By

Adel Fathi

Zafarana Wind Farm Technical Manager

Regulatory frames

Egypt is well aware that the challenge of pursuing economic development as well as protecting the environment cannot be fulfilled except through a sustainable energy production system.

This system depends largely on renewable energy (RE) resources.

In April, the Supreme Council for Energy adopted an ambitious plan which aims at covering 20 per cent of the country's total electricity needs using RE by 2020.

Therefore, *Egypt is posed to integrate more renewable energy resources into its national electricity grid*

This plan opens the door for the private sector to play an active role in developing new and RE resources.

Egypt's wind potential and future plan

•In 2003, the first phase of issuing a detailed Wind Atlas of Gulf of Suez area started.

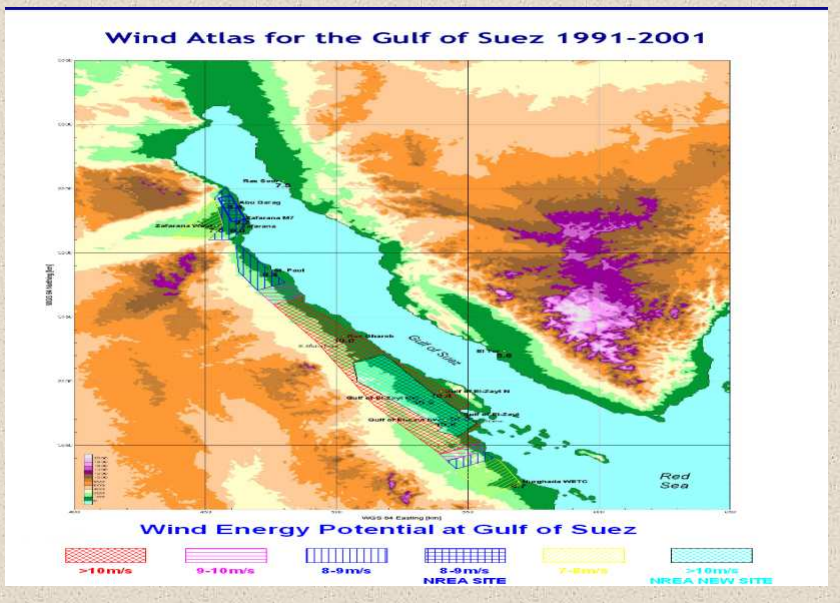
The Atlas finalized accurate wind data over the period from 1991 to 2001 for 13 sites with the cooperation of DANIDA.

•It was concluded from measurements and data analysis that

Egypt has a great wind potential that could produce up to 20,000 MW, which is the current demand for all of Egypt.

•However, the Egyptian government represented by NREA aims to meet 20% of electric energy demand by 2020 with renewable energy sources including hydropower, wind and solar energy. Target capacity for wind energy is 7200 MW.

Wind Atlas for the Gulf of Suez



Most Promising Locations

Region	Av. Wind Speed (m/s)
Ras Sedr	7.5
Abu Aldarag	8.8
Zafarana (North)	9.2
Zafarana	9.0
Zafarana (west)	7.5
St. Paul	8.4
Ras Ghareb	10.0
El Tour	5.6
El Zeit Gulf (North)	10.4
El Zeit Gulf (North-west)	10.5
El Zeit Gulf	10.3
El Zeit Gulf (North-west)	10.8
Hurghada	6.7

Hurghada demonstration wind farm

(Fig. 5) A side view of Hurghada wind farm and wind technology center

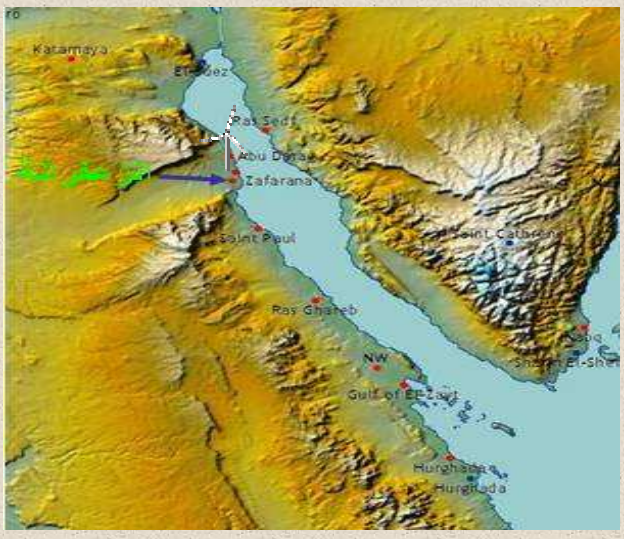
ZAFARANA

Zafarana site location

- 29⁰ 06' 49" N 32⁰ 36' 33" E),
- E 771500 m N 712825 m

Zafarana site in lines

Nearest place to the national grid
A.WS(8.5 : 9.5) m/s
Flat area
Low turbulence

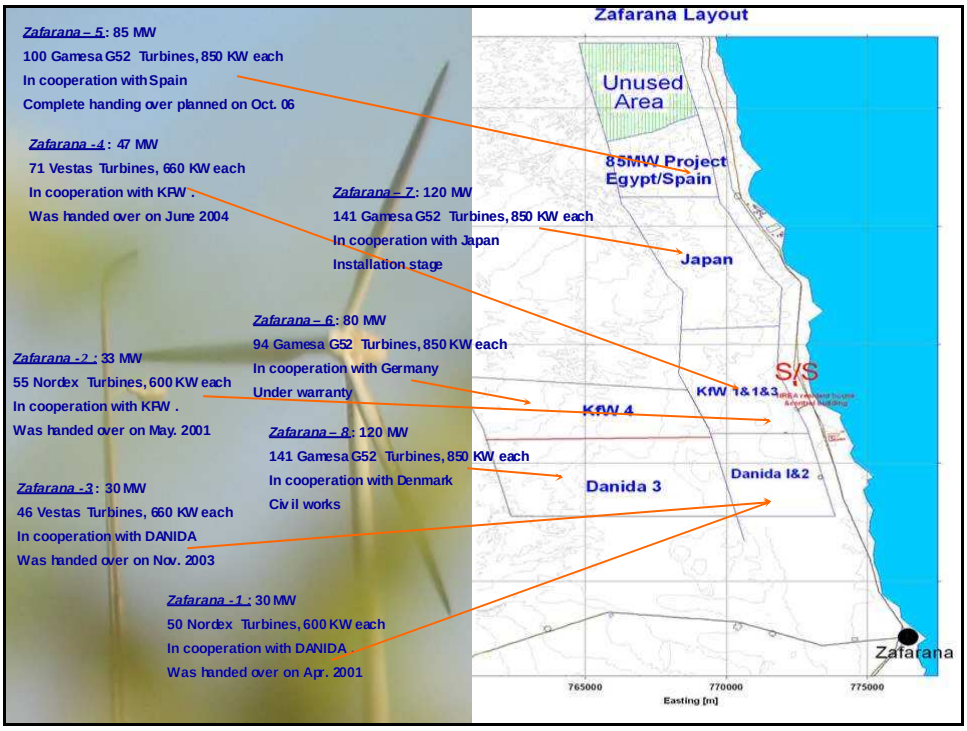


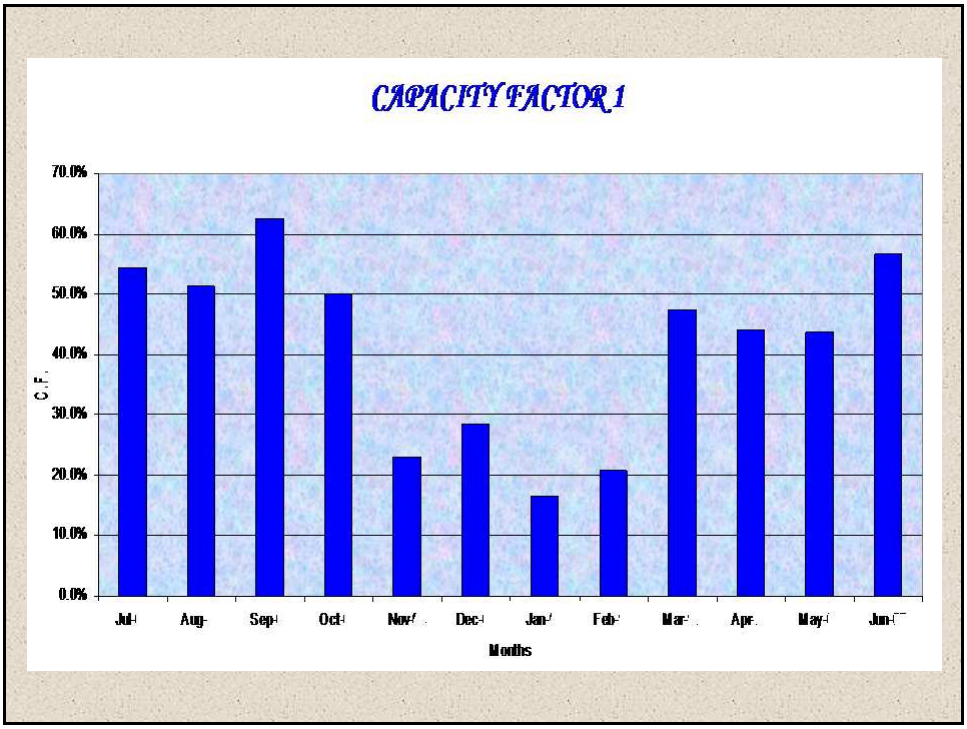
Wind farms in Zafarana region

The farm includes 105 turbines of Nordex N43, 600 kW each, 3 blades of 43m rotor diameter placed over a tubular tower of 40m height.

) The farm includes 117 turbines of Vestas V47, 660 kW each, 3 blades of 47m rotor diameter placed over a tubular tower of 45m height.

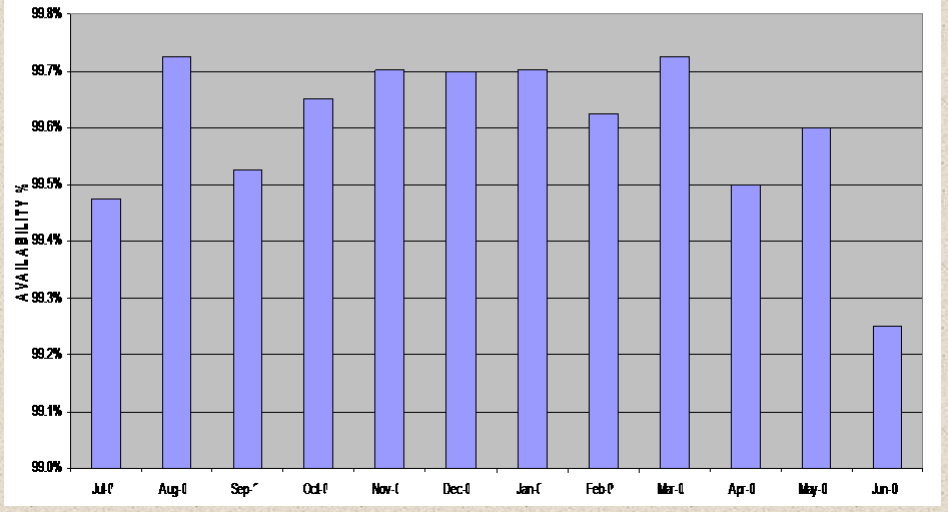
) The farm includes 194 turbines of Gamesa G52, 850 kW each, 3 blades of 52m rotor diameter places over a tubular tower of 45 m height.


Zafarana – 5: 85 MW
100 Gamesa G52 Turbines, 850 KW each
In cooperation with Spain
Complete handing over planned on Oct. 06
Zafarana -4: 47 MW
71 Vestas Turbines, 660 KW each
In cooperation with KFW .
Was handed over on June 2004
Zafarana – 7: 120 MW
141 Gamesa G52 Turbines, 850 KW each
In cooperation with Japan
Installation stage
Zafarana – 6: 80 MW
94 Gamesa G52 Turbines, 850 KW each
In cooperation with Germany
Under warranty
Zafarana -2 : 33 MW
55 Nordex Turbines, 600 KW each
In cooperation with KFW .
Was handed over on May. 2001
Zafarana – 8: 120 MW
141 Gamesa G52 Turbines, 850 KW each
In cooperation with Denmark
Civil works
Zafarana -3: 30 MW
46 Vestas Turbines, 660 KW each
In cooperation with DANIDA
Was handed over on Nov. 2003
Zafarana -1 : 30 MW
50 Nordex Turbines, 600 KW each
In cooperation with DANIDA .
Was handed over on Apr. 2001
Zafarana Layout
Unused Area
85MW Project Egypt/Spain
Japan
S/S
KfW 1&1&3
KfW 4
Danida 3
Danida I&2
Zafarana
765000
770000
775000
Easting [m]

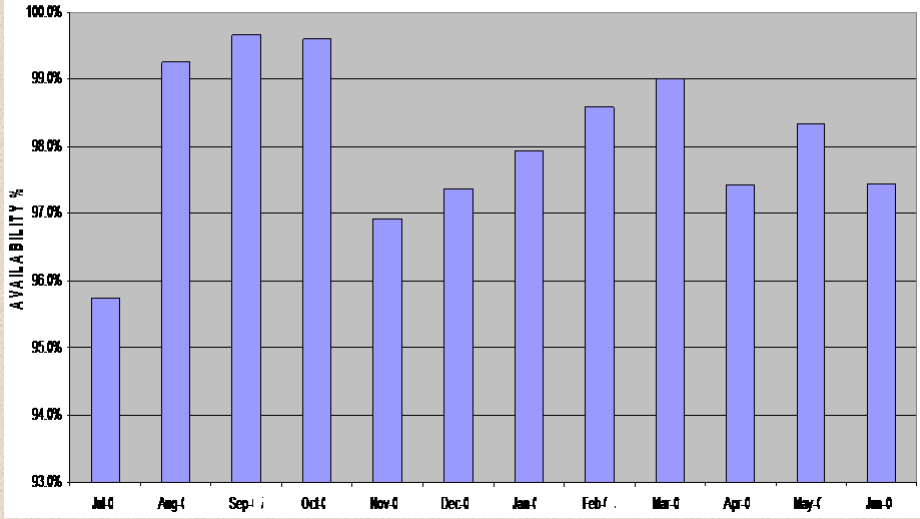

CAPACITY FACTOR 1
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
C.F.
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Months

CAPACITY FACTOR 2

Availability 1



Availability 2



Zafarana wind farm 305 Mw in running

2007/2008 prod. Re. 839.3 GWh Est. 1100 GWh

Annually emission Co2 Re. 450750 Est.465,000 ton

kWh production, and CO2, lower than estimated because Zaf 80 is not running with full capacity else few months during the year 2007/2008

National development goals

In early 1980s, a renewable energy strategy was formulated as an integral part of the national energy planning in Egypt. Such strategy has been revised in view of the projections for possible RE technologies/application options, available financing sources and investment opportunities in the field.

In 1986, New & Renewable Energy Authority (NREA) was established to act as the national focal point for expanding efforts to develop and introduce renewable energy technologies to Egypt on a commercial scale together with implementation of related energy conservation programs

National development goals

Arab Republic of Egypt
Ministry of Electricity and Energy

- Encourage large-scale private sector and foreign investment and ownership of assets in the renewable sector in Egypt.

- The proposed polices to foster increasing wind contribution in the Egyptian electricity mix consist of two phases:

Phase 1, will adopt Competitive Bids approach through issuing tenders requesting private sector to supply power from renewables. The financial risk for investors is reduced through guaranteeing a long term power purchase agreement.

Phase 2, will Increase the chances to the market forces through the implementation of feed-in-tariff taking into consideration the prices achieved in phase 1.

- Promote Egypt as a gateway for turbine manufacturers who wish to set up a base in Egypt to access the Southern Europe, North Africa and Middle East wind energy markets

Challenges of Wind Power Integration to the grid

Reliable and Sustainable Wind Operat
Intermittency
Wind Forecasting
Electricity Storage
Imbalance Charges
Capacity Value
Getting Interconnected
Wind Source Remoteness9
Micrositing
Egyptian Transmission Infrastructure
Interconnection Process

Challenges of Wind Power particularly in Egypt

- Finding a customer that is willing to purchase the power for long period at a fixed price, in Euros or Dollars which may limit the investors' interest in investing in wind farms.
- Finance problems
- The presence of a strong grid transmission company in Egypt
- Taxes and transmission fees

Proposed Measures

• Provide resource assessment, feasibility studies and technical support for potential project developers

• Decide public long-term target for renewable energy in Egypt (i.e. 20% of electricity generated in Egypt to come from renewable sources by 2020 or 10,000MW by 2020).

• Introduce an appropriate incentive scheme for wind energy using best international practice (Global Wind Energy Council or European Wind Energy Association).

• Have a clear and public process for getting grid connection

• Have a priority dispatch system for renewable energy (no curtailment by the grid operator)

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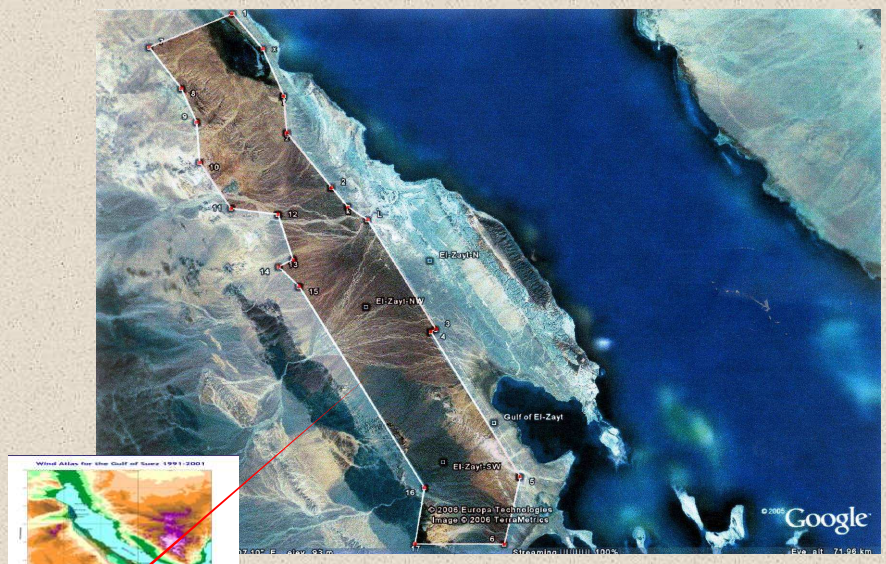
Draft of the Electricity Law

The new legislation is expected to be presented to the Egyptian parliament next winter January 2009.

The 4th chapter in the law tackles the RE and EE legislations (e.g.: Part IV, Chapter 1, Article 45: Investors may build, own and operate Electricity Generation plants using one of the Renewable Energy resources and sell the electricity to EETC under a contract at the price approved and announced by the Cabinet. Such contracts shall be effective for 15 years provided the price is not reduced during this period by more than 2% per annum)

EETC shall purchase and pay the value of the available power from the generation plants using renewable energies

Future Wind Farms projects on the Gulf of El-Zayt



Future Governmental wind farms

200 MW wind farm in cooperation with Germany and European Investment Bank (EIB) at the Gulf of El-Zayt

Currently, a feasibility study is being conducted to assess the site potentials to hosting large scale grid connected wind farms. The study was finalized in February 2008.

220 MW wind farm in cooperation with Japan (as a 2nd stage) at the Gulf of El-Zayt

A Japanese consultant carried out the feasibility study in 2005 for NREA. Presently, the study is being updated and the procedures are being taken to secure financing the project

Future Private Sector Wind Farms projects

- An Italian company (**Italciment**) expressed its interest to establish 120 MW wind farm, as a first stage to be expanded later on to 400 MW. The proposed wind farm would generate electricity to feed cement factories in Suez zone. A memorandum of understanding was signed between NREA and the Italian Company in this respect on November 26, 2007. It is expected to start the implementing phase of the project by the end of 2008.

- A British company (**Shell**) also, expressed its interest to perform a feasibility study for establishing a wind farm of 500 MW, with a possibility to be increased to 1000MW. It is expected to sign a memorandum of understanding in this respect in the last quarter of 2008

NREA

Thank you

adelfathi2003@yahoo.com

http://www.nrea.gov.eg/english1.html