Ministry of Electricity & Renewable Energy
Arab Republic of Egypt

Country Report

Arab Republic of Egypt

Knowledge Co-creation Program
Energy Policy

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2020

OUTLINE

1. General information of Egypt,
2. Current energy policy and measures,
3. Past energy demand and supply statistics,
4. Outlook of energy demand and supply,
5. Major difficulties and bottlenecks currently faced in formulating energy policies,
6. Subjects I would like to study.

1.General information of Egypt

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1- General information of Egypt

- Egypt is in the heart of the world map.
- Capital City is Cairo
- Population exceeds 100 million.
- Egypt occupies 1 million Sq. Km.
- GDP in 2016: 333 Billion USD
- GDP per Capita 2016: 3780 USD
- Language: Arabic

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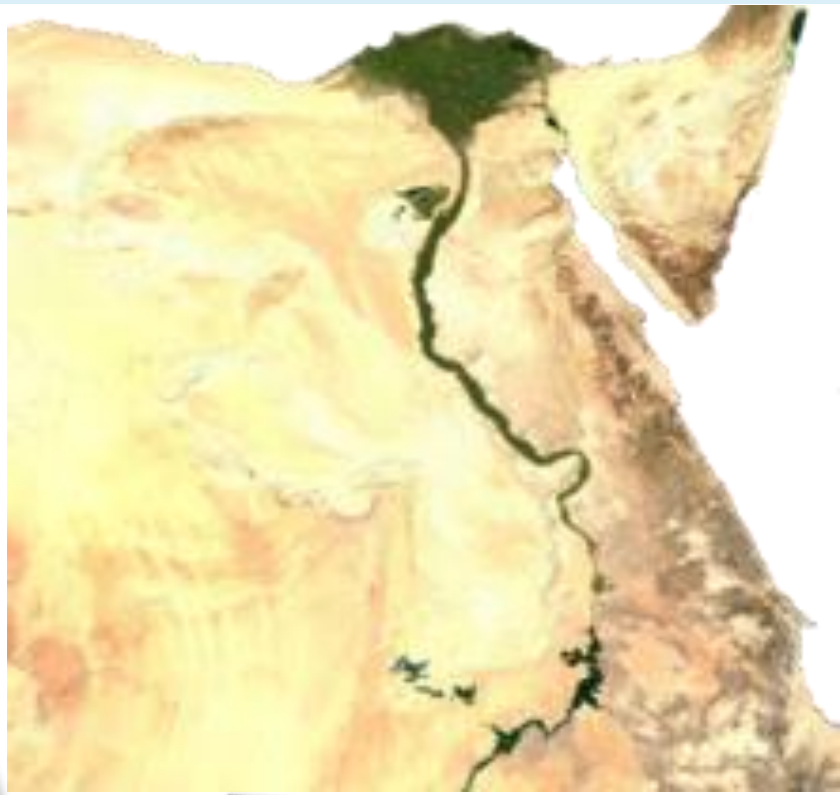
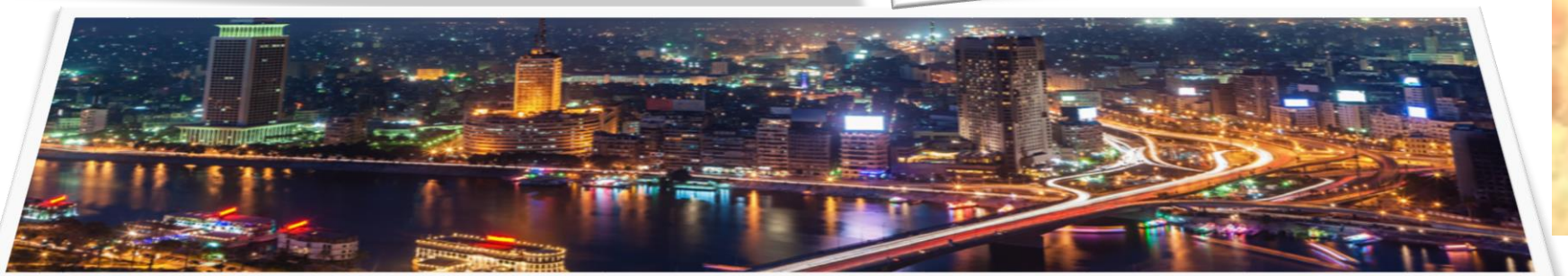
Photos from Egypt





2. Current energy policy and measures

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2. Current energy policy and measures

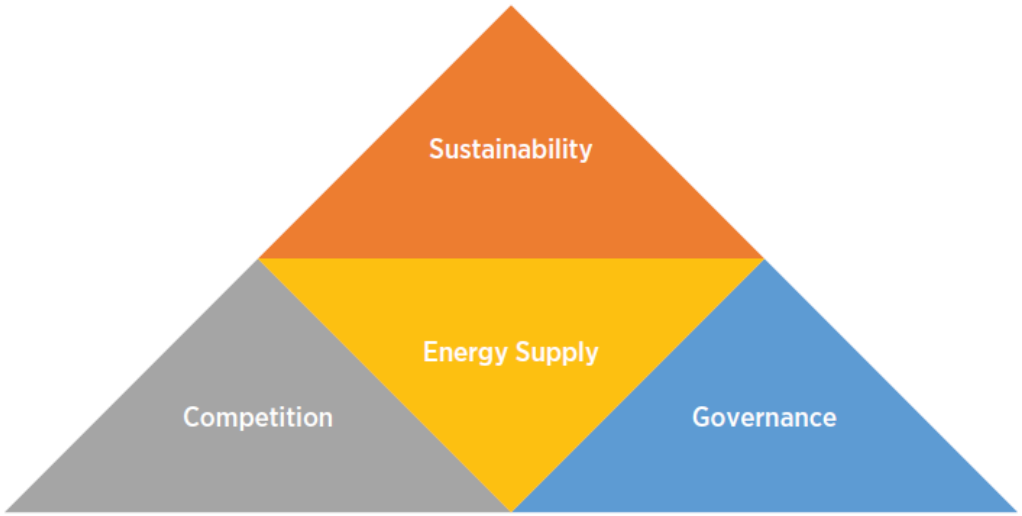
Egypt's Strategic vision for energy

2030 EGYPT VISION

"Maximize the efficient use of various Energy resources in a competitive, environment-friendly manner focusing on renewable energy".

A Coherence among the

Egypt's energy vision 2035 & National SDGs 2030 & UN SDGs 2030.



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Electricity Sector Efforts updating legislative infrastructure

Year	Legislation
March 2014	Amendment the name of the Ministry of Electricity and Energy to be: Ministry of Electricity & Renewable Energy
July 2014	A tariff reform program was adopted and announced for 5 years up to 2019 . Consequently the price of the electricity Generated from RE will be increased annually
September 2014	The Cabinet Approved the issuance of Feed in Tariffs (FIT) for electricity projects produced from RE resources (PV-Wind) and its prices was issued by Prime Minister's decree Oct. 2014
October 2014	NREA establishing law has been amended to allow for NREA to establish companies by itself or in partnership with private sector to implement O & M RE projects.
December 2014	RE law was issued to encourage generating the electricity from RE sources through 4 development schemes
July 2015	New Electricity law :Establishment of competitive electricity market, which is based on bilateral contracts and adoption of the concept of eligible customers. Third Party Access (TPA). Establishment of Transmission System Operator (TSO) and provide assurances for
April 2016	Electricity by Law has been issued.
October 2016	2nd phase of Feed in Tariff (FIT)

Incentives For Investments In RE

Considering the Renewable Energy in our Energy Strategy until year 2035 to encourage private investments:

- We started with Electricity tariff reform program, announced in July 2014 for seven years up to 2022.
- Concerning Renewable many different mechanisms were considered:
  - EPC tenders (Engineering, Procurement & construction mechanism).
  - BOO projects (Build, Own & Operate mechanism).
  - IPP (Independent Power Producer).
  - FIT (Feed in Tariff scheme).
  - Net Metering scheme.
  - Auction mechanism.

Incentives For Investments In RE

- **Land has been allocated for renewable energy project: Solar and Wind has been allocated. 7650 Km2**
- **Availability of information concerning Solar Atlas and Wind (was made available for all investors).**
- **Environmental Impact Assessment Studies.**
- **Long Term bankable PPAs.**
- **Custom duties for all imported materials and equipment do not exceed 2%.**
- **Sovereign Guarantees issued by Ministry of Finance.**

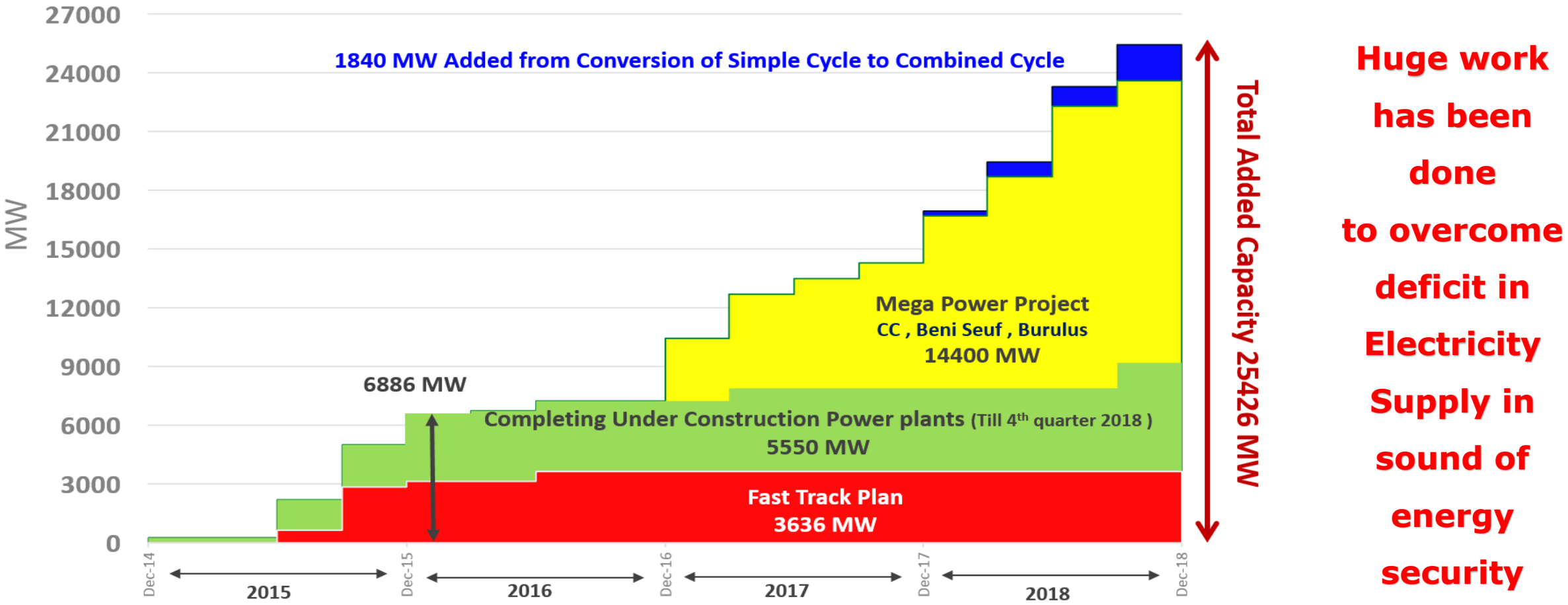
Incentives For Investments In RE

- Codes for interconnections with network
- Interconnection between neighbors.
- A bankable Power Purchase Agreement (PPA) and Network Connection Contract (NCC) as well as a wheeling charge tariff (for IPP investors) to facilitate process of Private investor.

Renewable Energy Policy in Egypt

- Targeting 20 % from total installed capacity by year 2022.
- Private sector investments will play acritical role in achieving the target through a framework mechanisms .
- The Supreme Energy Council approved, "Integrated and Sustainable Energy Strategy till 2035". Targeting 42 % RE from total installed capacity by year 2035.
- Studies are in progress to raise the share of RE.

Installed Capacities Added from the End of 2014 till the End of 2018

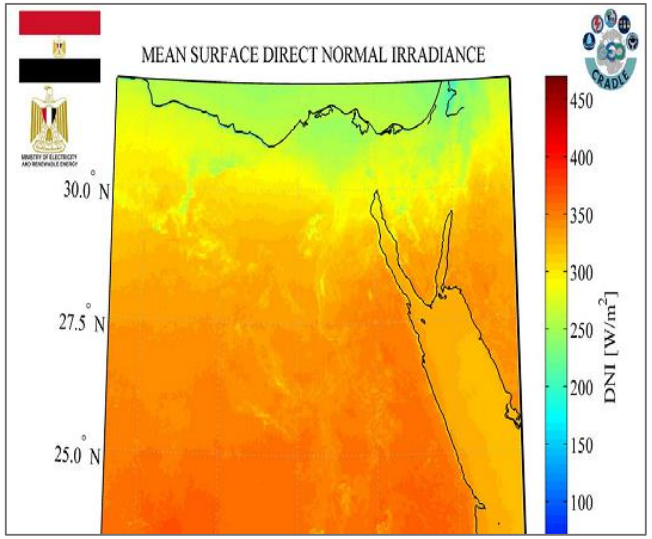


Huge work has been done to overcome deficit in Electricity Supply in sound of energy security

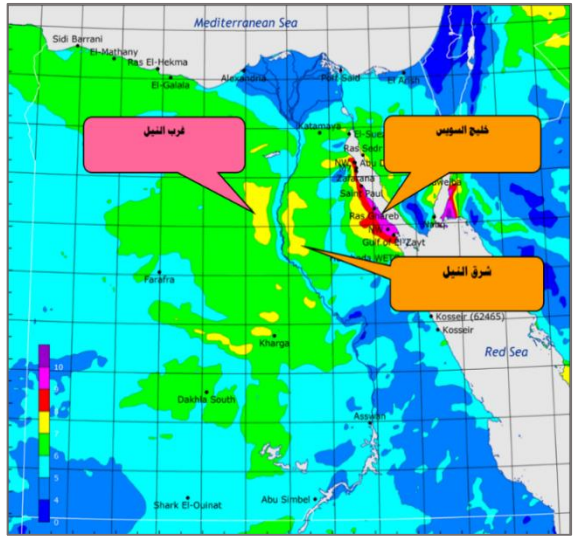
Potentials from Wind & Solar Based on (Wind & Solar Atlas)

Areas			
Zone		Areas (km^2)	Capacity MW
Suez Gulf (wind)		1220	3550
East Nile	Wind	841	5800
	Solar	1290	34900
West Nile	Wind	3636	25350
	Solar	606	17400
Benban (Solar)		37	1800
Kom Ombo (Solar)		7	260
TOTAL		7637	≈90,000

Yellow shaded cells represent the available areas as a whole



(Solar Atlas)



(Wind Atlas)

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Renewable Energy Current Situation

Renewable Energy	Total Installed Capacity by location
Wind Farms In cooperation with (Denmark , Germany , Japan, EU , Spain)	**545 MW** Zaafarana
	580 MW Gulf Suez
BOO wind farm (Engie-Toyota-Orascom)	**250 MW** Gabal Elziet
Total	**1375 MW**
Concentrated Solar Power CSP	**140 MW Kurymat P.P** (**20 MW Solar** + 120 MW Thermal)
PV	**40 MW** Remote areas not connected to Grid **120 MW** (Net Metering – Roof top) **1465 MW** (32 projects) in Benban solar park
Total	**1645 MW**
Hydro Power	**2832 MW**

Total Renewable Energy Installed 5852 MW + Thermal 120 M.W

Under Implementation Wind Energy Projects

Company	Project Location	Installed Capacity	Situation	Contract Scheme
Under Implementation				
Lekela Power	Suez Gulf	250 MW	PPA signed	**BOO**
Consortium **Engie-Toyota-Orascom**	Suez Gulf	500 MW	Wind Measurement	**BOO**
	Total	**750 MW**		

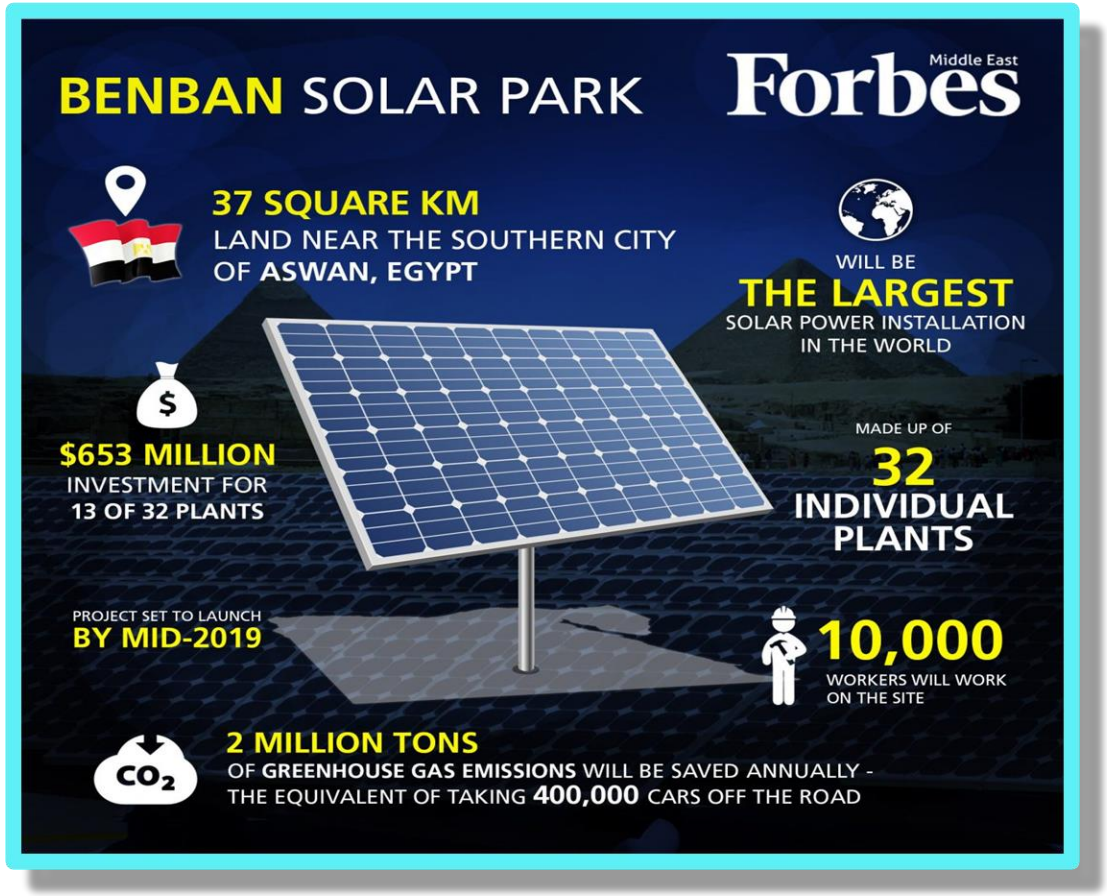
Wind Energy Proposed Projects by Private Sector

Consortium/company	Project Location	Installed Capacity	Contract Scheme
NREA	Suez Gulf	250 MW	EPC + Finance
NREA	Suez Gulf	200 MW	
Masdar –Elswedy – NREA	Suez Gulf	200 MW	BOO
Acwa Power	Ras Ghareb	500 MW	
SIEMENS	---	500 MW	
El Nowais	---	500 MW	
Total		**2150 MW**	

All Private Sector Requirements to establish RE projects taken in concern achieving 2035 target

Benban Solar Park
The Largest in the world

Signed PPA	32
Total Installed Capacity	1465 MW
Total Area for Solar Park	37.1 Km Square
Total Investment	2 Billion $
Workers and Job Creation	More than 10000



Under Implementation Solar Energy Projects

Company	Project Location	Installed Capacity
NREA	Kom Ombo (Aswan)	26 MW
NREA	Hurghada	20 MW
Acwa Power	Kom Ombo (Aswan)	200 MW
	Total	246 MW

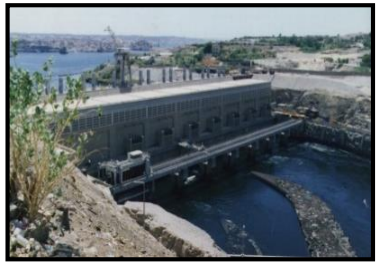
Under Study Solar Energy Projects

Company	Project Location	Installed Capacity
Understudy Projects		
NREA	Zafarana – Kom Ombo	3 * 50 MW
El Nowais	----	200 MW
Auction	----	600 MW
	Total	**950 MW**

Hydropower Installed Capacities

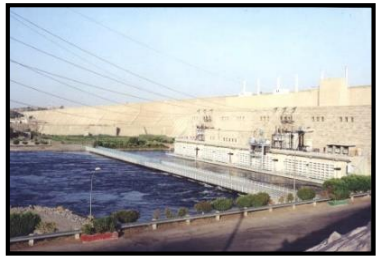
High Dam

2100 MW



Aswan Reservoir 1

280 MW



Aswan Reservoir 2

270 MW

Esna Barrage

86 MW

Naga Hamadi Barrage

64 MW

Assyiut Barrage

32 MW

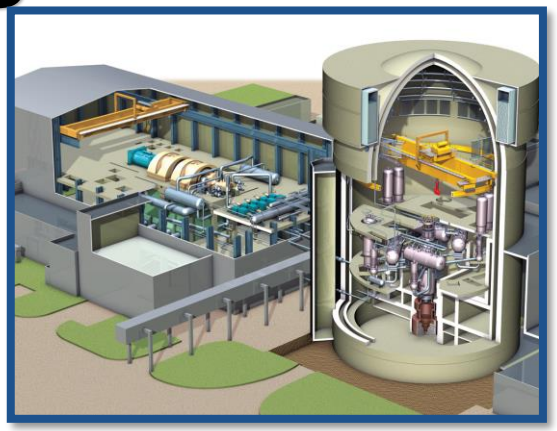
Total Hydropower Installed Capacities

2832 MW

Future Projects

ATAQA Pump Storage Power Plant

- Project Component : 8 units each 300 MW
- Total Capacity : 2400 MW
- Investment Cost : 2.671 Billion $
- Contractor : (Sinohydro) (China)
- Duration: 7 years .

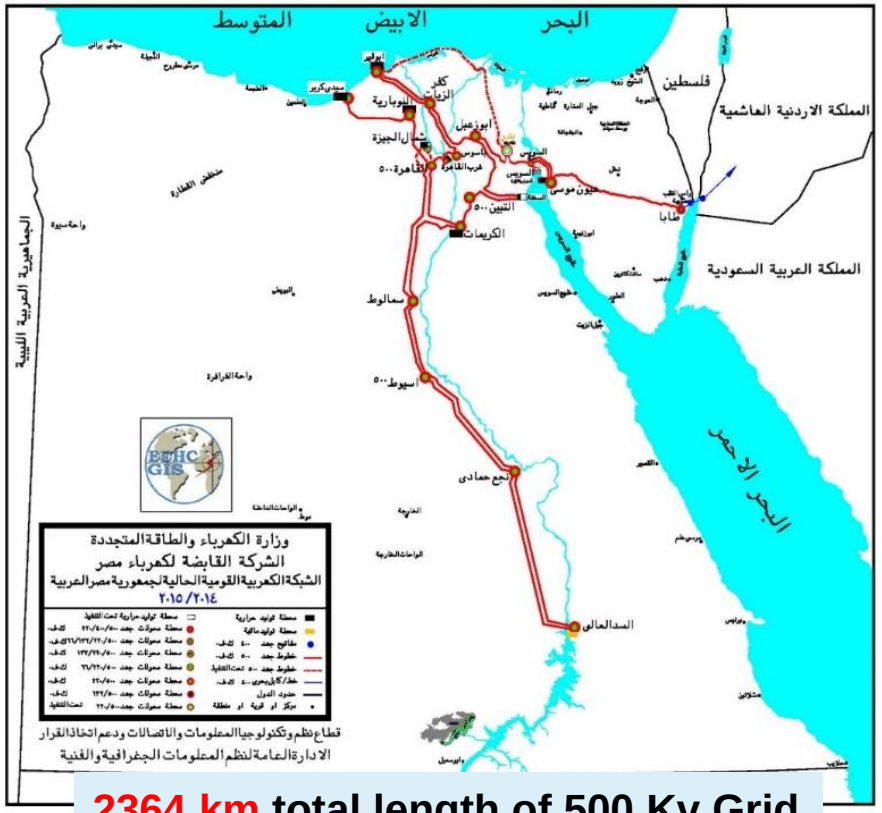


DABAA Nuclear power Plant

- Total Capacity : 4800 MW
- Investment Cost : 21.3 Billion $
- Contractor : (Rosatom) (Russia)
- Comissioning : 2026 - 2028.

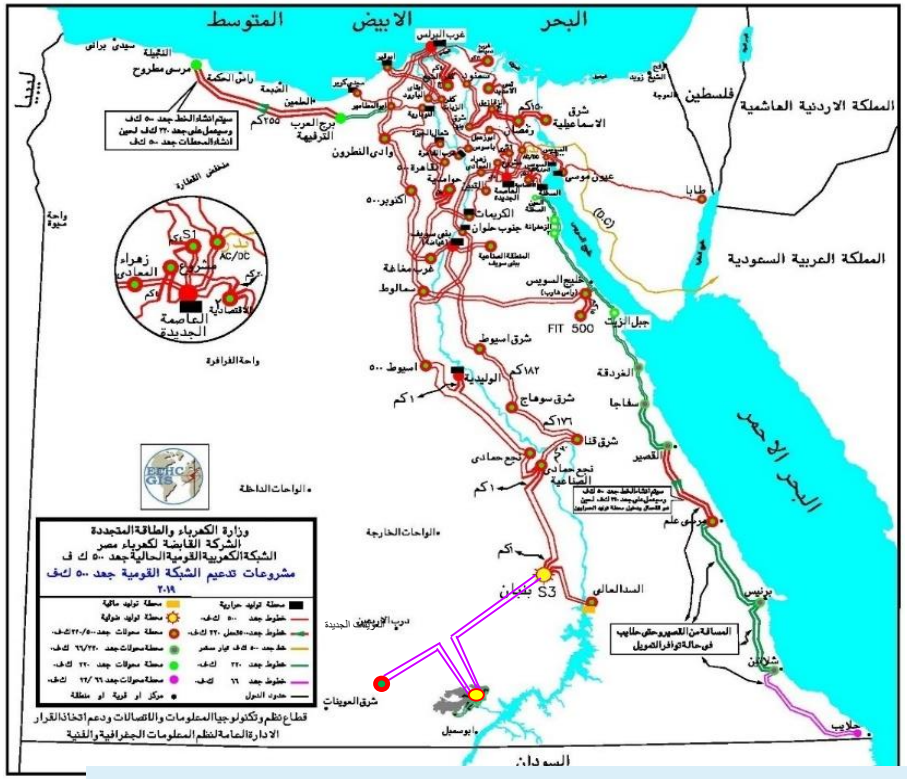
Upgrading Transmission Grid

Situation for 500K.V Transmission Network By End of 2019



2364 km total length of 500 Kv Grid

ELECTRICITY GRID 2014



6006 km Total Length of 500 K.V Grid

ELECTRICITY GRID BY END 2019

Under development transmission 500 k.V project in Oweinat
For enhancing electrification service and promoting interconnection with SUDAN

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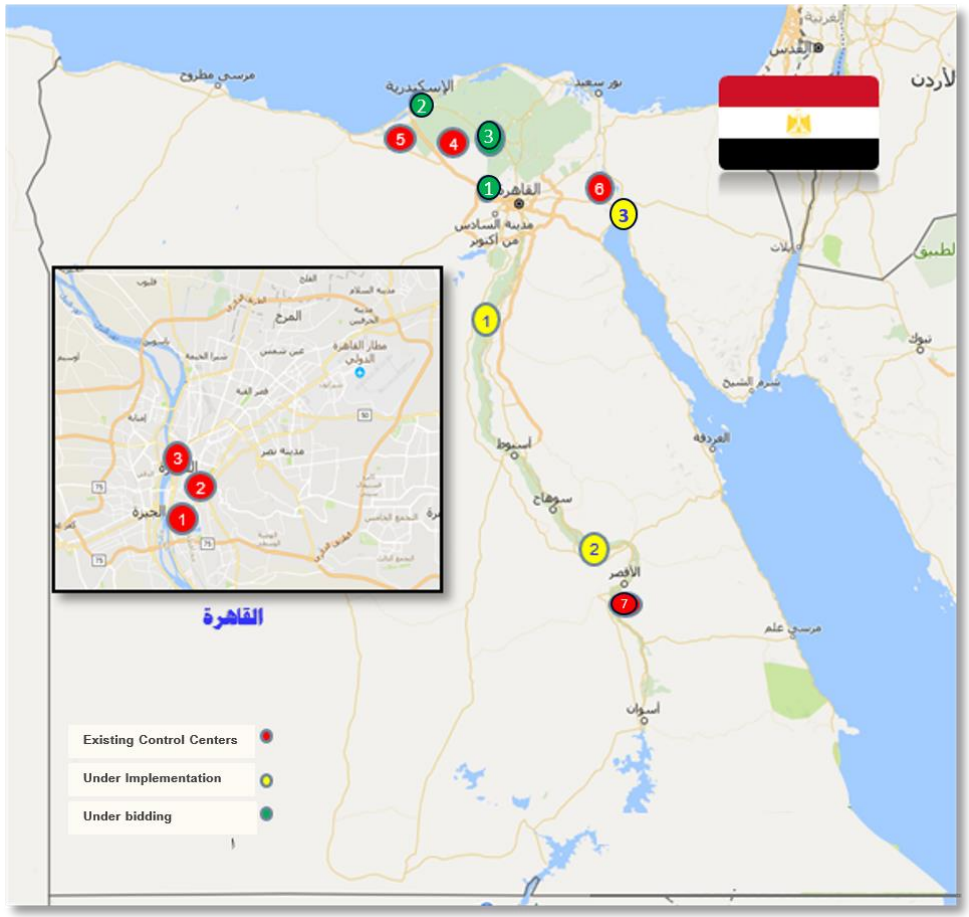
New and upgrading Control Centers in Transmission networks



7	Existing Control Centers	●
3	Under Implementation	○
3	Under bidding	●

no	Under implementation
1	Middle Egypt Regional Control Center
2	Upper Egypt Regional Control Center
3	Canal Regional Control Center (upgrade)

no	Under bidding
1	Cairo Regional Control Center (upgrade)
2	Alex Regional Control Center (upgrade)
3	Delta Regional Control Center (upgrade)

no	Existing
1	National Control Center
2	Cairo Regional Control Center
3	Backup Control Center
4	Alex Regional Control Center
5	West Delta Regional Control Center
6	Canal Regional Control Center
7	Egypt Regional Control Center

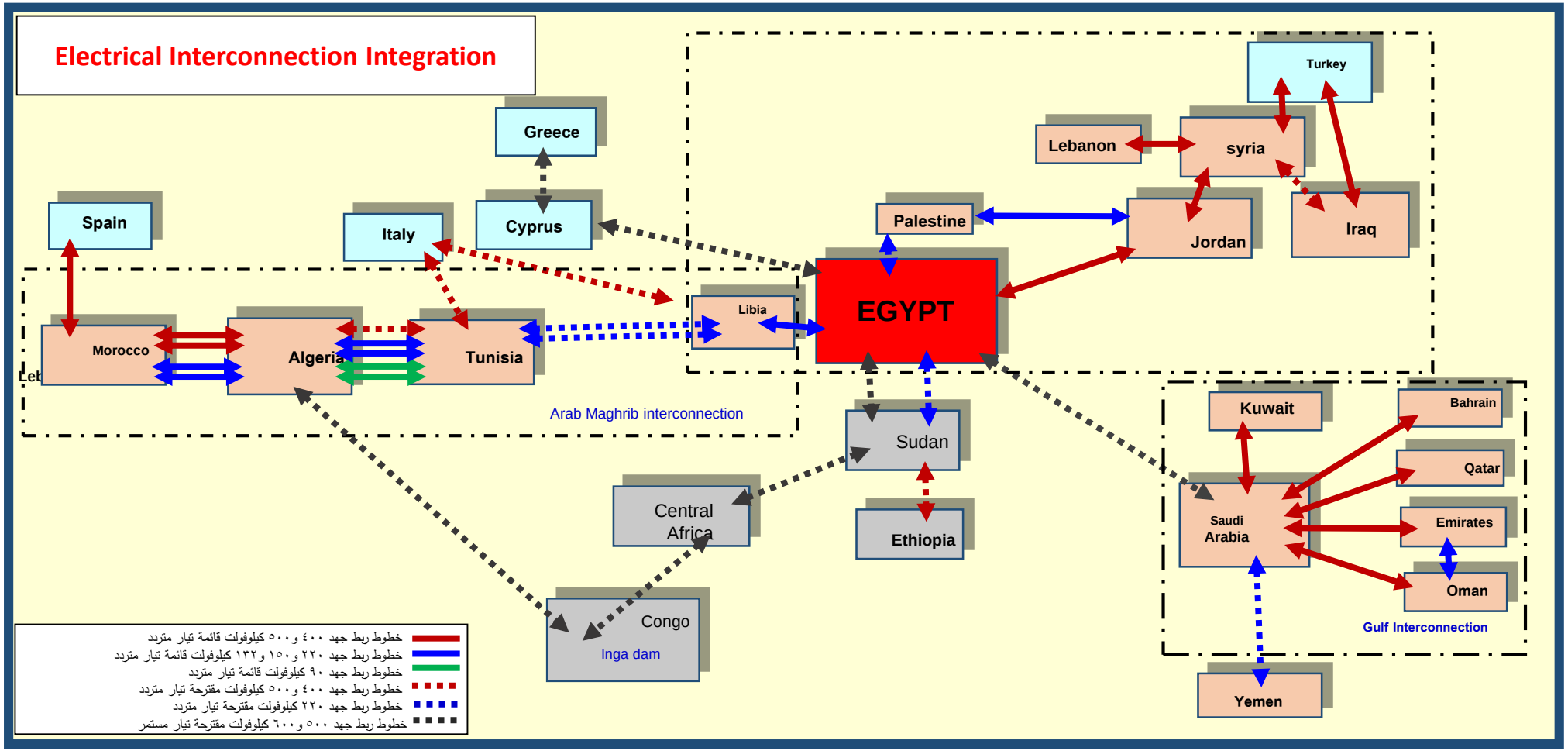
The project for the establishment and development of control centers of electricity distribution companies will be implemented in 4 phases as follows :

Under Implementation 12 control Center (Phase 1)

PHASE 1	PHASE 2	PHASE 3	PHASE 4
10 control Centers	**12 control Centers**	**11 control Centers**	**5 control Centers**
2 Surveillance Centers	**3 Surveillance Centers**	**3 Surveillance Centers**	**1 Surveillance Centers**
December 2021	**February 2022**	**July 2023**	**December 2024**

Modernization of Distribution control centers

Egypt is targeting to be an Energy Hub for International Interconnections and Corridors



- **Egypt /Jordan** Interconnection (450MW)- (Future upgrading to reach 2000-3000 MW).
- **Egypt /Libya** Interconnection (up to 200 MW

Efforts to implement Digitization

Power Generation

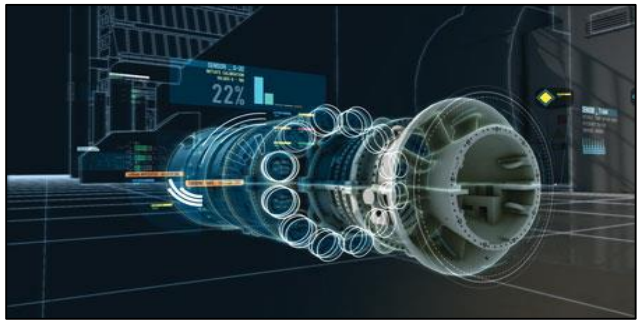
- Using new control systems in new Power Plants .

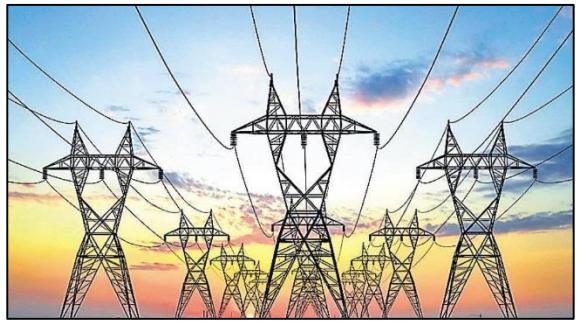
Power Transmission

- Modernization of control centers and substations in electricity transmission networks .

Power Distribution

- Modernization of control centers in electricity distribution networks .
- Implementation of smart meters .
- Present electronic services for all customers .





Smart Meters Program

- Currently, more than 8.2 million pre-paid meters already installed.
- Pilot project to supply of 250.000 smart meters already finished in 2019.
- According to the results of this pilot project the full program for replacing the mechanical meters with smart ones (about 30 Million) is undergoing.

Highlights: Adopted EE Programs

EE for different consumption sectors (Residential - public facilities & government agencies- tourist) several programs were considered **these include:**

- EE lighting in the residential sector (**Distribution of 12 million CFL** by the electricity distribution companies).
- 2nd phase of **EE standards & labeling program** for electric appliances.
- **Financing mechanism** to support the adaption of solar water heaters in the residential sector.
- EE in **street lighting**& EE in hotels (**Egysol)**
- 2nd Phase of the program for EE in **public buildings.**
- EE in **utilities** including water treatment and sewage plants.

National Energy Efficiency Action Plan NEEAP II, (2019-2022)

The second NEEAP has been approved by cabinet which aligned with the short term action plan of the national Energy strategy 2035 including the following main future pillars :

- Completeness of the institutional framework.
- Securing financial mechanisms.
- Data gathering and MRV system.
- Capacity building.
- Awareness campaigns.
- Issuing the first Energy Efficiency Report.
- EE measures in (Building, Industry, Tourism, Education and Transport…..) sectors.
- EE Public Sector (Procurements, Public lighting, Public facilities, Electrical equipment's).

Regional and International Partnerships

Several regional and international agencies & initiatives have been adopted such as:

- The New Partnership for Africa's Development (NEPAD),
- Program for Infrastructure Development in Africa (PIDA),
- Clean Energy Corridors,
- Africa Renewable Energy Initiative (AREI)
- Africa Agenda 2063 strategic framework.
- International RE Agency (IRENA),
- Regional Center for RE&EE (RCREEE),
- League of Arab States (LAS),

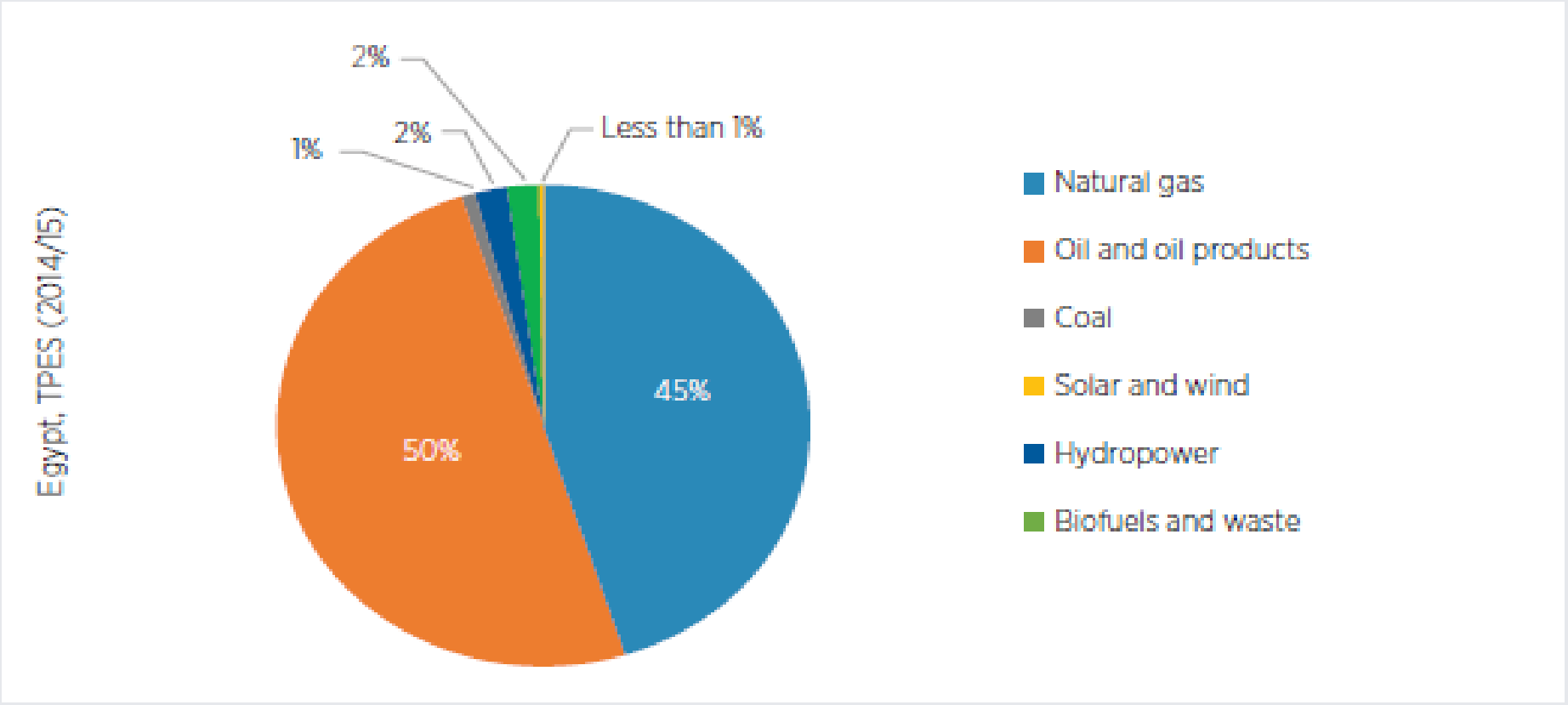
Capacity Building of Human Resources

22 training centers in all fields of Energy (Generation ”Thermal, Hydro, Wind, Solar and Diesel units – Transmission – Distribution -Managerial).

3. Past energy demand and supply statistics

3. Past energy demand and supply statistics

Figure 2. Total primary energy supply in 2014/15



Based on: EU (2015a), "Integrated Sustainable Energy Strategy"; EU (2015b), "TIMES-EG Model Input and Analysis"; IEA (2017), IEA Energy Balances for 2015, Egypt.

Total primary energy supply in 2015 depend on natural gas and oil as main sources of fuel

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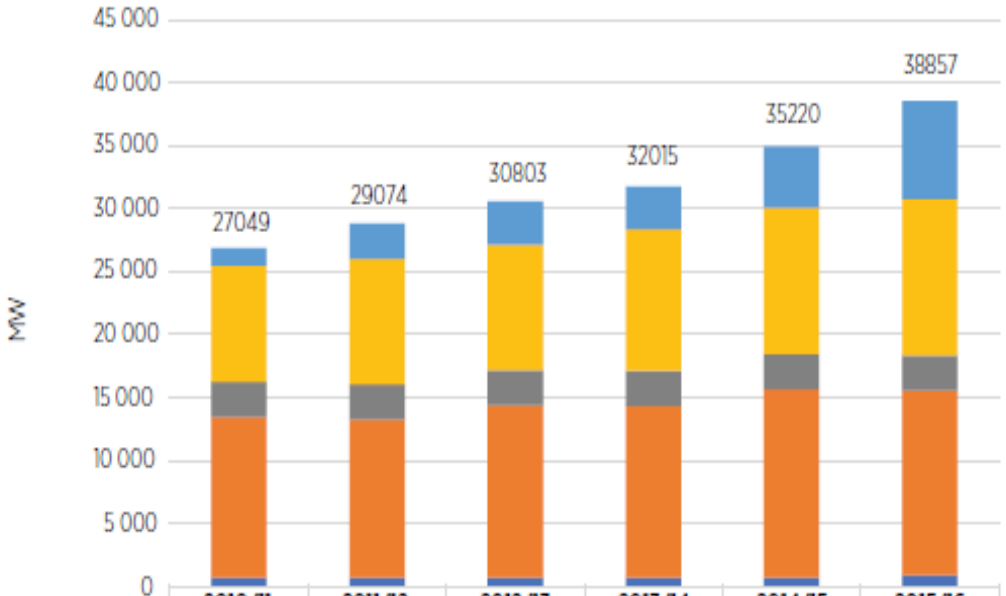
3. Past energy demand and supply statistics

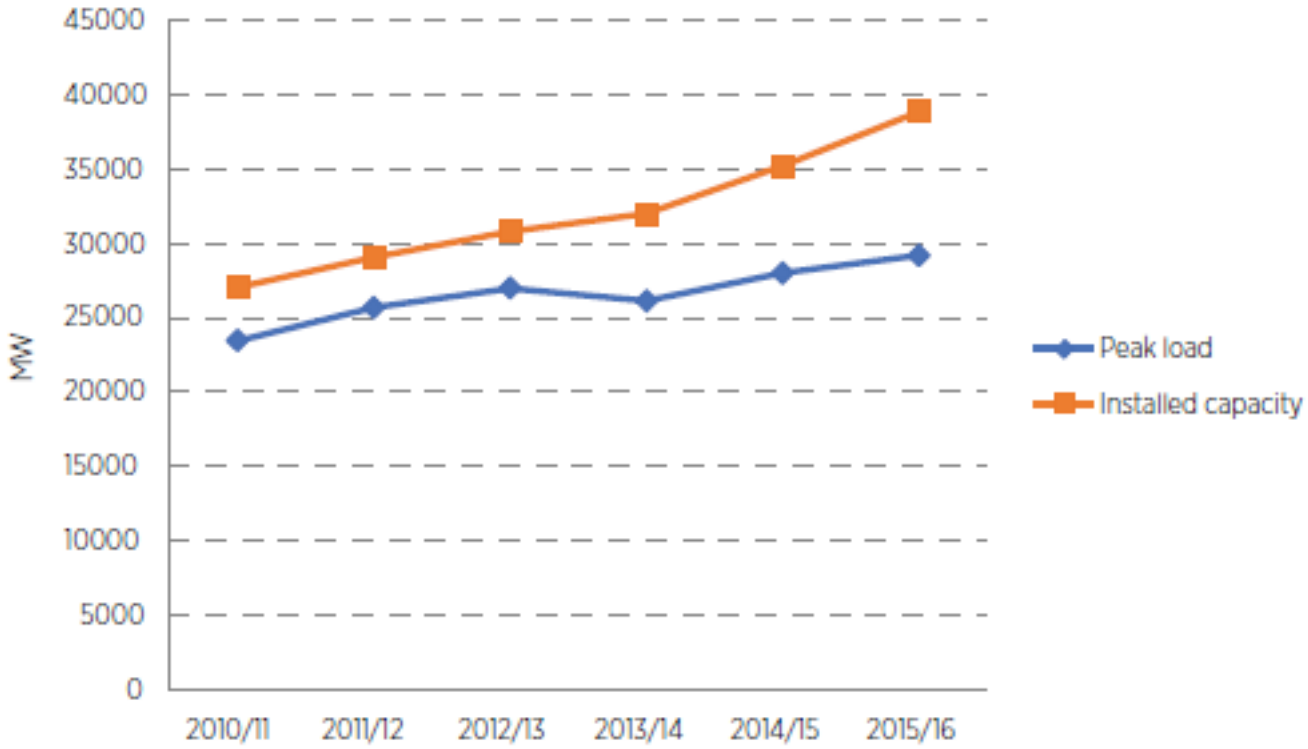
Figure 5. Installed capacity of power plants by plant type



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
OCGT	1376	2826	3428	3415	4874	7845
CCGT	9327	10077	10080	11330	11777	12527
Hydroelectric	2800	2800	2800	2800	2800	2800
Thermal steam	12859	12684	13808	13783	15082	14798
Non-hydro renewables	687	687	687	687	687	887
Total	**27049**	**29074**	**30803**	**32015**	**35220**	**38857**

Source: EU (2015a), "Integrated Sustainable Energy Strategy".

Figure 6. Development of installed capacity and peak load



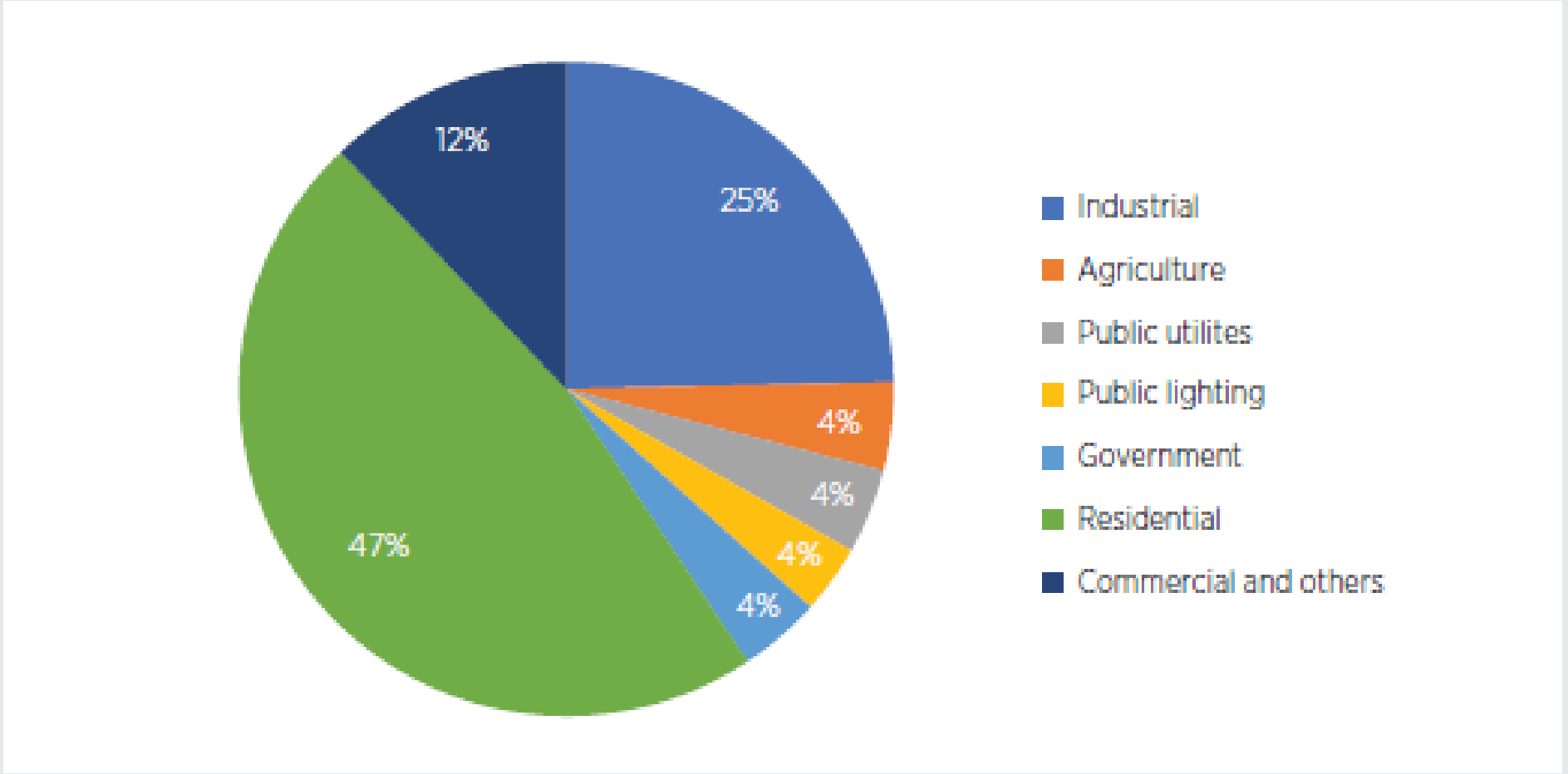
Note: Electricity shortages were not due to the lack of installed capacity, but due to insufficient supply of fuel to maintain continuous power generation.

Based on: EEHC (2016a), Egyptian Electricity Holding Company Annual Report 2015/16; EEHC (2015), Egyptian Electricity Holding Company Annual Report 2014/15.

3. Past energy demand and supply statistics

Electricity Demand from 7 main sectors, residential and industrial sectors are the largest consumers

Figure 9. Electricity consumption by sector



Based on: EEHC (2016a), Egyptian Electricity Holding Company Annual Report 2015/16; EEHC (2015), Egyptian Electricity Holding Company Annual Report 2014/15.

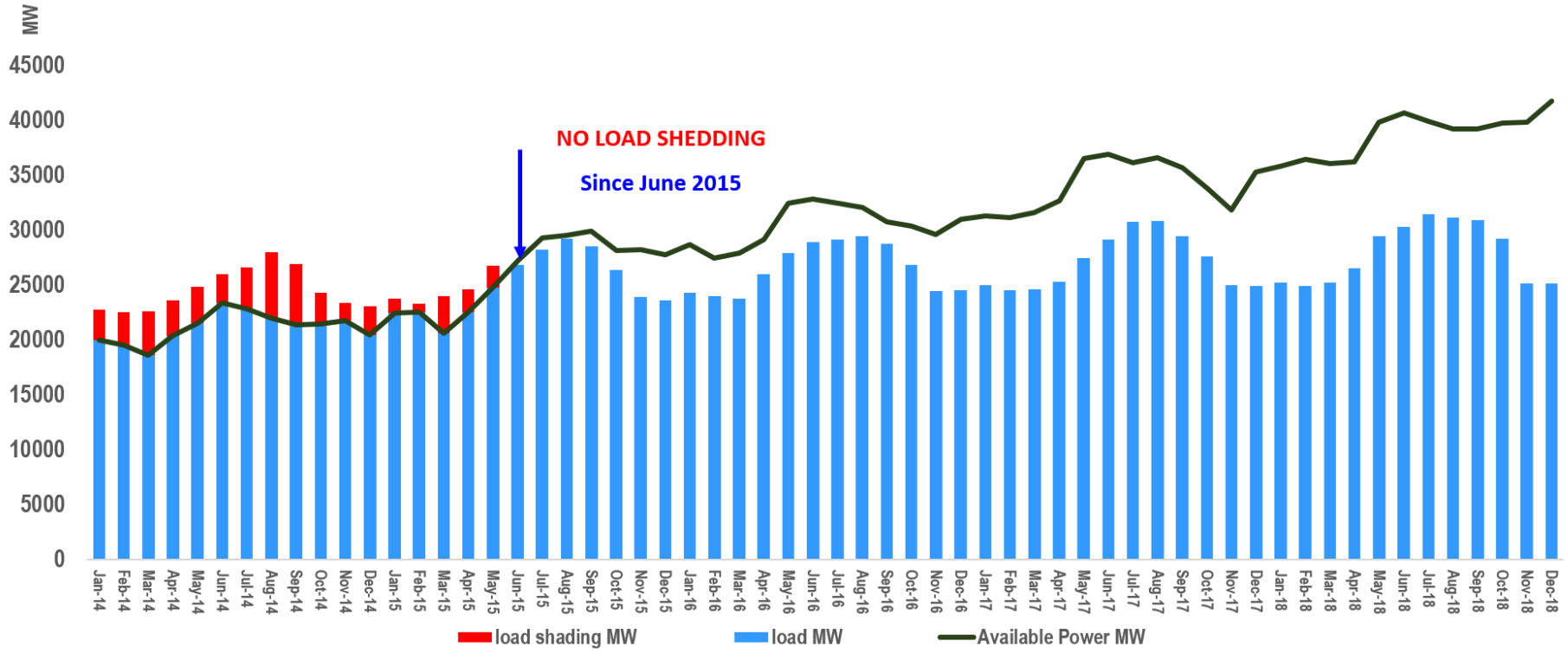
Generation performance during the

Period from 2014 Deficit – Dec 2018 Surplus

2014 Deficit

2018 Surplus

- In 2014 Egypt was Facing a major problem in the supply of electrical Energy.



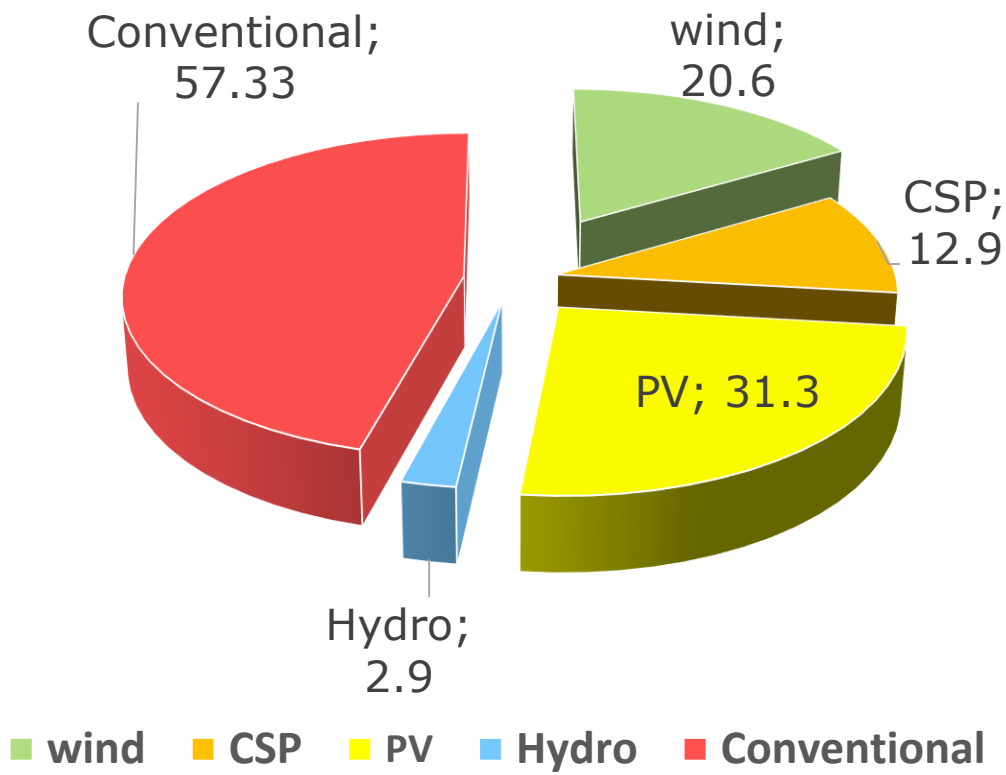
4. Outlook of energy demand and supply,

Main Indicators 2019

Installed Capacity (GW)	58
Max Load (GW)	31
No. of Consumers (million)	36
Electricity Share per Capita (kwh)	2070
Electricity Access Rate	99.7%

Source	Percentage
PV	31.3
Wind	20.6
CSP	12.9
Hydro	2.9
Conventional	57.33
100 %	

Renewable Energy 42.7 %

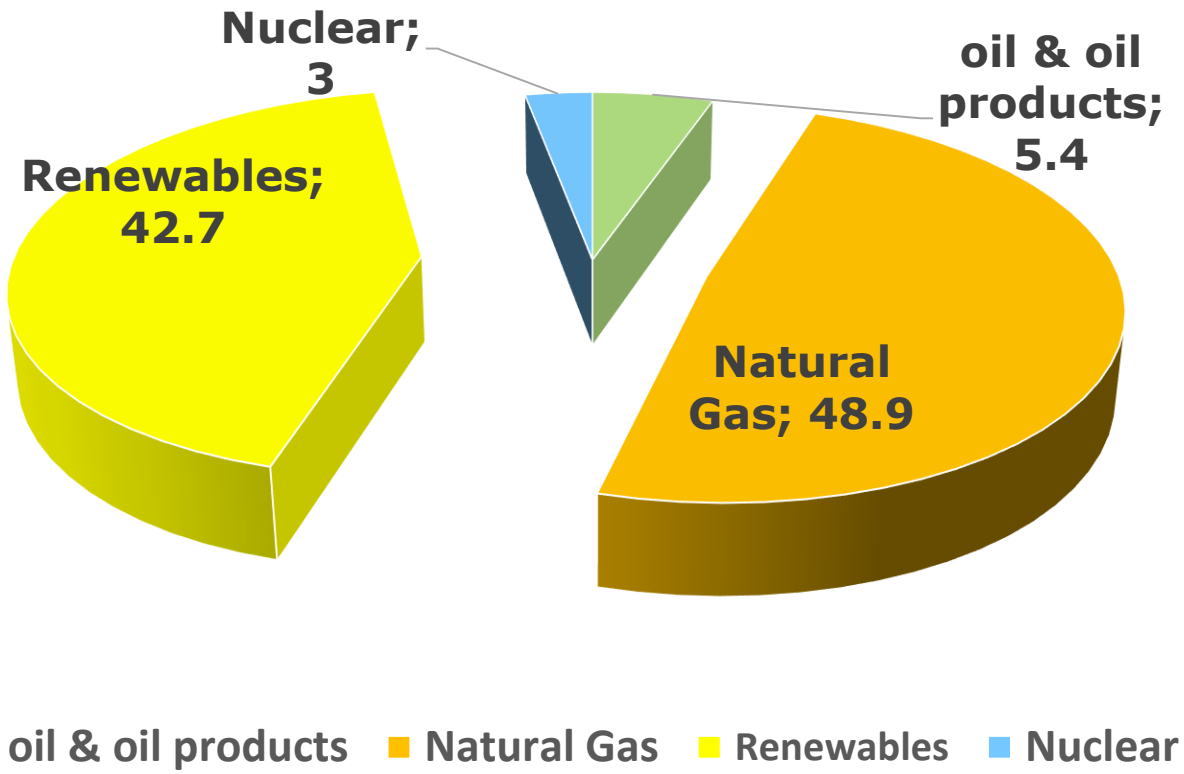


Energy Supply in 2035 planned to include both conventional and RE resources at 57.3 % and 42.7% respectively

Egypt’s Energy Mix by 2035

Source	Percentage
Nuclear	3
Oil	5.4
Natural Gas	48.9
Renewables	42.7
100 %	

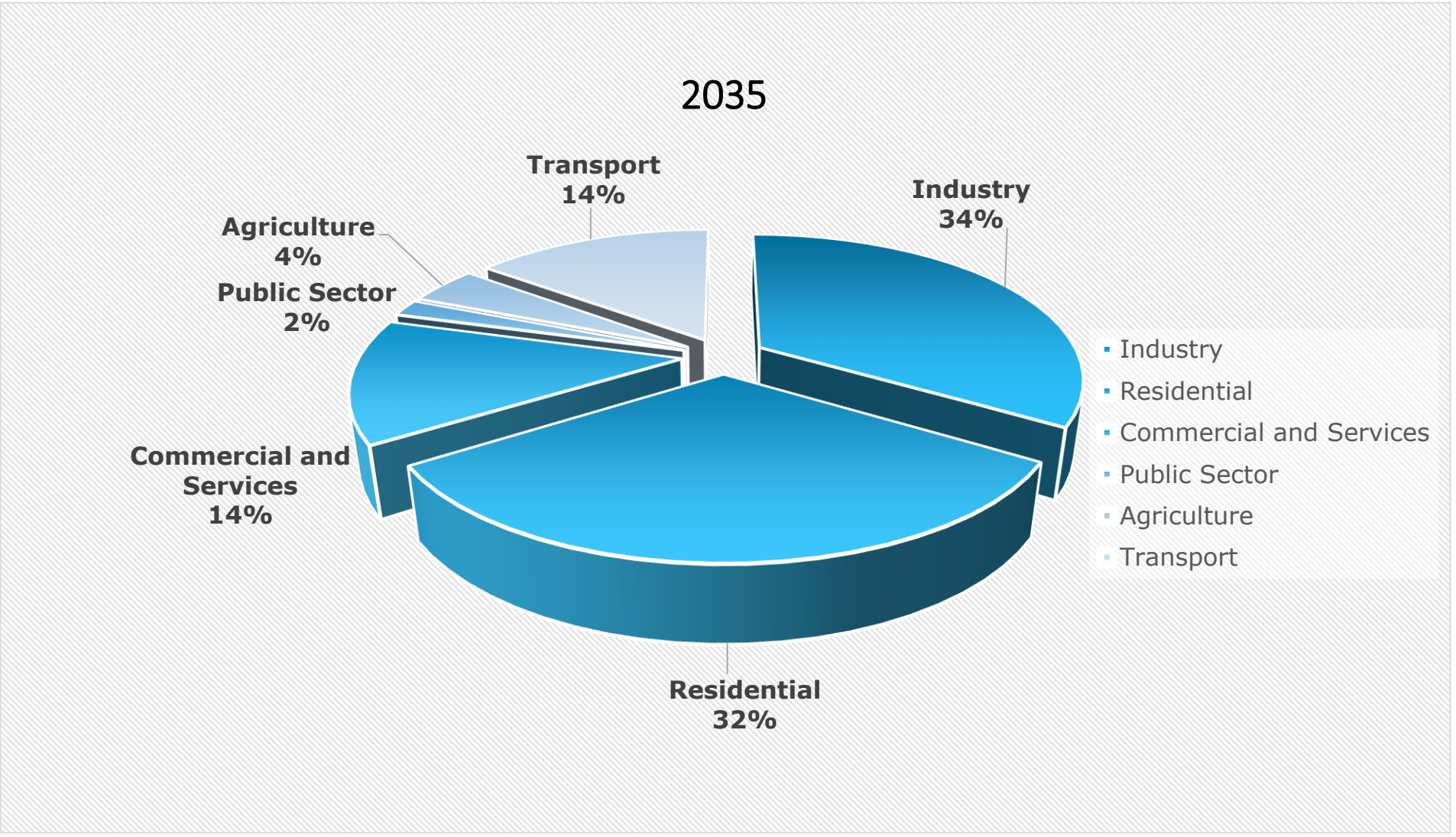
Non-Renewable Energy 57.3 %



Energy Supply in 2035 planned to include both conventional and RE resources at 57.3 % and 42.7% respectively

Egypt’s Energy Mix by 2035

4. Outlook of energy demand and supply,



According to policy scenarios it is expected in 2035 that residential and industry sectors still represent the largest consumers at 66% of total demand

5. Major difficulties and bottlenecks currently faced in formulating energy policies

5. Major difficulties and bottlenecks currently faced in formulating energy policies

- Ensuring power generation security because of rising demand.
- Diversification of resources still limited.
- Coal power plant as an option for diversification, security and its related environmental constraints.
- Subsidies still represent a fiscal burden.
- Financial sustainability is a major challenge with expand dependence on loans as a main financing resource.
- Corporate governance and unbundling of energy utilities.

6. Subjects I would like to study.

6. Subjects I would like to study.

- Tools for energy policy decision-making support like MARKAL-TIMES.
- Clean Energy Management Software like Retscreen.
- Subjects related to Biomass and tidal waves resources.
- Green banking.

20/30
EGYPT VISION

Thank You

Contact: report@tky.ieej.or.jp