

Egypt Energy Transition

Investment in Green Projects




**American Chamber
of Commerce in Egypt**

To the: Green Tech Business Mission

16th of May , 2022

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7- Egypt is an Energy Hub for International Interconnections and Corridors

1- Situation in Summer 2014

Massive Electrical Power Outage

Electricity Deficit in Egypt till 2014

Egypt's power outages continue to intensify

#Energy

Analysts say that while the current crisis has been expected since the Mubarak era, it will take at least a couple of years to reverse the situation



Power cuts in Cairo on 17 August due to high power consumption during the summer (AA).

Massive power outage hits Egypt

Officials say nearly 50% of the country's electricity cut for several hours. Cairo trains halted during rush hour

By MAGGIE MICHAEL
4 September 2014, 7:21 pm



Illustrative photo of the Shubra El Khayma power station along the Nile river in Cairo, Egypt, (photo credit: AP/Amr Nassef)

Major power outage hits Cairo and governorates

Electricity blackout hits large areas of Cairo and other towns on Thursday morning; minister blames 'technical problems'

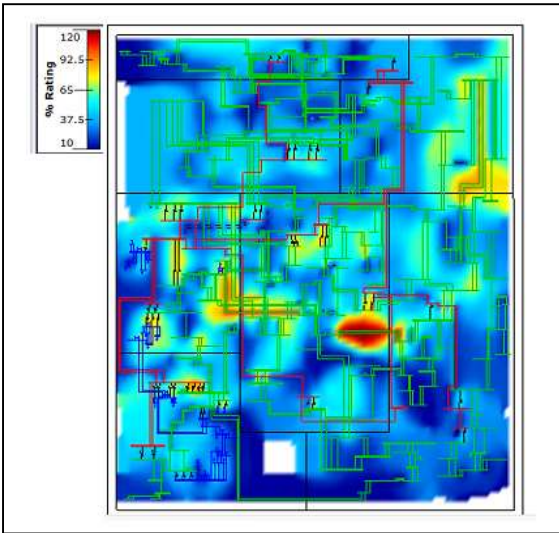
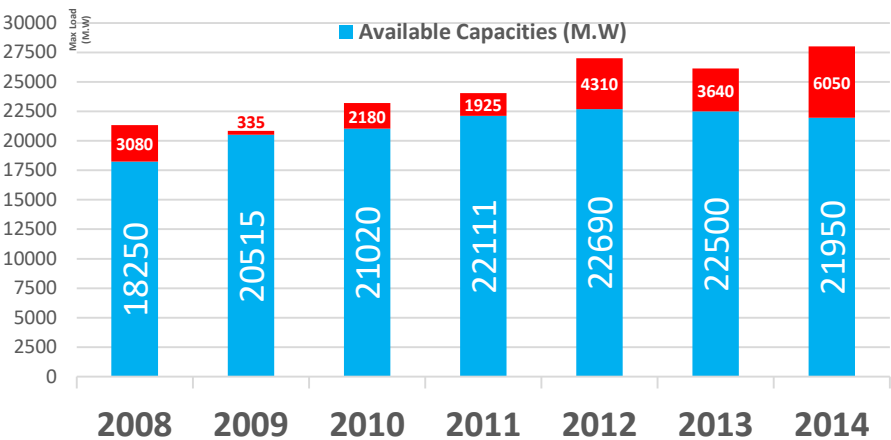
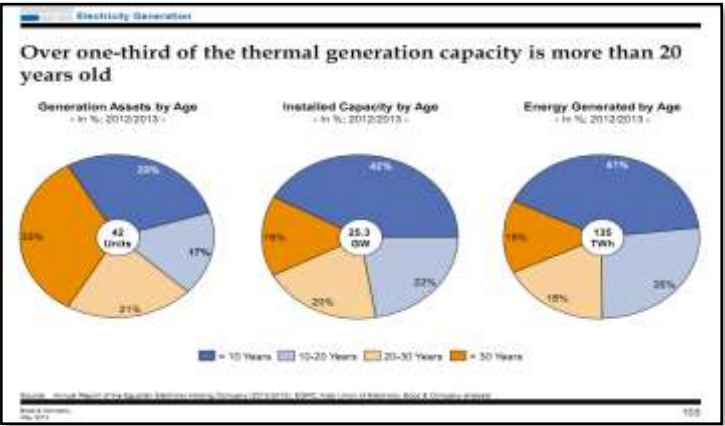
Ahram Online , Thursday 4 Sep 2014



A power cut is conducted at Emarag City in Maadi, Cairo, in this July 27, 2014 (Photo: Reuters)

Challenges lead to the Importance of setting a new strategy of electricity Sector

During Year 2014



Low Availability factor of power plant

Fuel Shortages & Load Shedding

Transmission Constrains and losses

Massive Electrical Power Outage

2- Actions Taken to Overcome Generation Shortage

Upgrading Generation Power Plant

Political Leadership Support

Energy is considered a matter of national security.



The political leadership has placed the issue of electric energy within its main agenda as it is the main pillar for development in various fields of economic and social life.

Actions Taken to Overcome Generation Shortage

Load Shedding reached 6000 MW (Summer 2014)

An Immediate Action has been Taken to Overcome Generation Shortage



Fast Track Plan

Added Capacity : **3636 MW**

Installed in **8.5 Months**



3 Mega Project Power Plants

Added Capacity: **14400**

MW installed in 2.5 years



Completion of Under construction Power Plant

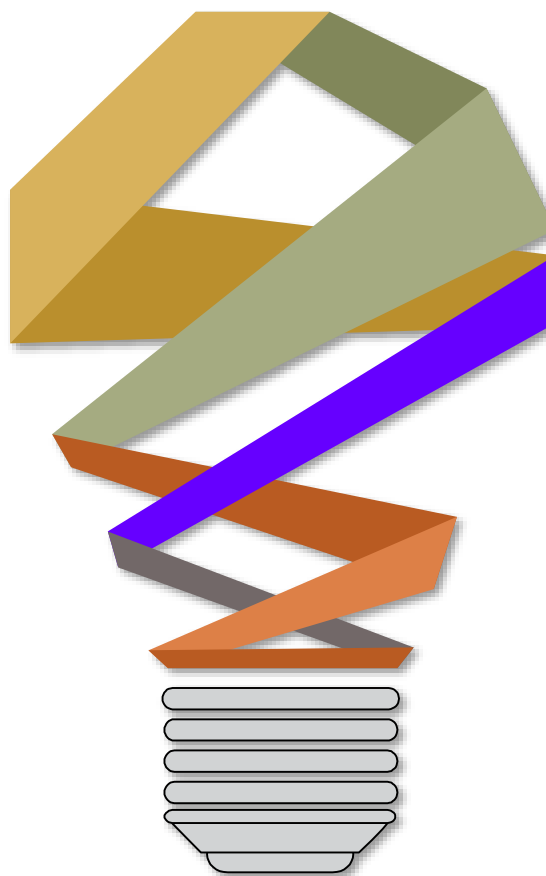
Added Capacity : **4250 MW**



Energy Efficiency

Added Capacity : **1840 MW**

without using an Extra Fuel.



Fast Track Plan

EPC + Finance

Added Capacity 3636 MW

Total Cost 2.7 Billion \$

Commercial Operation In 8.5 Months

**We Contracted with what was available
in the Market for immediate installation
(GE, Siemens , Ansaldo Energia)**



West Damietta PP
500 MW



West Assuit PP
1000 MW



Mobile Units
(40 x 25MW)Total 500 MW
Distributed in Upper Egypt



Attaqa PP
640 MW



Port Said PP
84 MW



Sharm Elshiekh PP
288 MW



Hurghada PP
288 MW



Mahmoudia PP
336 MW

Completion of Under construction Power Plants

Added Capacity 4250 MW
Total Cost 3.3 Billion \$

Start Date	End Date
Sep. 2009	March 2017



6th October P.P (600 MW)
600 MW Completed totally



Banha P.P (750 MW)
250 MW Completed



Wind Farm (200 MW)
200 MW Completed totally



SUEZ P.P (650 MW)
250 MW Completed



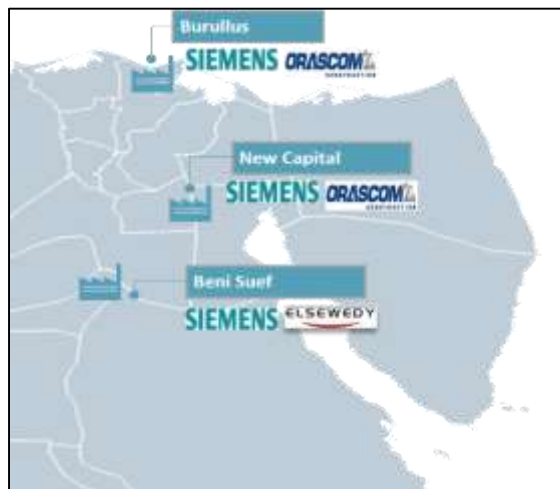
North Giza P.P (2250 MW)
1250 MW Completed



Ain Sokhna (1300 MW)
1300 MW Completed totally

Totally Added Capacities in **One Year** (From January -December 2015)
Fast Track Plan + Completed Power Plants = 6886 MW

Mega Project Power Plants in cooperation with **SIEMENS & Local Partners**



Three Mega Power Plants

with **Total capacity 14400 MW installed in 2.5 years**

Work Started in the three Power Plants : (end 2015).

EPC + Finance Cost of 6 Billion Euro.

Mega Project Power Plants in cooperation with **SIEMENS & Local Partners**

Egypt's Energy Mega Projects

Siemens together with its local partners Orascom Construction and El Sewedy have developed and constructed 3 Turnkey Power Plants over 3 years.

Cables Used

7x Traveling Across Egypt's borders.
6,800,000 m
From North to South

Back Filling

84% Volume of the Great Pyramids of Giza
4,207,000 m³

Concrete Used

85x The weight of the Sphinx
845,700 m³

Power Generation

7x High Dam Production
14,400MW
(Total of 3 Power Plants)

Man Hours

133,000 Trips around the world
145,000,000 Hrs

Steel Structure

11x Weight of the Eiffel Tower
78,000 t

The Consortiums Commitment

Egypt's Energy Mega Projects

Siemens together with its Local Partners Orascom Construction and El Sewedy have developed and constructed 3 Combined Cycle Power Plants.

Burullus Power Plant New Capital Power Plant Beni Suef Power Plant

24 H-Class Gas Turbines
24 Heat Recovery Steam Generators
12 Steam Turbines
36 Power Generators
3 Gas-Insulated Switchgears

The Combined Effort

24,600 Workforce of which 95% are local Egyptians
6,800,000m Cables used
3,750,000m³ Excavation
4,207,000m³ Backfilling
845,700m³ Concrete
78,000t Steel Structure
145,000,000 Man hours
450,000m Piles
79,550t Re-bar

The Achievements

14.4GW Energy to Egypt's Grid
45% Increase of Egypt's Power Capacity
66,000 Workers trained in Health & Safety
45MII Egyptians are provided with Electricity
600 Egyptians trained in Operation and Maintenance
3 Years Of Production, Development, Construction & Installation

Energy Efficiency

Converting simple cycle power plant into combined cycle power plant



Shabab P.P adding 500 MW
(Total capacity : 1500 MW)



Assuit P.P adding 500 MW
(Total capacity : 1500 MW)



6th October adding 340 MW
(Total capacity : 940 MW)



West Damietta P.P adding 250 MW
(Total capacity : 750 MW)

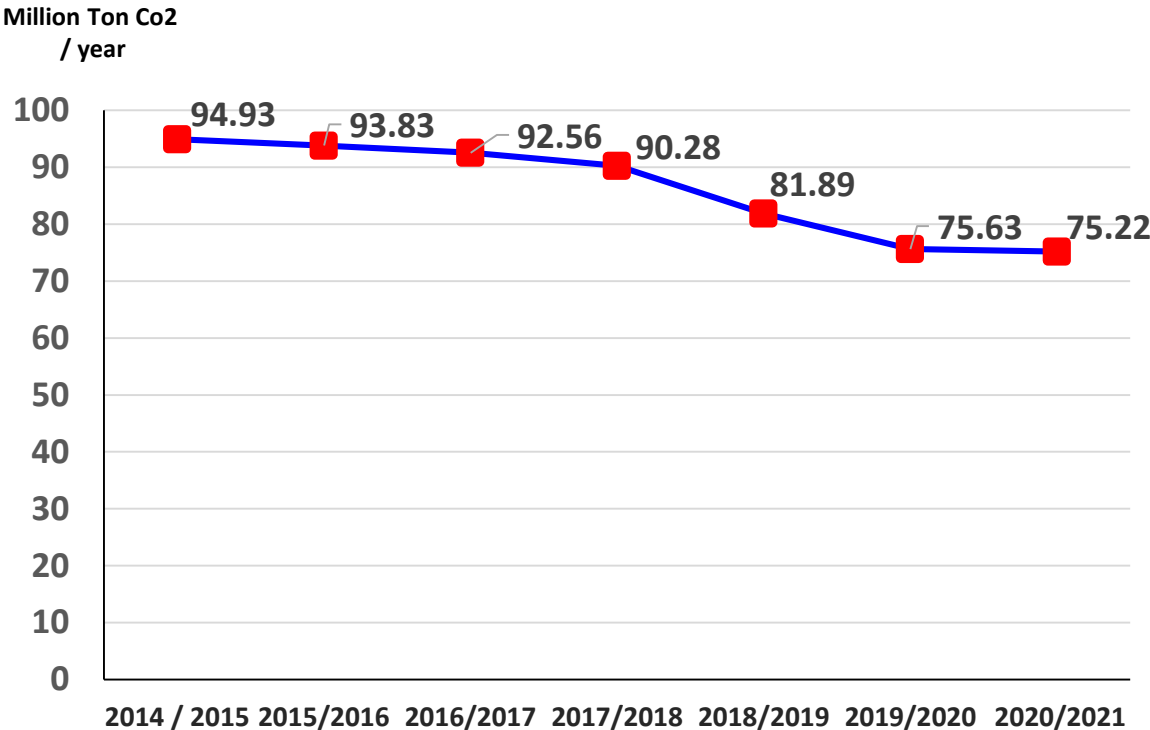
- ❑ Converting simple cycle power plant into combined cycle power plant by adding **1840 MW** without using an Extra Fuel.



Extension W. Damietta adding 250 MW
(Total capacity : 750 MW)

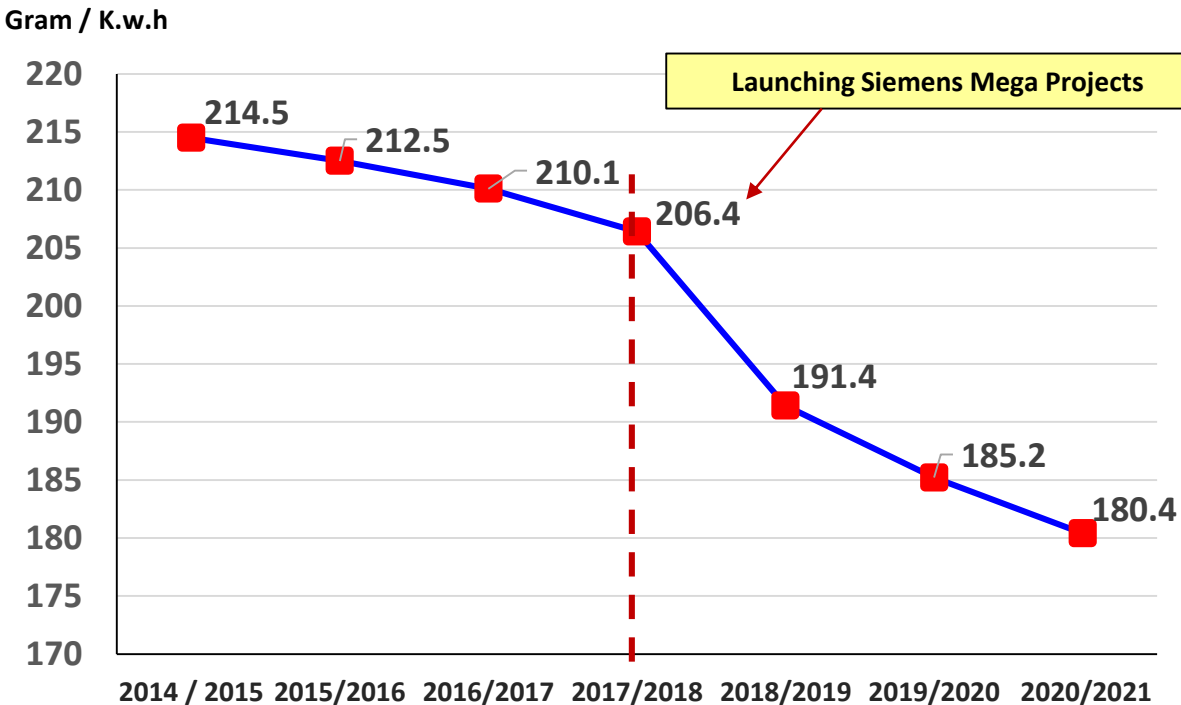
Energy Efficiency Indicators

The Reduction in CO2 Emissions



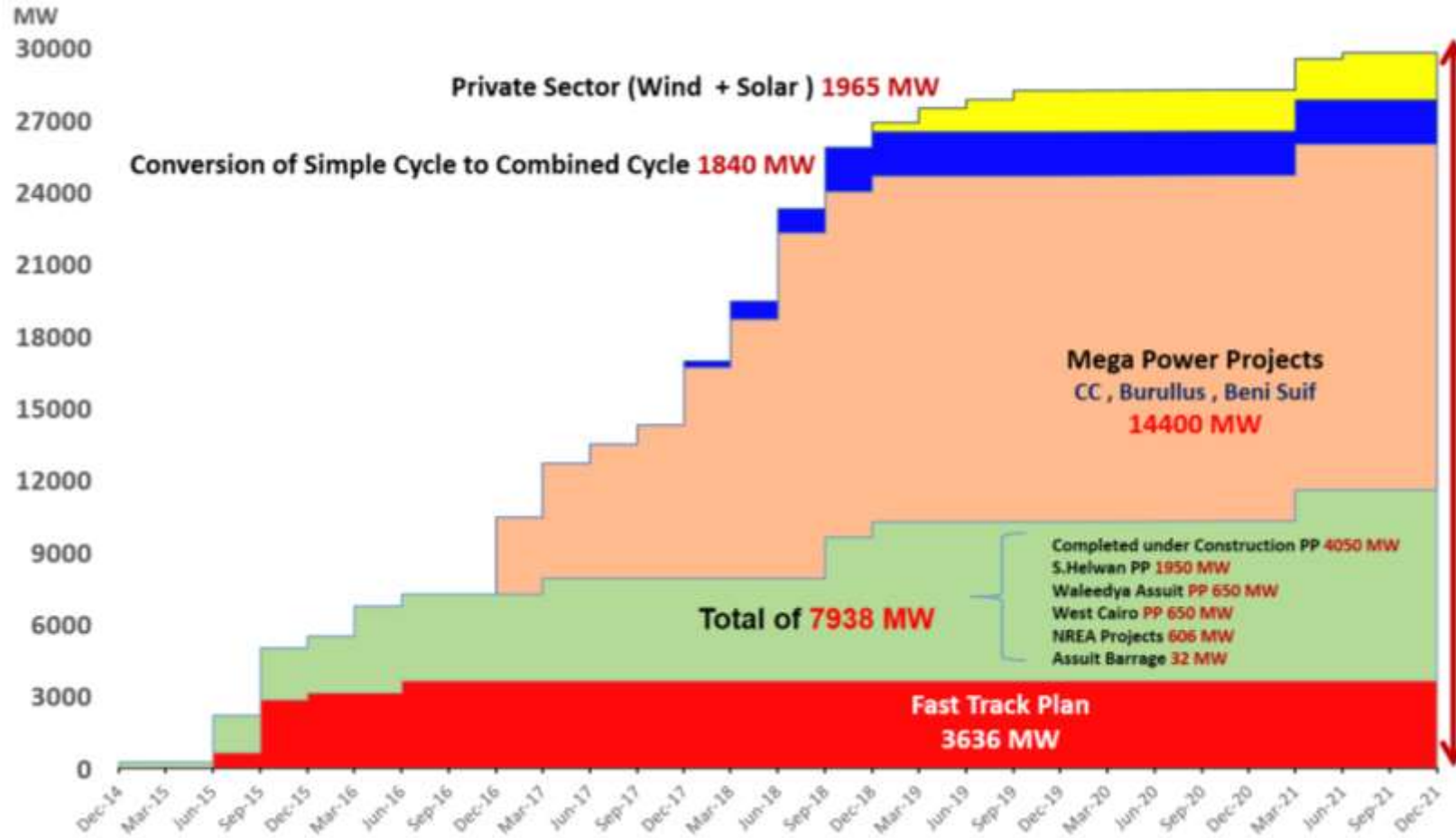
- The Reduction in CO2 Emissions in 2020/2021 comparing 2014/2015 **about 26.2 %**

The Reduction in Fuel Consumption



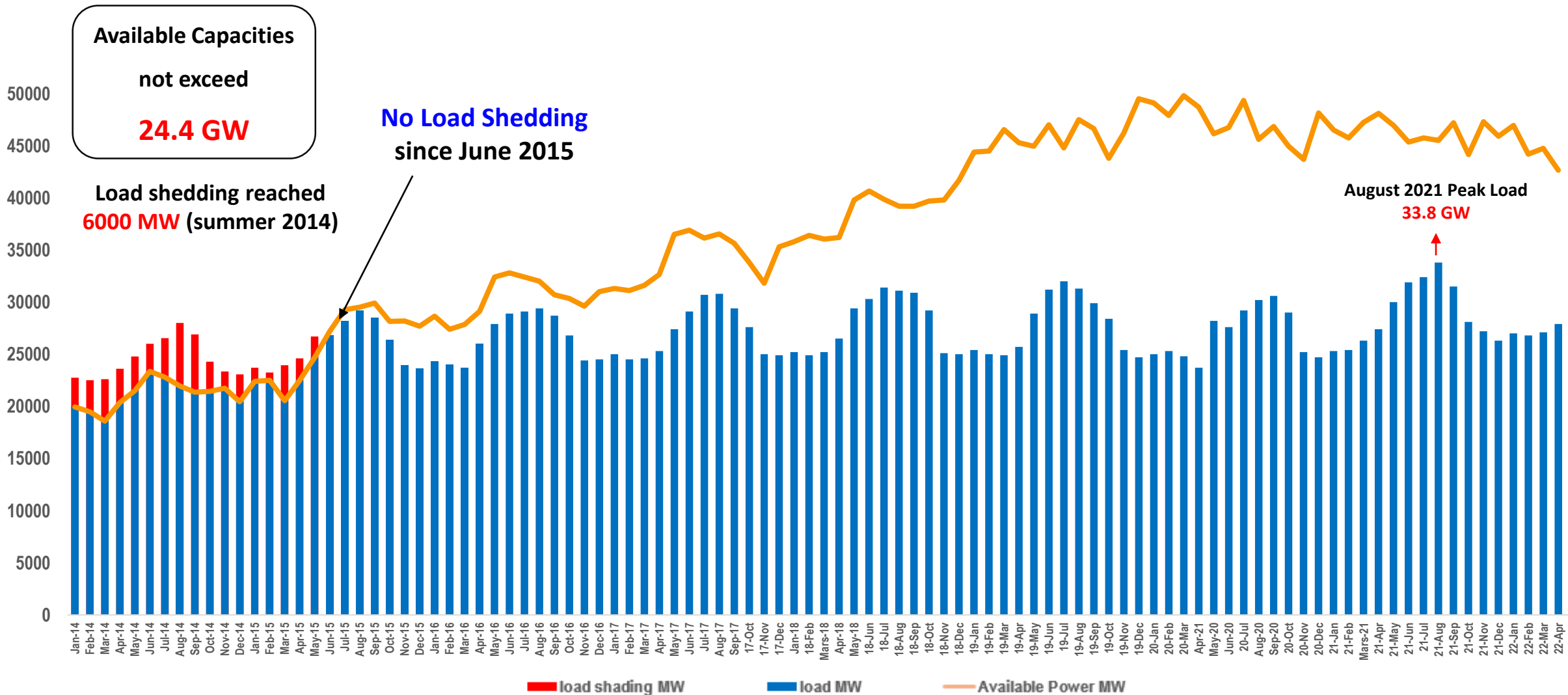
- The Reduction in Fuel Consumption 2020/2021 comparing with 2014/2015 **about 16%**

Installed Capacities Added from the End of 2014 till the End of 2021



**Total Capacities Added
About (29.8 Gigawatt)
Equivalent to 14 Times the installed
capacities from the High Dam**

Generation performance during the Period from 2014 Deficit – April 2022 Surplus



Generation Power Plant (Investment Cost)



During 7 years total investment cost of the Generation Power Plants over national Grid exceeds : **22 billion \$**

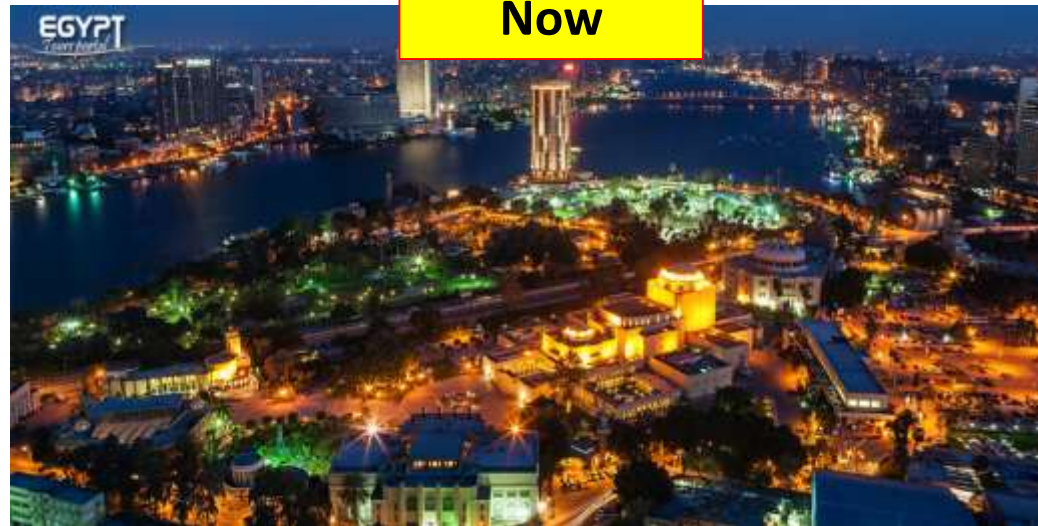


EGYPT By NIGHT (Satellite View)

During Year 2014



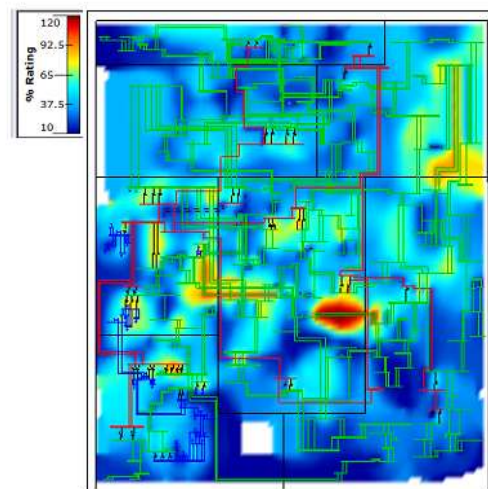
Now



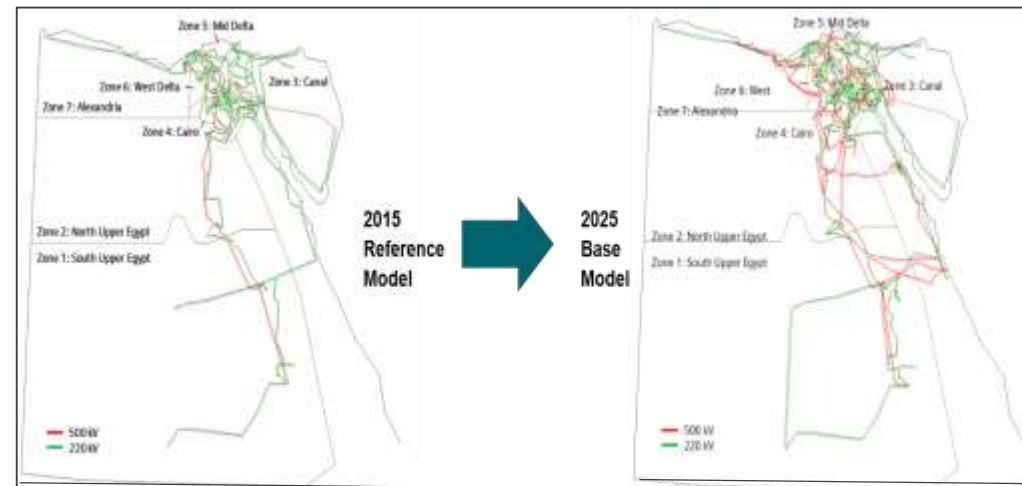
3- Upgrading Transmission Grid

Upgrading and Strengthening the National Grid

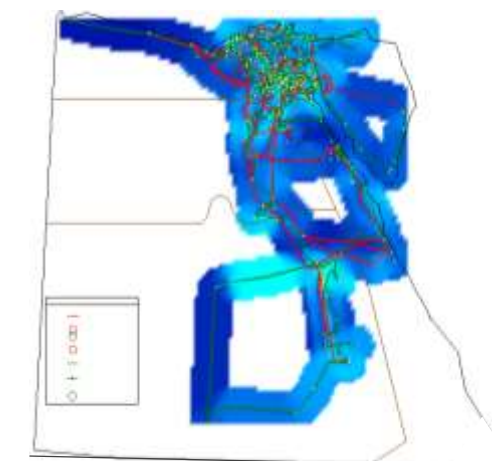
Base Model 2015 – Loading profile



2025 Long-term Scenario – Base Model Definition



**2025 Long-term Scenario – Base Model
Line loading in normal operation**

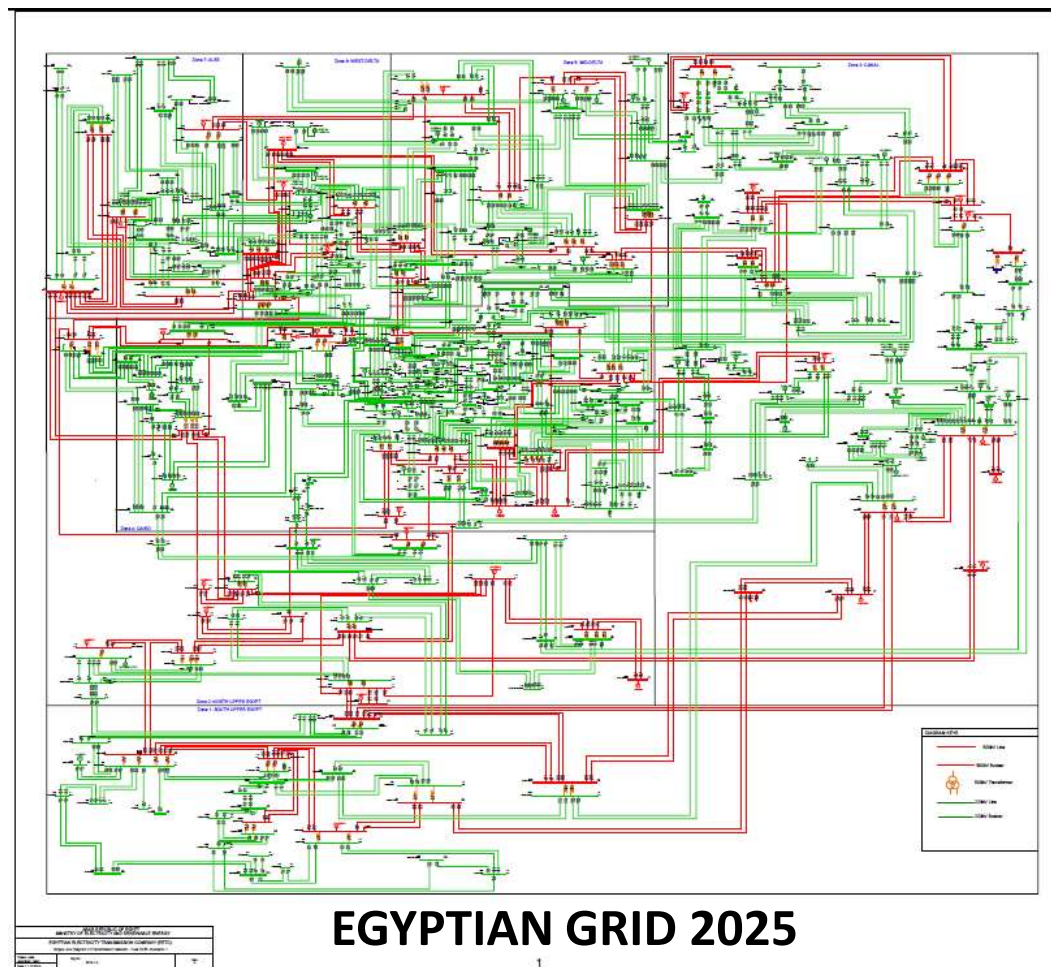


Upgrading the extra high voltage main transmission network.

- Investigate the impact of the growing demand on the transmission system infrastructure by 2025 and define the corresponding grid development measures.
- Set a target network topology as a guideline for the short term transmission planning phase.

Upgrading and Strengthening the National Grid

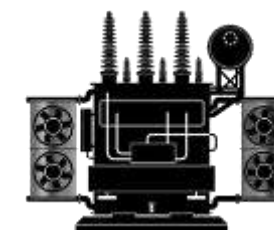
Electricity Sector took An Urgent Majors to Upgrade Transmission Network to Keep Pace with the Generation Capacities increasing and the new Technology Added from Different source of Generation



Transmission Lines



Substations

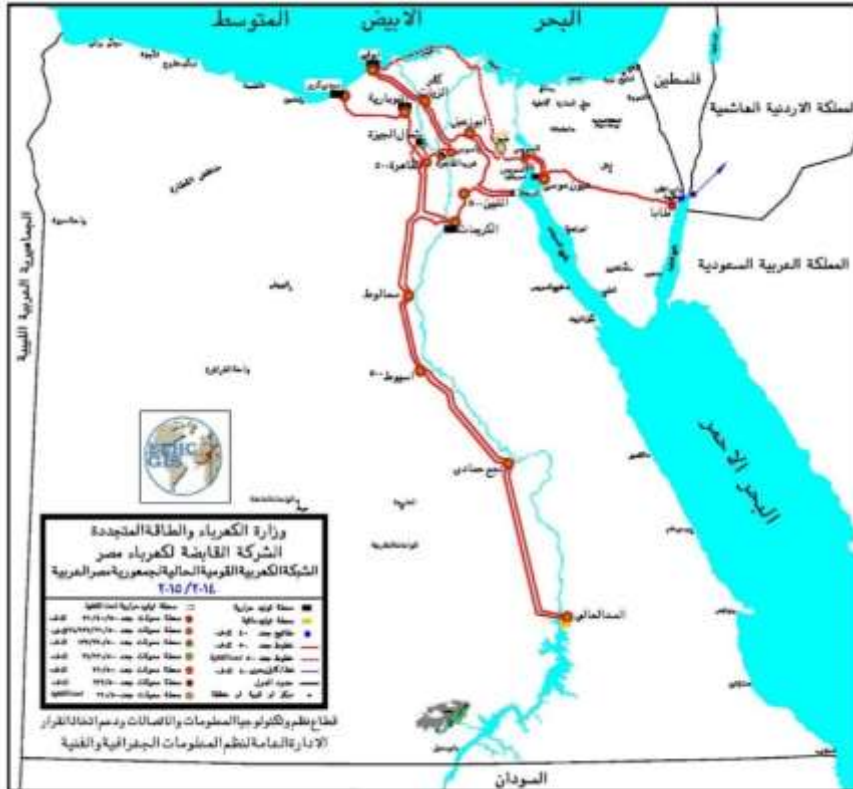


Control Centers



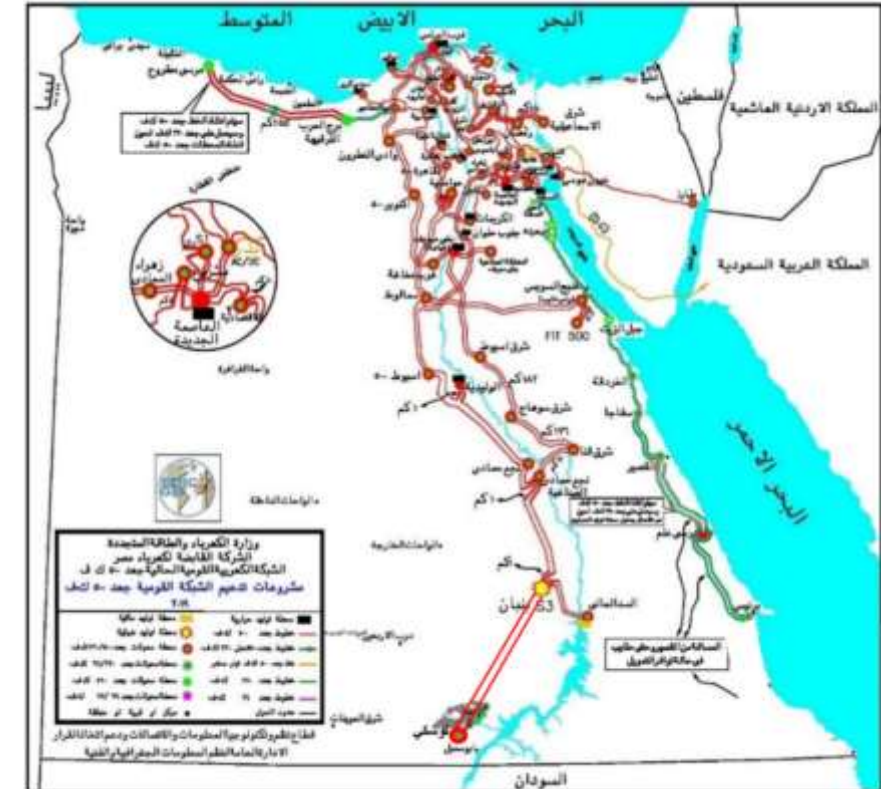
Situation for 500KV Transmission Network By End of 2021

ELECTRICITY GRID YEAR 2014



3078 km total length of 500 KV Grid

ELECTRICITY GRID BY END 2021

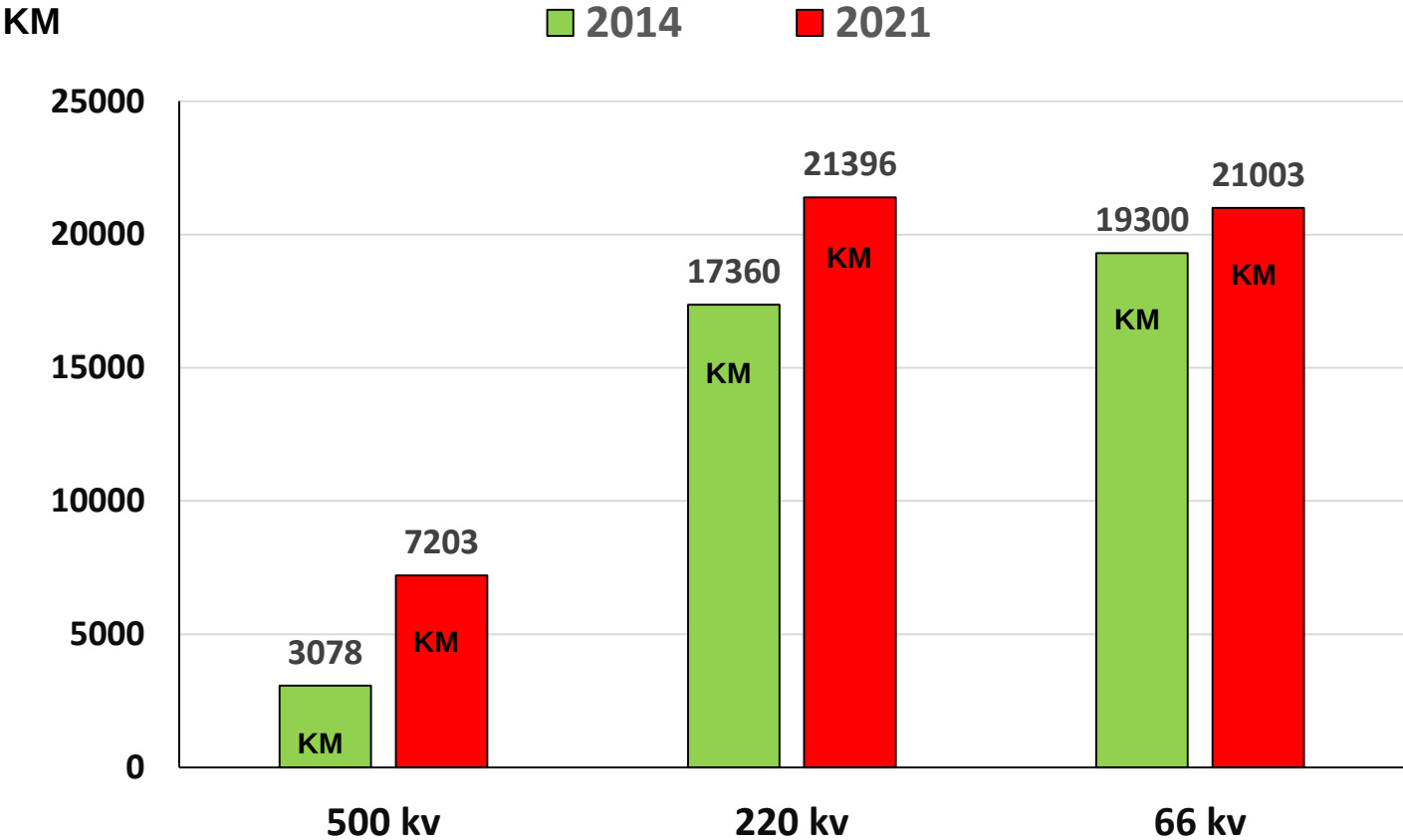


7203 km Total Length of 500 KV Grid

Adding more than **4125 KM**
More than **130 %** the
existing length in 2014



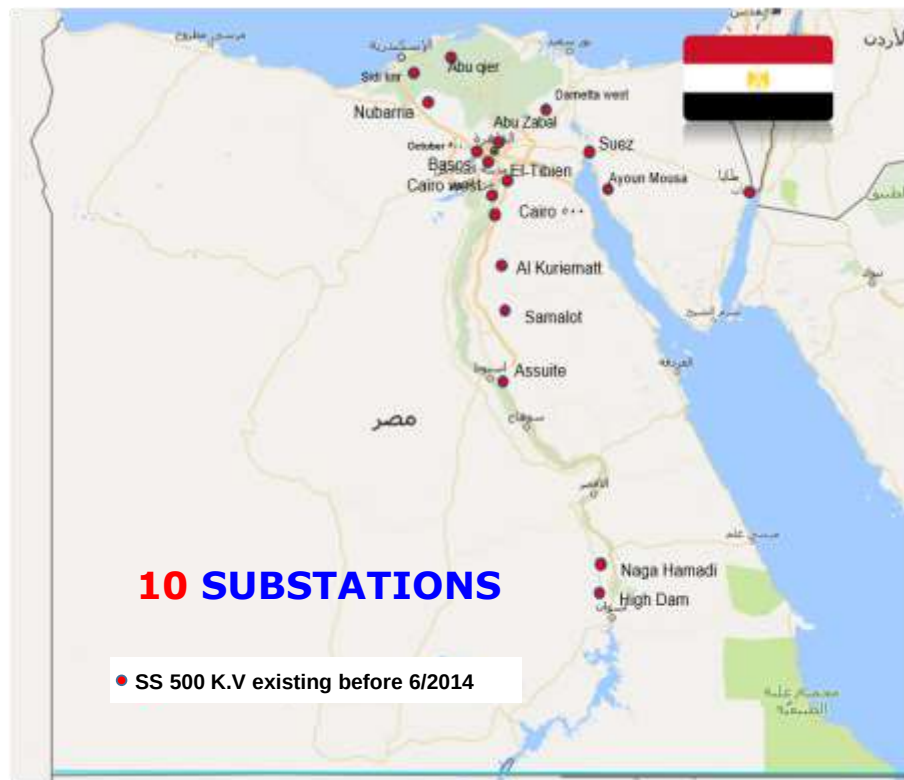
Total Ultra & High Voltage Transmission Lines



Development Since 2014			
Voltage	2014 KM	2021 KM	Added KM
500 KV	3078	7203	4125
220 KV	17360	21396	4036
66 K.V	19300	21003	1703

Situation for 500KV Substations By End of 2021

SUBSTATIONS IN 2014



9800MVA Total 500 KV capacities

Adding **21 substations** with
total capacities of **32500 MVA**
about **230 %**
the existing in 2014

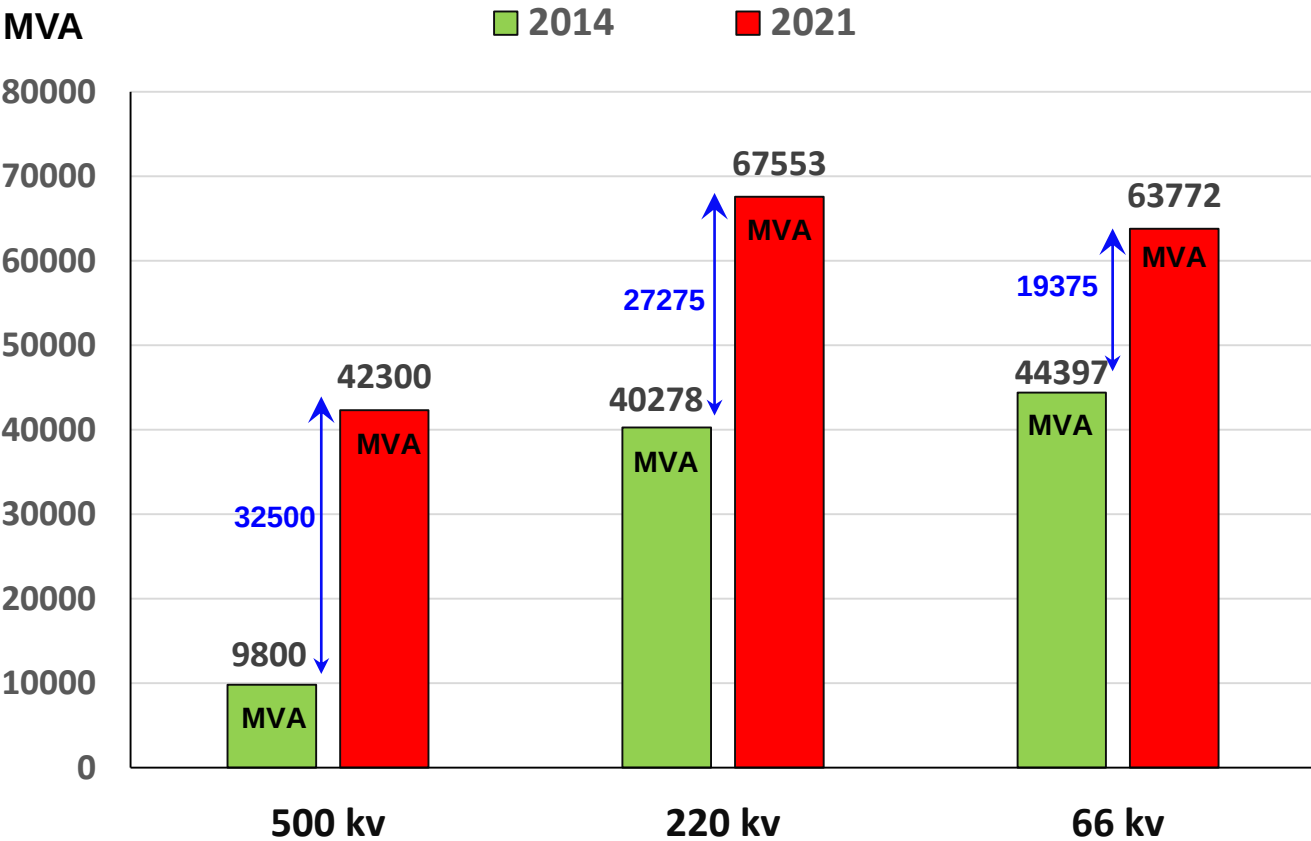


SUBSTATIONS BY END 2021



42300 MVA Total 500 KV capacities

Total Ultra & High Voltage Substations Capacities



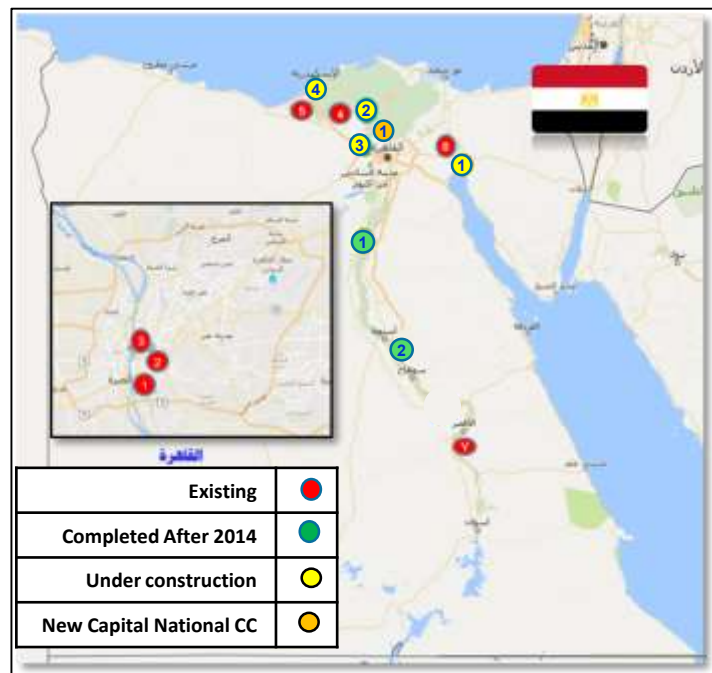
Development Since 2014			
Voltage	2014 MVA	2021 MVA	Added MVA
500 KV	9800	42300	32500
220 KV	40278	67553	27275
66 K.V	44397	63773	19375

National Grid Upgrading (Investment Cost)



During 7 years total investment cost of the Transmission network over
national Grid exceeds : **4.6 billion \$**

New and upgrading Control Centers in Transmission networks



no	Completed After 2014
1	Middle Egypt Regional Control Center
2	Upper Egypt Regional Control Center (upgrade)

no	Under Construction
1	Canal Regional Control Center (upgrade)
2	Cairo Regional Control Center (upgrade)
3	Alex Regional Control Center (upgrade)
4	Delta Regional Control Center

no	Existing Before 2014
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



New Administrative City Control Center

Control Center Design



Control Center Design



This Control Center features advanced Software and Hardware equipment that will make Egyptian Grid efficient and adaptive to the new technologies and energy sources of the future and maintaining secure energy supply.

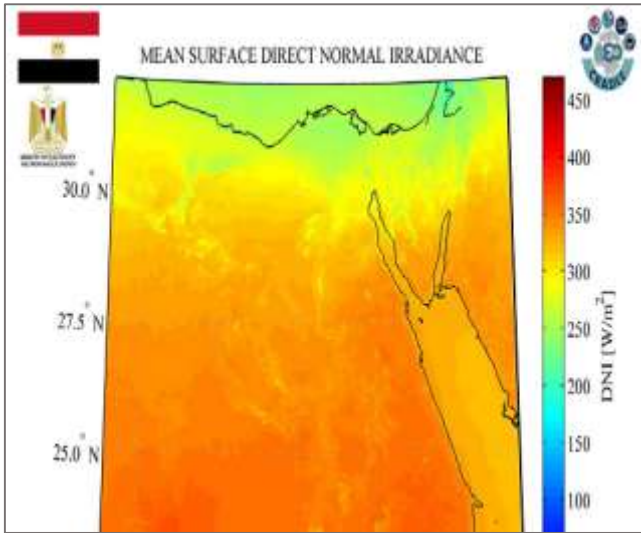
Project Expected to be Completed by the End of year 2022 With Total Investment Cost about 840 Mil. L.E

4- Transition to Renewable Energy

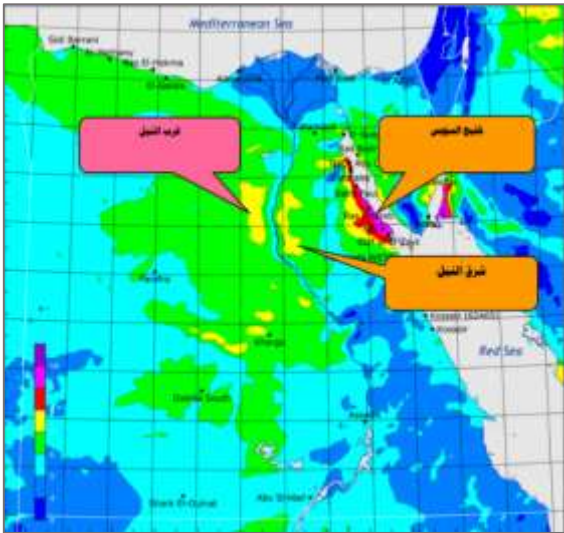
Potentials from Wind & Solar Based on (Wind & Solar Atlas)

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	2000
Kom Ombo (Solar)		7	260
TOTAL		7637	≈90,000

Yellow shaded cells represent the available areas as a whole



(Solar Atlas)

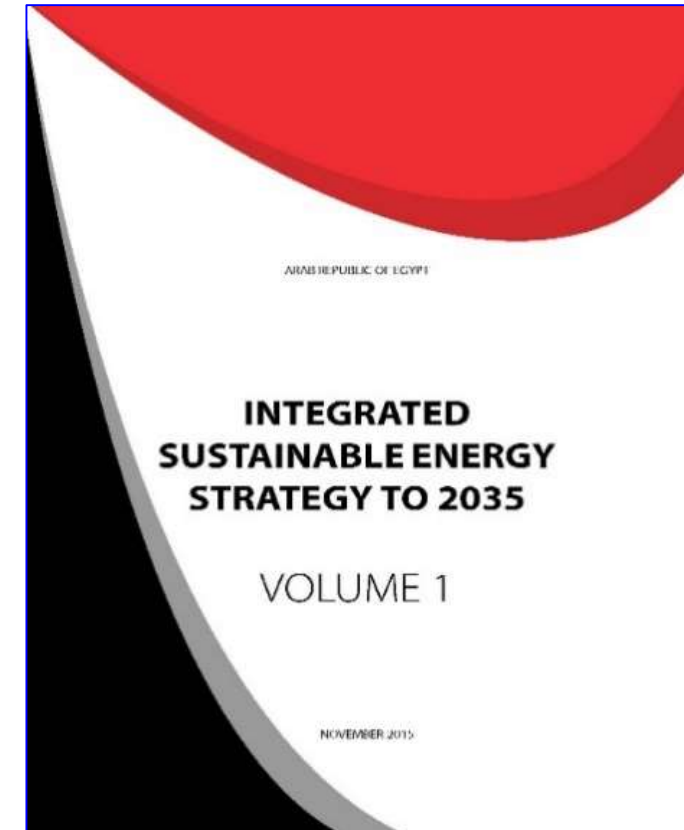


(Wind Atlas)

Land has been deducted from 7600 Km² to 5200 Km² for Development projects
resulted in reduction in RE capacities from 90 GW – 77 GW

Integrated Sustainable Energy Strategy to 2035

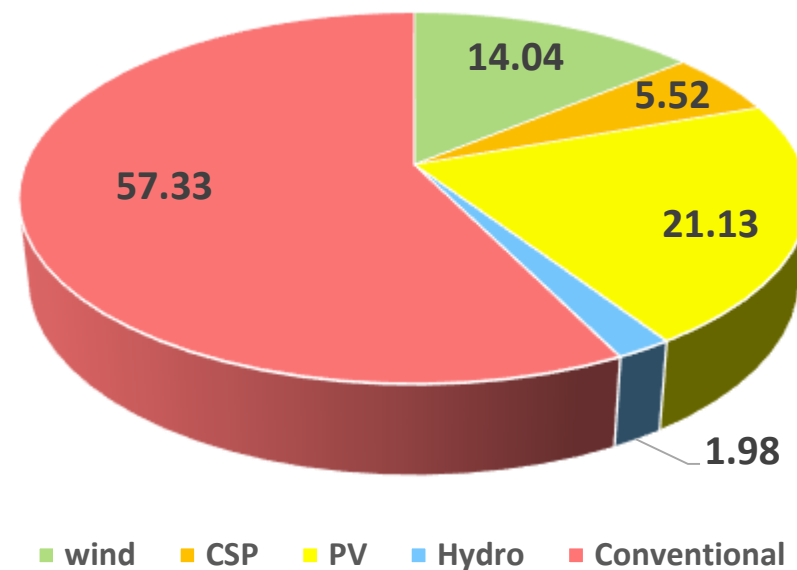
- Targeting : **20 % Renewable Energy** from Peak load by year 2022.
- Targeting by year 2035 :
 - **42 % Renewable Energy** from total Installed Capacity .
 - **18%** Improvement in **Energy Efficiency**.



Egypt's Energy Mix by 2035

Source	Percentage
PV	21.13
Wind	14.04
CSP	5.52
Hydro	1.98
Conventional	57.33
100 %	

Renewable Energy
42.7 %

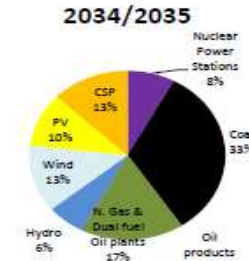
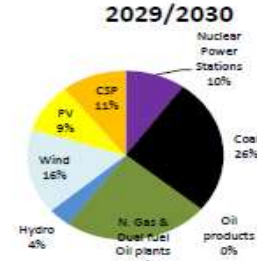
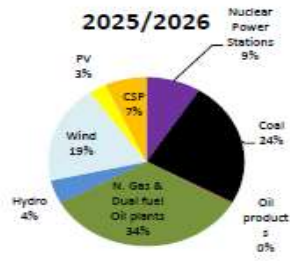
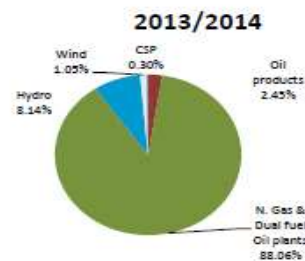
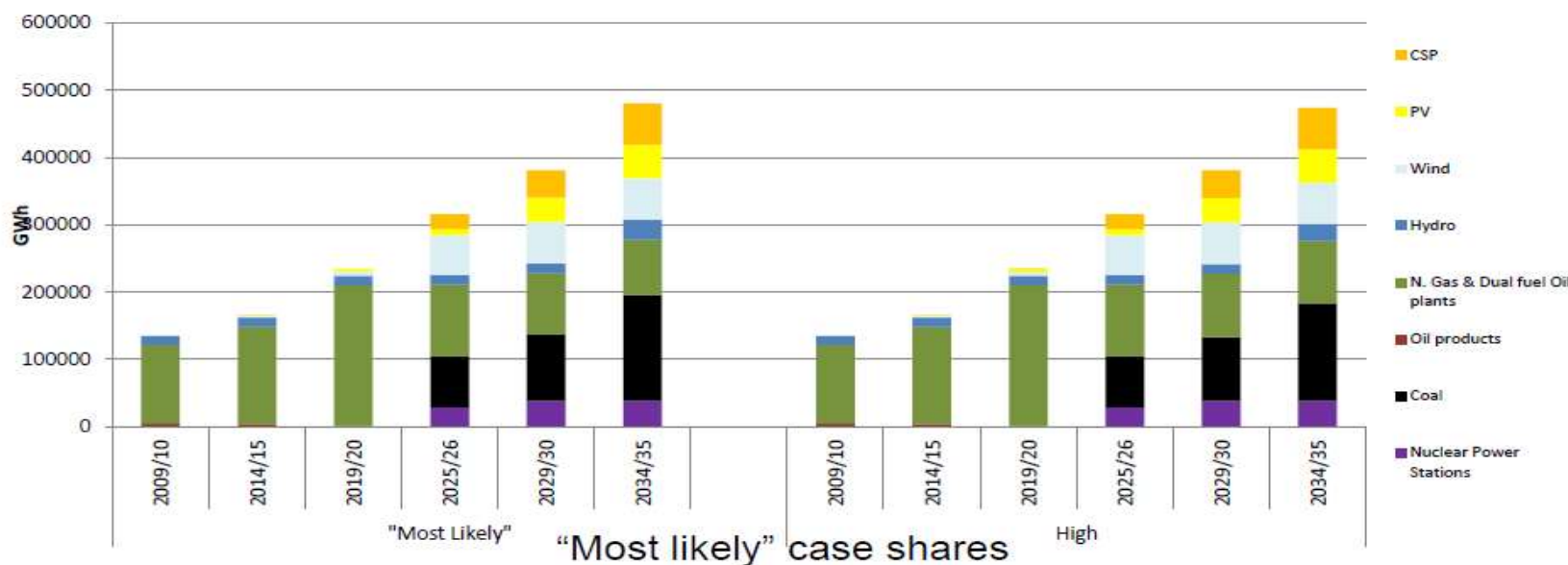


- 2035 Strategy has Been Revised and Excluding COAL option from the Energy Mix and replaced it by Renewable Energy using (BOO) Scheme “will be shown later”

Egypt's Energy Mix by 2035



Electricity production by plant type Updated Scenario 4b



Recent Updated Results From Renewable Energy

As a result of internal and external changes related to the energy sector, global economic changes, the emergence of new technologies such as green hydrogen, global trends regarding climate change and the green economy, and the decrease in the prices of renewable energies.

There is an urgent need to update the strategy to determine the possibility of increasing the participation of renewable energy in the Egyptian energy mix through **excluding COAL option from the Energy Mix and replaced it by Renewable Energy**

Recent Updated Results From Renewable Energy

Update of the Integrated Sustainable Energy Strategy to 2040 (ISES40)

ELECTRICITY DATA / INFORMATION REQUEST

1. Expansion plan by EEHC
2. Future Demand projection made by the planning department at EEHC(if it is available till 2040, it will be better). It is preferable to provide the study for this projection.
3. Status of the Nuclear plants and execution program (planned schedule for the commissioning dates of the four plants) and if there are plans for more Nuclear plants in future till 2040.
4. Status for the pumping and storage project at Attaqah and its implementation program
5. Status of the planned additional pumping and storage program and the expect introduction data of these plants.
6. Projected reduction in the Hydro power from the high dam and other hydro plants due to the renaissance dam (available studies).
7. Plans for the expansion in small hydro plants
8. Plans for market reform and unbundling of EETC from EEHC.
9. Electric mobility projection and expected demand (any approved studies)
10. Water strategy and its energy demand (water strategy report for both irrigation and municipal water including both pumping needs and desalination)
11. Expected demand increase due to the on going projects (Haya karma, new delta, 1.5million Fiddan program, Development of Sinai,...etc)
12. Hydrogen strategy (the report developed by the national committee on Hydrogen strategy which is formed by the prime minister)
13. Recent Update for the Study of Euro-Africa project and project program (feasibility study, expected changed energy, execution program, status of the implementation and trading agreements,...etc)
14. Recent Update on Egypt Saudi interconnection and the execution program
15. Recent update of Egypt Sudan Interconnection and future plans for expansion
16. Recent Update on Egypt Jordan interconnection expansion plan and expected traded energy (feasibility study for the project expansion). Plan for the expansion of Egypt/Lybia interconnection and study for the expected energy exchange.

- In coordination with the European Union Commission in Cairo, it was **agreed** to provide technical support to update the **scenarios** of the integrated and sustainable energy strategy until 2035.
- A contract was made through the Commission with an **international advisory office**, which includes the same consultants who previously worked in preparing the original strategy in 2016.

Incentives For Investments In Renewable Energy

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

Incentives For Investments In Renewable Energy
Land has been allocated for renewable energy project: Solar and Wind has been allocated 5200 Km2
Availability of information concerning Solar Atlas and Wind (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.

Framework for Renewable Energy Development Mechanisms

Private sector investments will play major role in achieving the target through a framework mechanisms .

Auctions



FIT

FIT Scheme

32 PPA Signed

with total capacities of **1465 MW**

Renewable Energy Projects Mechanism till 2022

New and Renewable Energy Authority NREA

EPC + Finance Scheme



BOO

BOO Scheme

Latest Prices for

Solar : **2 cent \$ / KWh**

Wind : **3 Cent \$ / KWh**

Renewable Energy FIT Private Sector Projects

Recent Projects Contracts

Company	Capacity (MW)	Technology	Price (cent \$ / K.w.h)	Investment Cost (\$)
Masdar	200	Wind	3	280
Acwa Power	200	PV	2.47 (Competitive Tenders)	186
Amea Power To replace Coal Fired Power plant	500	PV	2	465
	500	Wind	3	700
ENGIE - Orascom-Toyota	500	Wind	3	700
Siemens – Gamesa	500	Wind	3	700
ACWA Power	1100	Wind	2.85	1400
Total	3500			4.4 Billion \$

Benban Solar Park

Success Story of Private Sector Investment in Renewable Energy

Currently this project is considered largest in Middle East and Africa

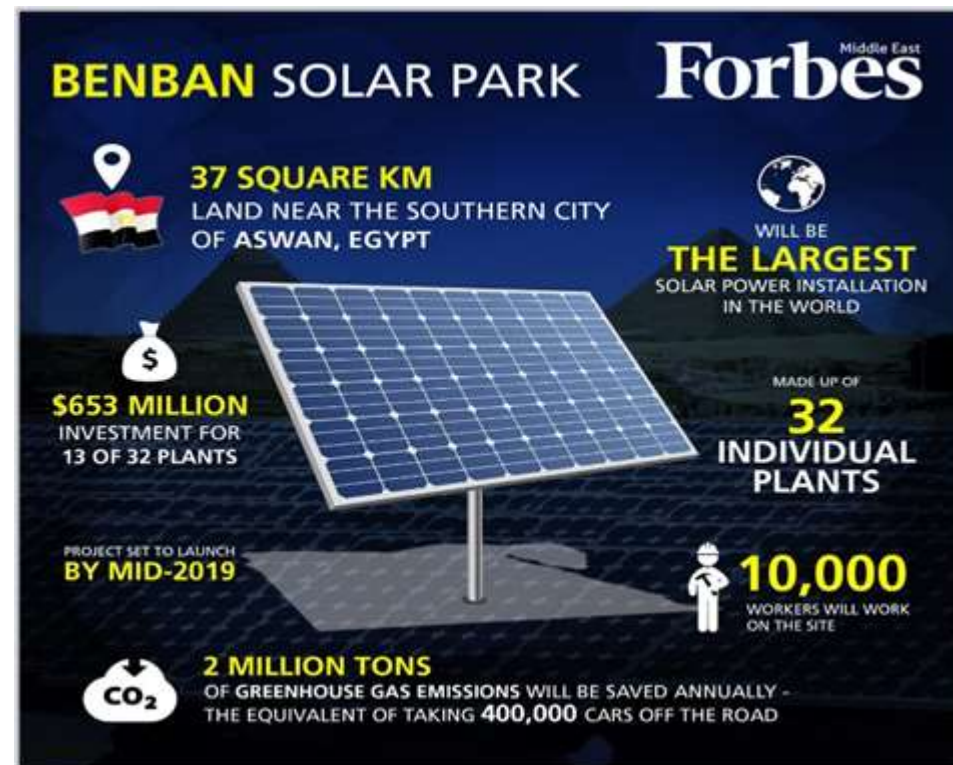


Benban Solar Park

The largest in Middle East and Africa

No. of Projects	Capacity (MW)	Total (MW)
27	50	1350
3	20	60
1	25	25
1	30	30
Overall Installed Capacity		1465

Signed PPA	32	
Total Area for Solar Park	37.1 Km Square	
Total Investment	2 Billion \$	
Workers	Job Created	More than 10000 during construction
	Direct Jobs	2000
	Indirect Job	1500 - 2000
Co2 emission	2 million tons / year	

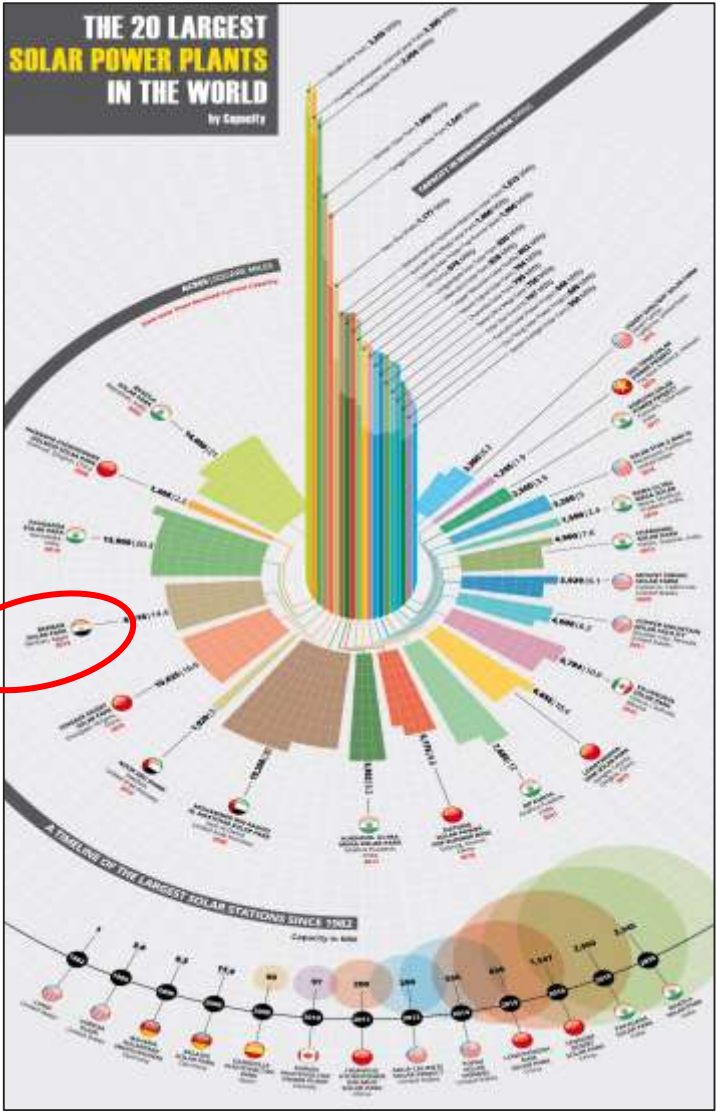


Benban Solar Park

The largest in Middle East and Africa

The 4 largest Solar Power Plants in the World

Rank	Country	Solar Park	Capacity MW
1	India	Bhadla	2245
2	China	Huanghe	2200
3	India	Pavagada	2050
4	Egypt	Benban	1465 For the readiness of the infrastructure of the site it can be expanded to 2000 MW



Benban Solar Park

The largest in Middle East and Africa

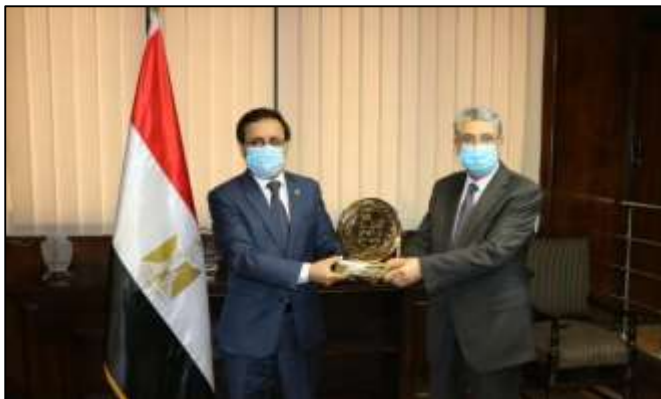


First time for Egypt to win such an award.

The Interim President of the WBG, Kristalina Georgieva announced that **Benban Solar Project (1465 MW) in Aswan** wins best project prize worldwide.

An award that reflects the bank's support for the economic reform program in Egypt and government plans to enhance the role played by the private sector in achieving comprehensive development

November 2020 Benban Solar Park wins the Arab Government Excellence Award as the best project to develop infrastructure from Arab League



Benban Solar Park

The largest in Middle East and Africa



Benban Solar Park connection to the grid

- 1 substation - 500 KV
- 4 substations - 22/22/220 K.V

Private Sector Commercial Operation Date In Benban Solar Park

Actual Operation	Expected Operation	MW	COMPANY	م
23 Feb.2018	20 Feb. 2018	50	INFINITY	1.
16 Jan. 2019	1 Aug.2018	50	FAS	2.
21 Jan. 2019	1 Jan. 2019	50	AL CAZAR	3.
4 Feb. 2019	1 Feb. 2019	30	MMID	4.
19 Feb.2019	15 Jan. 2019	50	TAQA ARABIA	5.
25 Mar 2019	1 Mar .2019	50	INFINITY BENBAN SOLAR BARK	6.
25 Mar 2019	28 Feb. 2019	50	ALSUBH	7.
26 Mar 2019	1 April . 2019	50	DELTA	8.
9 April 2019	28 April 2019	50	PHOENIX	9.
9 April 2019	9 April 2019	50	ASWAN PV	10.
18 April 2019	28 Feb. 2019	50	RISING SUN	11.
18 April 2019	30 Mar. 2019	50	SP ENERGY	12.
19 April 2019	28 Feb. 2019	50	SUN RISE	13.
20 April 2019	31 Mar .2019	50	ACCESS EGYPT	14.
20April 2019	31 Mar .2019	50	ACCESS BUILDING	15.
23 April 2019	15 April. 2019	50	AL FANAR	16.
7 May 2019	1 May . 2019	50	ATEN	17.
2 June 2019	20 May 2019	50	DARAW	18.
13 June 2019	1 June . 2019	50	HORUS	19.
10 June 2019	3 June 2019	50	UPPER EGYPT	20.
9 Aug 2019	18 Aug 2019	50	ASWAN 21 EDF	21.
9 Aug 2019	18 Aug 2019	50	ECSD EGYPTIAN COMPANY FOR SOLAR ENERGY	22.
19 Aug 2019	30 July 2019	20	TK	23.
18 Aug 2019	31 Aug 2019	50	ZAFARANA	24.
27 Aug 2019	30 July 2019	50	ALCOM	25.
29 Aug 2019	31 Aug 2019	50	KOMOMBO	26.
8 Sep. 2019	30 July 2019	50	ACWA	27.
7 Sep. 2019	31 July 2019	20	WINNERGY	28.
11 Sep. 2019	31 July 2019	20	ARINNA	29.
17 Oct. 2019	1 Aug. 2019	25	RA SOLAR	30.
3 Nov. 2019	15 Sep. 2019	50	ARC	31.
17 Oct. 2019	17 Oct. 2019	50	RED SEA	32.

NOVEMBER 2019

ALL OF BENBAN SOLAR PARK PROJECTS (37KM²)

ENTER THE COMMERCIAL OPERATION

BY 32 PRIVATE COMPANIES

USING FIT (PHASE 1 & 2)

WITH TOTAL INSTALLED CAPACITY 1465 MW

Net metering +Roof-Top **PV**

As a result of electricity sector procedures to promote small scale generation from renewables

- Solar projects, up to 1 megawatt, would be exempted from the integration fees on the electrical grid.
- Hotels in Sharm El-Sheikh will also be powered by solar energy, through the spaces inside each hotel separately, using the net metering system.



Total Capacities of (Net Metering + Roof Top PV) = 120 MW)

Wind Energy (Current Installed Capacities)

- **New & Renewable Energy Authority (NREA) With Total Capacities: 1125 MW**
 - Zafarana wind farm : 545 MW
 - Gebi Ziet wind farm (1,2,3) : 580 MW
- **Private Sector (FDI) With Total Capacities : 500 MW**
 - Consortium (Toyota , Orascom, ENGIE) : 250 MW
 - Lekela Project : 250 MW

Wind Total Installed Capacities : 1625 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

Summary

Project	Capacity	Commercial Operation
Current Renewable Energy Installed Capacities (Hydro – Wind – Solar)	6128 MW	In Operation
Solar Project – PV (Under Construction)	820 MW	2022 / 2023
Wind Projects (Under Construction)	1200 MW	2022 / 2023
	1850 MW	2023
Total	Approx. 10 GW	

- Installed Capacities of renewables (Hydro – Solar - Wind) : **6128 MW** (Approx. 20% of peak load)
- By End 2023 installed Capacities of Renewables reach approximately **10000 MW**

5- Investment opportunities in Green Projects

- 1- Green Hydrogen Projects**
- 2- EGYPT Green Energy Corridor**
- 3- The Strategic Plan for Water Desalination from Renewable energy**
- 4- Electric Vehicles**
- 5- Waste to Energy**
- 6- Private companies licensee in the field of electricity Generation & Distribution**

1st- Investment Opportunity

Green Hydrogen



- Preparing The National Hydrogen Strategy
- Cooperation with International Companies

Preparing The National Hydrogen Strategy

Preparing The National Hydrogen Strategy



- **5th March 2022** : MOU has been signed between EBRD , Ministry of Electricity and Renewable Energy, Ministry of Petroleum & Mineral resources to establish a national low-carbon hydrogen strategy, The strategy is expected to be completed before COP27 in November 2022.

Preparing The National Hydrogen Strategy

Task	Milestone	Deadline
-	Kick-off meeting	1 weeks from NTP
	Inception Report – draft	3 weeks from NTP
	Inception Report – final	5 weeks from NTP
1-4	Report on tasks 1 to 5 – draft	2 months from NTP
	Report on tasks 1 to 5 – final	3 months from NTP
5	Case studies – single reports	4 months from NTP
	Case studies – investment appraisal report – draft	4.5 months from NTP
	Case studies – investment appraisal report – final	5 months from NTP
6	Workshop	5.5 months from NTP
-	Conclusion	6 months from NTP

NTP: Notice to Proceed

Cooperation with International Companies

Green Hydrogen

Siemens



August 2021 Germany's Siemens Energy has signed a memorandum of understanding (MoU) with the Egyptian Electricity Holding Company (EEHC) to jointly develop hydrogen-based industry in Egypt with the capability for export based on the letter of intent The agreement builds on a letter of intent signed in January 2021 between Siemens Energy and EEHC

Green Hydrogen

Siemens

Partnership has to manage the scale up of a new industry - H2 Roadmap for Egypt until 2030

SIEMENS
energy



Siemens Presentation (Egypt Hydrogen) about the Hydrogen Road Map for Egypt until 2030

Green Hydrogen Siemens

Siemens Vision Aim To Transform Egypt to be Green Energy Hub

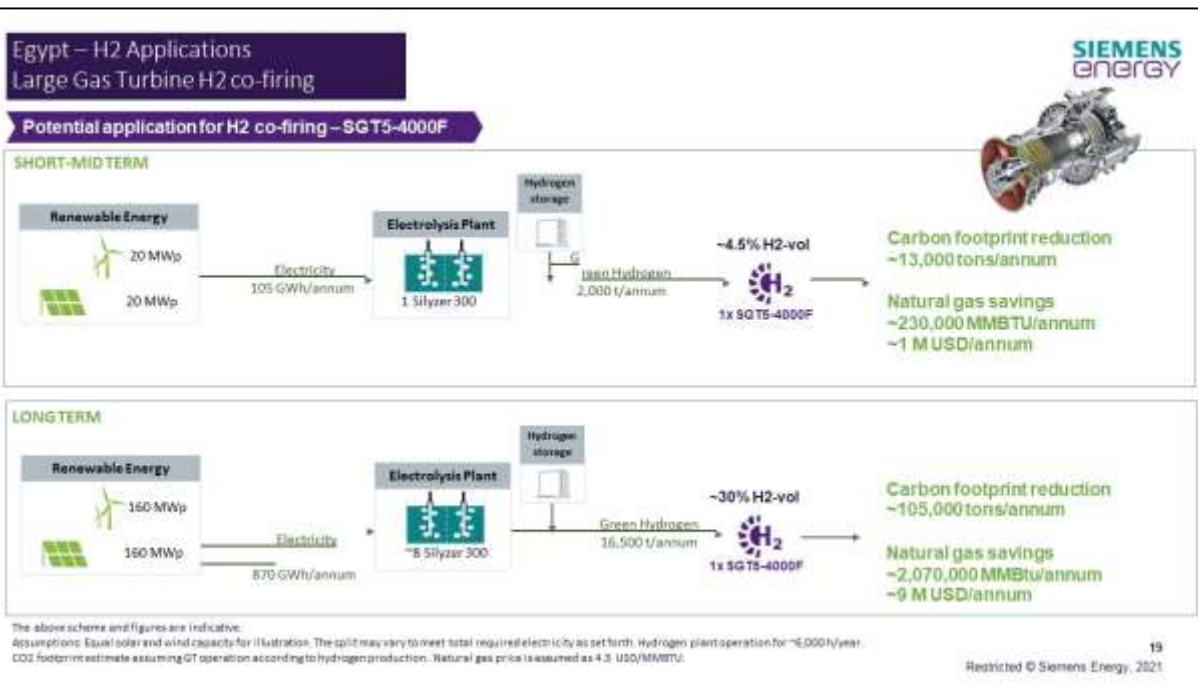
- **Green Industries:** Egypt to lead green ammonia exporting in the region
- **Transportation.(Green Mobility) .**
- **Green H2 Valley:** First scalable green H2 valley to be come the center of Green energy in the region to serve the different applications.
- **H2 co-firing** will help Egypt to reach **CO2 emission reduction targets (10-30% Co- firing capability available for current H class Fleet.)**



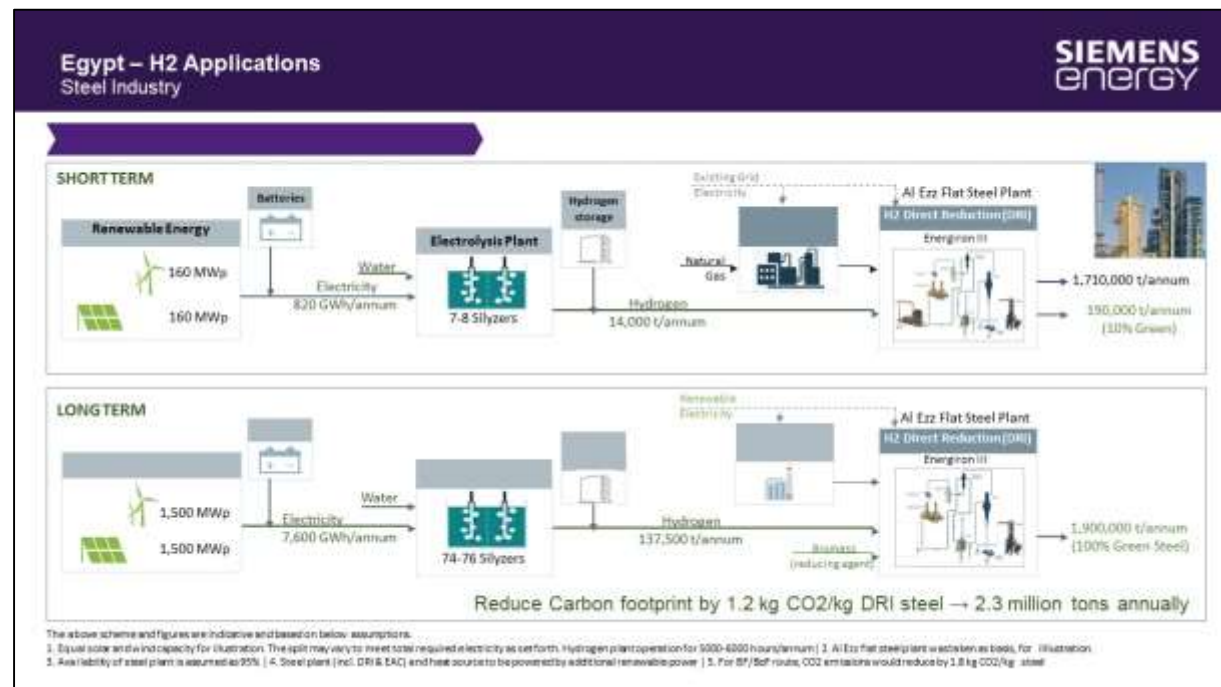
Green Hydrogen

Siemens

GT Upgrades H2 Co-firing



Steel Industry (Direct Reduced Iron)



Green Hydrogen

Belgian Consortium **DEME, FLUXYS, PORT OF ANTWERP**

March 2021 a cooperation agreement was signed between

- Egyptian electricity holding company .
- Aboukir ports construction and Management company
- Egyptian National gas Holding company.
- Belgian Consortium **DEME, FLUXYS, PORT OF ANTWERP**

To prepare a feasibility study in different locations in Egypt to establish a green hydrogen production project (HYPOR-EGYPT).

A pilot project with a capacity of 200 megawatts will be launched to produce green hydrogen, after which it will enter the commercial scope.



Green Hydrogen

Sovereign Fund of Egypt, Orascom , Norwegian company (Scatec) , Fertiglobe

Totally Private Sector Investment

14 October, 2021: The Sovereign Fund of Egypt had signed agreement with Orascom, Scatec and Fertiglobe to jointly develop a 50-100 MW green hydrogen plant as feedstock for green ammonia production.



Green Hydrogen

Sovereign Fund of Egypt, Orascom , Norwegian company (Scatec) , Fertiglobe

- The **1st 100 MW** project to come online in the world, positioning Egypt as the world's leader in green hydrogen
- Producing green ammonia to be used in industrial application and as marine fuel
- Partnership with Sovereign Fund of Egypt and Scatec
Target Completion in October 2022 in time for COP27

Green Ammonia Project: Largest Green Hydrogen Project in the World with 1st Green Ammonia Application to be Showcase Project for COP27



Green Hydrogen MAERSK

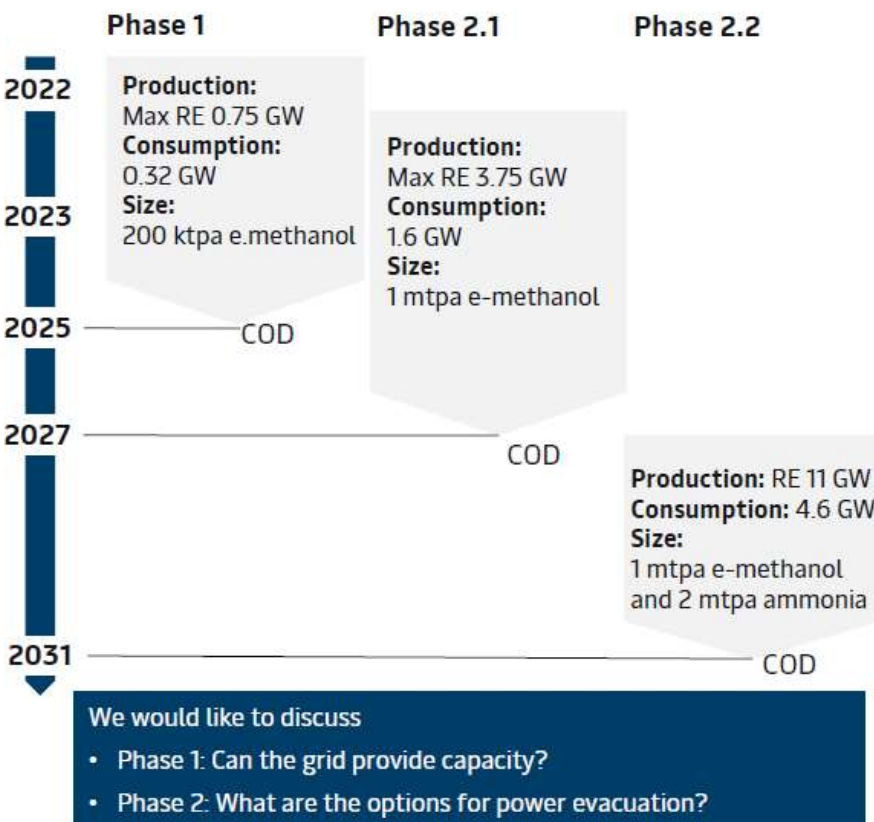


A memorandum of understanding was signed between the General Authority for the Economic Zone of the Suez Canal, the Sovereign Fund of Egypt, the New and Renewable Energy Authority, the Egyptian Electricity Transmission Company, and Maersk International **to establish a project to produce green fuel for ship bunkering supplies in the Suez Canal Economic Zone.**

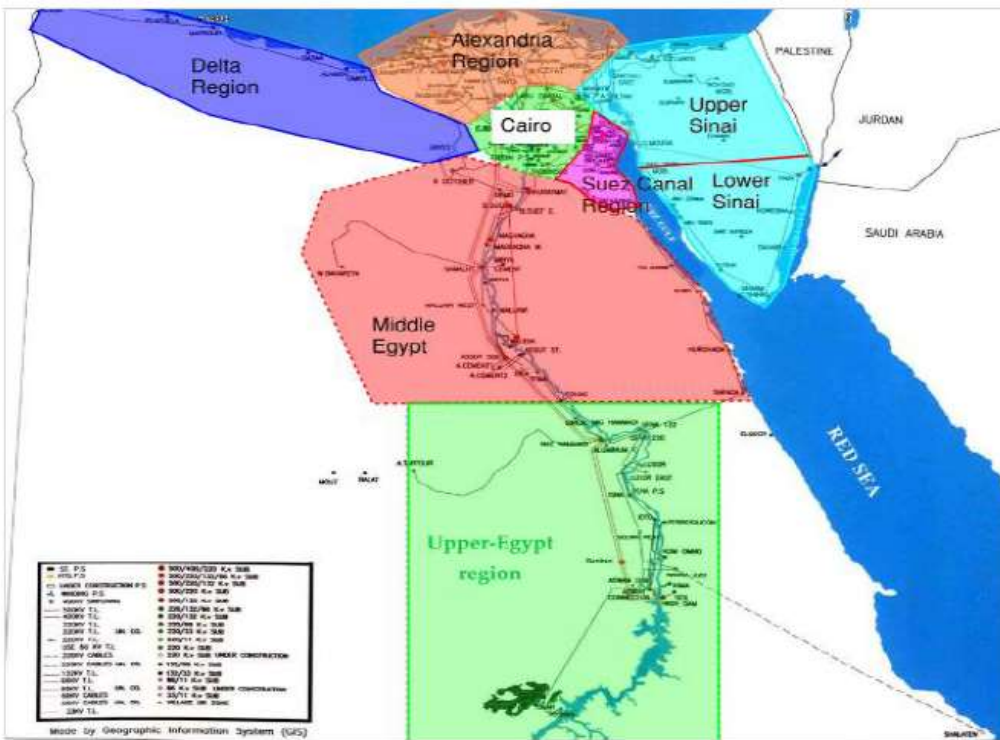
Green Hydrogen MAERSK

Transmission grid: Point of departure - Siting critical for overall transmission costs

Required electricity demand for different phases



Exp. peak demand by 2025 is 62 GW rising toward 2030 to 75 GW



Green Hydrogen

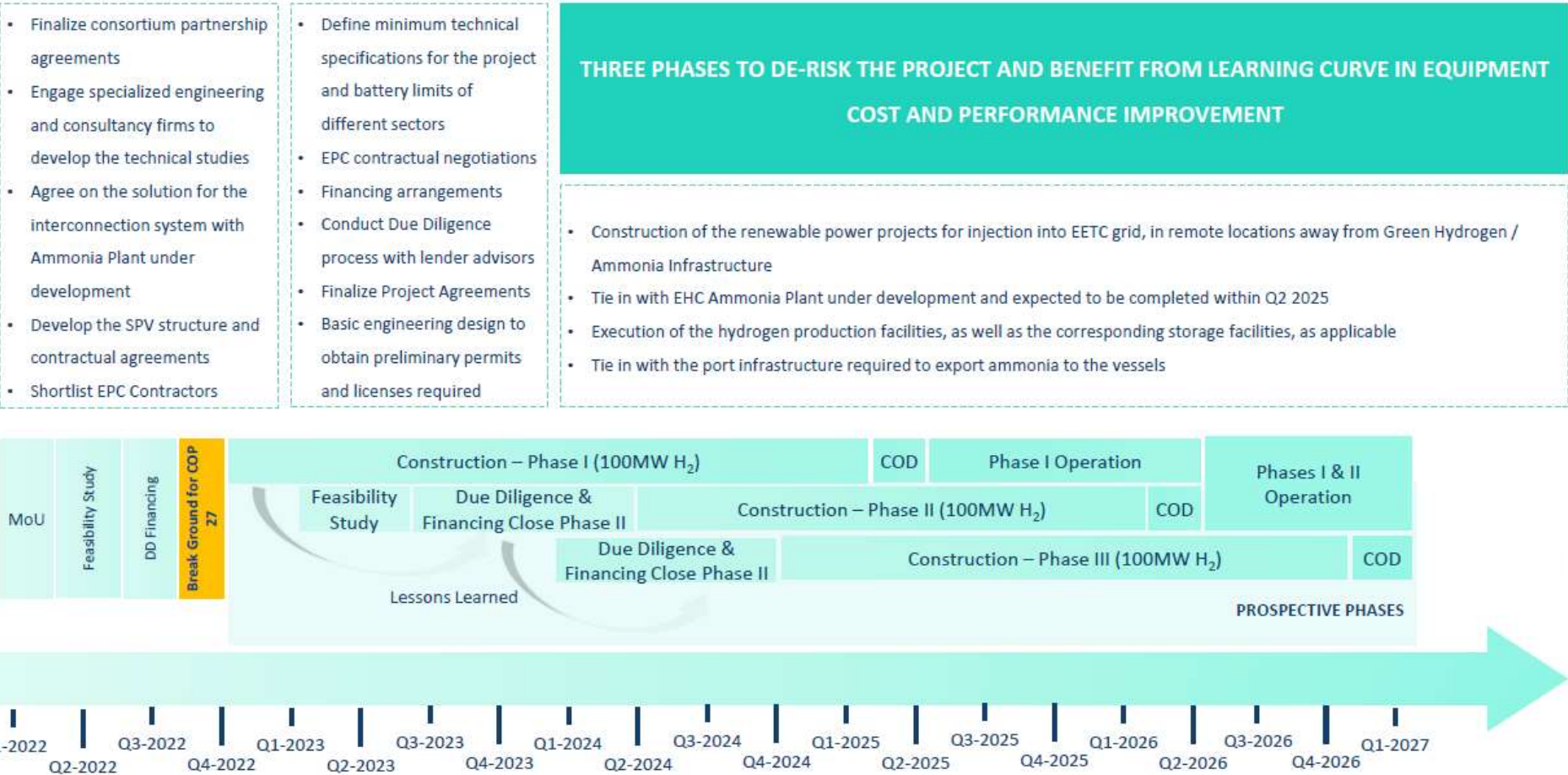
AMEA POWER



A memorandum of understanding was signed, aiming to establish projects to produce green fuel and green ammonia in the Sokhna.

Green Hydrogen AMEA POWER

TIMELINES



GREEN HYDROGEN PROJECT IN EGYPT

Green Hydrogen EDF



An agreement concerns EDF Renewables. The subsidiary of the giant Electricite de France (EDF) intends to collaborate with the General Authority of the Suez Canal Economic Zone (SCZone), the Sovereign Wealth Fund of Egypt (TSFE), the Egyptian Electricity Transmission Company (EETC), the New and Renewable Energy Authority (NREA) and the Zero-Waste Egypt Alliance. The agreement signed in the presence of several members of the Egyptian government aims to produce hydrogen and its derivatives from the port of Ain Soukhna in the Gulf of Suez.

Green Hydrogen EDF

Project Description : Project phases and Timelines



- Export agreement for 100% of total production until 2030,
- Paving the way for decarbonization of maritime industry.

Electrolysers: 200 MW

NH3 prod.: ~600 mt/day

PV: 350 MWdc

Wind: 280 MW

NH3 storage: 7,000 MT

Operation date: Q1 2026



- Scale up to fulfil the maritime market initial growing demand of green fuel.
- Investment in the bunkering terminal.

Electrolysers: up to 500 MW

NH3 prod.: ~1,600 mt/day

PV: 650 MWdc

Wind: 400 MW

NH3 storage: 15,000 MT

Operation date: Q1 2030



- Commercialization of green fuel for ships bunkering.

Electrolysers: up to 1,000 MW

NH3 prod.: ~3,000 mt/day

PV: 1,100 MWdc

Wind: 800 MW

NH3 storage: 30,000 MT

Operation date: Q1 2035

CONFIDENTIAL

7

Green Hydrogen

Masdar, Hassan Allam Utilities



- **The first MoU** was signed between the Suez Canal Economic Zone (SCZone), the Sovereign Fund of Egypt, the Egyptian Electricity Transmission Company (EETC), the New and Renewable Energy Authority (NREA), the UAE's Abu Dhabi Future Energy Company (Masdar), and Hassan Allam Utilities Company
- **The second MoU** was signed between the Sovereign Fund of Egypt, EETC, the New and Renewable Energy Authority, Masdar, and Hassan Allam Utilities Company

Green Hydrogen

Masdar, Hassan Allam Utilities

Masdar – HA Utilities proposed Roadmap for 2 GW electrolyser capacity by 2030

Pillars	Market	2026	2027	2028	2029	2030
I Develop Egypt's Green Bunkering	 	 e-methanol for the maritime sector ~200 MW 2026				
II Leverage local infrastructure to export green H2 to Europe	  			 green ammonia for export to Europe 600 MW 2028		 green ammonia for export to Europe 900 MW 2030
III Supply green H2 for local industry	  					 Green hydrogen for local industry 300 MW 2030

MW Electrolyzer installed capacity xx Commercial operation date

Green Hydrogen Masdar, Hassan Allam Utilities

The offer submitted by the MASDAR includes the implementation of a 4 gigawatt electrolyzer in the Suez

Canal Economic Zone by 2030 and aims to achieve three objectives:

- Supplying ships with green fuel .
- Exporting green ammonia to Europe.
- Providing green ammonia for local industry



Hydrogen Blending in Natural Gas Turbines

General Electric

GE CEO presented the possibility of the company's contribution to **Blend Hydrogen in Natural gas turbines**. Which leads to raising the efficiency of the electricity production units, Reduce carbon dioxide emissions



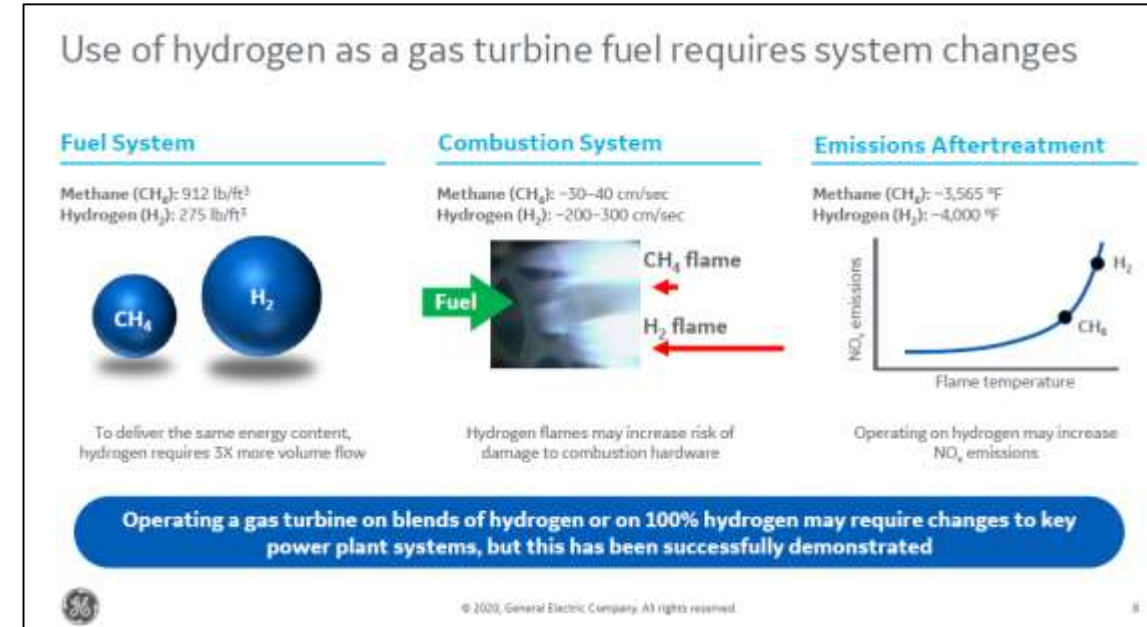
Strategic Cooperation Agreement Between GE and Egyptian Electricity Holding Company (EEHC) will be signed 2 June 2022

Hydrogen Blending in Natural Gas Turbines

General Electric

It was agreed that the company would convert one of the electricity generating units in **Sharm El-Sheikh** to work with hydrogen and apply this technology to it.

- The company bears the cost of artwork for the transfer.
- The company will manage the hydrogen used as fuel.
- The project is the first of its kind in Africa **This will be announced during COP 27.**
- A study is underway to sign a memorandum of understanding for this project.

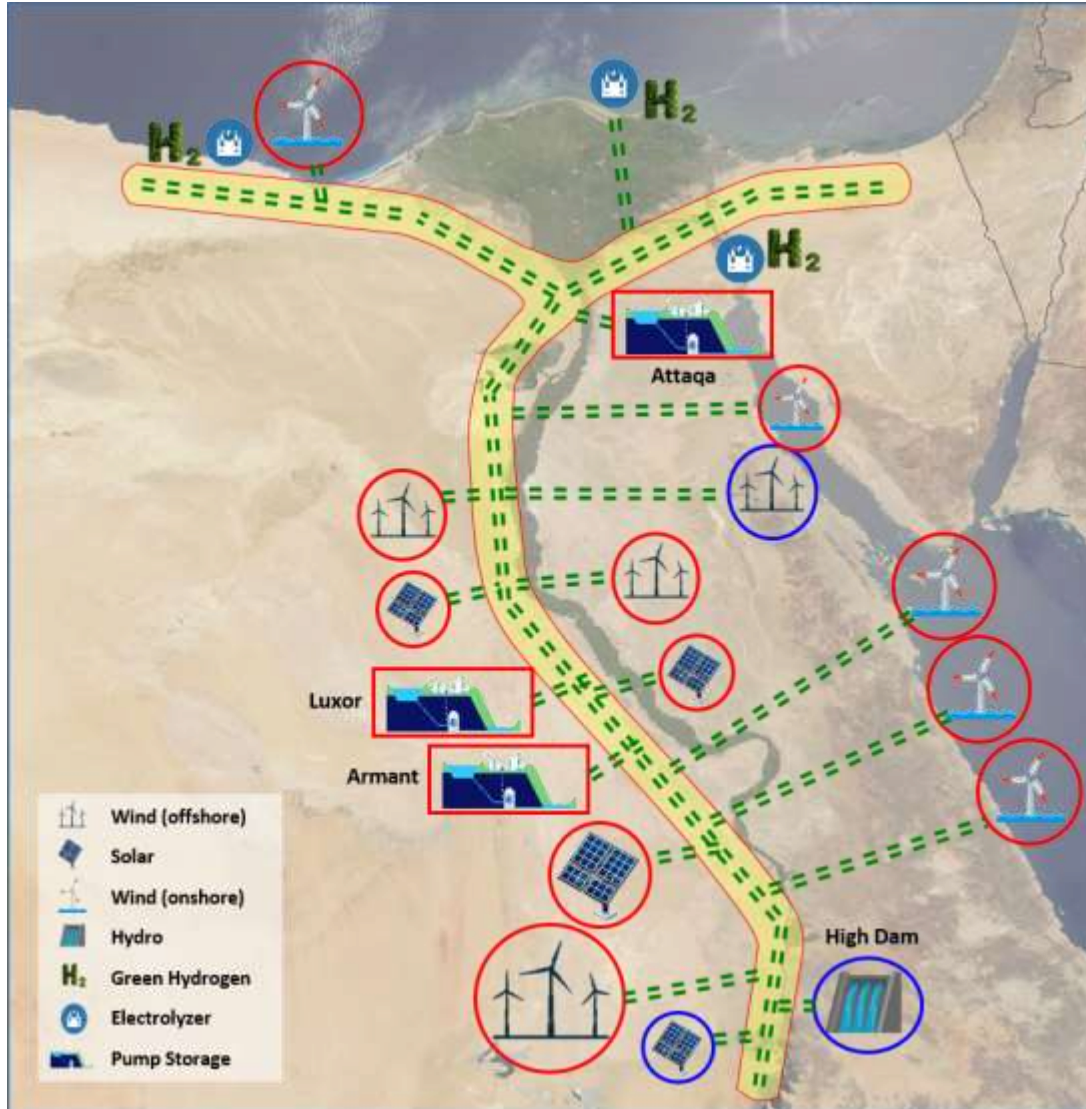


2nd- Investment Opportunity

EGYPT Green Energy Corridor

Due to expansion of Green Projects

EGYPT Green Energy Corridor



EGYPT Green Energy Corridor aims to facilitate integration of large scale Renewables into the Grid to Supply:

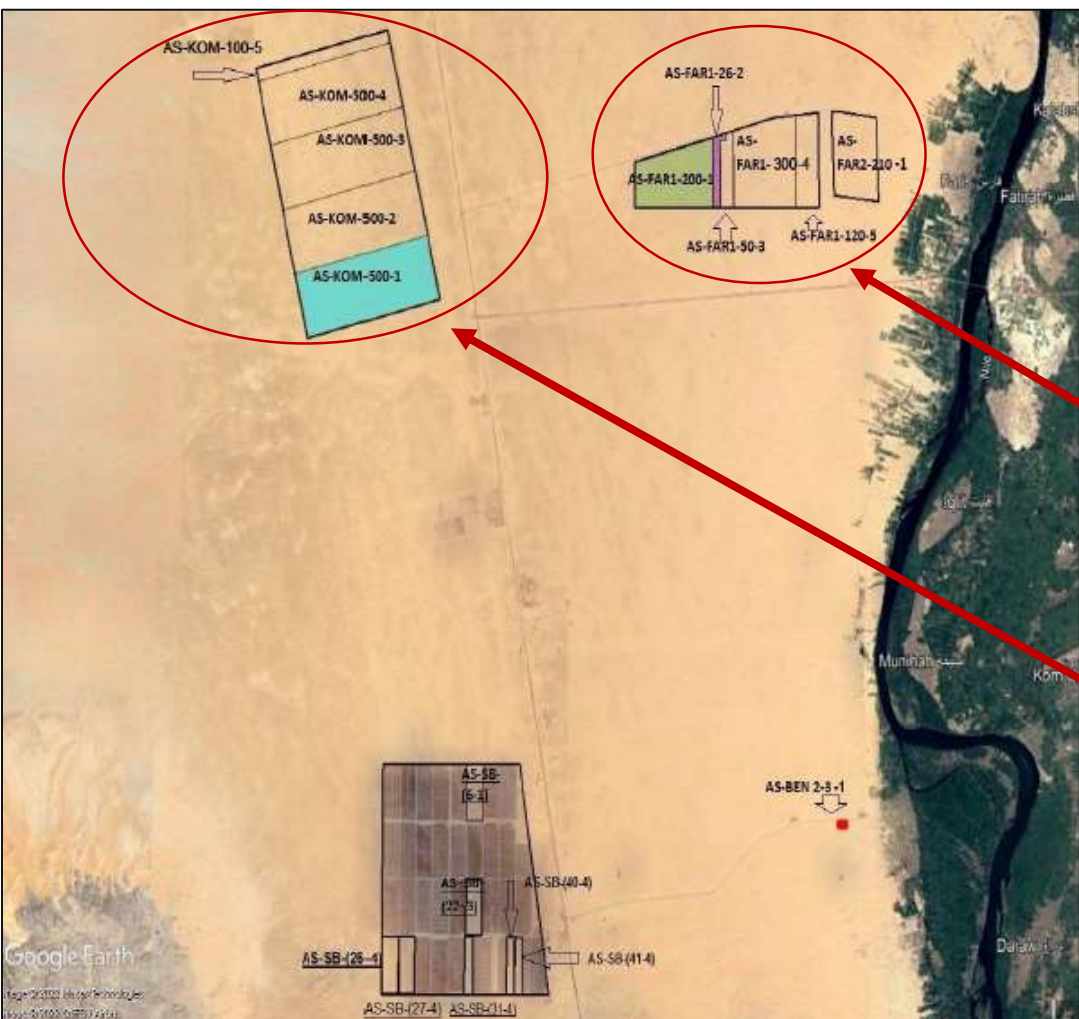
- National Development projects.
- Green Hydrogen projects.
- Water Desalination Projects.
- Interconnection Projects.

A- Available lands for establishment Renewable Energy projects (Wind / Solar)

Available lands for the establishment of projects to generate electricity from Renewable Energy (Wind / Solar)

Region	Available Areas (Km ²)			Capacities that could be Generated (MW)		
	Wind Energy Projects (Km ²)	Solar Energy Projects (Km ²)	Total (Km2)	Wind Energy Projects MW	Solar Energy Projects MW	Total MW
Suez Gulf 9 – 9.5 m/sec	80	-----	80	400	-----	400
West Nile 8 m/sec	1807	66	1923	9035	5800	14835
East Nile 7 – 7.5 m/sec	645	981	1626	3225	49050	52275
Fares 1	-----	7	7	-----	350	350
Fares 2	-----	4	4	-----	200	200
Kom Ombo	-----	32	32	-----	1600	1600
Benban	-----	5.5	5.5	-----	270	270
Zafarana 7 – 7.5 m/sec	-----	6.5	6.5	-----	300	300
Total	2532	1102	3684	12660	57250	70230

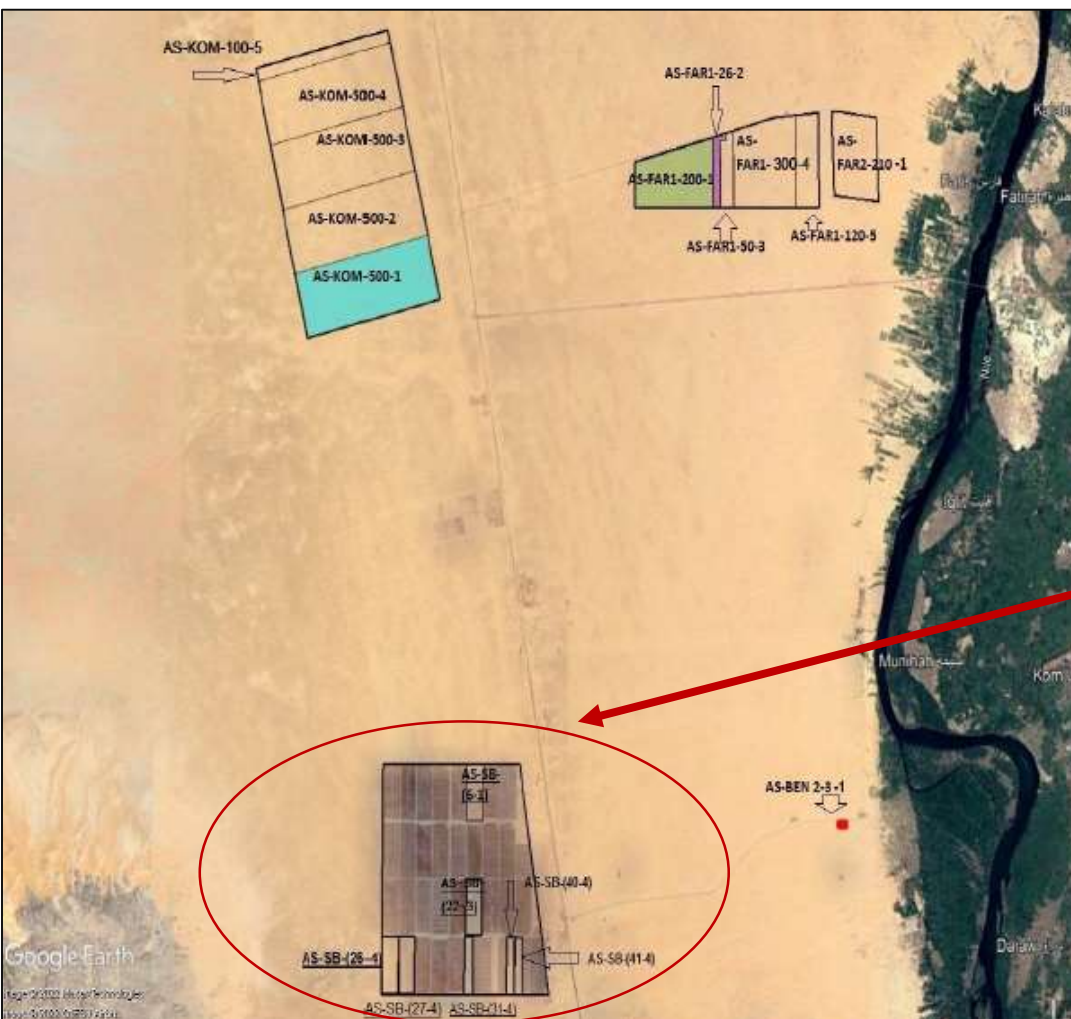
Map of the available lands for Solar Energy in **Aswan Governorate**



Zone Name	The name of the plot	Land Space Available for Generation (Km ²)	Max. Capacity that can be generated (MW)
Fars 1	AS-FAR1-50-3	1 Km ²	50 MW
	AS-FAR1-300-4	6 Km ²	300 MW
	AS-FAR1-120-5	2.4 Km ²	120 MW
Fars 2	AS-FAR2-210-1	4.2 Km ²	210 MW
Kom Ombo	AS-KOM-500-2	10 Km ²	500 MW
	AS-KOM-500-3	10 Km ²	500 MW
	AS-KOM-500-4	10 Km ²	500 MW
	AS-KOM-100-5	1.9 Km ²	100 MW

Max Capacity Generated : 2280 MW

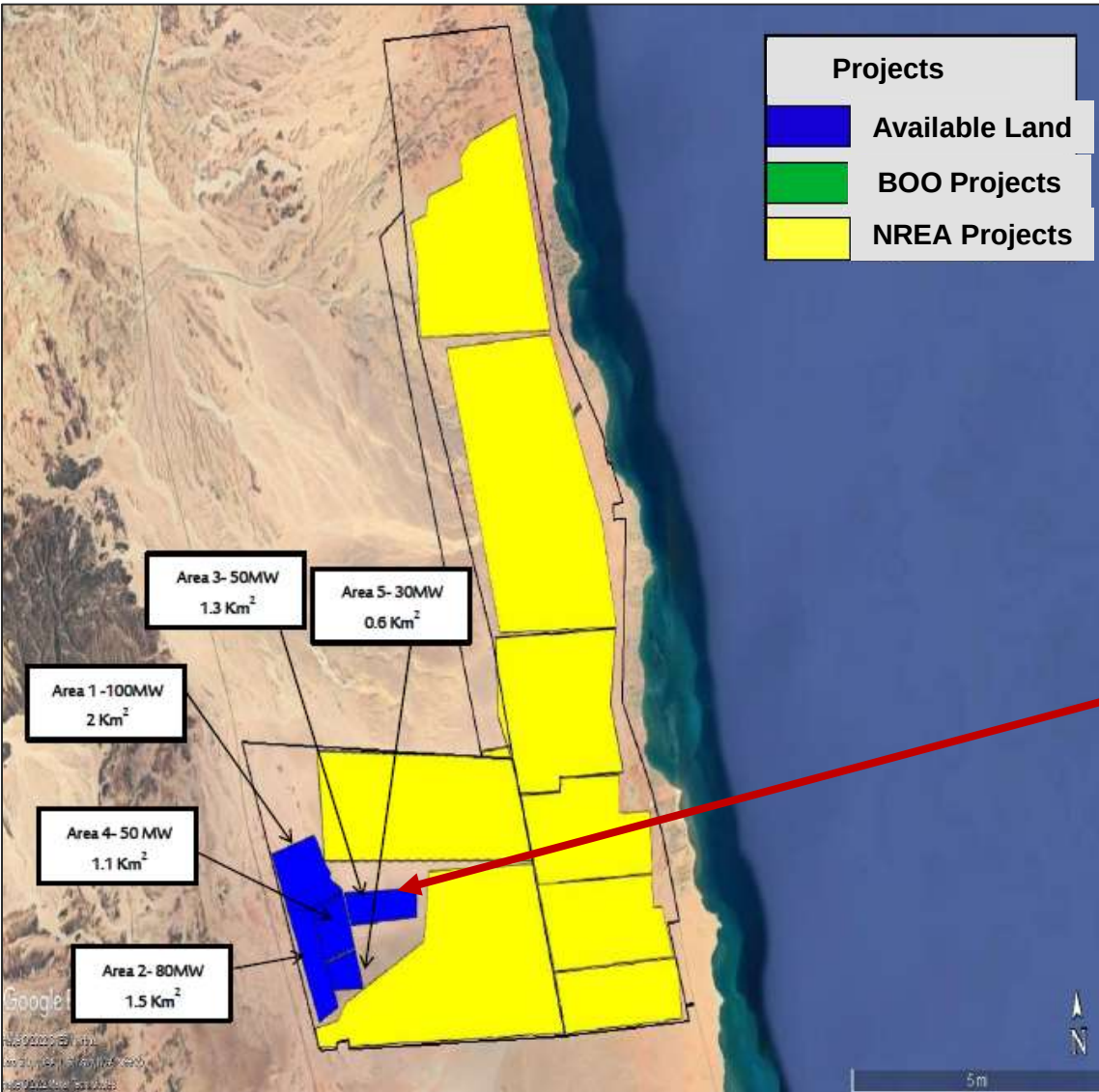
Map of the available lands for Solar Energy in **Aswan Governorate**



Zone Name	The name of the plot	Land Space Available for Generation (Km ²)	Max. Capacity that can be generated (MW)
Benban (Existing solar park with free Plot)	AS-SB-(6-1)	1 Km ²	50 MW
	AS-SB-(22-3)	1 Km ²	50 MW
	AS-SB-(26-4)	1 Km ²	50 MW
	AS-SB-(27-4)	1 Km ²	50 MW
	AS-SB-(31-4)	0.5 Km ²	20 MW
	AS-SB-(40-4)	0.5 Km ²	25 MW
	AS-SB-(41-4)	0.5 Km ²	25 MW

Max Capacity Generated : 270 MW

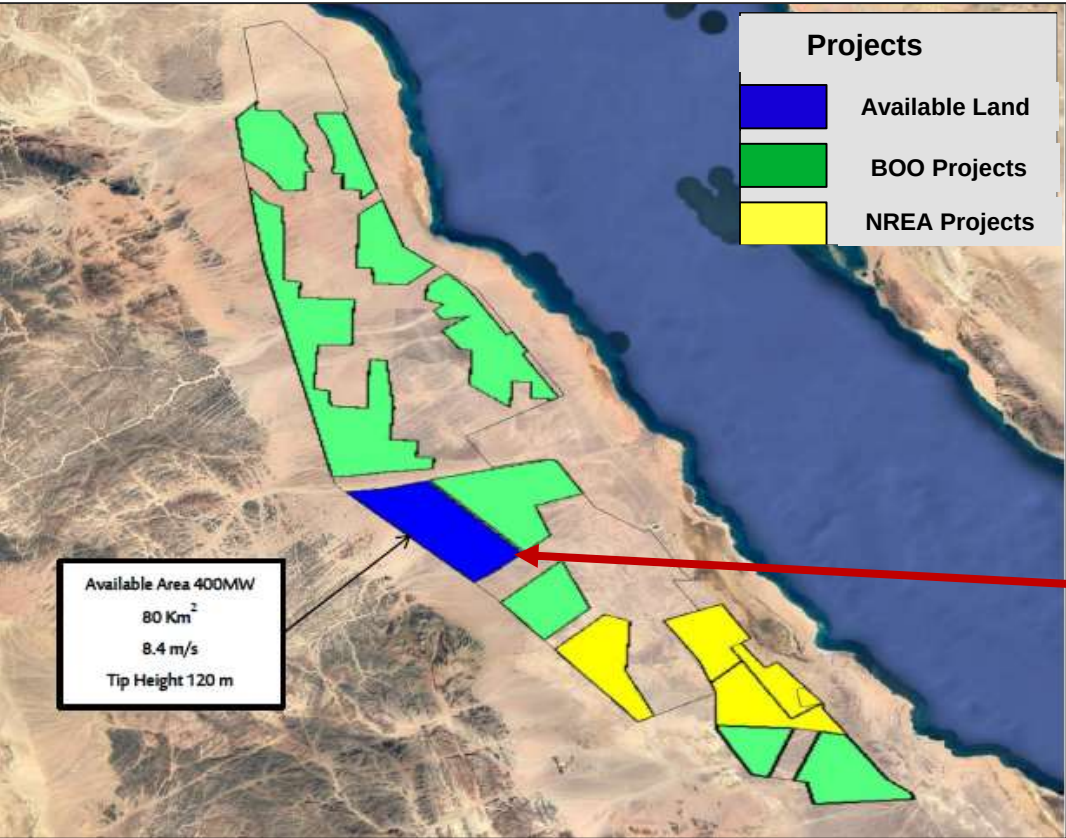
Map of the available lands for Solar Energy in **Zafaraana Area**



Zone Name	The name of the Area	Land Space Available for Generation (Km ²)	Max. Capacity that can be generated (MW)
Zafaraana	1	2 Km ²	100 MW
	2	1.5 Km ²	80 MW
	3	1.3 Km ²	50 MW
	4	1.1 Km ²	50 MW
	5	0.6 Km ²	30 MW

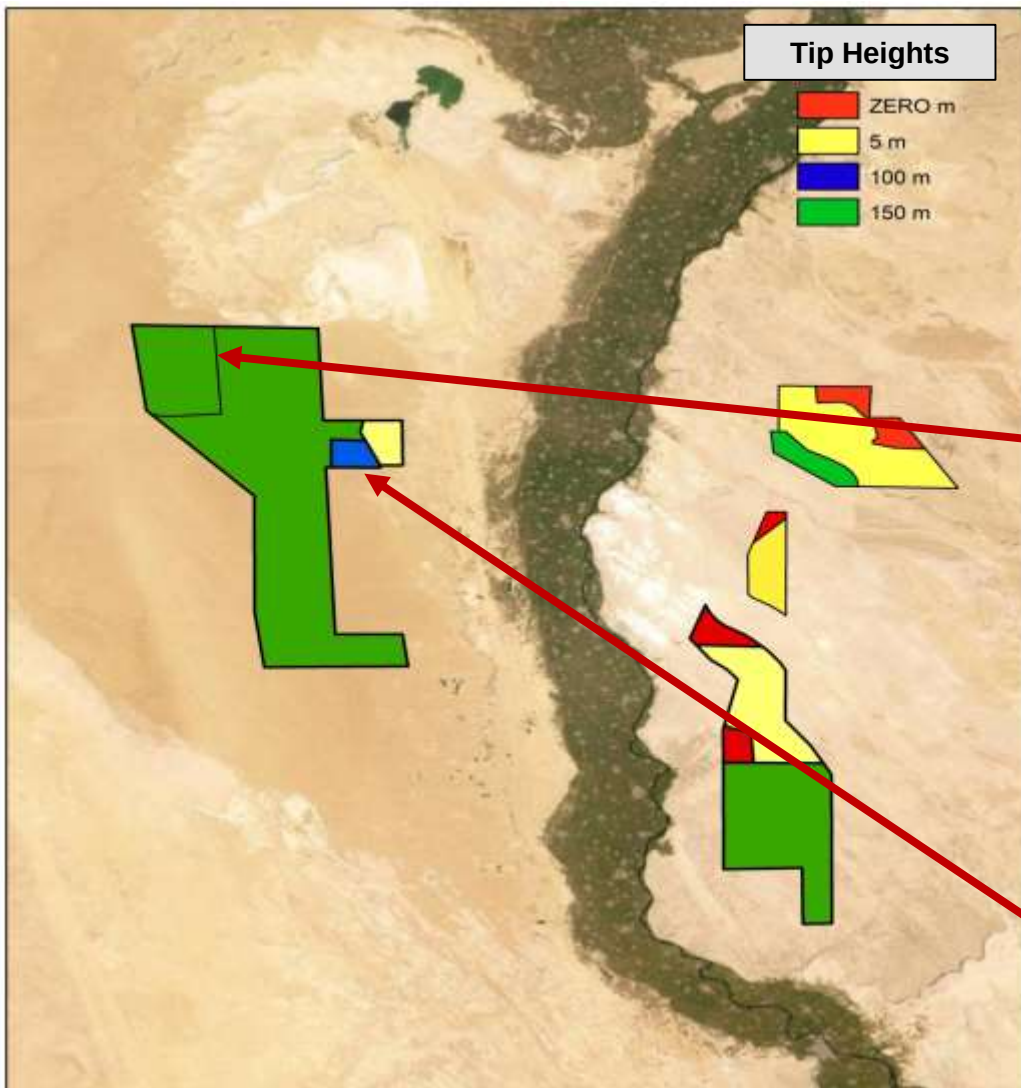
Max Capacity Generated : 310 MW
May be reached (350- 400 MW) by using new technologies (bi ficial)

Map of the available lands for Wind Energy in **Suez Gulf Area**



Zone Name	The name of the Area	Land Space Available for Generation (Km ²)	Max. Capacity that can be generated (MW)	Wind Speed m/s	Tip Height Meter
Suez Gulf	1	80 Km ²	400 MW	8.4 m/s	120 m

Map of the available lands for Solar / Wind Energy in **East & West Nile River Areas**



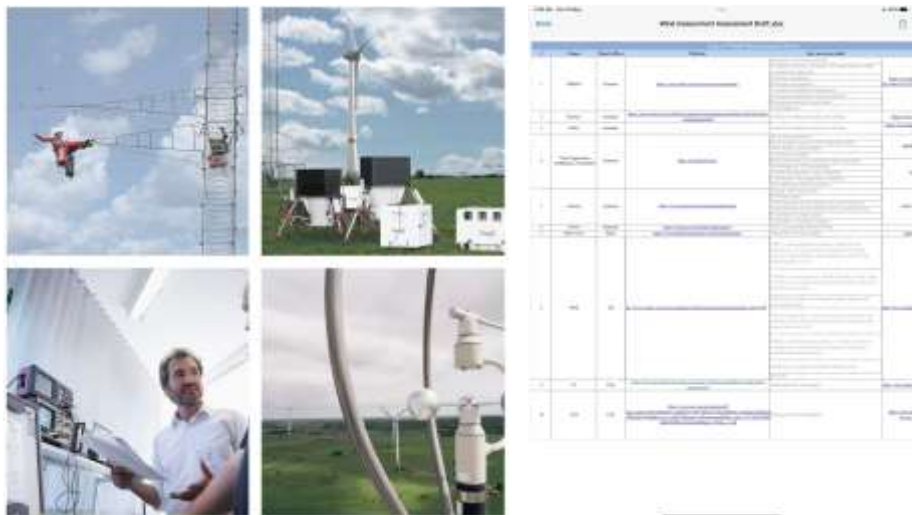
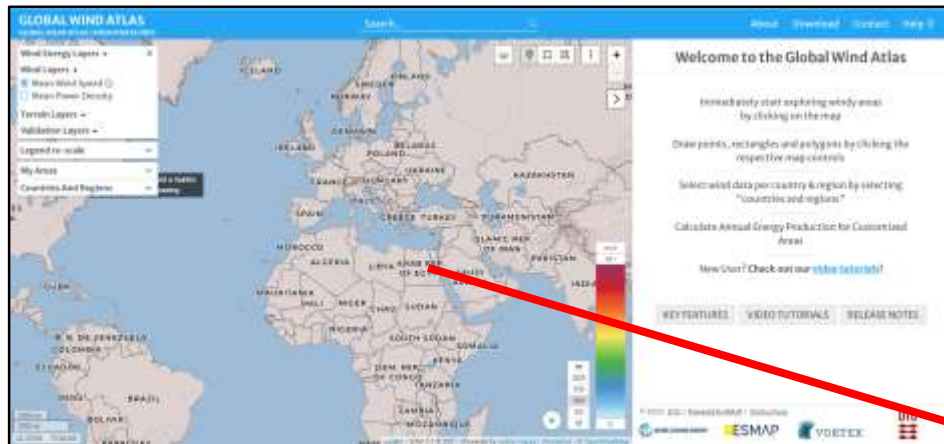
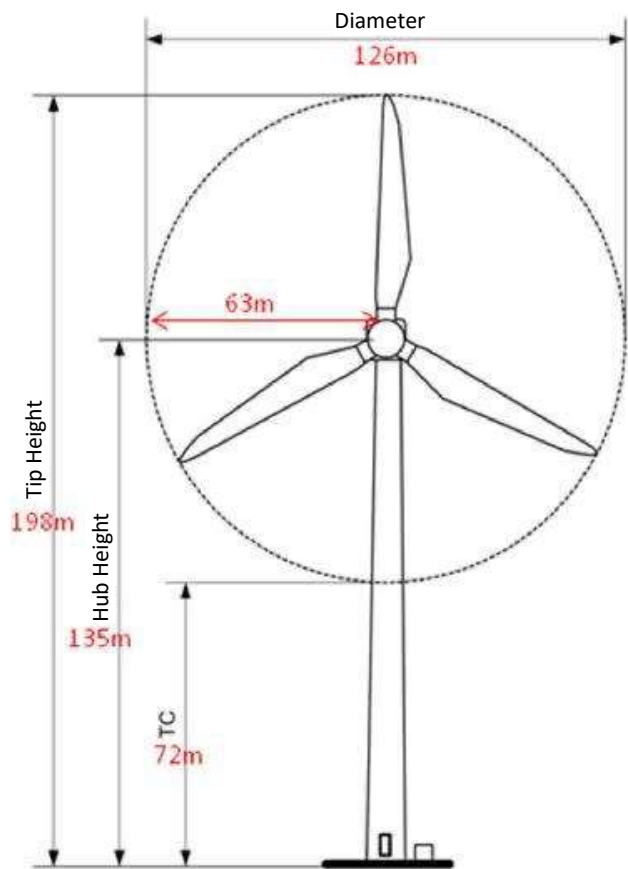
Wind Energy					
Zone Name	The name of the Area	Land Space Available for Generation (Km ²)	Max. Capacity that can be generated (MW)	Wind Speed m/s	Tip Height Meter
West Nile	Demarcation	300 Km ²	1200 MW	8 m/s	150 m

Solar Energy (PV)			
Zone Name	The name of the Area	Land Space Available for Generation (Km ²)	Max. Capacity that can be generated (MW)
West Nile	Demarcation	50 Km ²	2500 MW

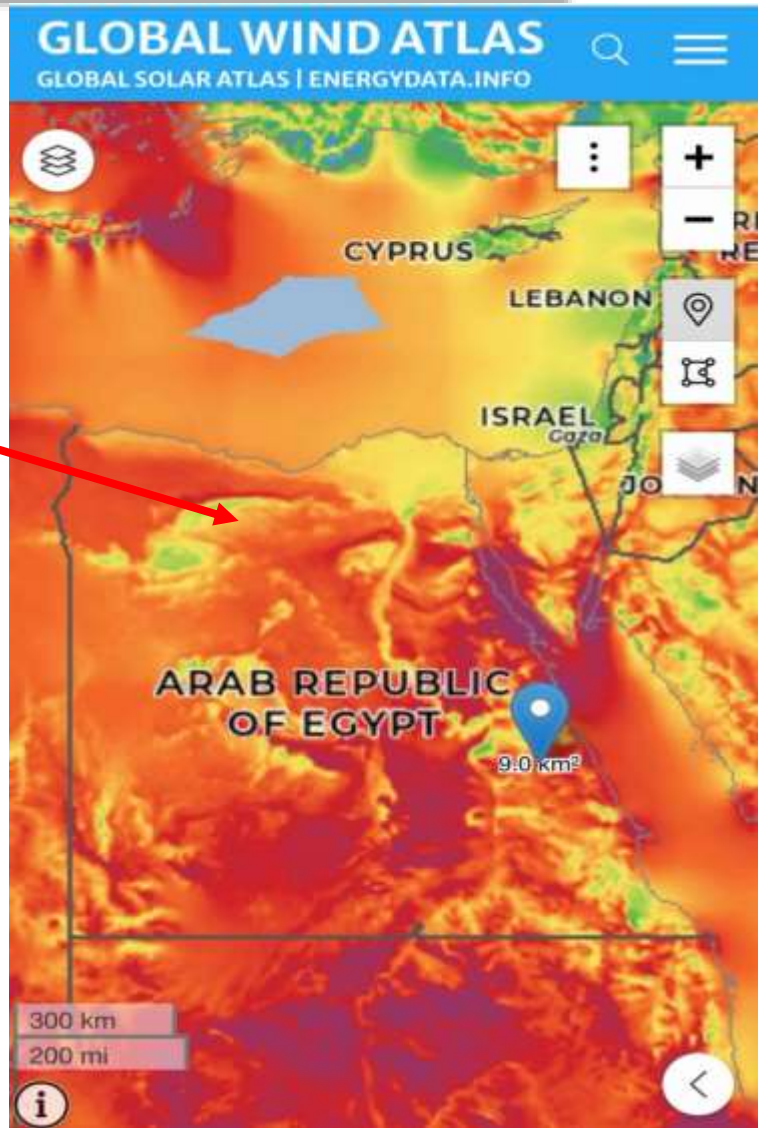
- Decree No. 116 of 2016 is updated with decree No. 126 of 2022
- The total area allocated to NREA is 3550 Km²

B- Analytical data from the Global Wind Atlas Program (Egypt)

Analytical data from the Global Wind Atlas Program (Egypt)

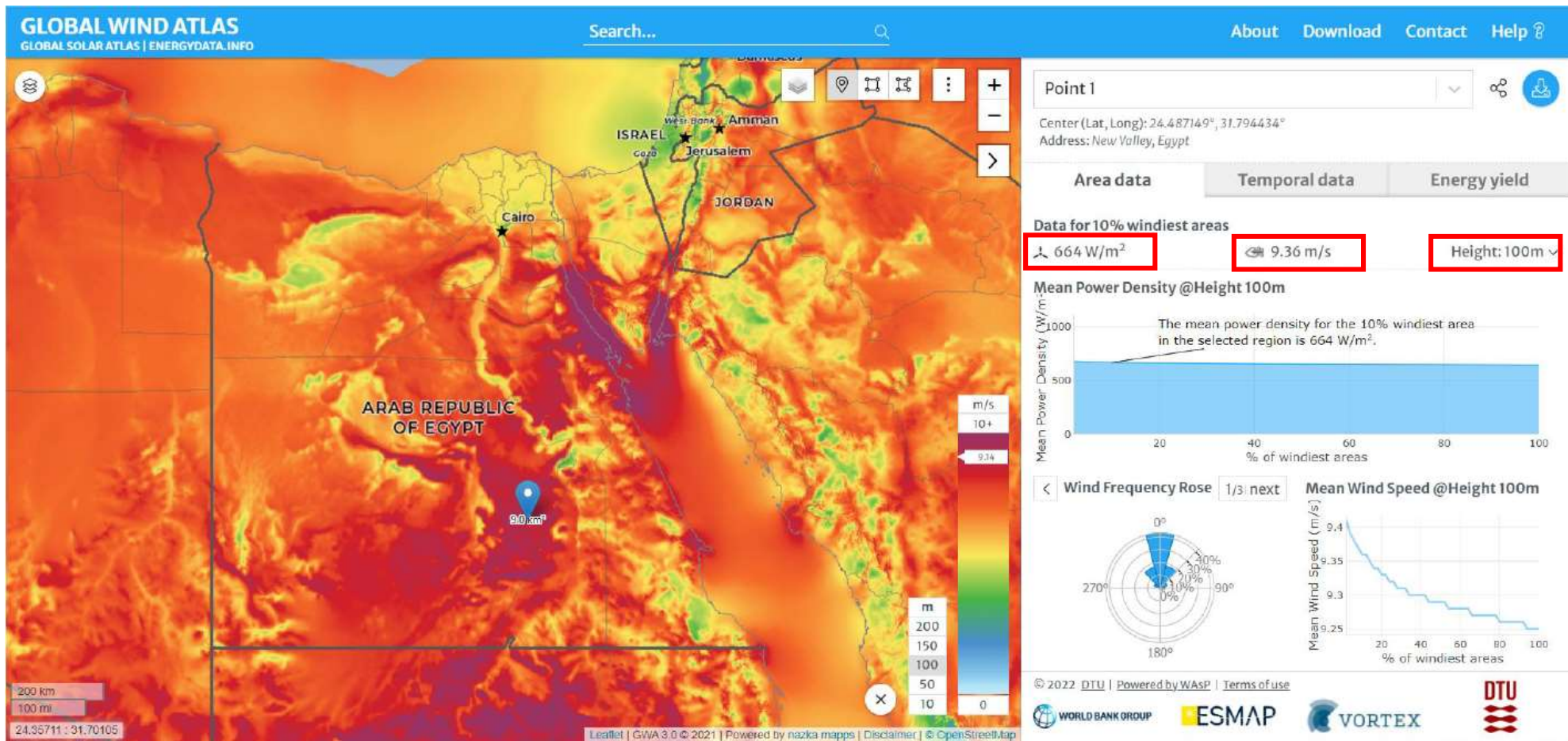


Wind Measurement assessment



Analytical data from the Global Wind Atlas Program (Egypt)

At 100 Meter – Hub Height



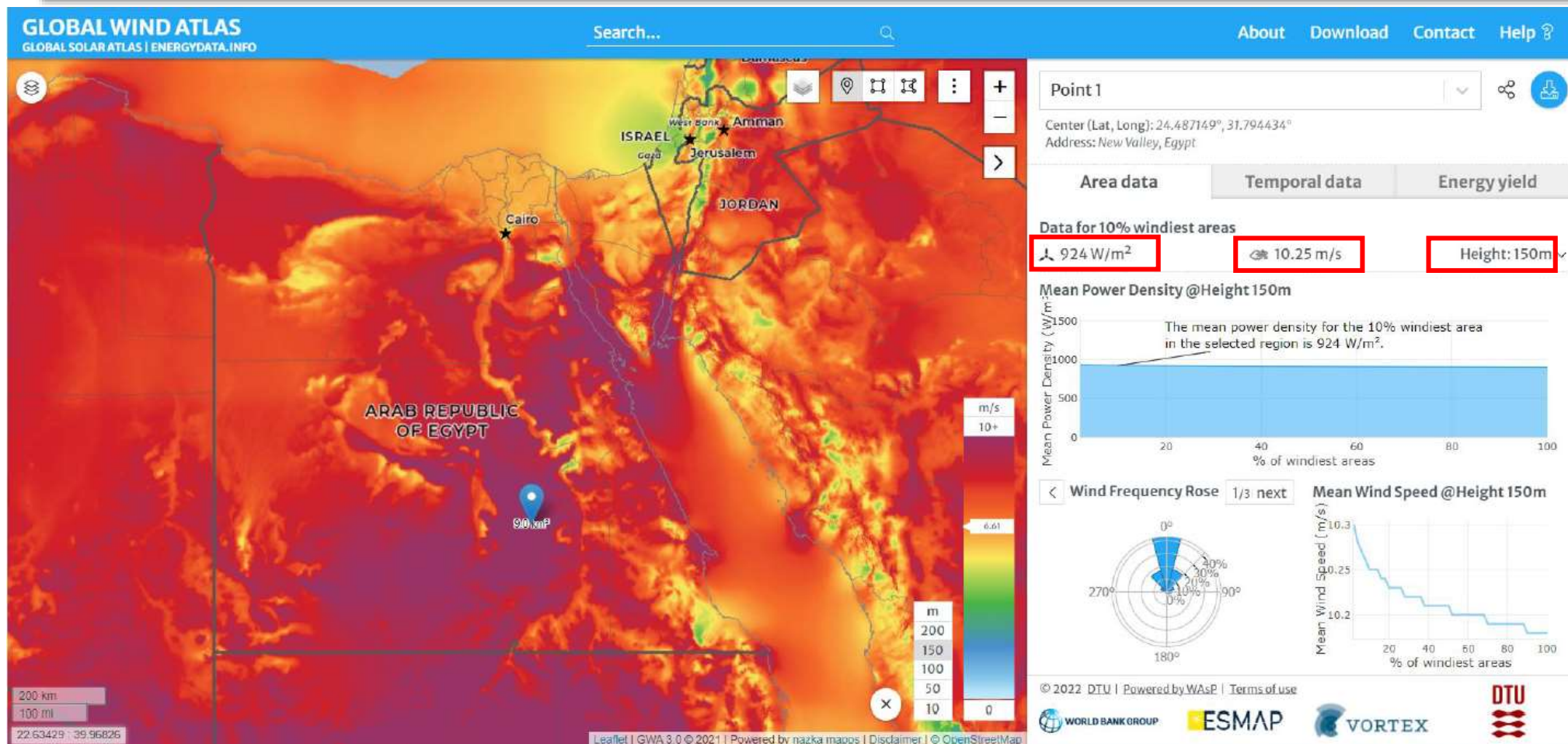
Wind Density 664 watt/ m²

Wind Speed 9.63 meter / Sec

Hub Height 100 meter

Analytical data from the Global Wind Atlas Program (Egypt)

At 150 Meter – Hub Height



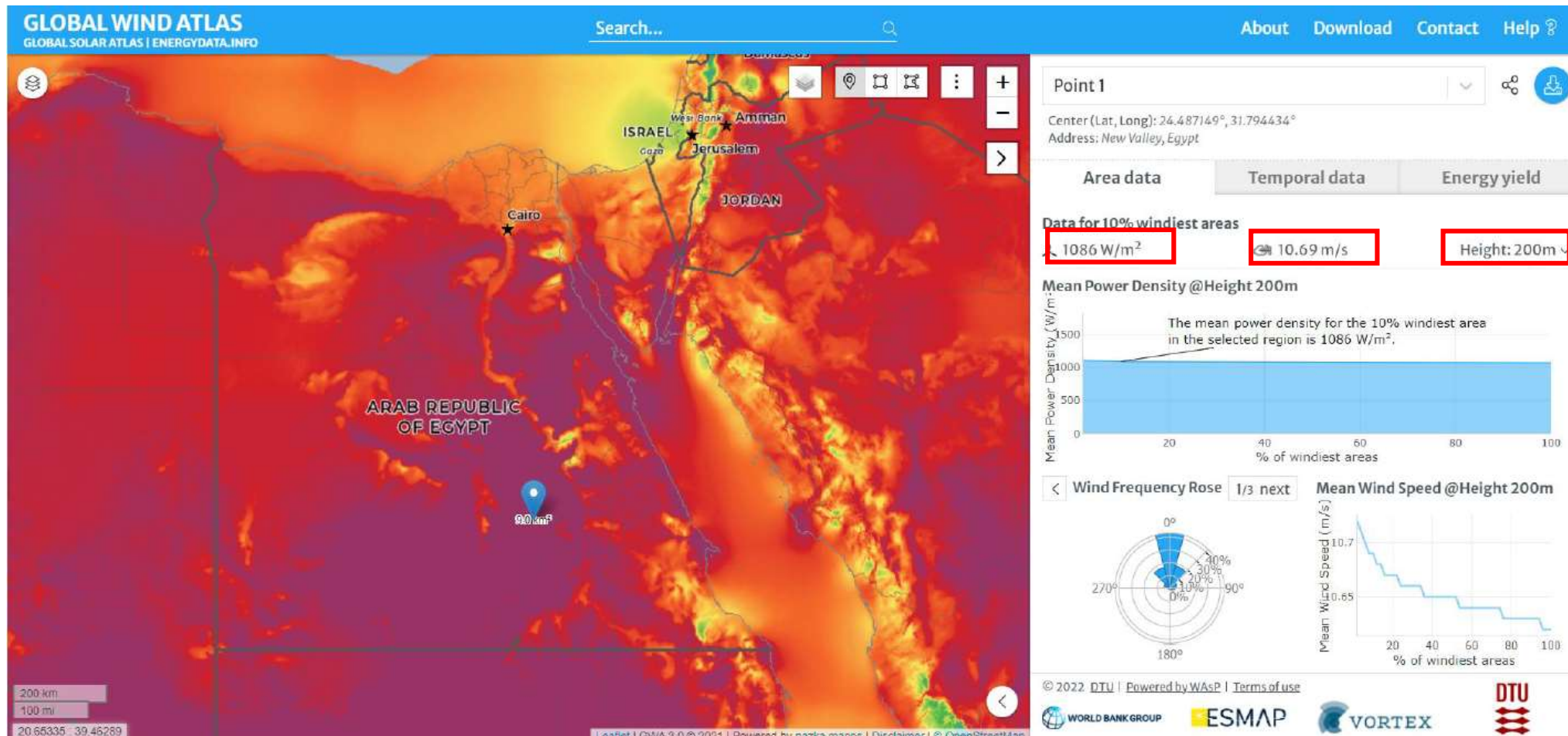
Wind Density 924 watt/ m²

Wind Speed meter / Sec 10.25

Hub Height 150 meter

Analytical data from the Global Wind Atlas Program (Egypt)

At 200 Meter – Hub Height



Wind Density

1086 watt/ m²

Wind Speed

10.69 meter / Sec

Hub Height

200 meter

C- Preliminary Study for Additional Areas for wind power

Preliminary Study for Additional Areas for wind power

Additional Areas for wind power from range 8-11 m/sec at (100 m Hub height)			
Zone		Location	Average Wind Speed (m/s)
1	Onshore	West of Minia	8
2	Onshore	East of Minia 1	7.5
3	Onshore	East of Minia 2	7.5
4	Onshore	Gulf of Zayt	11
5	Onshore	Zafarana	10
6	Onshore	Elkharga 1	8.5
7	Onshore	Elkharga 2	8.5
8	Onshore	Fayoum	7
9	Onshore	East of Sohag	8
10	Onshore	West of Sohag	8
11	Onshore	West of Nile near Aswan	9.2
12	Onshore	Western desert, South of Wahaat Region	8.5
13	Onshore	East of Suez Gulf, Ras Sedr region	9
14	Onshore	West of Aqaba Gulf, Dahab region	9.5
15	Onshore	Berenice	8.8
16	Offshore	Inside Suez Gulf, From South of Ain Sokhna to Gulf of Zayt	10.5
17	Offshore	Inside red sea, from Gulf of Zayt to Safaga	9.8



- Total Potential Area (km²) : 173 thousand Km²
- Total of Min. expected Wind Capacity (GW) : 347 GW

3rd- Investment Opportunity

The Strategic Plan for Water Desalination from Renewable energy in Cooperation with Ministry of Housing



- The Land required to be approved for allocation have been Identified.
- Utilize Renewable Energy to Supply Desalination plants .

Desalination plan requirements (2020 – 2050)

.Sn	Plan Pillars		2020-2025	2030	2035	2040	2045	2050	Total (Thousand m³/day)
1	Pillar No. (1)		382	375	220	212	189	120	1498
2	Pillar No. (2)		335	----					335
3	Pillar No. (3)	First Priorities	2370	585	-	-	-	-	2955
		Second Priorities	-	-	825	-	-	-	825
		Third Priorities	-	-	-	415	130	130	675
4	Pillar No. (4)		50	421	412	553	440	340	2216
Total			3137	1381	1457	1180	759	590	8504

❑ In addition to 0.7 M m³/day currently under discussions with Ministry of Water Resources & Irrigation.

Current Status of Desalination Plants in Egypt

Existing and ongoing desalination plants

Existing desalination
plants

82

Ongoing desalination
plants

14

Existing and ongoing
desalination plants

96

Total capacities

917000 m3/d

Total capacities

518000 m3/d

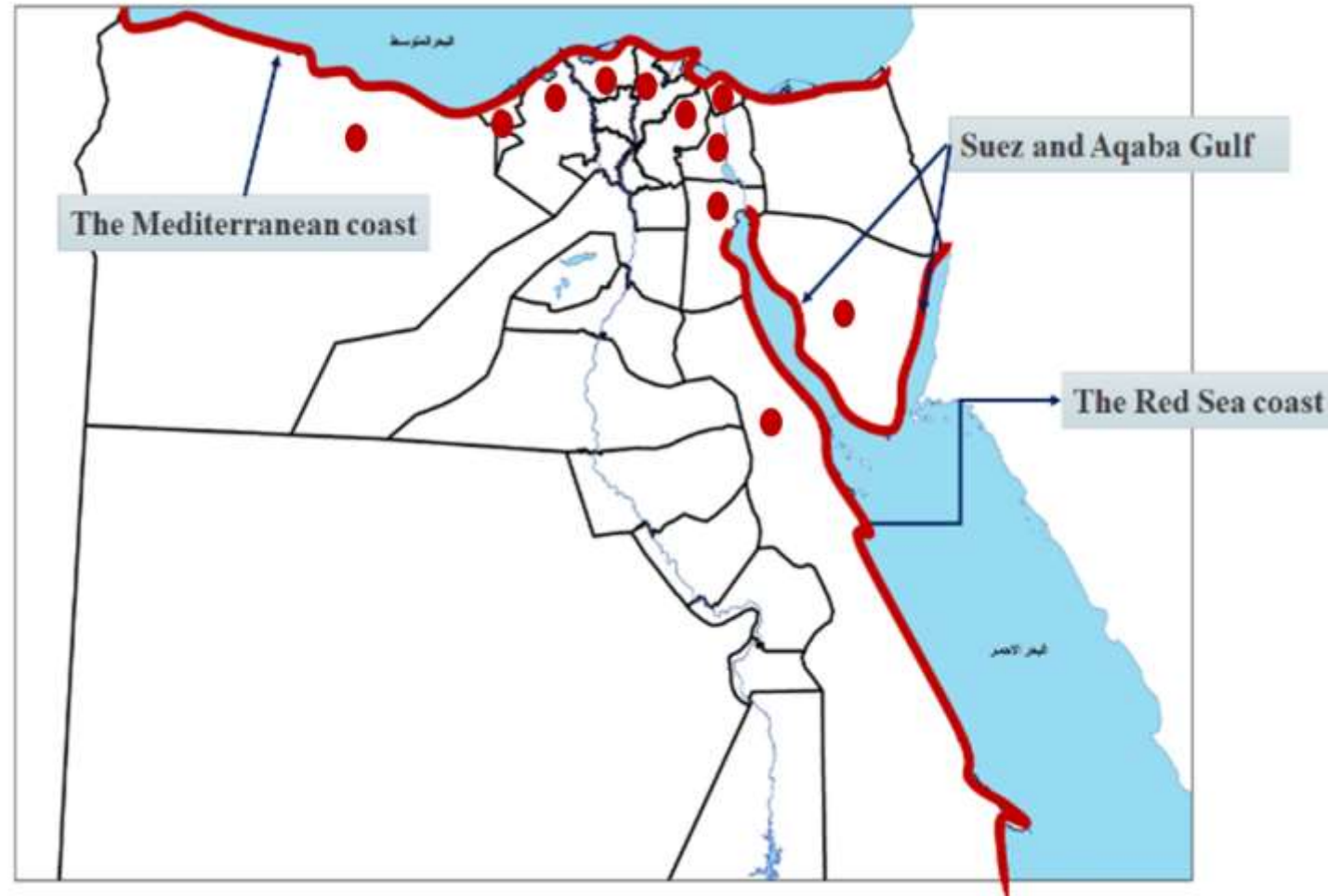
Total capacities

1.435 M m3/d

Strategic Plan for Desalination

Plan objective :

Ministry of Housing, Utilities, and Urban Communities has developed the **Strategic Plan for Desalination** to cover the seawater desalination for providing drinking water needs from **2020 to 2050**.



4th- Investment Opportunity

Government Support to Invest in Electrical infrastructure of Electric Vehicles



Government Support to Invest in Electrical infrastructure of Electric Vehicles

- An incentive tariff has been approved (by the Egyptian Cabinet) for EV charging.



- The Approved tariff :

Voltage Level	Tariff Approved
Up to 22 k.w (AC)	169 piaster / kwh (without the use of the place occupancy fees)
	189 piaster / kwh (with the use of the place occupancy fees)
Up to 50 K.w (DC)	375 Piasters / kwh
Household	The Same as household Tariff

- In addition The government has also provide a package of Incentives to encourage the investment in this field including :
Charging Tariff , Customs Exemption

5th- Investment Opportunity

Waste to Energy in Cooperation with Ministry of Environment

Waste to Energy

- Energy-from-Waste is the process of generating energy in the form of electricity and/or heat.
- According to the Ministry of Environment: **20%** of the total collected Municipal Solid Waste (MSW) will be forwarded to the technologies of W2E (**about 4.2 million tons of MSW to W2E**)



- Expected Electricity that could be Generated from Waste according to the cabinet Decree
(**300 MW for the coming 5 years**)

Waste to Energy

The issuance of Decree No. 41 # 2019 - Waste to Electricity

Issuance of a
Cabinet
Decision to
Tariff of
Electricity
Feeding

Reducing the amount of waste buried in sanitary landfills

1

Providing the areas of land that are allocated for the
establishment of sanitary landfills

2

Avoiding accumulations inside the governorates that lead to
environmental damage and emissions

3

Producing electrical energy suitable for self-use at the
station and for connection to the network

4

6th- Investment Opportunity

**Private companies licensee in the field of
electricity Generation & Distribution**

Private companies licensee in the field of electricity Generation & Distribution

- Private sector can invest in the filed of Generation and distribution level (**medium and low voltage**)
- 70 Private companies** are licensee in the field of electricity generation .
- 68 Private companies** are licensee in the field of electricity distribution .

بيان بعدد الشركات المرخصة حتى تاريخ 2022-1-31		
النشاط	عدد	القدرة (م.وات)
أولاً: نشاط الإنتاج		
أ- إنتاج حراري		
عدد التراخيص الصادرة وقدرتهم شاملين مشروعات BOOT	21	2814
ب- طاقات متجددة		
1 عدد التراخيص الصادرة للإنتاج بنظام تعريفة التغذية وقدرتهم للمرحلتين الأولى والثانية (*)	39	1480
2 عدد التراخيص الصادرة للإنتاج بآليات أخرى		
2-1 عدد التراخيص الصادرة للإنتاج بنظام صافي القياس وقدرتهم	3	10.6
2-2 عدد التراخيص الصادرة للإنتاج بنظام الاستهلاك الذاتي وقدرتهم	4	26.6
2-3 الهيئة العربية للتصنيع	1	3.6
2-4 عدد التراخيص الصادرة للإنتاج بنظام البناء والتملك والتشغيل وقدرتهم (BOO)	2	512.5
اجمالي التراخيص الصادرة لإنتاج الطاقة الكهربائية وقدرتهم	70	4848
ثانياً: نشاط التوزيع		
عدد التراخيص الصادرة لتوزيع الطاقة الكهربائية وقدرتهم التعاقدية	68	2390.0
اجمالي التراخيص الصادرة إنتاج / توزيع طاقة كهربائية	138	-
ثالثاً: بيان المشروعات التي تعمل بنظام صافي القياس وغير حاصلة على تصريح أو ترخيص		
المحطات المنشأة بنطاق شركات التوزيع الحكومية أقل من 500 ك.و	950	40.6

6- Preparation for EGYPT's hosting of the 27th Conference of Parties on Climate Change **COP27**

Preparation for EGYPT's hosting of the 27th Conference of Parties on Climate Change **COP27**



Energy Wealth Initiative: A COP27 initiative

- **EBRD suggested** (Energy Wealth Initiative: A COP27 initiative) **of a green Energy Transition** in regards of retirement of low efficiency power plant units by **decommissioning of 5GW from thermal power plant units and implement 10 GW renewable energy with total investments of 10 Bn \$** (EBRD will provide 500 Mil \$ as grant and soft loan)

Preparation for EGYPT's hosting of the 27th Conference of Parties on Climate Change **COP27**



Energy Wealth Initiative: A COP27 initiative

The EWI seeks to establish a green energy transition platform for Egypt in order to:

10 GW

New wind & solar

Accelerate the deployment of renewable energy to lower the cost of energy supply and develop a regional market for decarbonised fuels.

5 GW

Decommissioned

Accelerate the retirement of inefficient fossil-fuel plants to abate carbon emissions and free up Egypt's domestic gas resources for sale at global energy prices, hereby improving the balance of payments.

\$10,000

Million
Investment

Invest at scale in renewable energy, storage and infrastructure, underpinned by ambitious GHG emission reduction commitments to access climate finance from MDBs, private sector and donors.

\$500 Million

Grant & climate finance

Support a just transition (so that the EWI benefits are shared, while protecting vulnerable regions and people) and develop local supply chains and grid strengthening for renewable energy equipment.

Investments, technology transfer, capacity building, reskilling and new job opportunities for youth, gender and social inclusion.

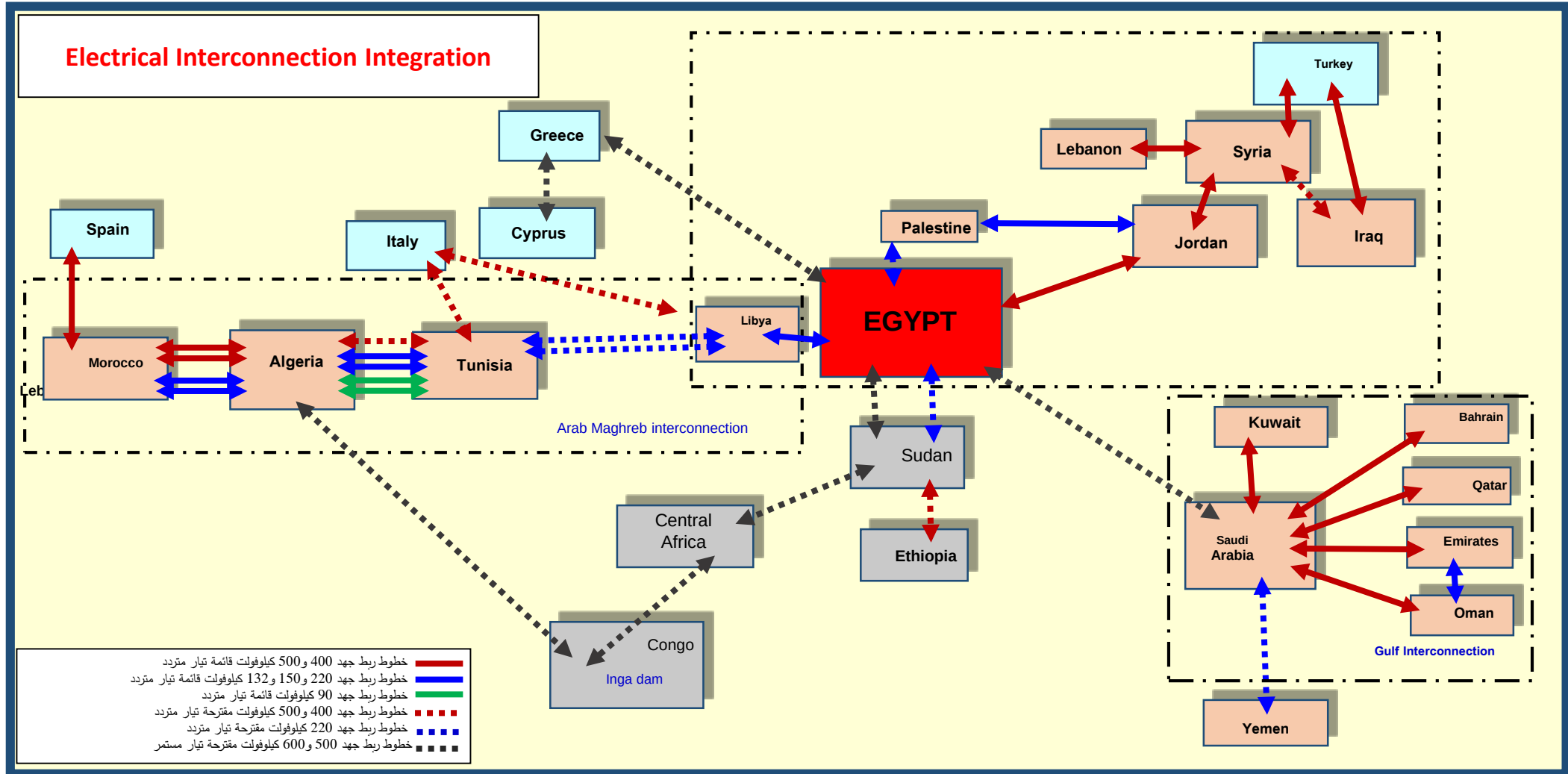
7- Egypt is an **Energy Hub** for International Interconnections and Corridors

Egypt is ready to participate in Global Interconnection

Egypt has the following potentials:

- **Excellent location between three important continents (Europe – Africa – Asia).**
- **Existing interconnection with neighboring countries.**
- **Huge renewable energy potential (wind - solar).**
- **Electrical energy surplus.**
- **Strong extra high voltage transmission network**
- **Strong local manufactured electrical systems.**

Egypt is an Energy Hub for International Interconnections and Corridors



Egypt Electrical International Interconnections

Egypt /Jordan Interconnection (450MW) Existing + Strengthen connection

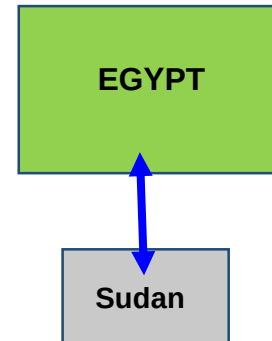
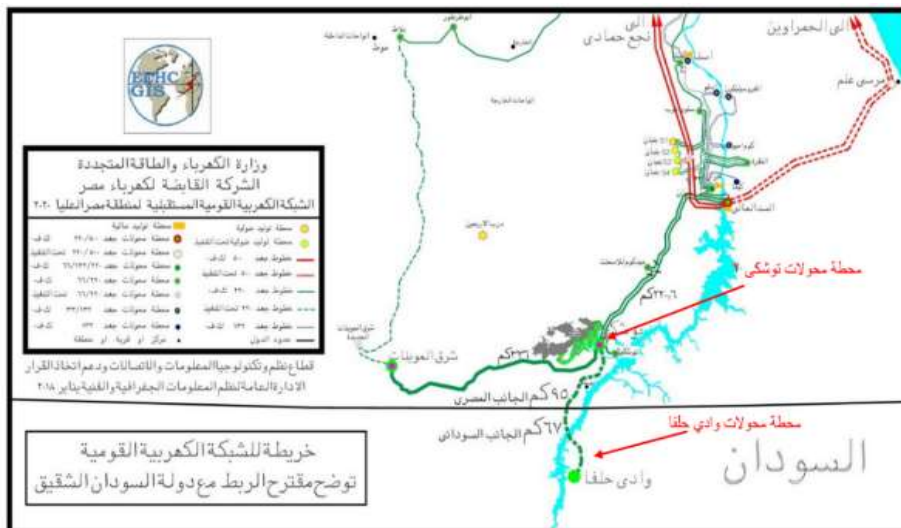
- **March 2021**, A framework agreement was signed between Egypt /Jordan to increase interconnection capacity **to 1000 M.W.**



Egypt Electrical International Interconnections

Egypt / Sudan Interconnection (300 MW).

(Existing + Strengthen Connection)



- (Phase 1): In April 2020 Energized with exchanging up to 80 MW and will reach 300 MW in the next year.
- (Phase 2): Intended to be raised to 1000 MW .

Egypt Electrical International Interconnections

Egyptian /Libyan Interconnection (150MW). (Existing + under Study Strengthen Connection)

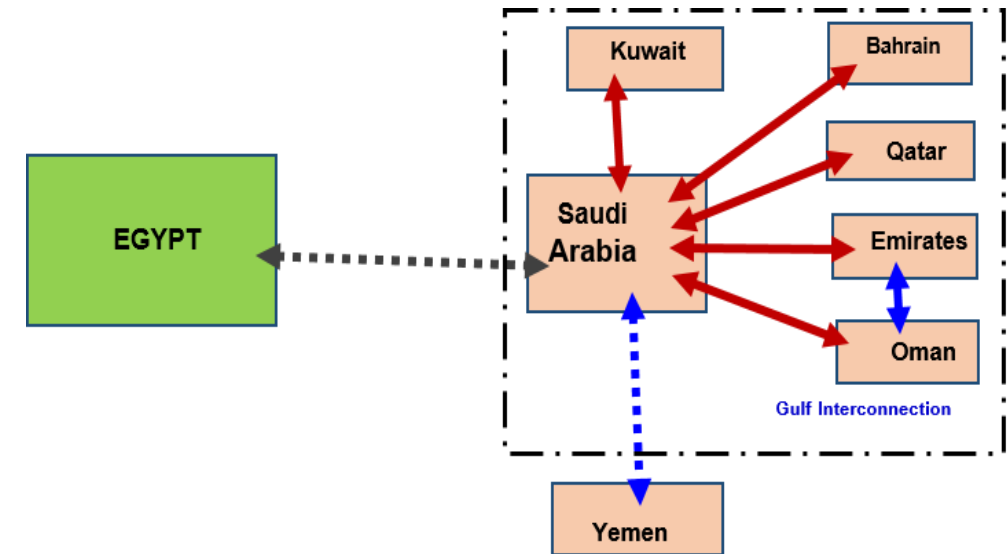
A study of strengthening the Egyptian - Libyan electrical connection was prepared to increase the exchange capacity to **2000 MW** through two alternatives as follows:

- Supporting the connection to the voltage of 400 KV.
- Strengthening the connection on the voltage of 500 KV



Egypt Electrical International Interconnections

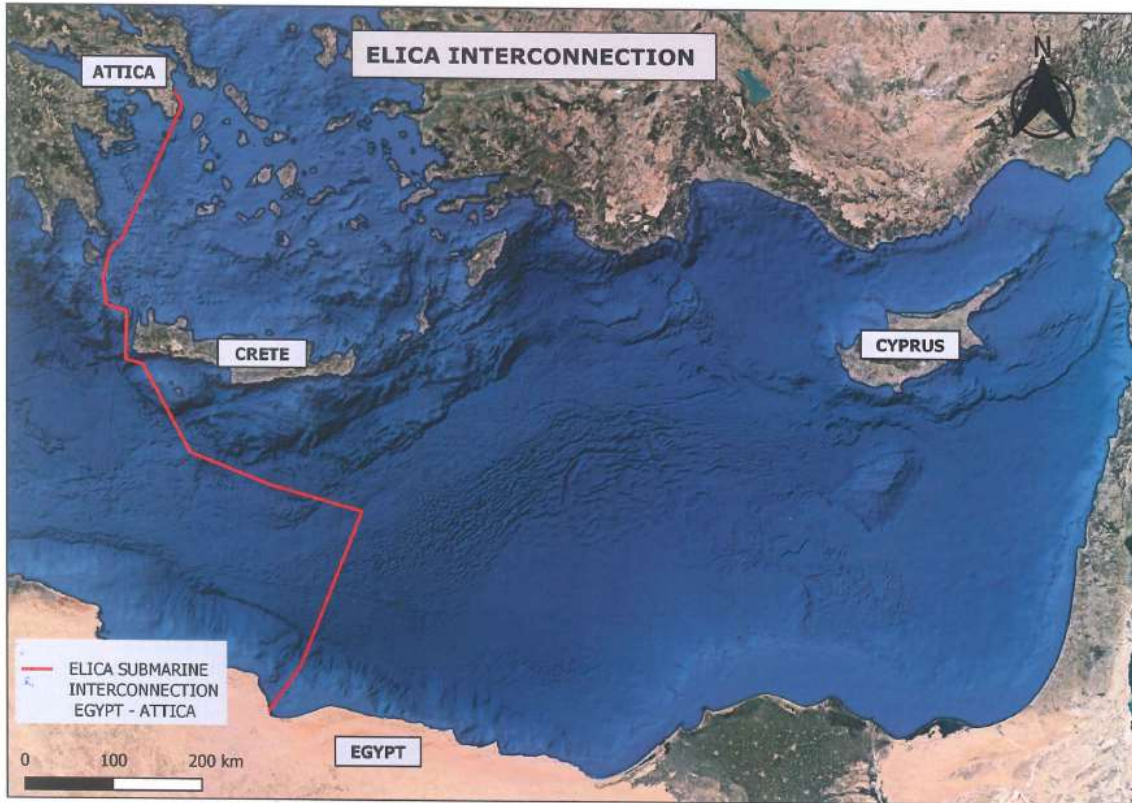
Egypt / Saudi Arabia to Allow Exchanging of 3000 MW



- 5th of October 2021 a **package of contracts** has been signed for the electrical interconnection project between **Arab Republic of Egypt & Kingdom of Saudi Arabia**
- **Total Investment cost from both sides : 1.8 Bil \$**

Egypt Electrical International Interconnections

Egypt, Cyprus and Greece



Allow supply **3000 MW of** Green Energy to Europe.

Egypt- Greece Interconnection

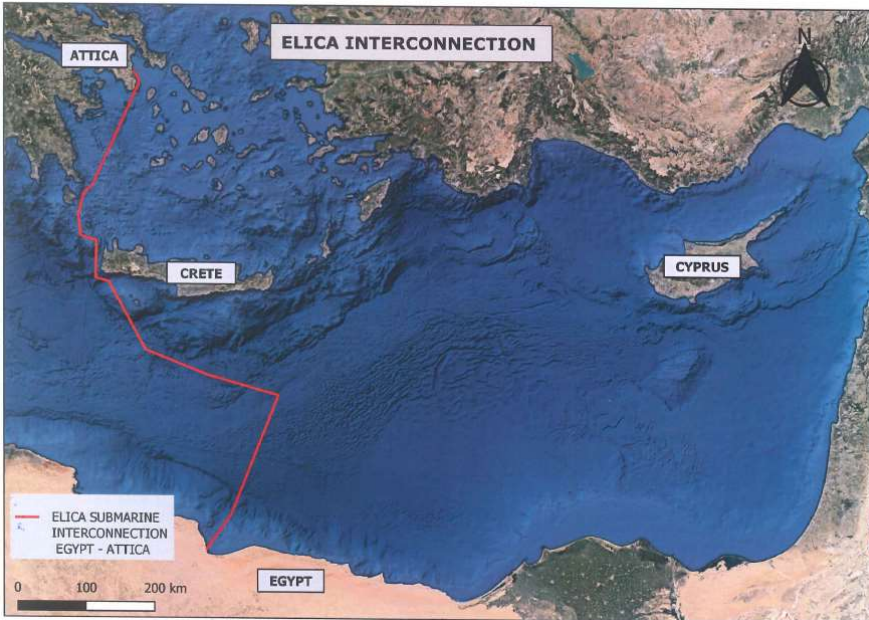
Copelouzos – Elica Proposal

Technical description of the Project and overall budget

Main equipment - Budget

1	Converter Stations	Voltage Source Converter Stations of 3,000 MW are envisaged to be installed at both ends of the link near WADI EL NATROON EHV Center in Egypt and near AHARNES EHV Center (Attica -Greece). Now alternative locations for Attica, such as Mesogia EHV center and /or Agios Stefanos EHV center are evaluated, instead of ACHARNES, in order to avoid local congestion. The Converter type is Voltage Source Converter (VSC).
2	Submarine cables	The submarine cable is of extruded type (XLPE insulation), synthetic armoring, voltage ± 500 kV and Al conductor.
3	Interconnection Lengths	- Overhead line 500km length between WADI EL NATROON Converter Station and EL SALLUM and up to the sea shore underground cable length: 10 km - The new alternative routing between EL SALLUM and Keratea has a length of 921 km and EL SALLUM to N.Makri of 954 km. - Underground cables lengths in Attica are 18,7 km and 29,8km
4	Overall Budget	Estimated Budget: € 3.569bn

Approximate Cable Lengths (km)	Maximum sea depth (m)
68	1,298
357	2,712
48	2,527
78	1,520
370-403	752



Proposed Route

Egypt Electrical International Interconnections

Egypt, Cyprus and Greece



Cyprus, Greece and Egypt signed a **trilateral Memorandum of Understanding (MoU)** to **connect their respective electricity grids** in **Athens on Tuesday 19 Oct. 2021.**



Egypt Electrical International Interconnections

Egypt, Cyprus and Greece



Bilateral MoUs had been signed between (Egypt- **Greece**) and (Egypt- **Cyprus**) in the field of Electrical Interconnection on 14,16 Oct. 2021

Egypt- Greece Interconnection

- It was **agreed** to **appoint a consultant** to prepare a pre-feasibility study for the project.
- Several international companies have expressed their desire to discuss opportunities for cooperation in financing the project between Egypt, Cyprus and Greece:
 - Gridworks
 - Tractebel
 - EDF
 - Copelouzos - Elica
 - Bechtel
 - Nexans
- World Bank has expressed interest in the project and **propose a grant to cover the cost project consultancy services.**

Egypt Electrical International Interconnections

Egypt, Cyprus and Greece

April 2022 the **first meeting** between the management of IPTO and the EETC , laying the foundations for the cooperation that the two sides have begun in the last year to prepare the major energy project.

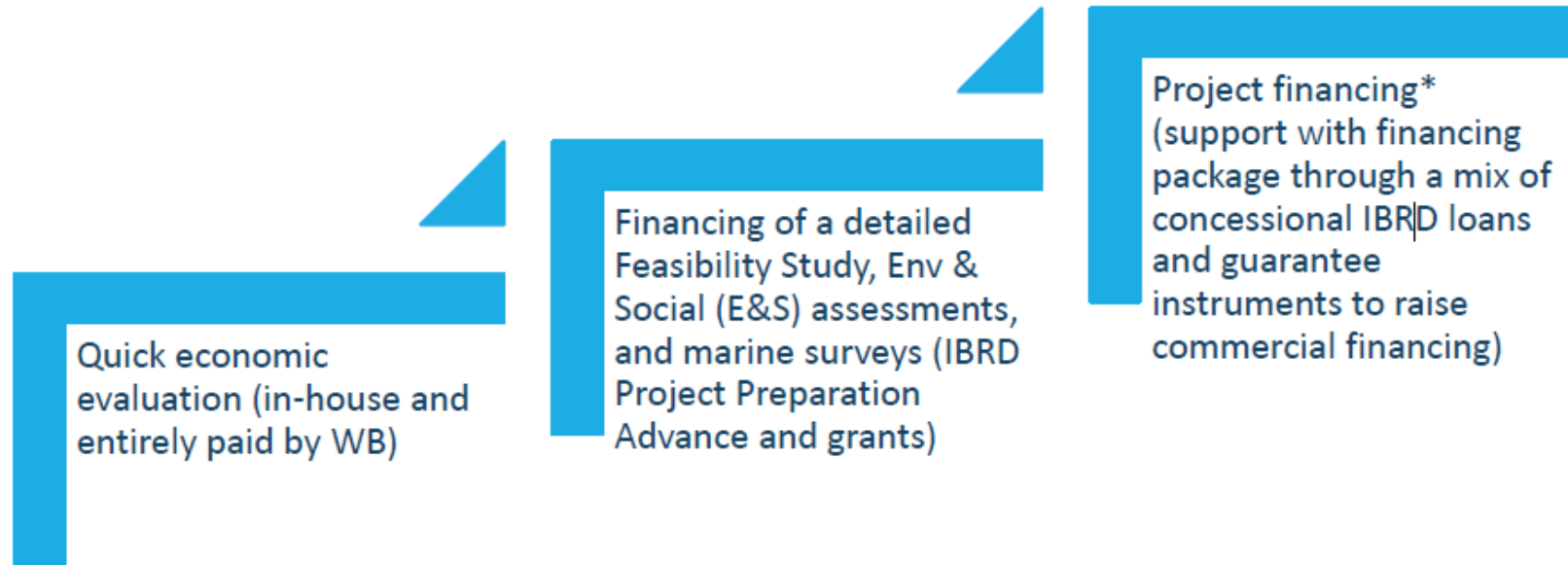


An informative meetings held between the Heads of Administrators of the two countries

Egypt Electrical International Interconnections

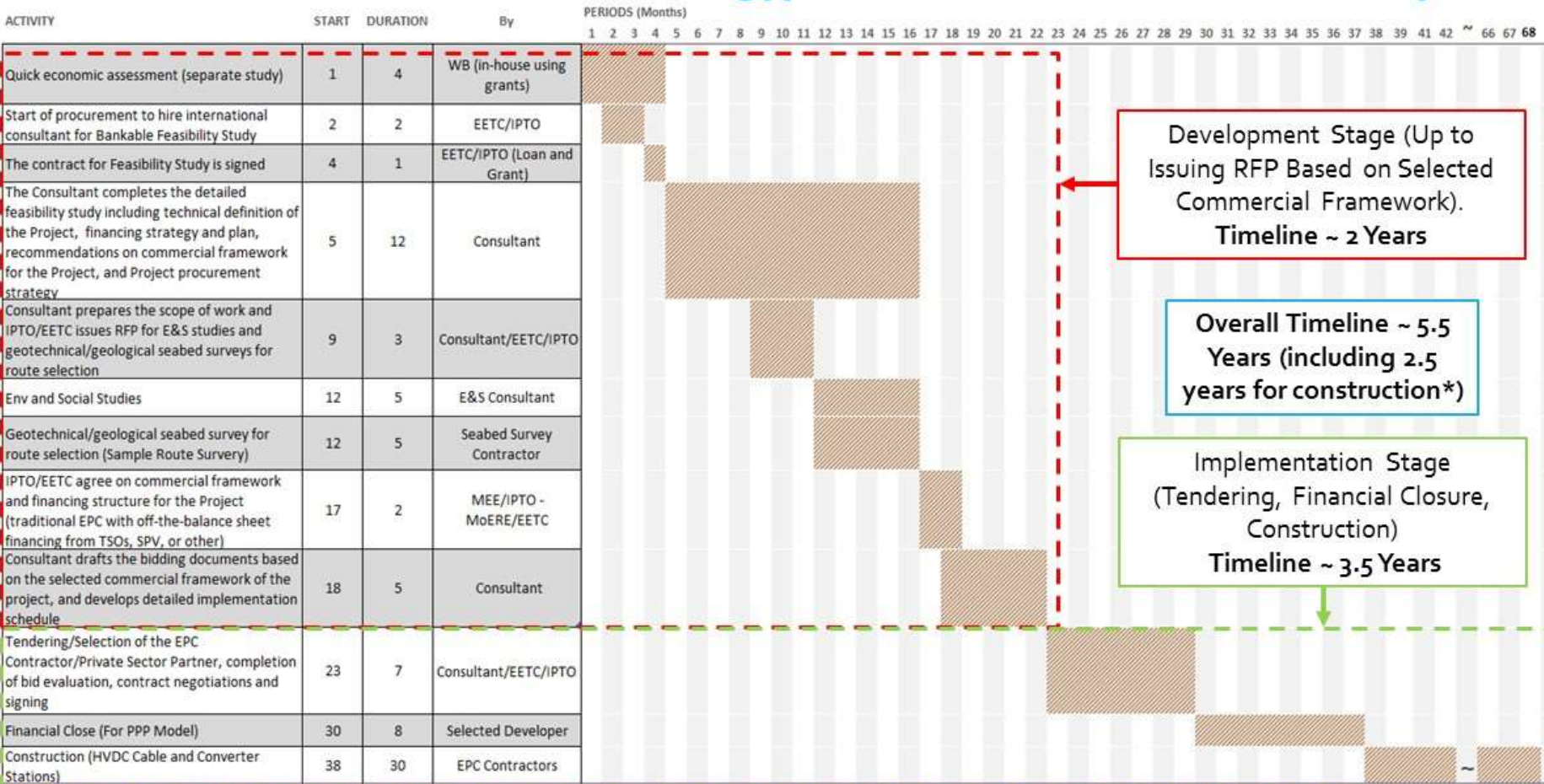
Egypt, Cyprus and Greece

- On April 13, 2022, the World Bank technical team met with EETC and IPTO leadership teams to discuss possible ways to support both entities to develop the Project.
- The World Bank can offer potential support to the Project in a sequential way.



Egypt- Greece Interconnection

Tentative Ambitious Schedule for Egypt-Greece Interconnection Project

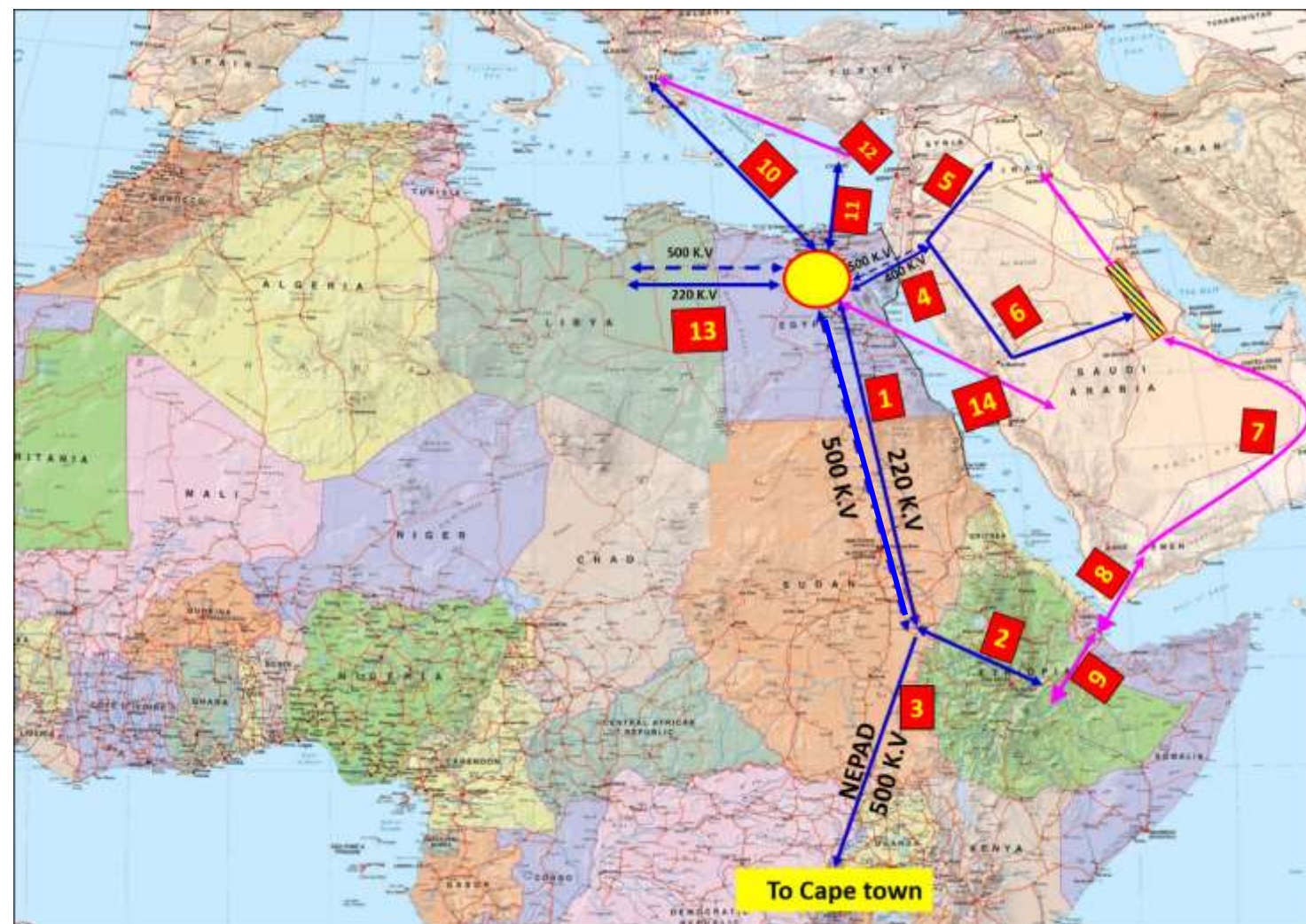


* It is recommended to balance the scheduling crashing needs with the project budget to avoid unnecessarily expensive bids

A Conception Figure After Completing the Interconnection between Egypt and Neighbor Countries

Line	Path / Interconnection
1	Egypt / Sudan (220 – 500 kv)
2	Sudan / Ethiopia 500 kv
3	Egypt / Cape town 500 kv
4	Egypt / Jordan (400 kv – 500 Kv)
5	Egypt / Jordan / Iraq
6	Jordan / GCC Gulf Cooperation Council
7	GCC Gulf Cooperation Council / Yemen
8	Yemen / Djibouti
9	Djibouti / Ethiopia
10	Egypt / Crete/ Greece
11	Egypt / Cyprus
12	Egypt / Cyprus / Greece
13	Egypt / Libya (220 kv – 500 kv)
14	Egypt / KSA

GCC Gulf Cooperation Council



THANK YOU