

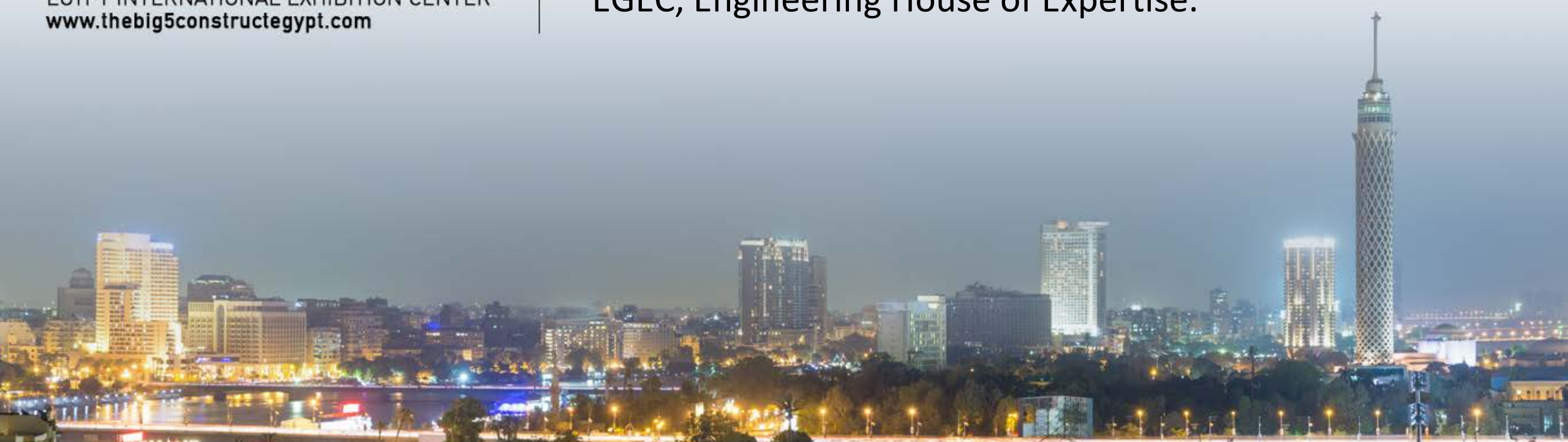


18 - 21 SEPTEMBER 2018

EGYPT INTERNATIONAL EXHIBITION CENTER
www.thebig5constructegypt.com

DESIGN OF 100 MW WIND FARM – EGYPT





Abdelrahman A. Elsayed, Senior Design Engineer.
EGEC, Engineering House of Expertise.



ORGANIZED BY:

dmg :: events

www.thebig5constructegypt.com

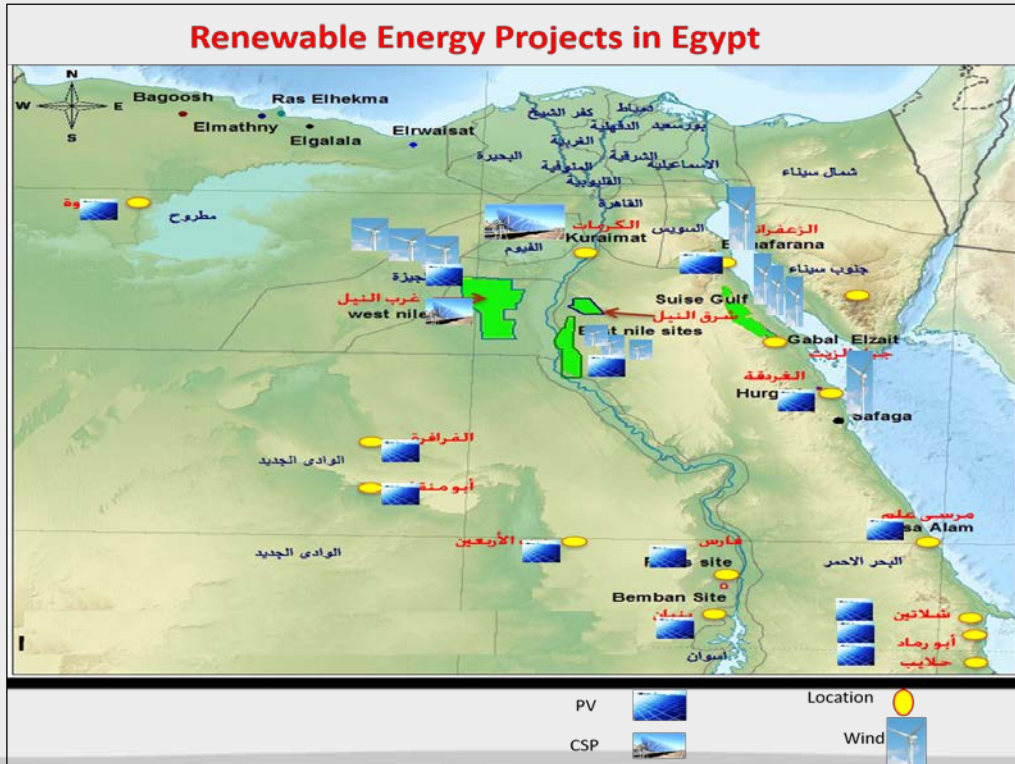
Real time updates on:    



1. INTRODUCTION







- Egypt is planning to provide 6.8 GW of electricity through wind energy by 2022.



ORGANIZED BY:

dmg::events

www.thebig5constructegypt.com

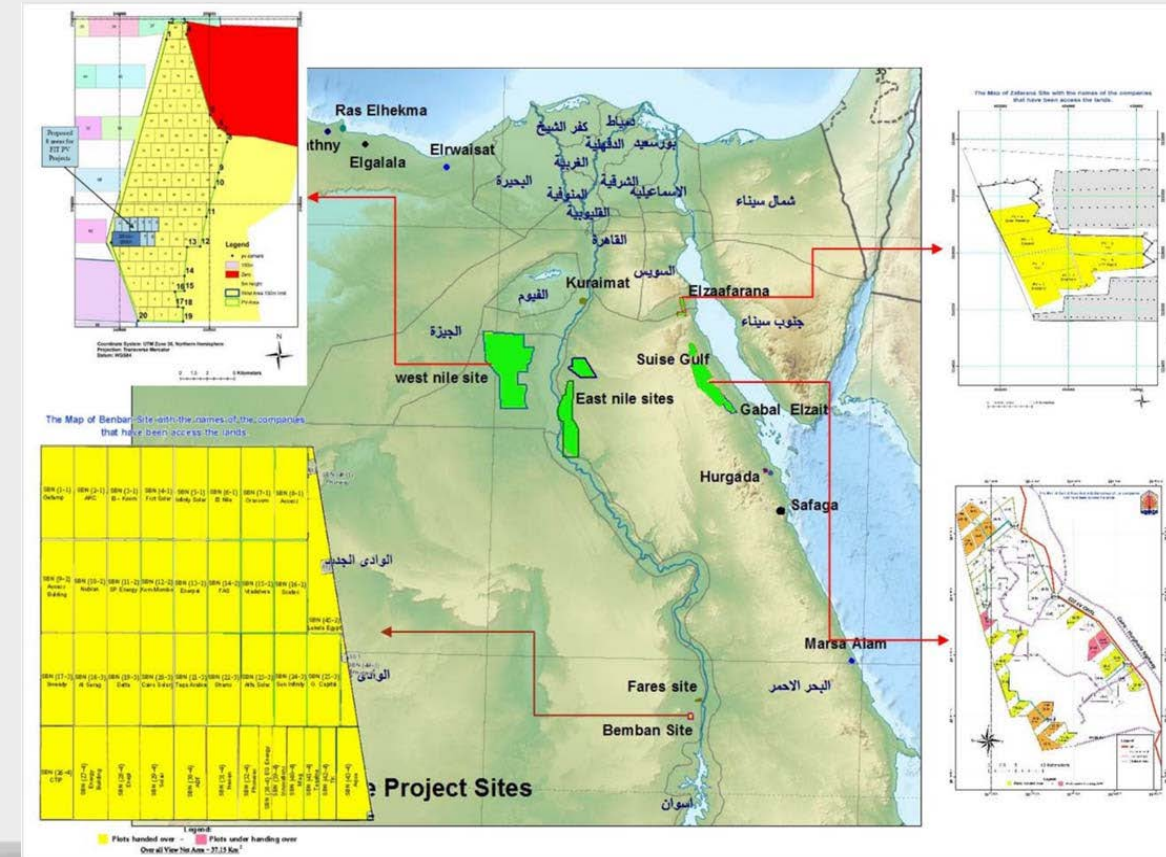
Real time updates on:    



1. INTRODUCTION







- EGEC presents design concept of wind farm project at El-Minia (west Nile site).
- The project is designed on 15 km² of the areas allocated for 100 MW wind farm.
- The design considered alternatives of the latest technology of the wind generators.
- The project area has dimensions of 3 km (in North) by 5 km (in East).



ORGANIZED BY:

dmg events

www.thebig5constructegypt.com

Real time updates on:    



2. DESIGN METHODOLOGY







How is it designed ?

1. Full-defined project area.
2. land topography and roughness class.
3. Wind resources (Wind atlas for Egypt).
4. Proposed turbine generators.
5. A real meteorological station.
6. Verification of assigned area.
7. Optimum turbines layout.
8. A techno-economic analysis.

ORGANIZED BY:

dmg :: events

www.thebig5constructegypt.com

Real time updates on:    



3. DESIGN PLATFORM







- The licensed software is **WASP** (**W**ind **A**tlas **A**nalysis and **A**pplication **P**rogram)
- WASP used for wind data analysis, wind atlas generation, wind climate estimation, wind farm power production calculations and siting of wind turbines.
- WASP does vertical and horizontal extrapolation of wind climate statistics. It describe wind flow over different terrains and close to sheltering obstacles.
- WASP methodology consists of five main calculation blocks:
 - a. Analysis of raw wind data.
 - b. Wind climate estimation.
 - c. Generation of wind atlas data.
 - d. Estimation of wind power potential.
 - e. Calculation of wind farm production.

ORGANIZED BY:

dmg events

www.thebig5constructegypt.com

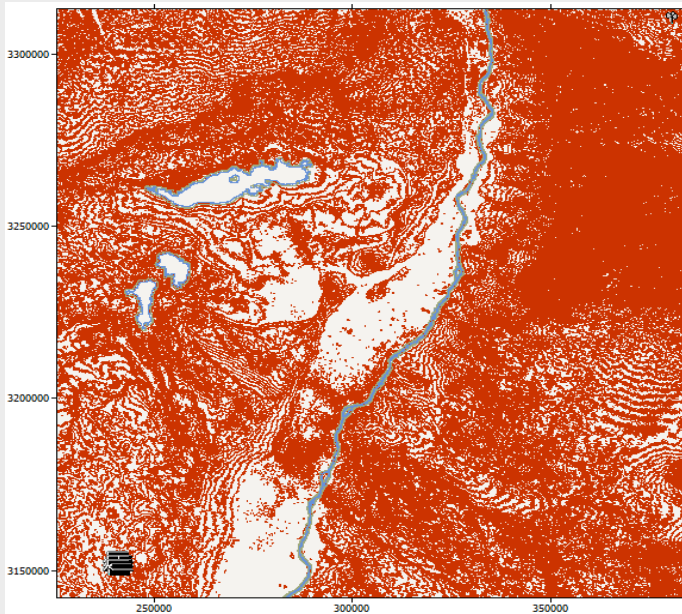
Real time updates on:    



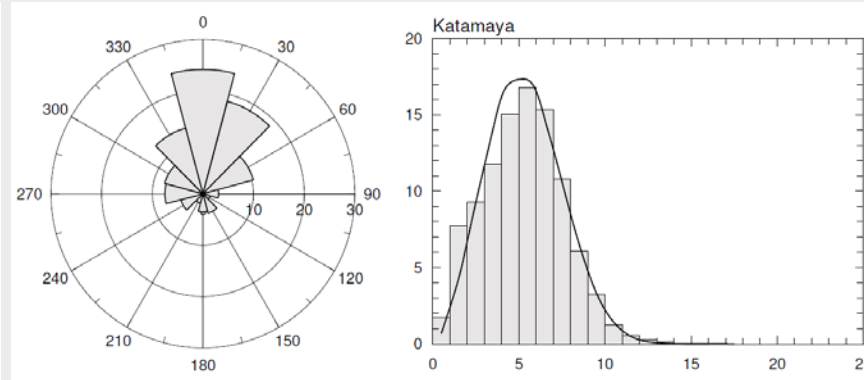
4. WASP REQUIREMENTS



Overall Vector Map



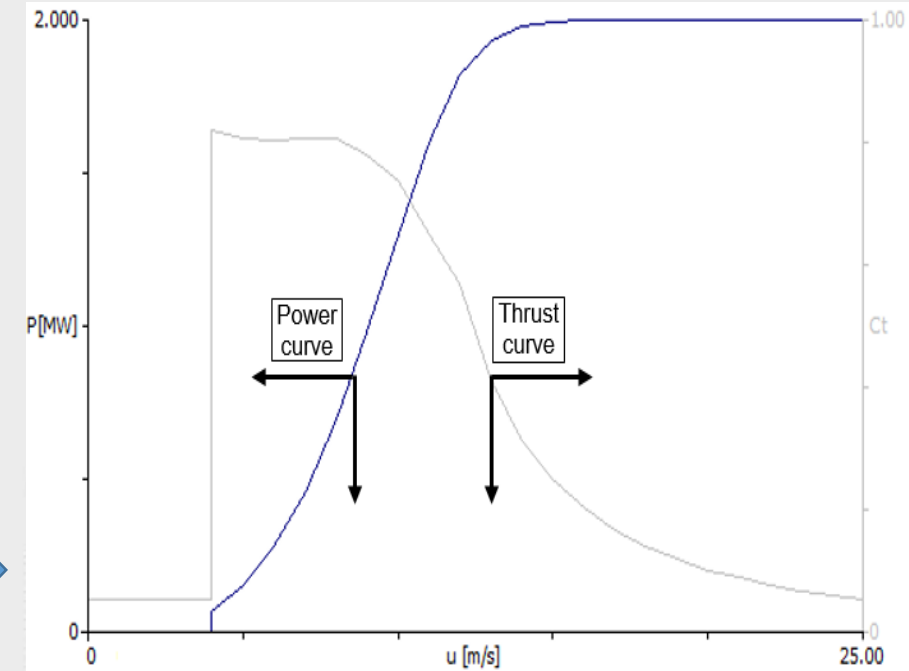
Meteorological station



Feature	G80	G52
Rated power (kW)	2000	850
Rotor diameter (m)	80	52
Hub height (m)	100	74
Total weight (ton)	391	152







Wind Turbine Generators



ORGANIZED BY:



www.thebig5constructegypt.com

Real time updates on:    

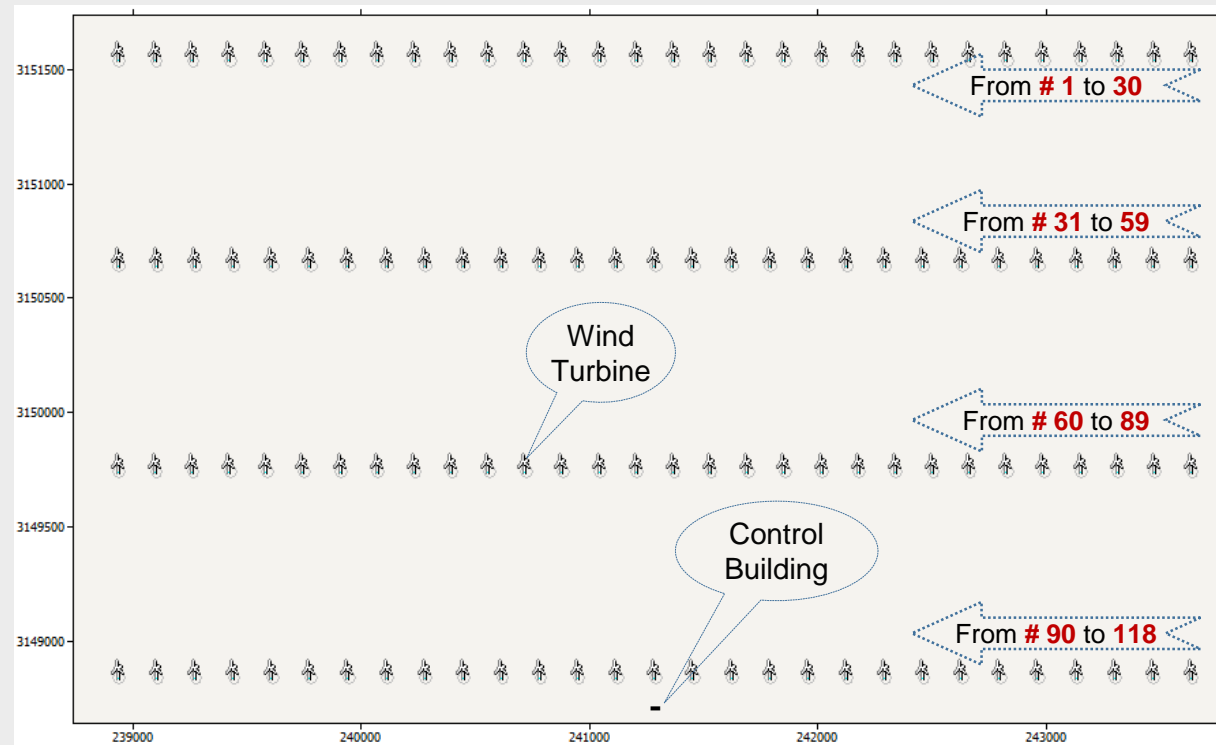
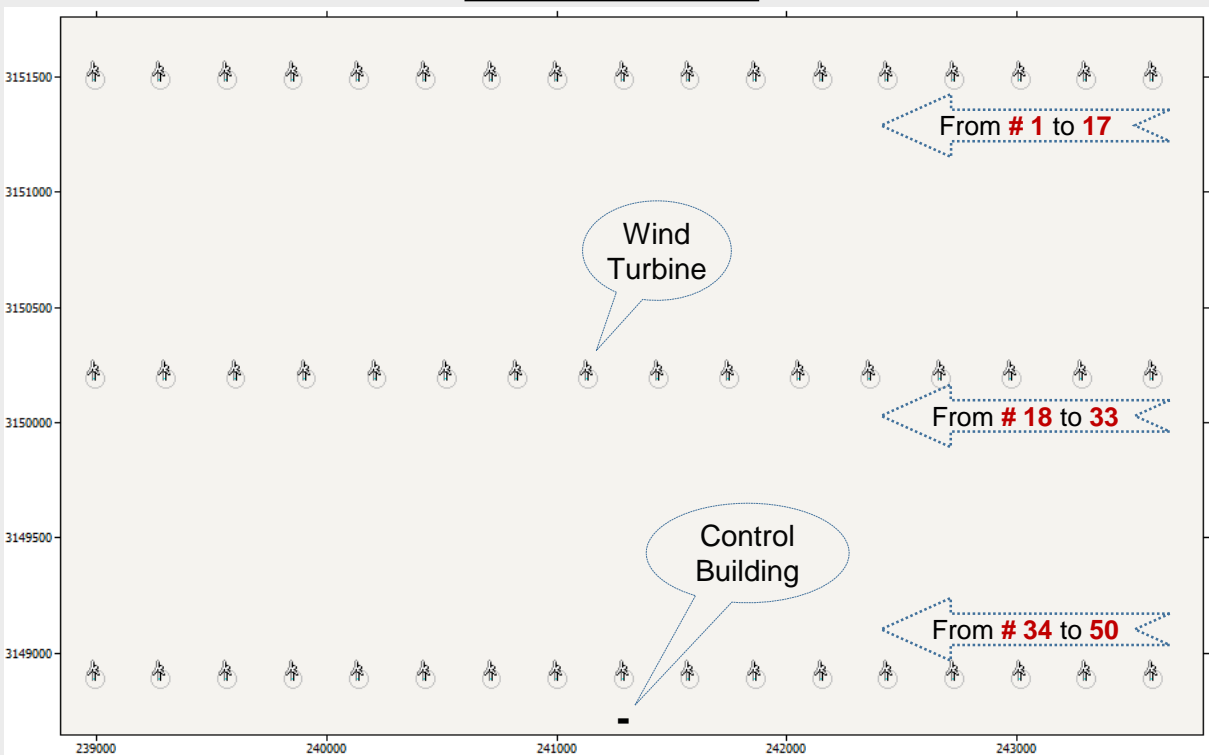


6. OPTIMUM TURBINES LAYOUT



G80: 2 MW





G52: 850 kW



ORGANIZED BY:



www.thebig5constructegypt.com

Real time updates on:    



7. Economical Visibility



Cost Structure of a Typical 2 MW Turbine

	Investment (USD/MW)	Share(%)
Turbine (ex works)	928,000	75.6%
Foundation	80,000	6.5%
Electric installation	18,000	1.5%
Grid connection	109,000	8.9%
Control systems	4,000	0.3%
Consultancy	15,000	1.2%
Land	48,000	3.9%
Financial costs	15,000	1.2%
Road	11,000	0.9%
Total	1,227,000	100.0%





Economic Parameters of Alternative Turbines

Parameter	2 MW	850 kW
Installation Cost (\$/MW)	1,227,000	1,500,000
Nominal Capacity (MW)	100	100
Total Installation Cost (\$)	122,700,000	150,000,000
AEP (GWh/year)	256.797	215.726
Operating and Maintenance costs (\$/kWh)	0.015	0.017
Annual O&M costs (\$/Year)	3,851,955	3,667,342
Price of electricity for 1st 5 years (\$/KWh)	0.0957	0.0957
Price of electricity for later 15 years (\$/KWh)	0.046	0.046
Annual revenue for 1st 5 years (\$/year)	24,575,473	20,644,978
Annual revenue for later 15 years (\$/year)	11,812,662	9,923,396
Interest rate (%)	4.5	4.5
salvage value of the plant (% of installation)	25	25
salvage value of the plant (\$)	30,675,000	37,500,000

ORGANIZED BY:

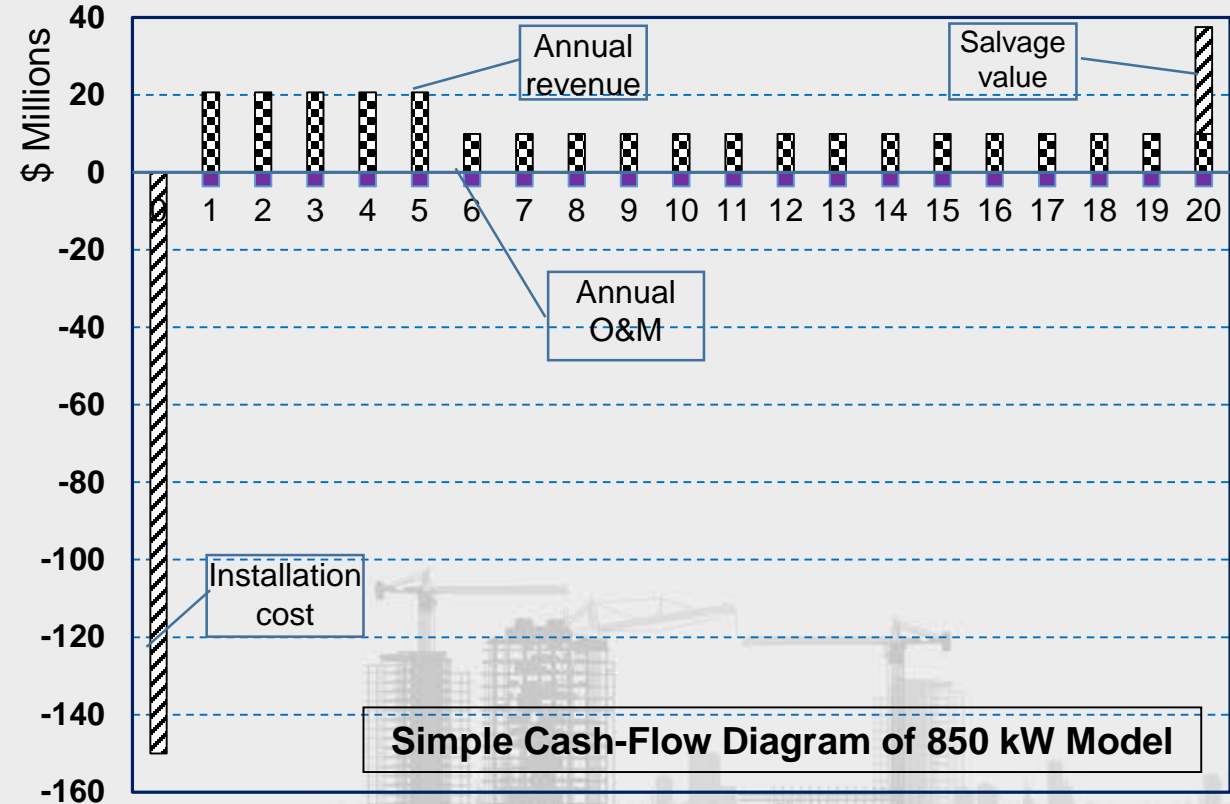
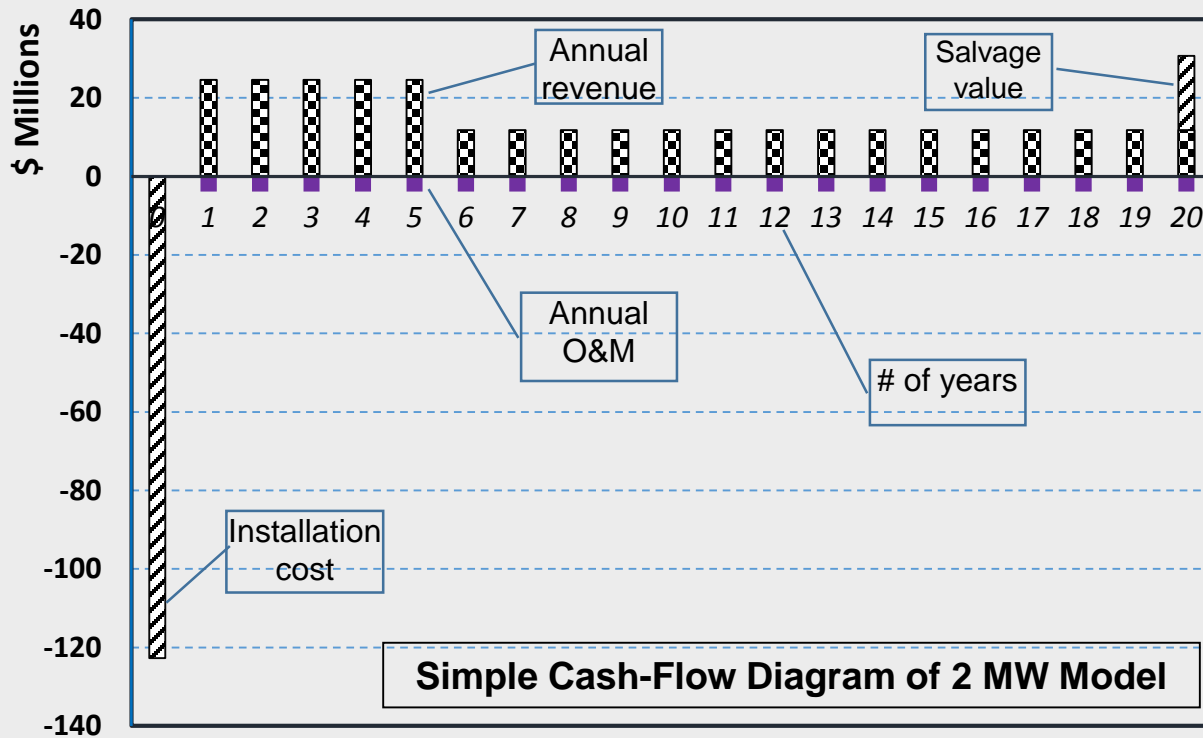
dmg events

www.thebig5constructegypt.com

Real time updates on:    



8. Economical Visibility



ORGANIZED BY:



www.thebig5constructegypt.com

Real time updates on:



9. CONCLUSION



- The net future value will be about \$120 million for 2 MW turbine model and a **loss** of \$14 million for 850 kW turbine model.
- The 2 MW model have a payback period of less than 10 years while the 850 kW turbine model **does not** have payback period with its 20 years lifetime.
- Two MW model is recommended and the predicted profit from the project after 20 years will be about **\$120 million**.





[How is it sited](https://www.youtube.com/watch?v=fW6xZtsHp1o) “https://www.youtube.com/watch?v=fW6xZtsHp1o”

[How is it erected](https://www.youtube.com/watch?v=Jf-Q1wyowWc) “https://www.youtube.com/watch?v=Jf-Q1wyowWc”

ORGANIZED BY:

dmg events

www.thebig5constructegypt.com

Real time updates on:    





18 - 21 SEPTEMBER 2018
EGYPT INTERNATIONAL EXHIBITION CENTER
www.thebig5constructegypt.com

THANK YOU!



ORGANIZED BY:

dmg :: events

www.thebig5constructegypt.com

Real time updates on: 