



RENCONTRE MAROCO - ITALIENNE

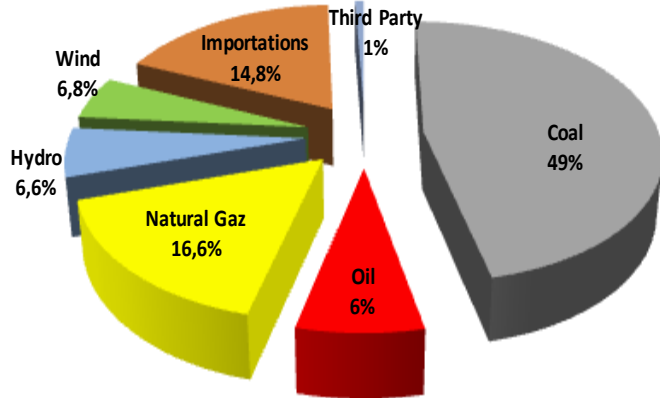
Pour une transition des énergies propres vers l'Afrique

Current situation, goals and challenges of Renewable Energy in the Moroccan Energy System

- ❑ **SIGNIFICANT ACHIEVEMENTS IN THE ELECTRICITY SECTOR**
- ❑ **THE MOROCCAN ENERGY STRATEGY**
- ❑ **SUCCESS FACTORS**
- ❑ **COOPERATION WITH AFRICAN COUNTRIES**

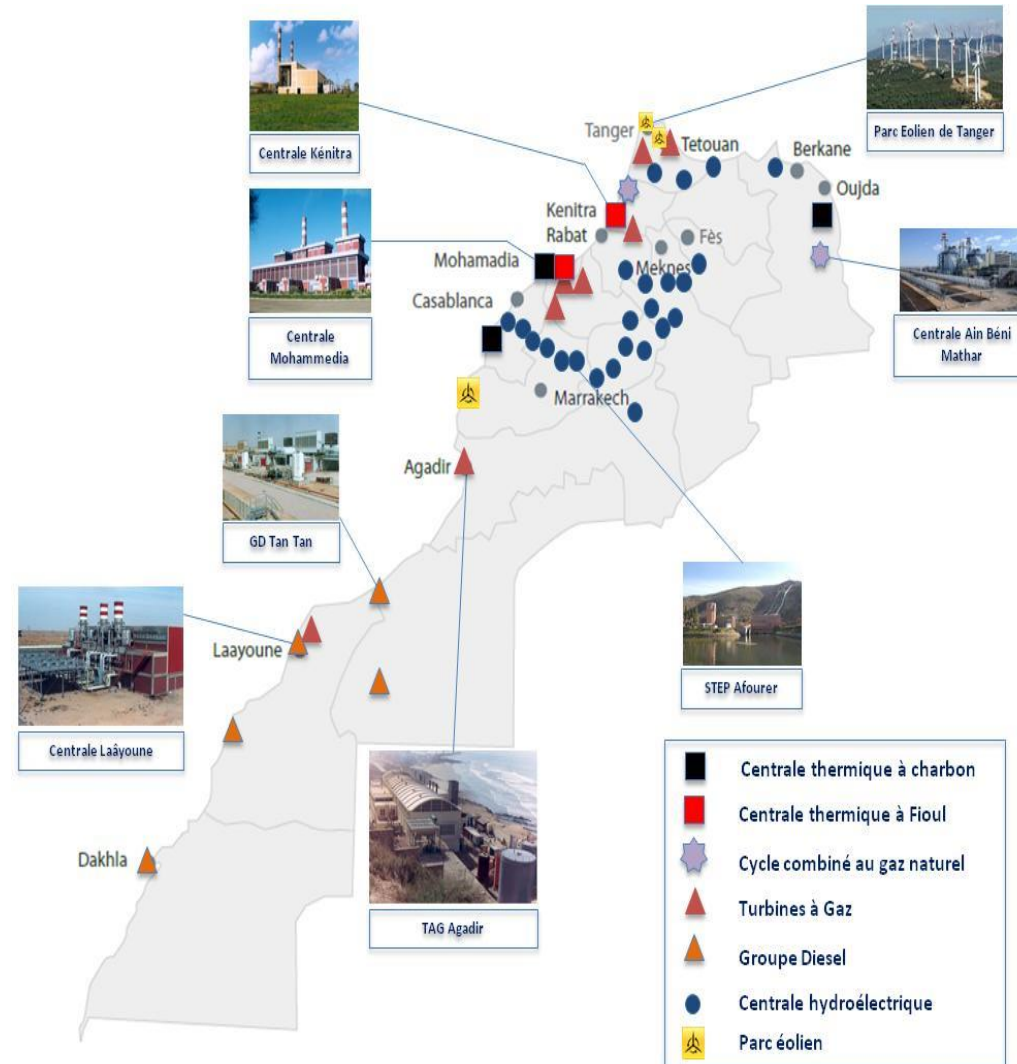
Moroccan Installed Capacity

Energy consumption in 2015 : 34 400 GWh



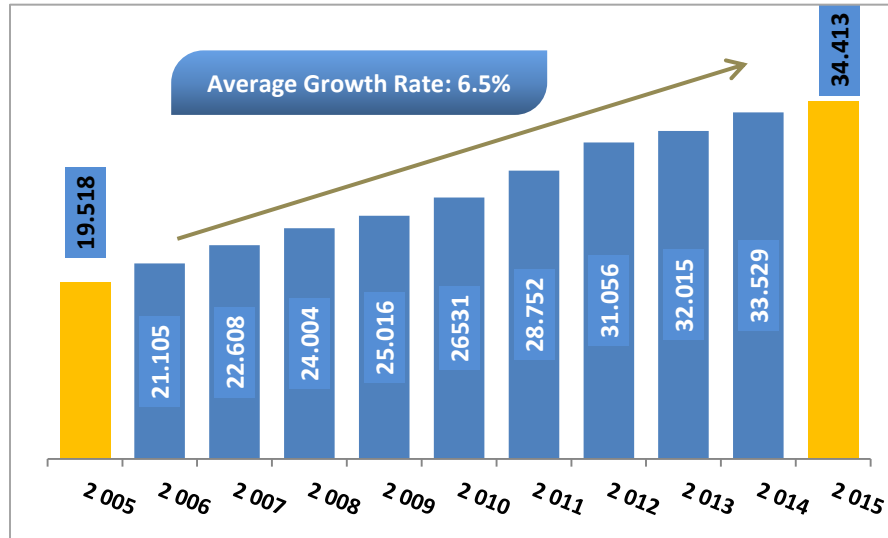
	En MW	En %
Hydraulic	1 306	16%
Pumped Storage Hydo	464	6%
Total Hydraulic	1 770	22%
Steam Turbine	1 065	13%
Gas Turbine	1 230	15%
Diesel Generators (DG)	201	2%
Jorf Lasfar Power Plant	2 080	25%
Combined Cycle of Tahaddart	384	5%
Combined Cycle of Ain Beni Mathar	452	6%
Total Thermal	5 412	66%
ONEE Wind Farms	205	3%
Private Wind Farms (Law 13-09)	203	2%
Private Wind Farm (PPA with ONEE)	352	4%
Wind Farms (Self Generation)	37	0%
NOOR 1	160	2%
Combined Cycle of Ain Beni Mathar (Solar Part)	20	0%
Total Wind & Solar	977	12%
Total Installed Capacity	8160	100%

Total Installed Capacity up until 2015 : 8 160 MW

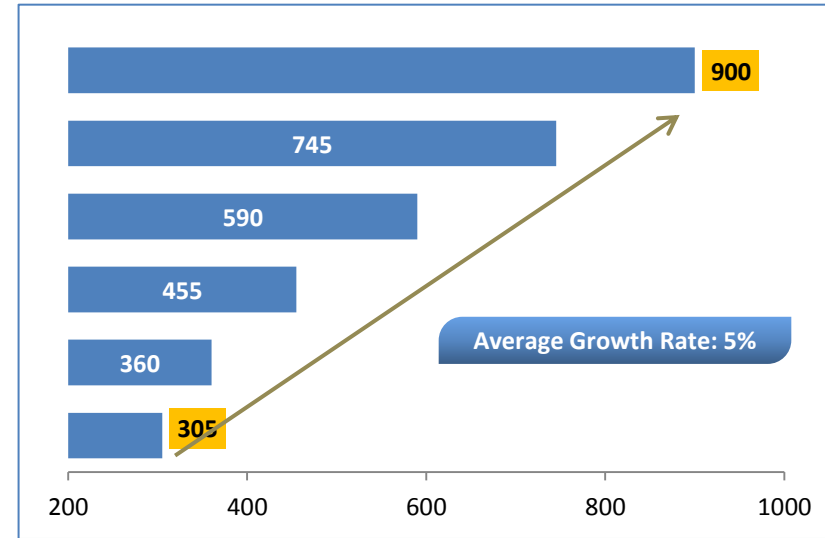


THE GROWING ELECTRICITY DEMAND

**Energy Demand growth
(GWh)**



**Annual Electricity Consumption per inhabitant
(kWh/cap)**



Consequences of the Country's Economic and Social Growth

- **Widespread access to electricity (in rural and urban areas) ;**
- **Development of major projects across the Kingdom (infrastructures, industry,),**

SIGNIFICANT ACHIEVEMENTS IN THE ELECTRICITY SECTOR

Various achievements in the electricity sector proving acquired expertise by Morocco in this area

– **GLOBAL RURAL ELECTRIFICATION PROGRAM (PERG) AND DECENTRALIZED ELECTRIFICATION**



– **HIGH EXPERTISE IN VHV & HV GRIDS AND INTERCONNECTIONS**



– **DEVELOPMENT OF ENERGY PROJECTS IN PUBLIC-PRIVATE PARTNERSHIP (PPP)**



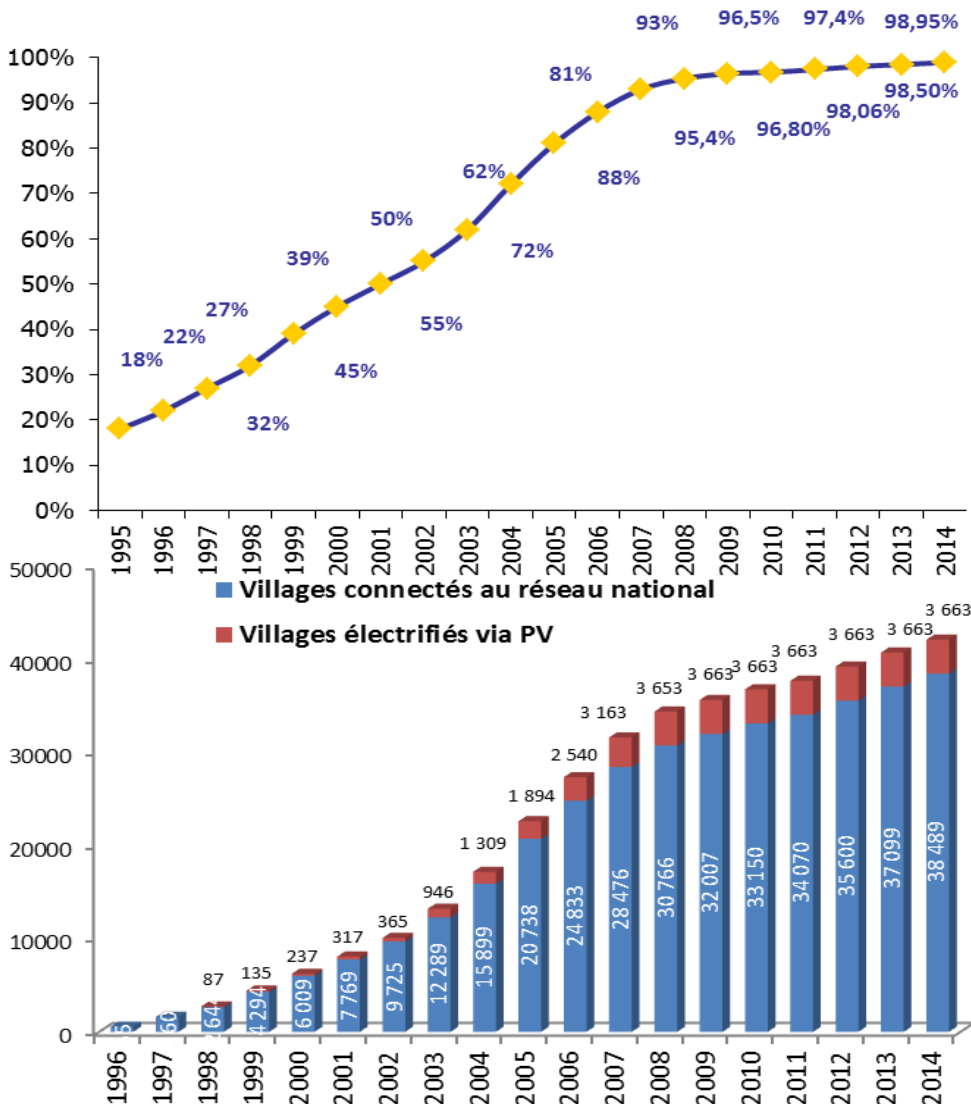
– **NATIONAL ENERGY STRATEGY, TO DIVERSIFY THE ENERGY MIX, PROTECT THE ENVIRONMENT AND PROMOTE ENERGY EFFICIENCY**

– **DEVELOPMENT OF RENEWABLE ENERGY PROJECTS**



The MOROCCAN RURAL ELECTRIFICATION PROGRAM : A REAL SUCCESS STORY

A huge effort in term of access to electricity.....



A program based on two modes of electrification

- connection to the interconnected grid, for most of the rural villages
- decentralized rural electrification, mainly photovoltaic equipment for remote grid or sparsely populated

**38 598 villages
connected to the
national grid**

**3 663 villages with a
decentralized
electrification**

**Rural
Electrification
Rate***

98,95%



A REAL EXPERTISE IN THE DOMAIN OF PPP'S ELECTRICITY GENERATION PROJECTS

A significant part of the installed capacity and the Moroccan electricity generating come from projects developed through Public-Private Partnerships (PPP)

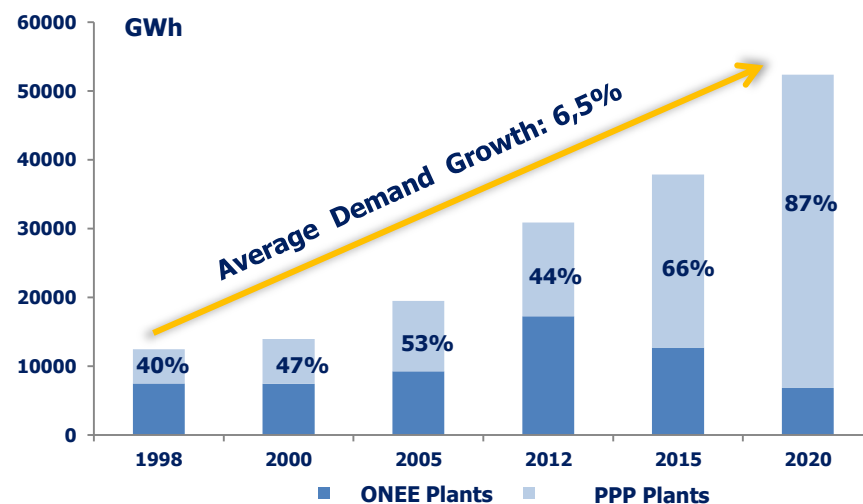
PPP projects

- Jorf Lasfar coal Plant (six units)
- Koudia al Baida wind farm (CED)
- Tahaddart CCGT plant
- Tarfaya Wind Farm
- Solar projects (NOOR, ...)
- Wind projects (Integrated Wind Project, Taza, ...)
- Thermal projects (coal Safi and Nador Plants, Gas to Power)



Part of PPP projects

Installed Power	~ 30%
National power generation	~ 50%



MOROCCO: CROSSROADS OF ELECTRICITY TRANSIT BETWEEN AFRICA AND EUROPE

Morocco-Spain interconnection :

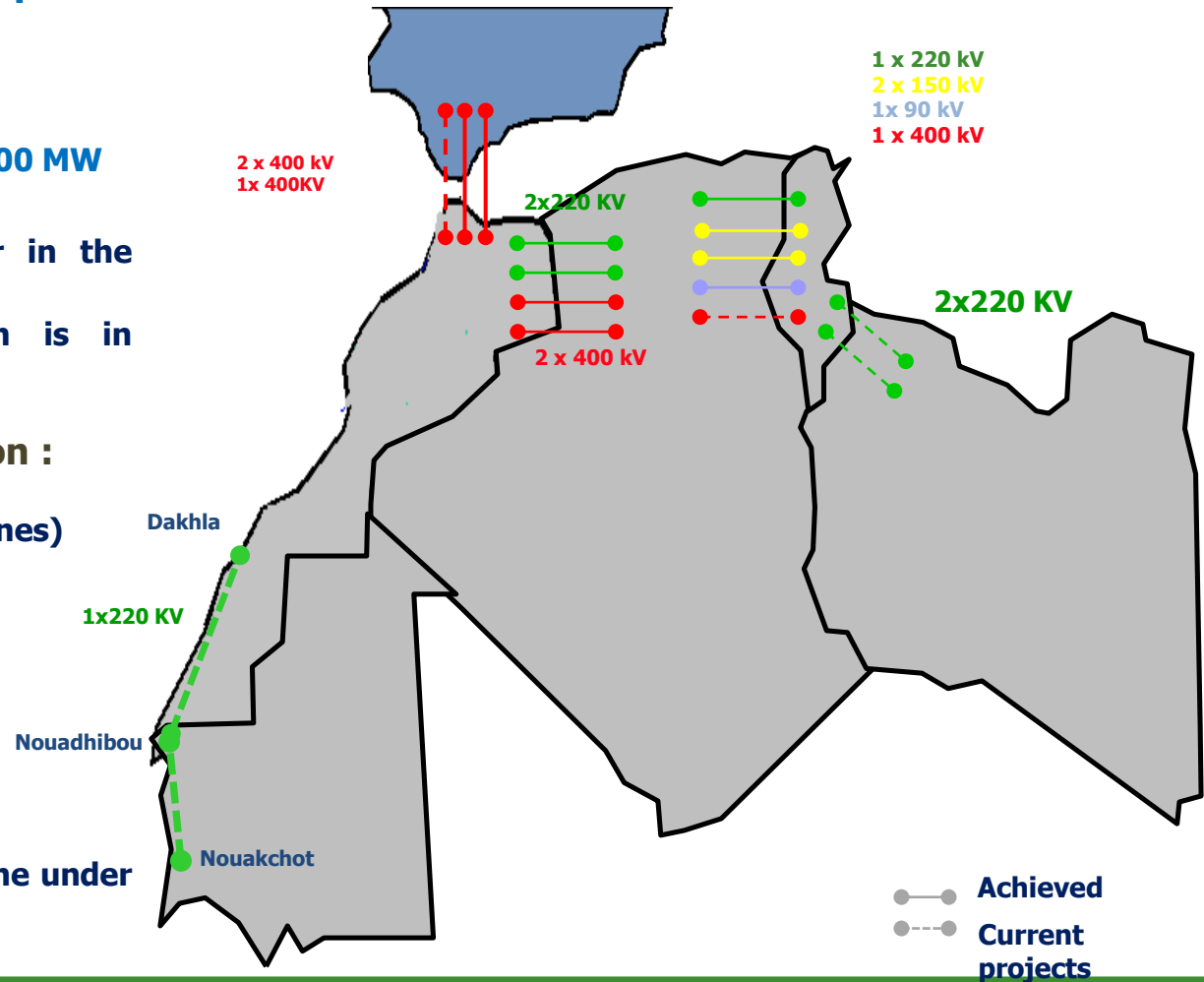
- Commissioned in 1997
- Capacity doubled in 2006
- Available capacity of exchange : **1400 MW**
- Commercial capacity : **900 MW**
- ONEE has been the 4th operator in the Spanish market since 1999
- Studies of 3rd interconnection is in progress

Morocco-Algeria interconnection :

- Commissioned in 1988 (2x 225kV lines)
- 400 kV line in 2008
- Exchange capacity 1500 MW

Expected Morocco-Mauritania interconnection :

- Under study
- As a first step, Laâyoune-Dakhla line under development

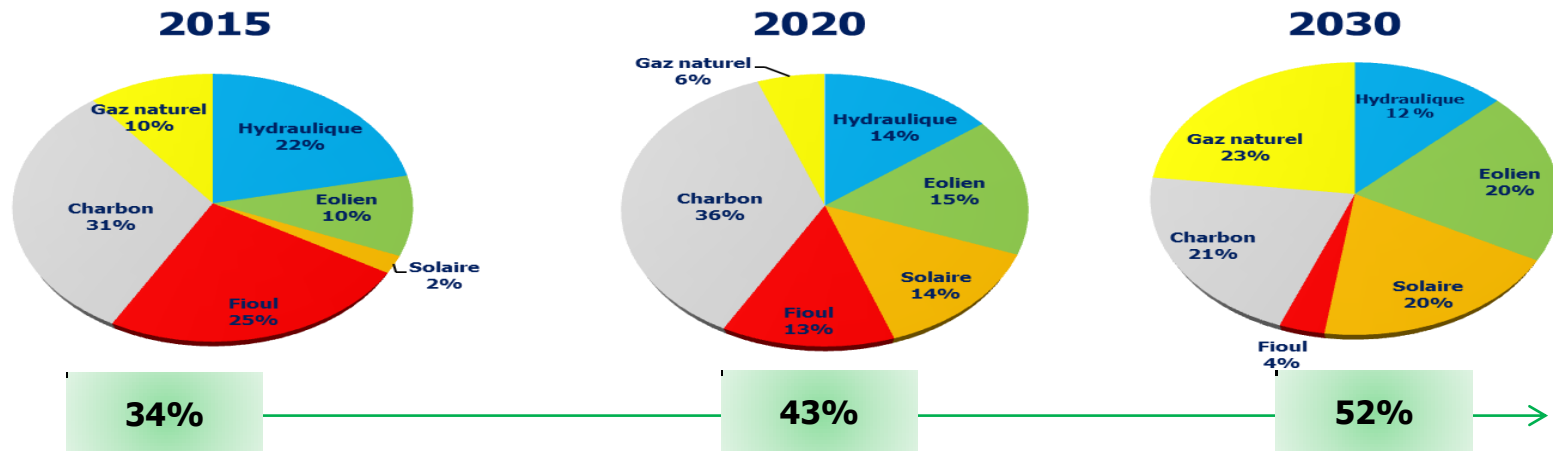


THE MOROCCAN ENERGY STRATEGY

AMBITIOUS ENERGY STRATEGY WITH AN APPROPRIATE FRAMEWORK

Morocco's Energy Strategy prioritize the diversification of the country's energy sources with particular emphasis on the renewable energies.

Evolution of renewables share in the energy mix



Launching of important projects

- Wind Targets: 2 000 MW by 2020 and 5000 MW by 2030
- Solar Targets: 2 000 MW by 2020 and 5000 MW by 2030
- Hydro Targets: 2 000 MW by 2020 and 3000 MW by 2030

Appropriate institutional and legislative framework

- Law n° 13-09 allowing the private sector to develop renewables energy projects, ...
- Fund Energy Development (7,3 billion dirhams)
- Law n° 16-08, raised the ceiling for self-generation from 10 MW to 50 MW and above 300 MW with access to the grid
- Creating special instances : MASEN, ADEREE, ...

Strong support in setting-up renewable energy development

SUSTAINABLE & ATTRACTIVE BUSINESS MODELS

MOROCCAN INTEGRATED WIND PROJECT	MOROCCO'S SOLAR ENERGY INTEGRATED PROJECT	RE PROJECT UNDER THE LAW 13-09	CONVENTIONAL PPA PROJECT	SELF GENERATION
<ul style="list-style-type: none">• BOOT Public Tender for green field project development• PPA with ONEE as offtaker• Private-Public Partnership• local content as a key requirement	<ul style="list-style-type: none">• BOOT Public Tender for green field project development• PPA with MASEN and between MASEN and ONEE as offtaker• Private-Public Partnership• local content as a key requirement• Ability of exporting the electricity generated from solar production	<ul style="list-style-type: none">• RE projects can sell the power produced to a large consumer• Access to the Grid• ONEE as last supplier of electricity;• ONEE can buy the excess of electricity• Ability of exporting the electricity generated from RES• Ability to build direct transmission line	<ul style="list-style-type: none">• Cover the design, financing, construction, operation and maintenance of the plants;• Purchase guaranteed by ONEE as Off taker within a PPA contract• ONEE is the provider of land and the infrastructure needed• Letter of support from the Government ensuring the guarantee of ONEE payment	<ul style="list-style-type: none">• Capacity limited to:<ul style="list-style-type: none">• 50 MW in site• above 300 MW with access to the grid• ONEE as last supplier of electricity;• ONEE can buy the excess of electricity

SUCCESS FACTORS

❑ INSTITUTIONAL AND REGULATORY FRAMEWORK

- Political stability and regulatory environment
- Transparency in the tendering process
- International standard contracts
- IPPs Experiences have been essential in attracting investors

❑ VISIBILITY

- Sustainable increase of the electricity demand
- Establishment of a transparent and adequate long-term agenda for the planned projects
- Local content requirement corroborated by a long term policy framework that ensures stable and predictable local and regional demand

❑ FINANCING

- Public Private Partnership model was crucial in de-risking the large scale projects, thus securing their financing
- Provision of concessional finance through international financing institutions
- Strong contribution of the local banks



A successful experience, to share with brother countries



SOME FIGURES ABOUT AFRICA'S ELECTRICITY SECTOR

❑ Huge Reservoir of Fossil Fuels:

- ✓ 7 % of the World's Oil Reserve ;
- ✓ 8 % Of the World's Natural Gas Reserve ;
- ✓ and 6% of the World's Coal Reserve.

❑ Significant Renewable Energy Potential :

- ✓ A Hydroelectric potential estimated to 13 % of the World's potential. 7 % of this potential has been exploited so far ;
- ✓ Solar Radiations around 5-6 kWh/m²/year.

❑ Low Energy Consumption :

- ✓ Lowest Energy Consumption per inhabitant in the World (as little as the third of the World's average Energy Consumption) ;
- ✓ An average electrification rate of 32% against 60% measured on the international level.

❑ Poor Installed Electrical Capacity : 114 GW only serving as much as 1 billion inhabitants :

- ✓ Africa's capacity matches the Germany's inhabited with only 82 million inhabitants ;
- ✓ In sub-saharan Africa, there are 74 GW supplying 860 million inhabitants.

❑ Unbalanced distribution of power generation capabilities in comparison with the locations where Electricity is the more needed ;

❑ Mean Electricity Production Cost remains far expensive according to international standards.

These statistics presents an excellent investment opportunity.

***An energy partnership between Morocco and Sub-saharan Africa,
so as to promote south-south integration***



MOROCCO, A SUPPORT AND EXPERTISE HUB IN THE FIELD OF ENERGY



Objectives

- ✓ **strengthening the connection of European and Moroccan power grids to Africans networks to create a unified and sustainable regional electricity market**
- ✓ **Securing the supply of cities, ensuring a reliable electricity supply at competitive costs**
- ✓ **Widespread rural electrification**
- ✓ **Establishment of preconditions for the achievement of local power generation projects** (supervising the design / implementation and / or co-development of projects)



MOROCCO-MAURITANIA INTERCONNECTION :

A ridge of 220KV Nouakchott – Nouadhibou-Dakhla

- Current studies-

Objectives

Complete the integration of electrical systems in West Africa (Mauritania, Senegal, Mali, Ivory Coast, etc.) **to the European electricity system** through the Moroccan power grid and Morocco-Spain Interconnection.

Action framework

Strategic Partnership between ONEE and SOMELEC, aiming at strengthening the cooperation and integration of electricity grids of both companies.



Experiments to multiply to create an extensive grid providing continuous interconnection between the North and South

COOPERATION WITH AFRICAN NEIGHBORS COUNTRIES

❑ **Share a highly proven expertise in electricity domains : generation, transmission, distribution and commercialization :**

- Conducting studies in order to rethink the whole electricity system with concerned African countries ;
- Suggesting measures to enhance the electric system performances.

❑ **Transfer of know how :**

- Project management ;
- Operating and maintenance of power plants (hydro, oil-thermal, natural gas, coal, renewable energy) ;
- Training courses in electricity fields.

❑ **Share a highly proven expertise in Rural Electrification :**

- Coming up with innovative solutions to provide rural population with electricity.



ONEE AS A MAJOR ACTOR IN RURAL ELECTRIFICATION IN SENEGAL

□ **2008 : first concession covering St-Louis, Dagana and Podor countries :**

- Consistency : electrification, distribution and operation.
- Goals : electrification of more than 550 villages. Households to be electrified during 3 years time are around 20 000, including :
 - ✓ 14 000 households via the electricity network ;
 - ✓ 5 800 households through individual PV.
- Duration of concession: 25 years.
- Creation of SPC "Compagnie Maroco-Sénégalaise d'Electricité de Saint Louis S.A " (COMASEL), with IFC partnership (16,6% of capital).

□ **2009 : second concession covering Louga, Kébémér and Linguère central northern countries :**

- Consistency : electrification, distribution and operation ;
- Goals : electrification of 372 villages. Households to be electrified during 3 years time are around 11 800 ;
- Duration of concession : 25 years ;
- Creation of SPC "COMASEL de LOUGA" with IFC partnership (19,9% of capital).



OTHER REFERENCES WITH AFRICAN COUNTRIES



SENEGAL

Partner : SENELEC

- 2004-2005 : Tariff study
- 2006-2007 : Supervising new power plant project (60 MW - Bel Air in Dakar)
- 2008-2009 : Supervising new power plant (60 MW - KAHONE 2, Kaolack)



SIERRA LEONE

Partner: NPA

- 2006 : Ensuring electricity supply of Freetown:
 - Re-establishment of power plants of kingtown
 - Upgrade the distribution grid



CHAD

Partner: STEE

- 2007 : Technical assistance to upgrade the distribution grid of N'djamena
- Managerial assistance



GAMBIA

Partner: NAWEC

- 2010: Construction supervision of the 9 MW diesel plant in Brikama-Banjul
- 2012: Construction supervision of 20 MW diesel plant in Brikama-Banjul (2nd part)





Thank you for your attention

