of which:</p> <p><b>PV projects</b></p> <p>100 companies for Solar PV for a total capacity of 2.880 MW</p> <ul style="list-style-type: none"> <li>- 42 developers are currently are in the process of land allocation (Proposals amounting to 1.890 MW)</li> </ul> <p><b>Wind projects</b></p> <p>36 Companies for Wind for a total capacity of 1.670 MW</p> <ul style="list-style-type: none"> <li>- 10 developers are currently are in the process of land allocation (500 MW)</li> </ul> <p>Of the 52 Companies (solar and wind) in the allocation phase), 20 companies granted the Interim License (see figures below)</p>	<p>A total of 2.390 in land allocation phase</p> <ul style="list-style-type: none"> <li>- 1.890 MW PV</li> <li>- 500 MW Wind</li> </ul> <p>Projects to be operated by 2018</p>
	< 500 kW	<p>A total of 83 companies have been qualified for Solar PV projects</p> <p>Projects to be operated by 2018</p>	

Source: RES4MED on NREA data

Of the **52 companies** in the land allocation phase (the full list of Companies is reported in Annex 2), **20 Companies have been granted the Interim License** by EgyptERA (the FiT process is reported in Annex 1), of which 11 are Egyptian (45%) and 9 are Foreign Companies (55%) (Figure 15).

Of the 9 Foreign Companies granted the Interim License, 3 come from Gulf countries, 3 come from European Union (of which one is Italian,) and 3 come from other countries.

**Figure 15 - Share of Egyptian/Foreign companies granted FiT interim license and related investments share**

Source: RES4MED on EgyptERA presentation at RES4MED event (Cairo, 28 September 2015)

In terms of **investments**, the 20 companies that have been granted the interim license for projects under the FiT scheme are investing capital for a **total amount of \$215 Million**, of which \$136.55 from Egyptian Companies (64%), and \$78.45 from foreign capital (36%).

Of the total foreign company investments, Gulf countries lead the capital with \$30 Million, followed by European Union with \$24.5 Million (15% from Italy).

#### Box - Snapshot on FiT market dynamics

- **Enerray spa and Desert Technologies awarded 150 MW PV and Wind projects** under the FiT scheme in Egypt, for a total investment expected to exceed \$250m. As well as developing the projects, Desert Technologies and Enerray will also be acting as an EPC contractor and O&M provider through their joint venture partnership<sup>21</sup>.
- **Building Energy signs \$200m project for 250 MW solar plants in Benban**, Upper Egypt. The project was awarded by NREA and will cost \$200m, while each plant is expected to generate around 143 GWh per year. The project's construction will start in summer 2016, and it will take 12 month to be completed, creating more than 1,000 jobs during construction and a further 70 to 80 long-term jobs during operation<sup>22</sup>.
- **Scatec Solar (SSO) has signed agreements to participate in five projects totalling 250 MW (AC)** under Egypt's FiT PV program. One of the biggest players in Egypt's new solar program, SSO will be the lead developer in one project, while in four others it will participate as strategic investor, EPC and O&M provider, with investments totalling \$600m over the next two years. In addition, Scatec Solar have already launched field activities in Beban and Zaafarana<sup>23</sup>.

## 4.4 Merchant scheme

A total of 120 MW of private wind projects is under construction and a further 800 MW are under development.

**Table 11 - Ongoing merchant projects**

Company	Technology	Capacity (MW)	Status	Features
Italgen	Wind	120	Construction phase (to be operated by 2019)	Wind project in Gulf El Zayt Phase 1 <ul style="list-style-type: none"> <li>- Usufruct agreements signed</li> <li>- Network usage contract signed</li> <li>- Financial closure and start of construction</li> <li>- Investment: 200 Million USD for Phase 1</li> </ul>

Source: RES4MED on NREA Annual Report, April 2015

<sup>21</sup> <http://www.enerray.it/enerray-e-desert-technologies-realizzeranno-150-mw-di-impianti-fotovoltaici-in-egitto/?lang=en>

<sup>22</sup> <http://www.dailynewsegypt.com/2015/06/29/building-energy-signs-200m-project-for-2-50-mw-solar-plants-in-egypt/>

<sup>23</sup> <http://www.scatecsolar.com/Investor/Stock-exchange-notices/Scatec-Solar-launches-field-activities-in-Egypt>

**Table 12 - Planned merchant projects**

Project	Technology	Capacity (MW)	Status	Features
Italgen	Wind	200	Under development	Wind project in Gulf El Zayt - Phase 2
Elsewedy Electric	Wind	600 (6*100)	Under development	Wind project in Gulf of Suez <ul style="list-style-type: none"> <li>- December 2012: Tender issued</li> <li>- October 2013: Offers opened for consideration</li> <li>- June 2014: Technical and financial evaluation done and awarding to Elsewedy Electric for 6 lots</li> </ul>

Source: RES4MED on NREA Annual Report, April 2015

## 5 Main market dynamics

### 5.1 Renewable energy and the economy

The Egyptian authorities have made very important steps over the last year to promote investments in the vast renewable energy resources of the country, with the aim of closing down the energy demand deficit and injecting much needed investments into the economy. While renewable energy legislation, policy and supporting mechanisms are at the forefront of this effort, it is vital to point out the work going on in the economy as a whole in order to facilitate an attractive environment for investors both local and international.

By giving attention to the improvement of the grid, technological and institutional advancement, growing the industry of renewable energy and improving fiscal conditions, the authorities display an intent of developing the renewable energy sector sustainably over the long-term. This ensures that while short-term investments continue to come in, a more encompassing infrastructure is being developed, which can ensure that the renewable energy sector continues to flourish and provide the foundation from which the economy can recover.

### 5.2 Bilateral market agreements

**Beyond the 9.6 GW of planned installed capacity** through the established implementation mechanisms (see Paragraph 3.3.2), there remains a huge effort to galvanise the renewable energy market through other mediums. One of the main approaches taken by the authorities is striking **bilateral agreements with private developers for very large installed capacities**. The three main bilateral agreements were all signed during the Egypt Economic Development Conference (EEDC) of March 2015 in Sharm el-Sheikh, with **investments totalling \$11bn** and a total **installed capacity of 7 GW**, of which:

**1. 2 GW (1.5 GW PV + 500 MW Wind)**

ACWA & Masdar from Saudi Arabia and UAE respectively agreed deals for a combined capacity of 2 GW, split 1.5 GW Solar PV and 500 MW Wind with a total investment of \$2.4bn.

**2. 3 GW PV**

Sky Power Global & IGD consortium agreed a deal to install 3 GW of Solar PV capacity for an investment worth \$5bn.

**3. 2 GW PV**

Terra Nex & Terra Solar signed a deal for an investment worth \$3.5bn, providing 2 GW of Solar PV capacity.

While the exact details and timeframe of these agreements are yet to be sealed and revealed, it does demonstrate the potential size of the renewable energy market beyond the current plan and the established implementation mechanisms.

Crucially, it raises questions about the ability of the four implementation mechanisms to absorb the whole market and adds to the queries over the authorities' future plans, particularly regarding the second phase of the FiT scheme.

### 5.3 Energy investments and co-operation

Apart from investments in renewable energy plants, there is also a noteworthy movement on other fronts with the aim of developing and improving the foundations for the deployment of renewable energy projects. Realizing the importance of improving the transmission grid as well as focusing on capacity building and institutional advancements, the Egyptian government has agreed a number of deals that could be of great importance for the renewable energy market and can in fact lead to the attraction of more private investors.

1. **China's State Grid signed an agreement** worth \$1.8bn with EETC to develop Egypt's electricity transmission grid (March 2015).
2. **Egypt, the UAE and France signed an MoU** on the sidelines of the Sharm el-Sheikh conference for support in the field of IT and renewable energy (March 2015).
3. **Abengoa signed an MoU** with Egypt to cooperate in the development of national Concentrated Solar Power (CSP).

The agreement aims at initiating a commercial and technical relationship between NREA, EETC and Abengoa, including a technology cooperation and local value creation relating to solar energy activities with a particular focus on the development of Solar Thermal Electricity (April 2015).

### 5.4 Manufacturing initiatives

Furthermore, the Egyptian government is aiming to grow the renewable energy industry by attracting technology developers to establish facilities manufacturing renewable energy components. These projects are especially **significant for the government as they provide permanent jobs**. Additionally, the training of employees creates a knock-on effect that contributes to **increasing labour skills** and the **attraction** of further **manufacturers**. Moreover, by sourcing components such as wind turbines locally, cost of production will decrease allowing for **economies of scale** and making renewable energy development in Egypt even more competitive.

#### 1. Rotor blade manufacturing

Siemens will build a rotor blade manufacturing facility in Egypt's Ain Soukhna region, which will provide training and employment for up to 1,000 people. The facility is scheduled to go into operation in the second half of 2017. The MoU was signed in the EEDC in March 2015 and the deal was sealed in June 2015 as part of Siemens' €8 billion investment, which also includes 12 wind farms and 3 CCGT power plants.

#### 2. Module factory

Italian PV maker MegaCell Srl and Cairo-based Misr Asset Management (MAM) signed a memorandum of understanding in November 2014, intending to build a 120-MW solar cell and module factory in Egypt. The facility will use MegaCell's bi-facial cell technology which relies on high efficiency, monocrystalline n-type silicon wafers, providing high-tech training and jobs.

### 5.5 Investments and Capital

In a wider context, the government is committed to attracting investments in other fields through introducing a new Investment Law<sup>24</sup> in March 2015 and ensuring it meets its current and previous financial commitments in order to increase investor confidence and revive the economy. Beyond renewable energy, a number of important agreements and pledges of investment were announced during the EEDC, particularly in the oil and gas sector, real estate and transportation and logistics, displaying an increased interest by investors to enter the Egyptian market.

1. **The European Investment Bank (EIB)** pledged investments worth \$2.1 billion in Egypt.
2. **The World Bank allocated** \$5 billion for its Egypt program for the next four years, doubling its annual portfolio to \$1.2 billion.
3. In April 2015, **Moody's Investors Service** upgraded Egypt's issuer and senior unsecured bond ratings to B3 from Caa1, with a stable outlook, citing improving macroeconomic performance, reduction in external vulnerabilities and ongoing commitment to fiscal and economic reform as drivers for the upgrade.

Attracting International Financial Institutions (IFIs) and regaining lender trust are crucial in displaying faith in the current economic and fiscal policies as well as sending positive signals to international

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<sup>24</sup> Presidential Decree n. 17 (2015)

financiers and investors. Access to finance is especially important as development of renewable energy projects requires high levels of capital and the role of financial institutions will be central to any progress in this sector.

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[http://www.moee.gov.eg/english\\_new/home.aspx](http://www.moee.gov.eg/english_new/home.aspx)

Ministry of Finance (MOF)

<http://www.mof.gov.eg/Arabic/Pages/Home.aspx>

Egyptian Electric Utility and Consumer Protection Regulatory Agency (EgyptERA)

<http://egyptera.org/en/>

Egyptian Electric Transmission Company (EETC)

[www.eetc.net.eg/](http://www.eetc.net.eg/)

Egyptian Electricity Holding Company (EEHC)

<http://www.egelec.com/mysite1/eehc/about%20us.htm>

New and Renewable Energy Authority (NREA)

<http://www.nrea.gov.eg/>

Regional Center for Renewable Energy and Energy Efficiency (RCREEE)

<http://www.rcreee.org/>

International Energy Agency – Policy and measures database

<http://www.iea.org/policiesandmeasures/renewableenergy/>

International Renewable Energy Agency (IRENA)

<http://www.irena.org/home/index.aspx?PriMenuID=12&mnu=Pri>

Association of Mediterranean Energy Regulators (MEDREG)

<http://www.medreg-regulators.org/>

World Bank

<http://www.worldbank.org/>

Central Agency for Public Mobilization and Statistics (CAPMAS)

<http://www.capmas.gov.eg/>

European Bank for Reconstruction and Development (EBRD)

<http://www.ebrd.com/home>

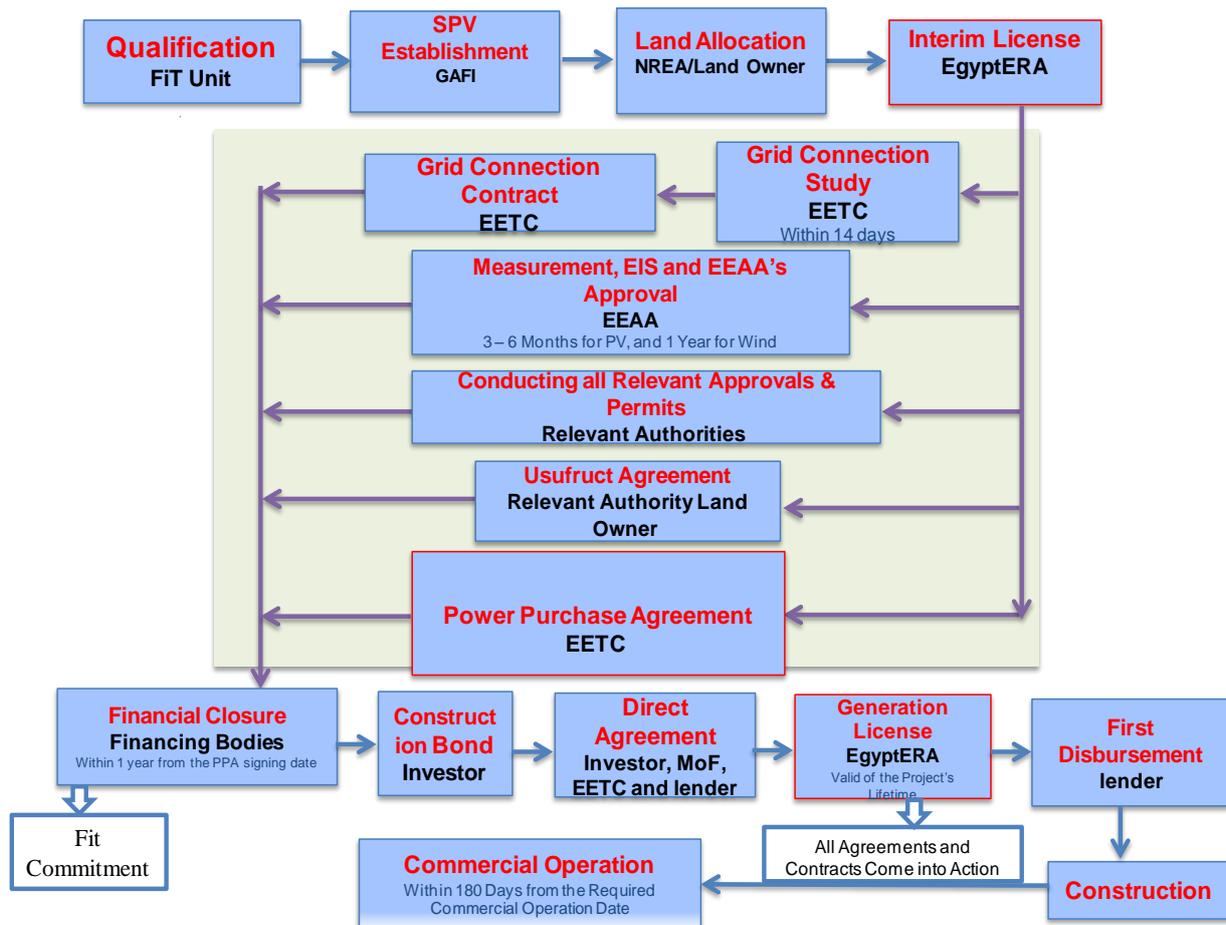
US Energy Information System

<http://www.eia.gov/state/seds/>

***Main market intelligence websites***

- <http://www.businessworld.in/>
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- <http://www.pv-tech.org/>
- <http://www.renewablesbiz.com/>
- <http://www.greentechlead.com/>

## Annex 1 - FiT process for projects >500 kW



Source: RES4MED on EgyptERA presentation at RES4MED event (Cairo, 28 September 2015)

## Annex 2 - List of Companies in the land allocation phase of FiT process

ID	Company/SPV	Capacity (MW)	MoU (Date)	Land allocation (Status)	Country
<b>WIND</b>					
1.	Alpha for wind energy (Al fanar)	50	29/04/2015	Delivered	Saudi Arabia
2.	Orascom	50	29/04/2015	Delivered	Egypt
3.	Nile co. for wind energy GDF Suez international	50	11/05/2015	Delivered	France
4.	Masr co. for wind energy GDF Suez international	50	11/05/2015	Delivered	France
5.	ACWA Ghreb 1	50	20/05/2015	Delivered	Saudi Arabia
6.	Acwa Ghreb 2	50	20/05/2015	Delivered	Saudi Arabia
7.	Lekela Egypt for wind energy Lekela-Actis	50	03/06/2015	Delivered	International consortium
8.	Alcazar energy Egypt for wind	50	03/06/2015	Delivered	UAE/Int.
9.	Enel Green Power (IFNUT)	50	23/06/2015	Ongoing Delivery	Italy
10.	Enel Green Power (SHU)	50	23/06/2015	Ongoing Delivery	Italy
	<b>Sub-total wind</b>	<b>500</b>			
<b>SOLAR PV</b>					
1.	Scatec Egypt solar energy (SAE)	50	14/03/2015	Delivered	Norway
2.	O capital for Energy	50	14/03/2015	Delivered	Egypt
3.	FAS for renewable energy	50	14/03/2015	Delivered	Saudi Arabia
4.	Philadelphia Solar	50	15/03/2015	Delivered	Jordan
5.	Orascom for solar energy	50	29/04/2015	Delivered	Egypt
6.	Sun infinite energy consortium	50	29/04/2015	Delivered	Egypt
7.	TK for energy systems ALTawakol	20	29/04/2015	Delivered	Egypt
8.	Access Power	50	29/04/2015	Delivered	UAE
9.	Alpha for solar energy (Alfanar)	50	29/04/2015	Delivered	Saudi Arabia
10.	Taqetna (European Jordan Renewable energy project)	20	29/04/2015	Ongoing Delivery	Jordan/Europe
11.	Acwa Benban for energy	50	10/05/2015	Delivered	Saudi Arabia
12.	Kom Ombo for solar energy	50	10/05/2015	Delivered	Egypt
13.	ARC for renewable energy (Secipv consortium)	50	10/05/2015	Delivered	USA
14.	Nile co. for solar energy	50	11/05/2015	Delivered	Egypt
15.	Nubian for renewable energy	50	11/05/2015	Delivered	United Kingdom
16.	Shams Egypt (FRV/AU)	50	15/05/2015	Delivered	Saudi Arabia
17.	First Solar Egypt PV (First Solar INC)	50	17/05/2015	Ongoing Delivery	USA
18.	TAQA Arabia for solar energy	50	25/05/2015	Delivered	Egypt
19.	Cairo Solar Farm	50	25/05/2015	Delivered	Egypt
20.	CTIP	50	26/05/2015	Delivered	Na
21.	Delta for renewable energy	50	28/05/2015	Delivered	Na

ID	Company/SPV	Capacity (MW)	MoU (Date)	Land allocation (Status)	Country
22.	Lekela Egypt for solar energy Lekela-Actis	50	03/06/2015	Delivered	International consortium
23.	El-serag for solar energy Abengoa	50	03/06/2015	Delivered	Spain
24.	Alcazar energy Egypt for solar	50	03/06/2015	Delivered	UAE/Int.
25.	Infinity 50 for renewable energy	50	04/06/2015	Delivered	Na
26.	Gestamp renewable co.	50	09/06/2015	Ongoing Delivery	Spain
27.	El-koum for energy Hassan Allam Sons	50	11/06/2015	Delivered	Egypt
28.	NEOEN	50	11/06/2015	Ongoing Delivery	France
29.	El Masreya for solar energy development (ElSewedy)	50	12/06/2015	Delivered	Egypt
30.	Jordanian Egyptian co. for solar energy Mag engineering and contracting	20	17/06/2015	Ongoing Delivery	Jordan
31.	Innovations unlimited Egypt	20	17/06/2015	Ongoing Delivery	Qatar
32.	Solar Shams & Building Energy	50	17/06/2015	Ongoing Delivery	Egypt/Italy
33.	Access Building	50	17/06/2015	Ongoing Delivery	UAE
34.	EDF	50	22/06/2015	Ongoing Delivery	France
35.	Enel Green Power	50	23/06/2015	Ongoing Delivery	Italy
36.	Solar Benban for energy	50	23/06/2015	Ongoing Delivery	Na
37.	Sp energy	50	23/06/2015	Ongoing Delivery	United Kingdom
38.	EGY Energy Wadi Degla	50	23/06/2015	Ongoing Delivery	Egypt
39.	Phoneix	50	23/06/2015	Ongoing Delivery	Na
40.	Elf Energy Egypt Co.	50	27/06/2015	Ongoing Delivery	UAE
41.	ICD	50	02/07/2015	Ongoing Delivery	Saudi Arabia
42.	Canard	50	06/07/2015	Ongoing Delivery	Na
	<b>Sub-total PV</b>	<b>1.890</b>			
	<b>Total</b>	<b>2.390</b>			

Source: RES4MED on NREA data

(<http://www.nrea.gov.eg/download/fit/%D9%85%D9%88%D9%82%D9%81%20%D8%A7%D9%84%D8%B4%D8%B1%D9%83%D8%A7%D8%AA%202.pdf>)



## **About RES4MED**

RES4MED (Renewable Energy Solutions for the Mediterranean) is a non-profit association of leaders among utilities, industries, agencies, technical service providers, consultancy and academia, with the mission to support the deployment of renewable energy, both large scale and distributed energy, of energy efficiency solutions and facilitate their integration in the local and regional markets to satisfy local energy needs.

RES4MED, as integrated platform for public-private dialogue on renewable energy issues in the Mediterranean, aims at building a dialogue with Regional Institutions, local Governments and Regulatory bodies by providing a practical outcome oriented approach.

To achieve this mission, RES4MED has built a wide and solid network with the main Institutions, Association, Agencies and Research Centers, among which the Union for the Mediterranean (UfM), the Arab Cooperation on Renewables and Grids, the Regional Center for Renewable Energy and Energy Efficiency (RCREEE), the Association of Mediterranean Energy Regulators (MEDREG), the Association of Mediterranean Transmission System Operators (MEDTSO), International Renewable Energy Agency (IRENA), Institut de Recherche en Energie Solaire et Energies Nouvelles (IRESEN), Société d'Investissements Energetiques (SIE), Agence Nationale pour le Développement des Energies Renouvelables et de l'Efficacité Energétique (ADEREE), etc.

With all these partners, RES4MED started relevant partnerships and joint initiatives aimed at cooperating in specific fields in the Mediterranean Countries. This engagement activity is part of the RES4MED operating model set up for achieving the Association objectives', based on the public-private partnership model.

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