

Wind Energy in Egypt



مركز تحديث الصناعة
Industrial Modernisation Centre



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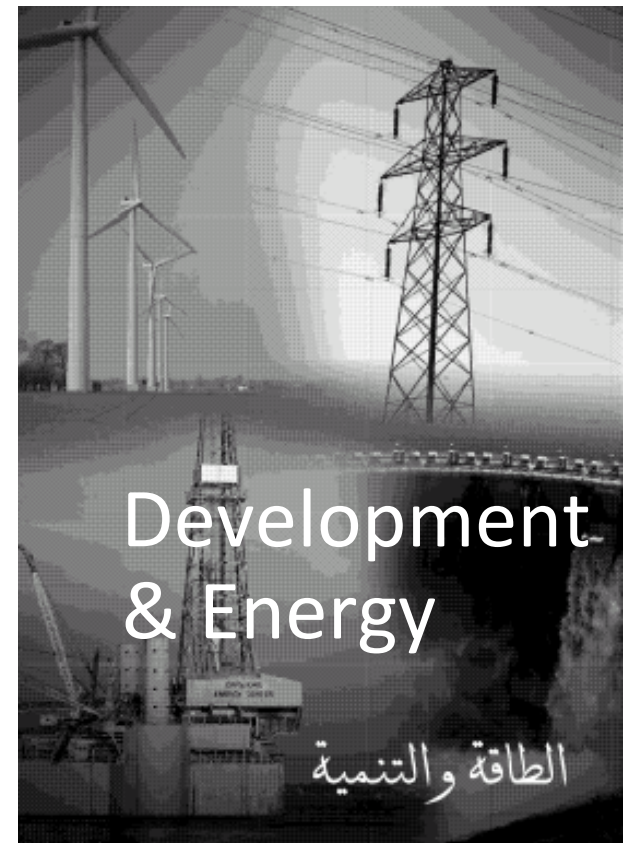
Wind Energy in Egypt

- **An overview of the energy sector in Egypt.**
- An overview of the wind energy sector in Egypt.
 - Past and current
 - Immediate and near future Plans
- Addressing issues such as the national policy/legislative framework that has been put in place to support the development of the market; the potential for growth;
- The win-win opportunities for:
 - Business/manufacturers and
 - Also from an environmental point of view;
 - Challenges that Egypt might be facing in this particular sector.

An overview of the energy sector in Egypt

A national energy target were declared by the end of 2007; stating:

- Diversity of energy resources
- Confirming the continuation of activities towards liberalization of energy markets
- Setting targets for the energy mix; including **renewable**, **energy efficiency** and **nuclear**



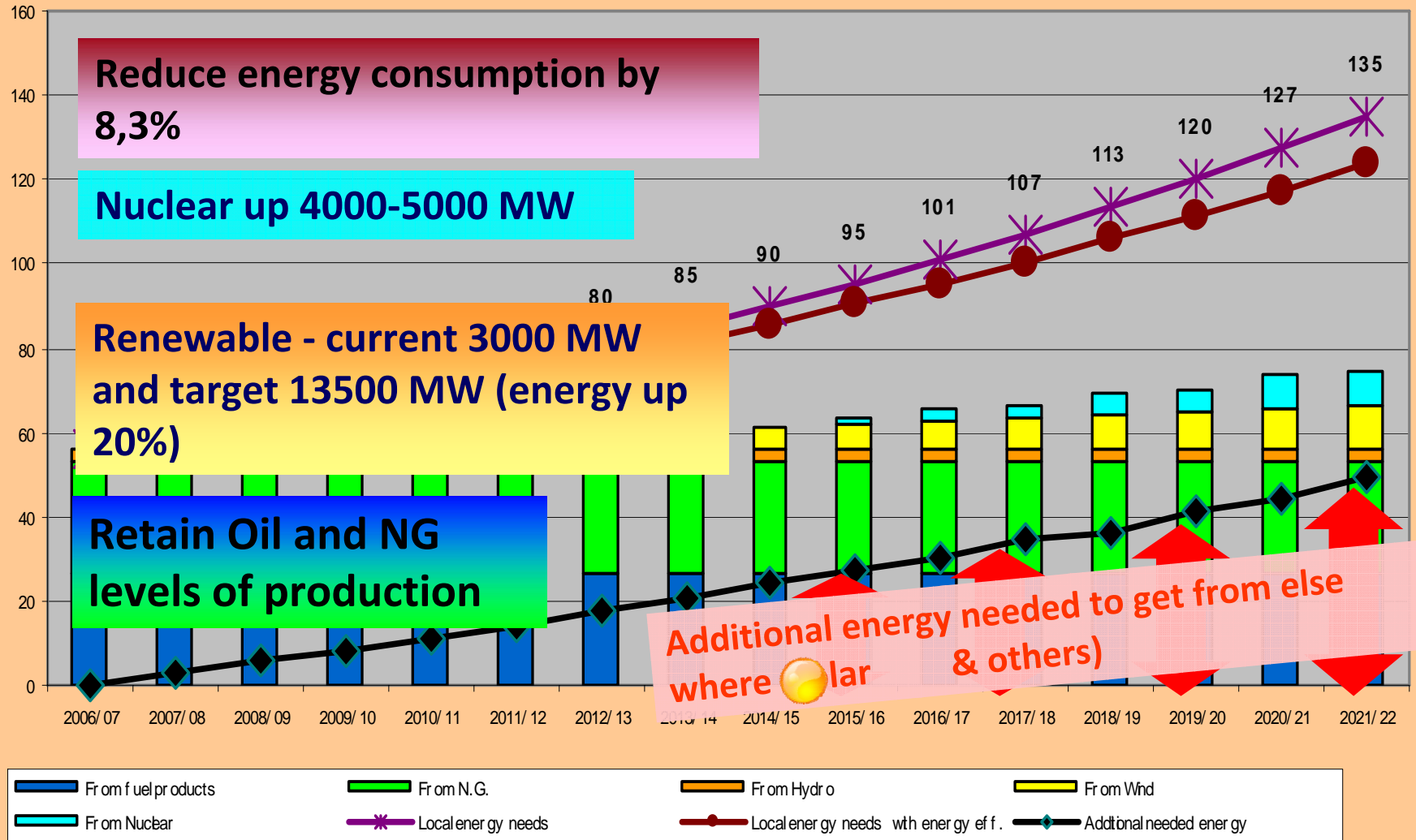
Current Energy Situation in Egypt

- By the end of **2007** two bounding forecasts for a national energy **supply/demand scenarios** were developed.
- The scenarios were based on:
 - An overall average 7% annual development rate.
 - A starting energy supply mix of around 2007/08:
 - 94% from fossil fuel and NG
 - 5% hydro
 - 1% from wind and others

Expected / Targeted Future Energy Status **up 2022** (conservative)

- **By year 2022 other national resources become available:**
- **The first scenario was based on:**
 - Supply of fossil based energy production will remain at the same level.
 - Wind energy grows, leading to about 20% contribution to electricity generation from renewable (hydro and wind).
 - Nuclear energy would contribute about 6%.
 - The energy supply mix around 2021/2022 becomes:
 - 40 % from (20% fossil fuel and 20% NG)
 - 8 % from energy efficiency implementations
 - **9 % from renewable (2% hydro and 7% wind)**
 - 6 % from nuclear
 - **% 37 additional energy is needed**

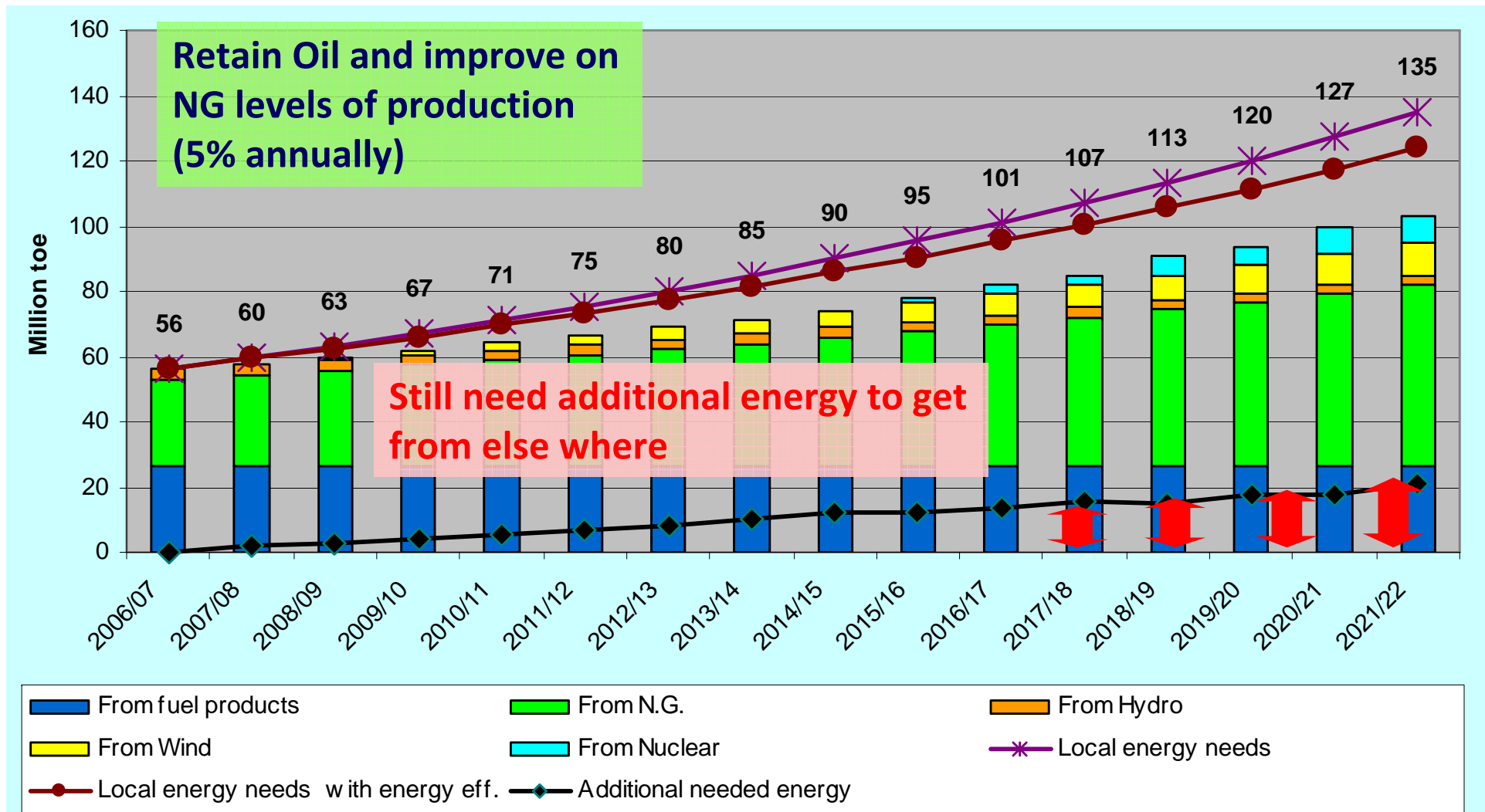
Expected / Targeted Future Energy Status up 2022 (conservative)



Expected / Targeted Future Energy Status up 2022 (ambitious)

- **By year 2022 other national resources becomes available:**
- **The second scenario was based on:**
 - Supply of Oil based energy production will remain at the same level, NG supply will grow at an annual 5% rate.
 - **Wind energy grows, leading to about 20% contribution from renewable (hydro and wind).**
 - **Nuclear energy would contribute about 6%.**
 - **The energy supply mix around 2021/2022 becomes:**
 - **61 %** from (20% fossil fuel and **41%** NG)
 - 8 % from energy efficiency implementations
 - **9 % from renewable (2% hydro and 7% wind)**
 - 6 % from nuclear
 - **Only 15 % additional energy is needed**

Expected / Targeted Future Energy Status up 2022 (ambitious)



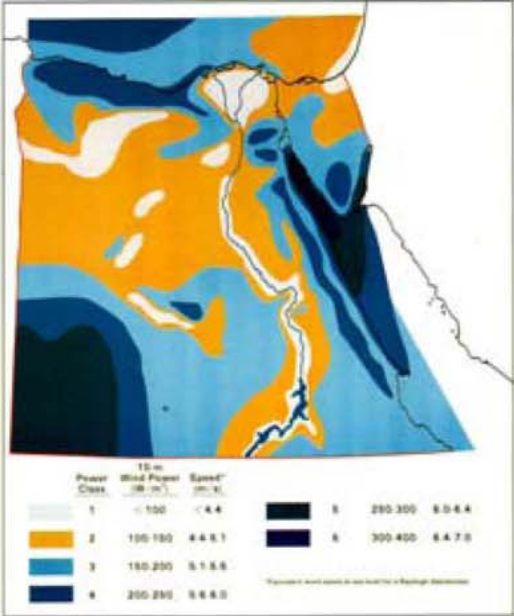
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Resource Assessment

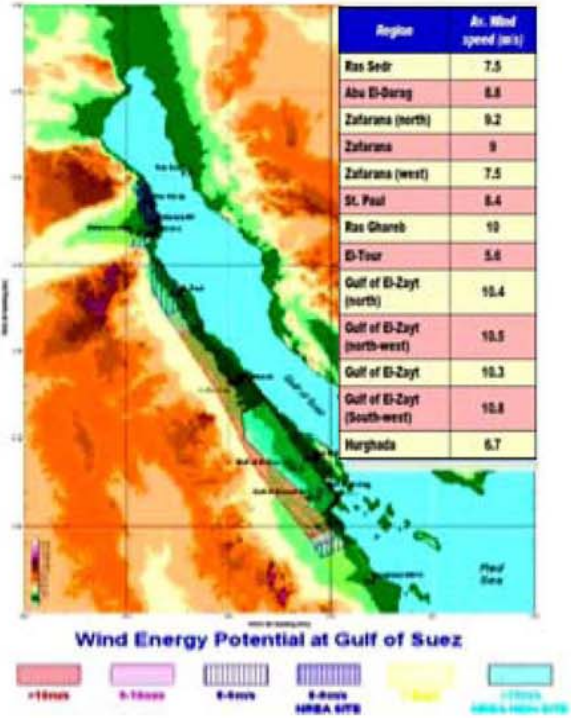
Egypt Wind Map, 1987

Egypt Annual Average Wind Power Estimates



In cooperation with USAID

Wind Atlas of Gulf of Suez, 1996 - 2003



In cooperation with Risoe (Denmark) & EMA

Pilot & Demonstration Projects



Wincon Danish WT, Stall regulated, Tubular tower, 100 KW

1988: the 1st WF at Ras Ghareb on the Red Sea coast (4 x100KW).



Ventis German WT, Pitch regulated Tubular tower, 2 blades, 100 KW

1993-1996: The 2nd WF at Hurghada city (5.4MW in phases):

- includes 42 WT of different types and sizes.
- some components were locally manufactured (towers, blades, other mech. and elect. components).
- interconnected to the local grid,



Nordtank Danish WT, Stall regulated, Lattice tower, 300 KW

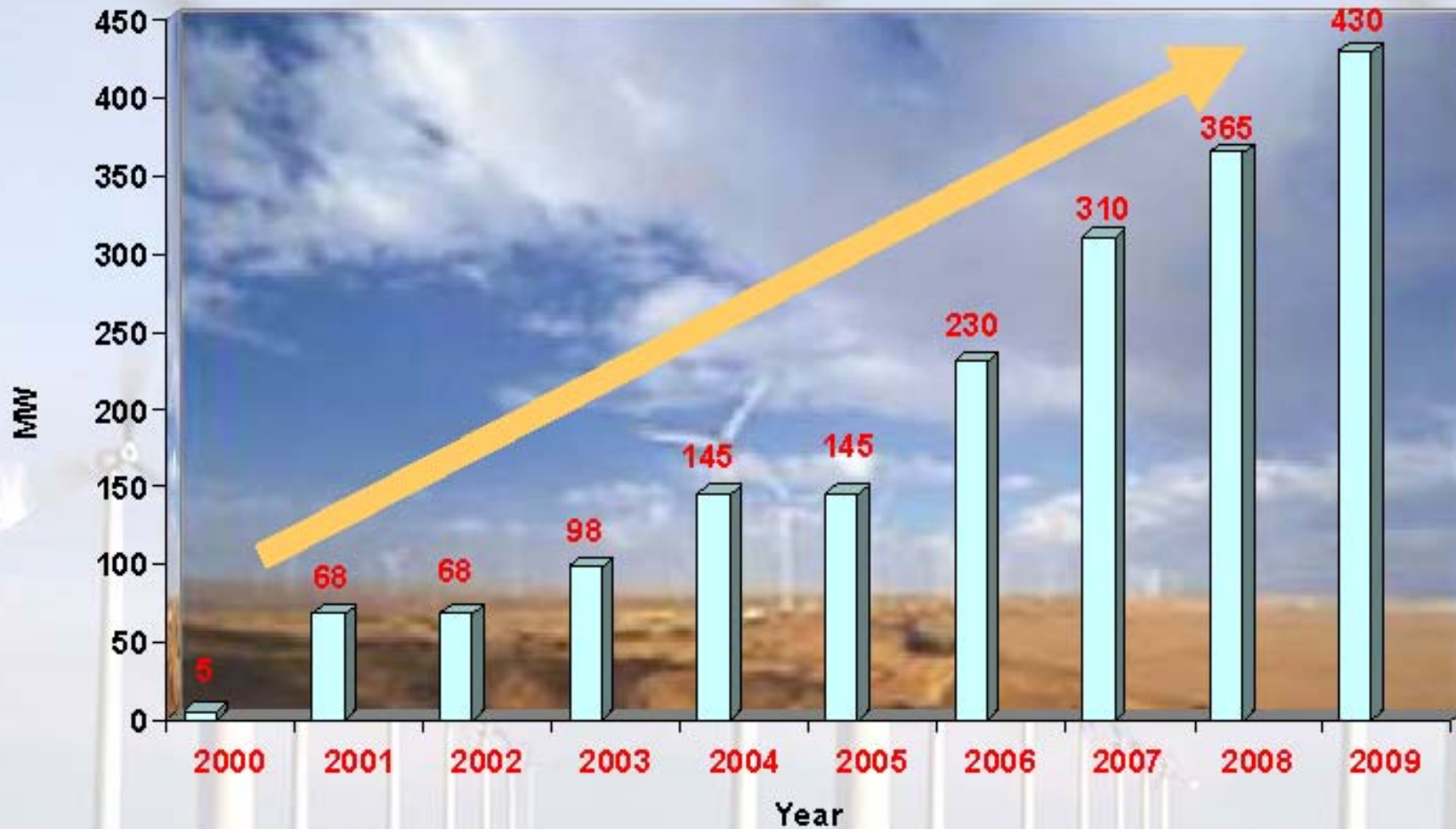
- These projects were implemented through international cooperation, availing financial and technical supports.

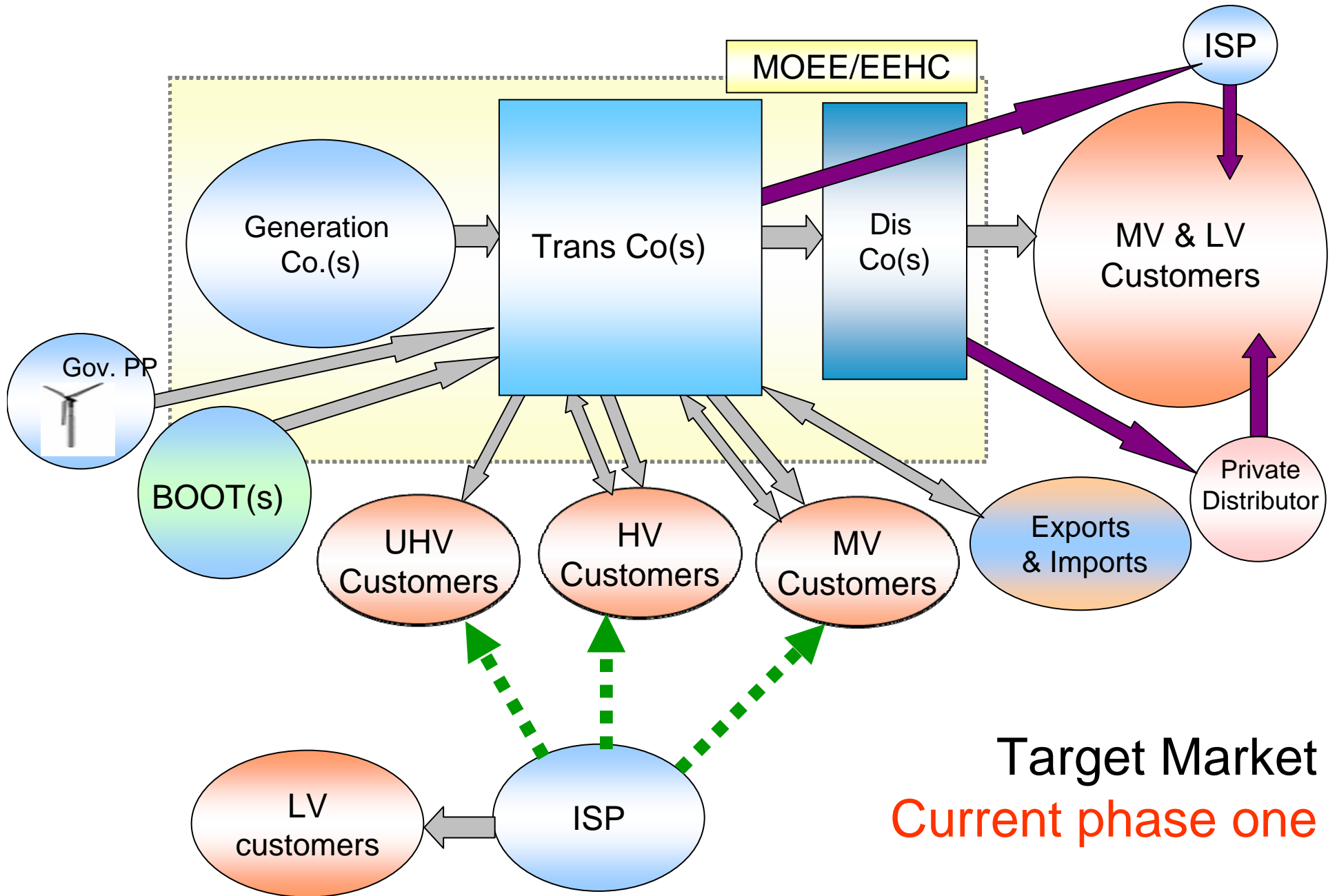
Large Scale Wind Farms



- Since 2001, series of large scale wind farms, totaling about 430 MW in cooperation with Germany, Denmark, Spain and Japan.
- Key Indicators:
 - Generated Electricity: ~ 4 Billion kWh,
 - Fuel Saving: ~ 900,000 T.O.E.,
 - Emissions Reduction: ~2 Million T.CO2.

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Target Market
Current phase one

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Projects under implementation

- **120 MW**, in Cooperation with **Denmark**, planned to be operated in 2010.

Projects in the Pipeline

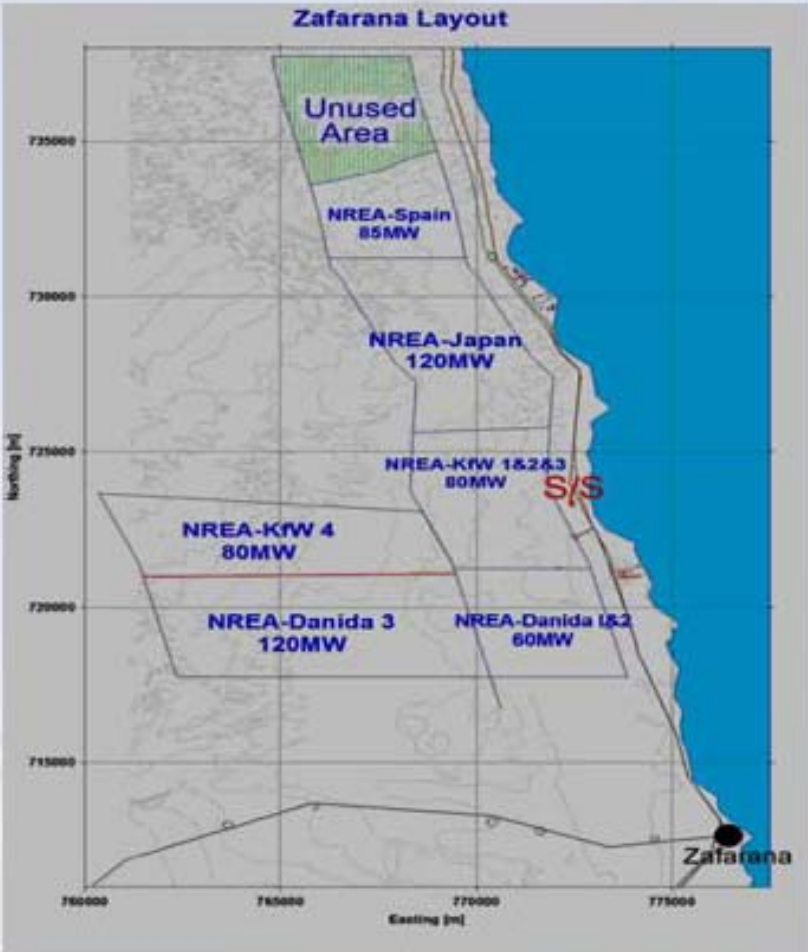
- **200 MW**, in Cooperation with **Germany & EU**
- **220 MW**, in Cooperation with **Japan**

Projects under preparation

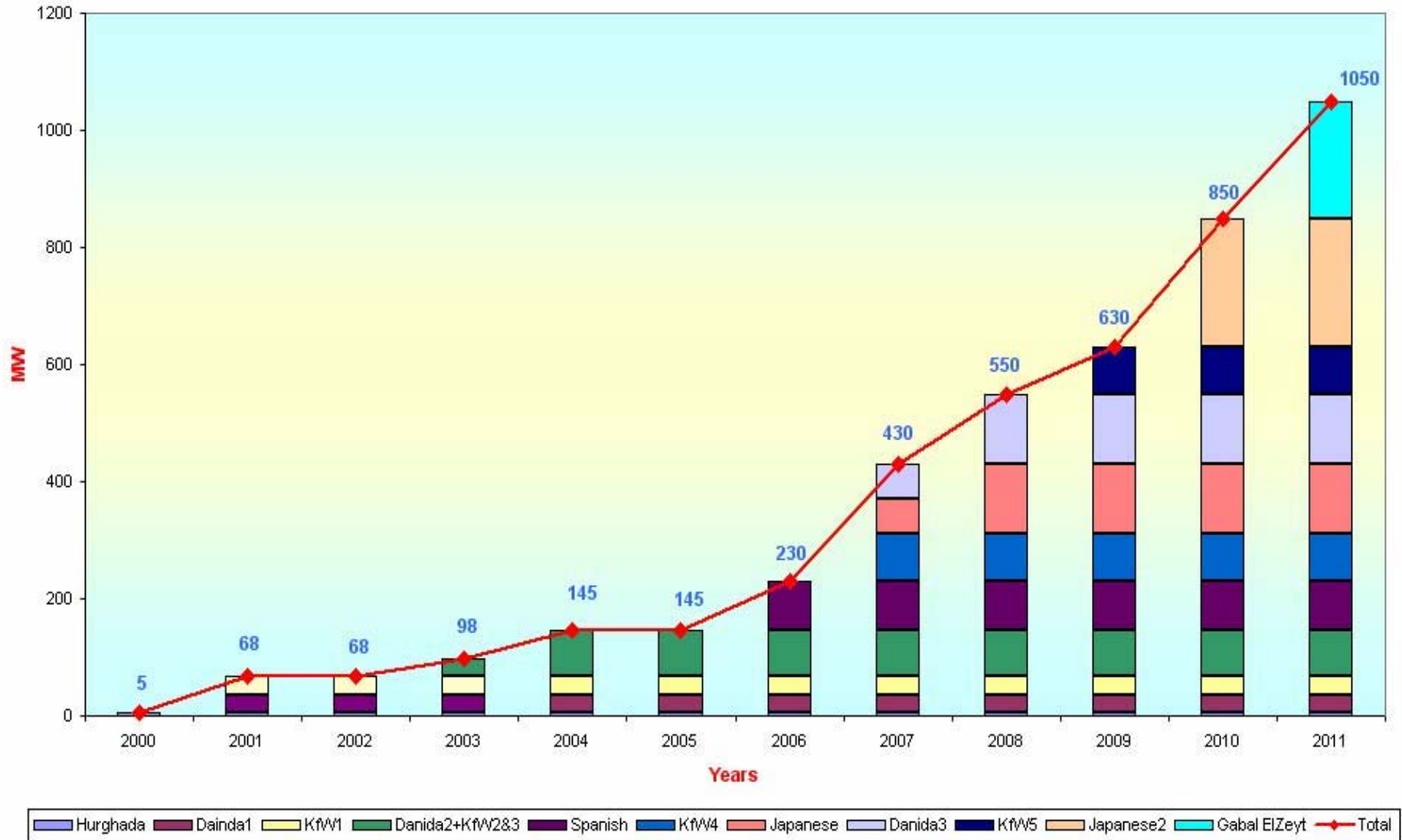
- **300 MW** (120 + 140 + 40 MW), in cooperation with **Spain**.
- **200 MW**, in Cooperation with **Japan** (on the Nile Western Bank).



Zafarana wind farm projects



EGYPT'S WIND ENERGY PROJECTS



National Strategy up to 2020

• In February 2008, the Supreme Council of Energy approved an ambitious plan to:

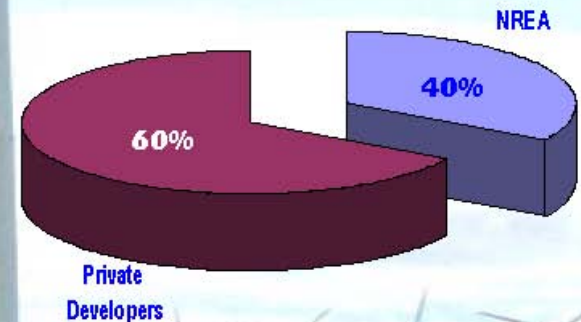


Satisfy 20% of the generated electricity by renewable energies by 2020, including 12% from wind energy, i.e., reaching more than 7200 MW grid-connected wind farms (about 600 MW wind farms annually).

Possible tracks

Governmental projects

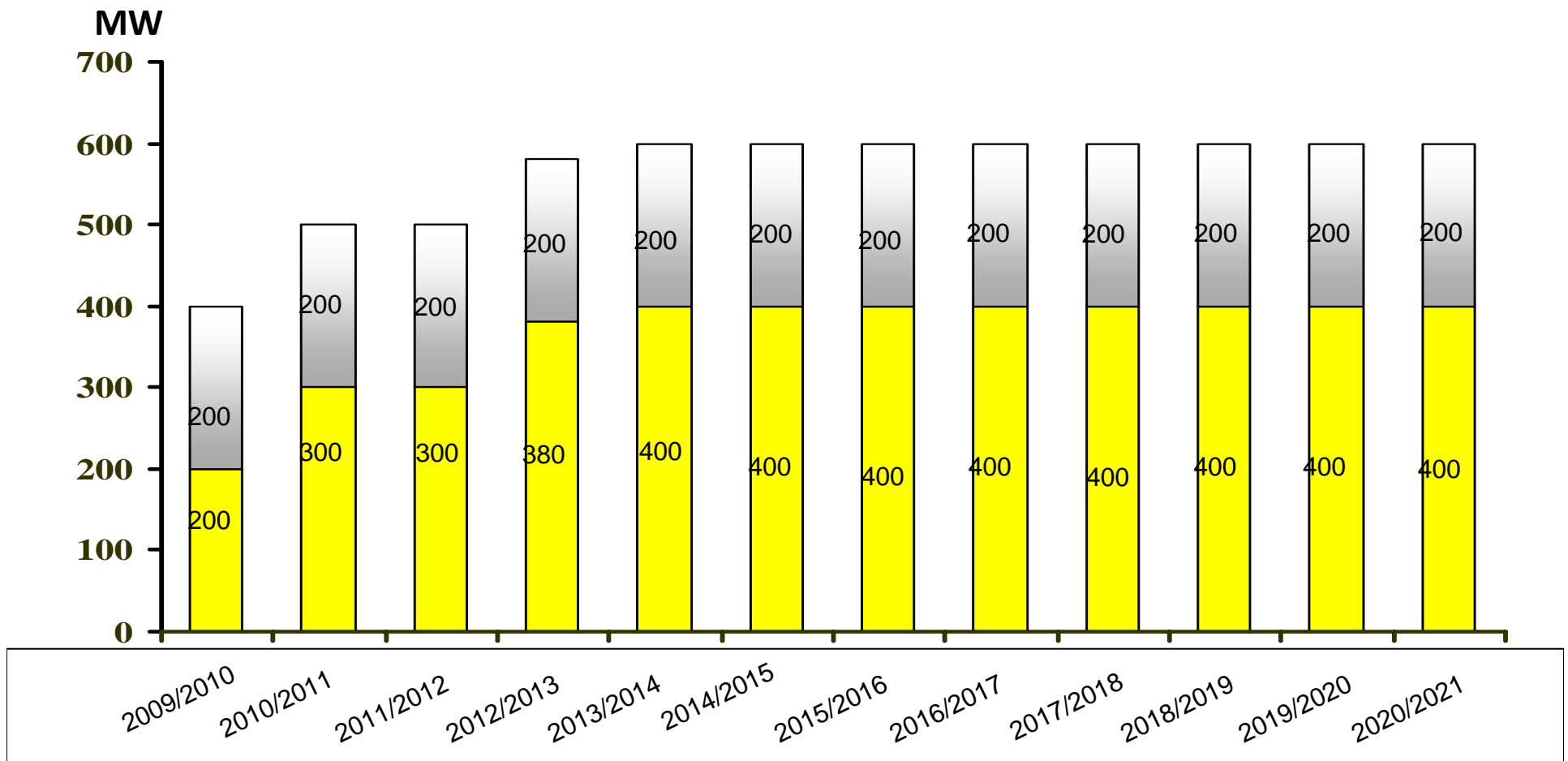
Private investments



Sharing of Gov. and Private Sector Up to 2020 Plan

Renewable Energy Authority

Private Sector With total share about 63 %



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Renewable Energy Development Business Models

Item	NAREA	Competitive Bidding	Feed-In-Tariff
Program size	2200 MW	2500 MW	2500 MW
Single Wind Farm Size	Large (100-400 MW)	Large ten Modules each (250 MW)	Medium and Small below 50 MW
Developer	NAREA	Private (most probably international)	Private (focus on local and small and medium size developers)
finances	Governmental and soft financing from international development agencies	Commercial finance	Commercial finance
Tariff Setting	Proposed by Egypt era and approved by the cabinet of ministers	According to the bid outcome	proposed by Egypt era and approved by cabinet of ministers
Contracting	20 years	Long term PPA mostly for 20 years	15 -20 years
Off taker	Grid		Grid or distribution system
O/M	NAREA	Developer	Developer
Construction Responsibility	NAREA through EPC	Developer	Developer

Implementation Plan for Renewable Energies

- In addition to the market reform which guarantee third party access, power generation from renewable sources will enjoy priority in dispatching whenever they are available.
- The proposed polices consists of two phases
- **Phase 1: Competitive Bids**
 - **According to this approach the grid will issue tenders requesting supplying power from renewable energies resources**

This will be done within the scope of the following criteria:

- Control the increase in RE capacities with reference to the capacity of transmission system and capacity of the market to absorb.
- Increase local manufacturing
- Increase private investment
- Achieving the lowest possible prices.
- Provide the investors with guarantees through long term power purchase agreements

Measures Adopted for Renewable Energies in the New Electricity Law (Contd.)

- ***Phase 2 (after the adoption of the New Electricity Law)***
 - Feed in Tariff will work hand in hand with the competitive bids mechanism.
 - International experience has showed that feed-in tariff is more attractive for smaller investors like farmers, cooperatives and private investors.
 - *To prevent intersection between the two mechanisms competitive bid will be for large size installations (250 MW wind farm), while feed in tariff will be restricted from small capacities (less than 50 MW installations).*

Renewable Energy Fund

– *Establishment of RE fund:*

- The fund could cover:
 - Full/partial deficit between the RE cost and market prices
 - Exchange rate risk in case of transferring cost full or partially to consumers.
 - Guarantee of the transmission company payments
 - Financial support to pilot projects.
 - Research and development for RET.
- The main sources of finance of the fund will include:
 - Subsidy currently given to the fossil fuels used in power generation.
 - State Budget.
 - Donations
 - Investment of the fund money

Support of Egyptian Government

- Central Bank of Egypt will guarantee all financial obligations of EETC under the PAA.
- Signing long term PPA (20-25) years.
- Reduction of custom duties from 5% TO 2% for all renewable energy equipment and spare parts .
- An area of about 1228.7km² has already allocated for establishing W.E. projects
- Signing usufruct agreement.
- All permits for land allocation are already obtained .
- The project will benefit from carbon credit .
- Preliminary EIA including Bird migration study will be prepared by NREA in cooperation with international consultant and financed by KfW.
- A general Authority for Investment GAFI provides assistance to all investors through one window operation for obtaining all permits and licenses.
- The project company shall get license for power generation from Egyptian Electricity Regulatory Agency.

Wind Farm Project at Gulf of El zeyt

- The size of the project is 250 MW.
- Maximum height to blade tip is 100m.
- The allocated site area of approximately 37 km²
- 3 km buffer zone without wind turbines upstream (unidirectional wind).
- Developer is responsible about planning, construction and O&M of the wind farm, in addition to the internal roads, cabling and the 220 kV substation .
- Developer is responsible for dismantling after PPA expires (20-25 years).
- Delivery point is the high voltage side of the substation
- EETC will pay for, build and operate 220 kV lines up to delivery point.



Bidder Qualifications

- Joint venture members have to meet the complete range of requirements jointly.
- Some qualifications may be met by hiring subcontractors / suppliers / affiliates / turnkey contractors
- MoU between members of joint venture suffices for RFPQ
- Change in members of the joint venture: New member must have equal or better qualifications than the one leaving the pre-qualified team.
- Experience requirement for developing IPP 50 MW wind power project:
The project could be located in more than one site.
- Winning bidder will set up Egyptian project company in Egypt.

Financing of Wind Project

- Developer is fully responsible for budgeting and financing of the project, and must demonstrate this capability for the RFPQ.
- Developer can use any source of finance, domestic or foreign.
- Expression of interest from bank(s) is sufficient



Land, usufruct, Licensing ...etc.

- NREA has the right to use the land for wind power (Law 168 of 2009).
- All permits for allocation of land are already obtained by NREA.
- Project company will apply for other permits and licenses, EETC/NREA will assist in getting these licenses.
- NREA will sign the usufruct contract for the duration of the PPA with the project company.
- RFP will determine price to be paid

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Local Manufacturing of RE Equipment

- A parallel approach to increasing RE generation capacity is the local manufacturing of RE equipment. This will increase the added value to the economy.
- This programs necessitates:
 - Large scale technology transfer program
 - Large scale program to support research and development program for RE technologies similar to that considered in China and India.
 - Incentives to local activities supporting localization of RE technologies

EGYPT'S WELL LOCATED GEOGRAPHICAL LOCATION

EU Agreement

No customs imposed on some RE Egyptian industries exports from Egypt to Europe, whereas European imports into Egypt are subject to tariffs (limited)

Industry Regulations

Egypt's RE industries

Arab Free Trade Agreement

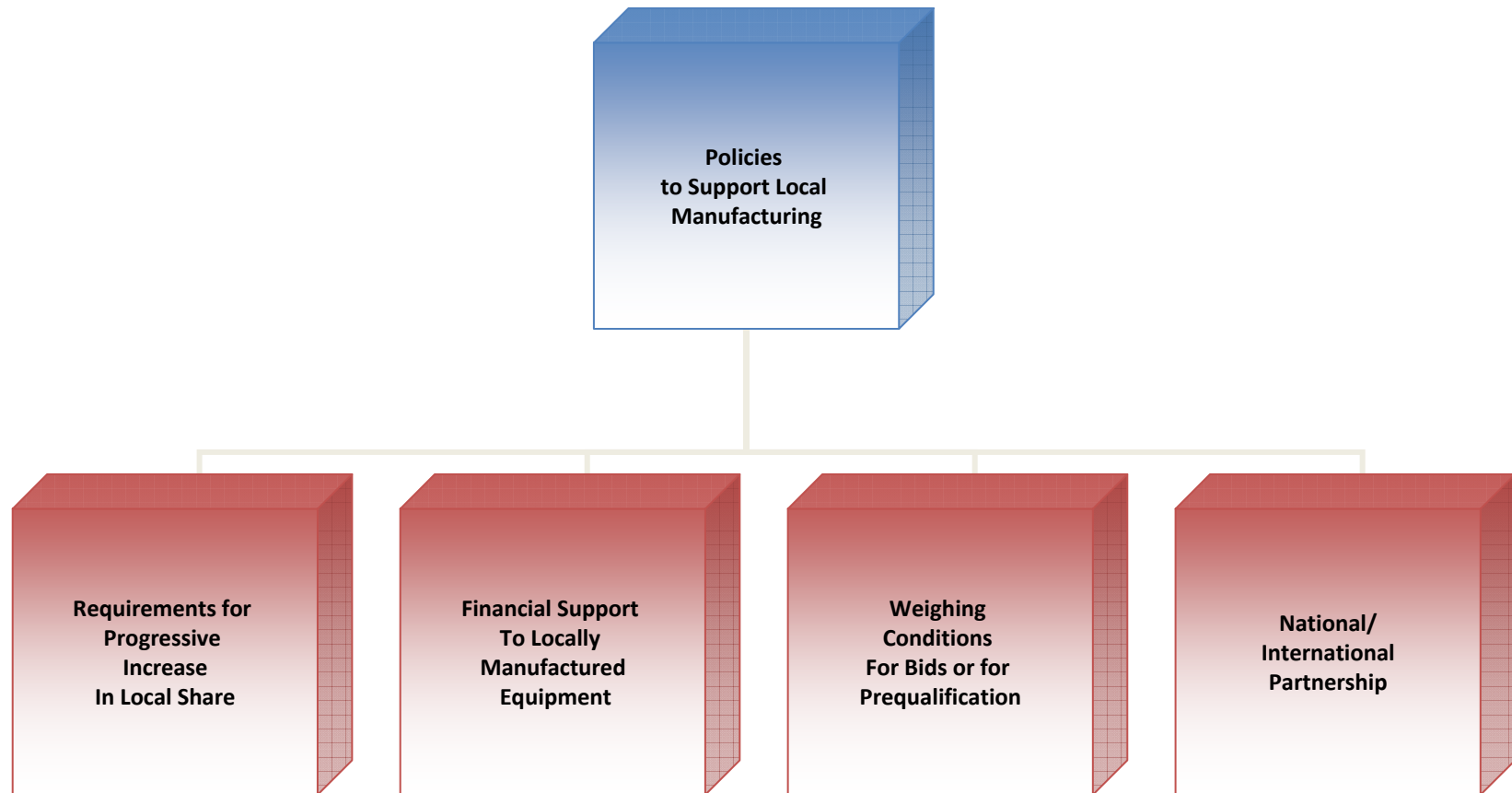
No customs imposed on RE Egyptian industries exports from Egypt to all Arab countries

COMESA Agreement

No customs imposed on RE Egyptian industries exports from Egypt to all African member countries, whereas Arab and European competitors do not enjoy this privilege

- *Egyptian industries enjoys a number of trade agreements between Egypt and Europe, Arab countries, and African countries*

Proposed Policies to Support Local Manufacturing of Renewable Equipment



Economic Growth

- Estimated **Turn Over** in **Egypt** of **Euro 10.6 Billion** (Appx. Egp 80 Billion) by 2020 (estimation based on today's prices! (Source: RCREEE 2009)
- Expected at least 3 potential local wind turbine manufacturers & 10 potential local IPP/developers by 2020 (Source: current market situation)
- Approximate indirect development of 30 local sub-suppliers & related supporting industries

Clean Environment

- With 322 MW wind energy installed Zaafarana saved 190,000 T.O.E and reduced emissions of about 450,000 TCo2 in 2007 (Source: NREA statistics)
- With 7200 MW wind energy installed, Egypt would Appx. **save 4.25 Million T.O.E** and **reduce emissions** of about **10 Million TCo2** (Source: Projection on NREA statistics)

Job Creation

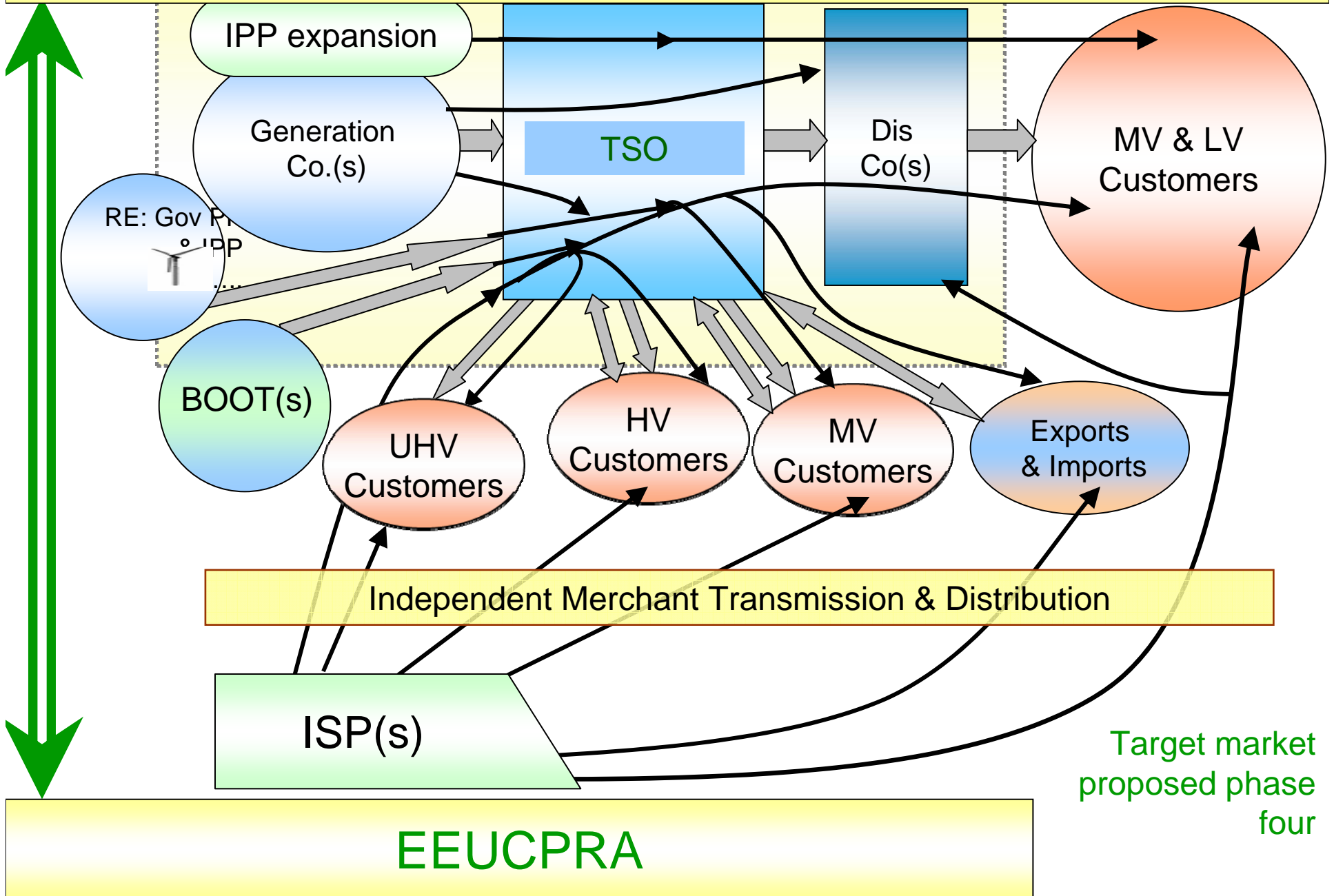
- Wind energy in Egypt would impact direct (e.g. manufacturers, IPP/developer...etc) and indirect (RM, related services...etc) employment
- The wind energy industry in **Egypt** could participate for the creation of **75,000 direct jobs** by **2020** (Source: RCREEE 2009)

Wind Energy in Egypt

Challenges that Egypt might be facing in this particular sector

- Financing.**
- Network capacity.**
- Attraction of investors.**

Ministry of Electricity and Energy



THANK YOU