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Renewable Energy Policies Case Study For Morocco

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Country Brief

❖ **Governance System: Constitutional, democratic, parliamentary and social monarchy**

❖ **Key economic sectors: Agriculture, tourism, phosphates, textiles;**

❖ **Main Trade partners: France, Spain, China, USA, Italy, Germany, Saudi-Arabia, Russia**

❖ **Area: 710 850 km²**

❖ **Population: 33.8 millions**

- **Urban: 20.4 millions**
- **Rural: 13.4 millions**

❖ **GDP: 102.8 USD billion**

❖ **GDP per Capita: USD 3,036**

❖ **GDP growth: 2,6%**

❖ **GDP by sector:**

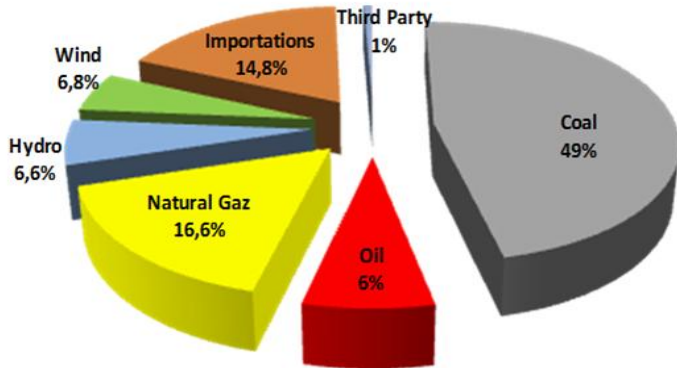
- **Primary sector: 13%**
- **Secondary sector: 29%**
- **Tertiary sector: 58%**

❖ **Unemployment rate: 9.9%**

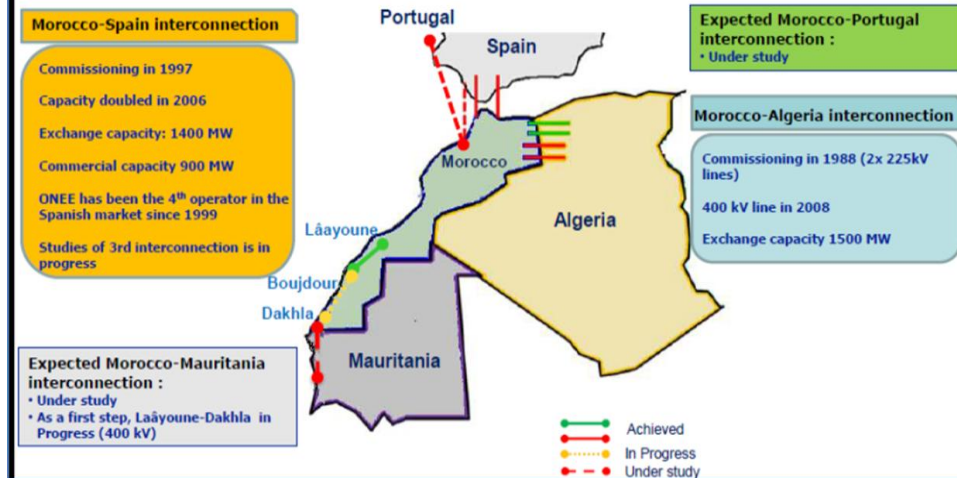
- **Urban: 14.8%**
- **Rural: 4.2%**

Energy Sector Characteristics

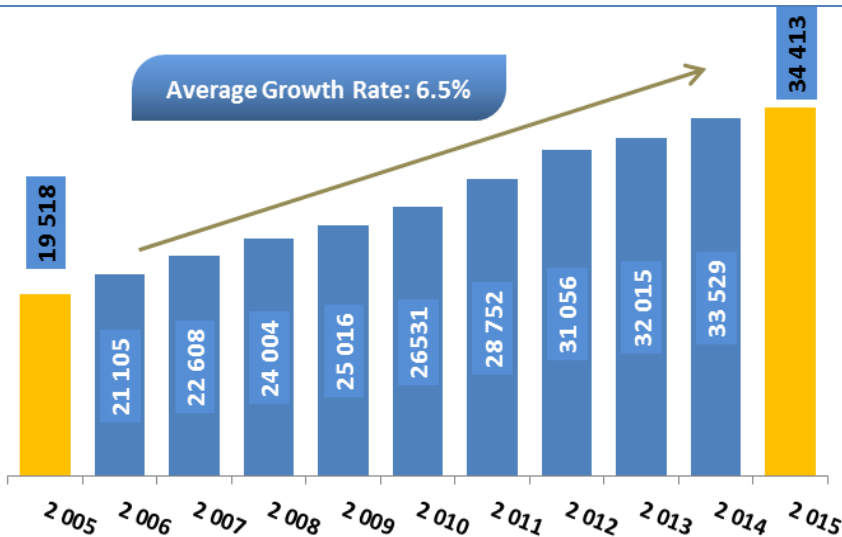
Energy Generation in 2015: 34 400 GWh



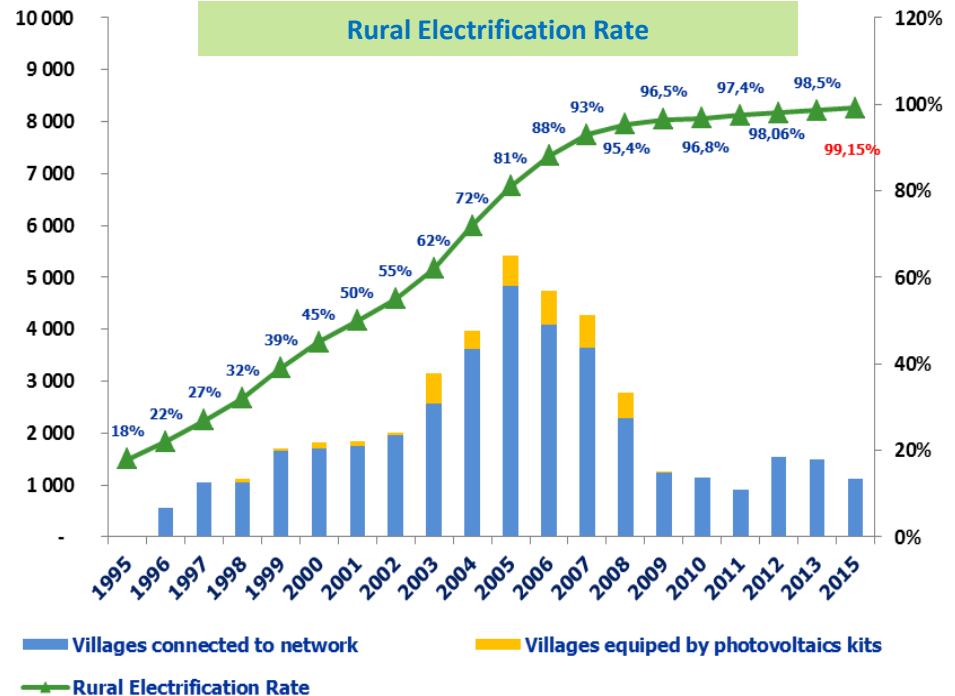
Electricity Interconnections



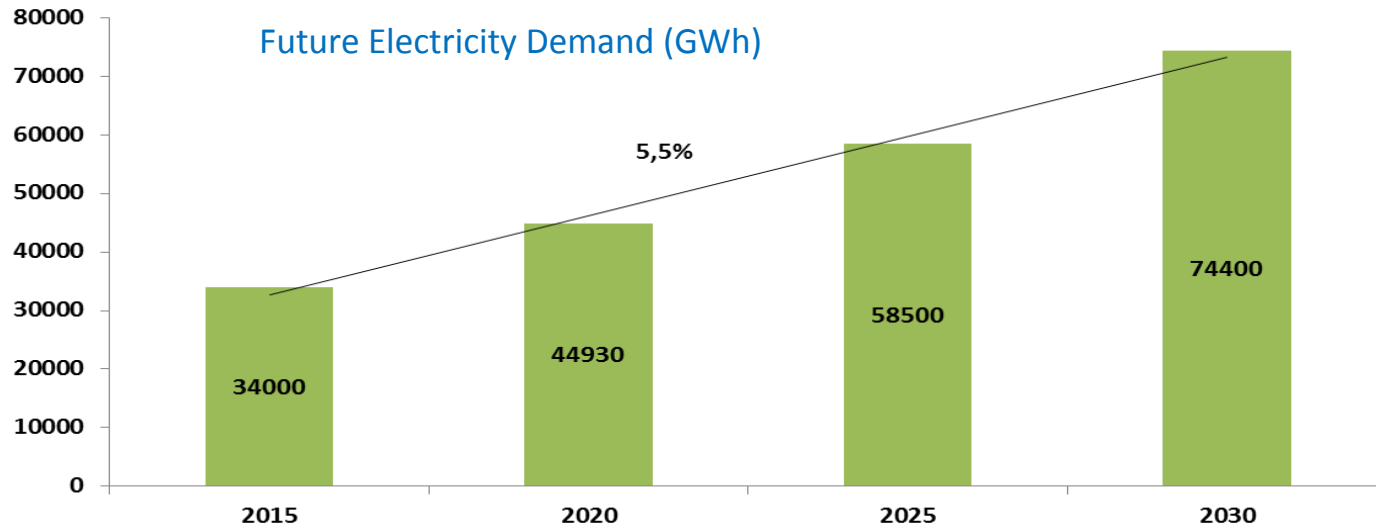
Electricity Demand Growth (GWh)



Rural Electrification Rate



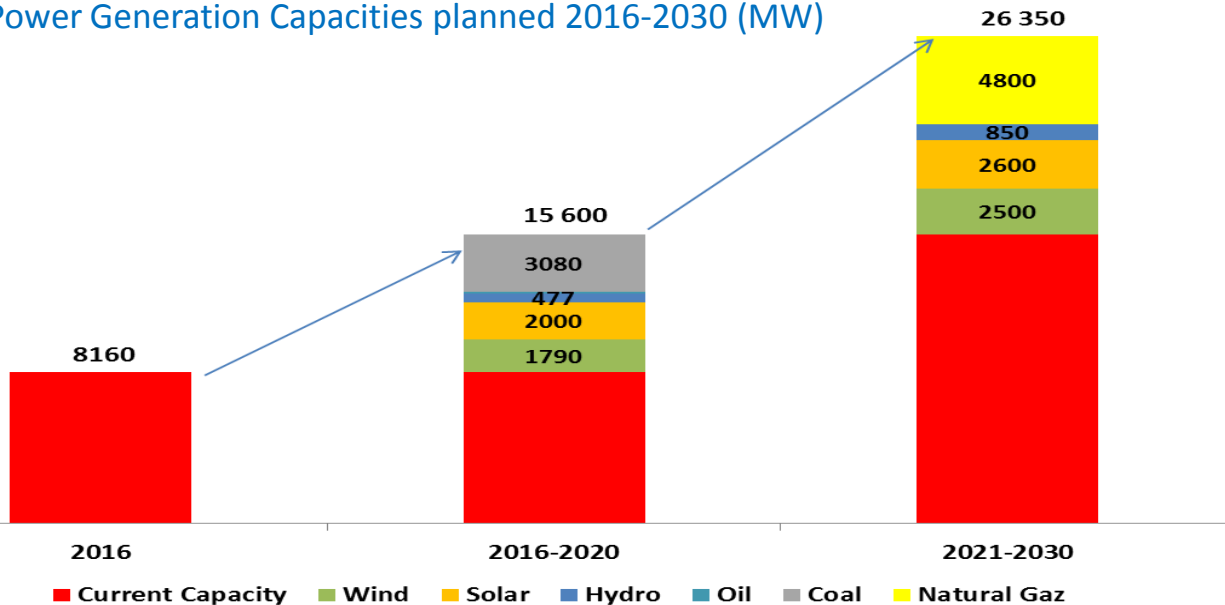
Energy Sector Characteristics



The factors explaining this increase are:

- Economic and industrial development,
- Demographic growth,
- Improved access to electricity (improving from 22% in 1996 to 99.15% in 2015)
- The diffusion of household appliances

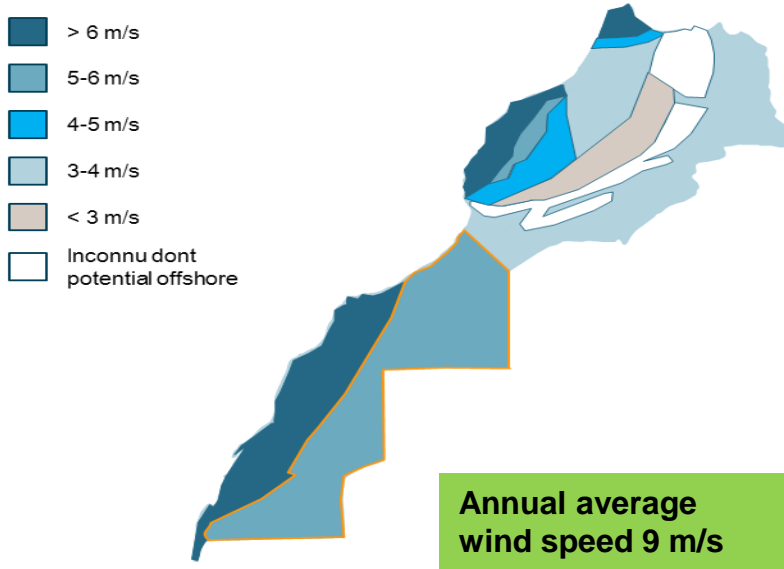
Power Generation Capacities planned 2016-2030 (MW)



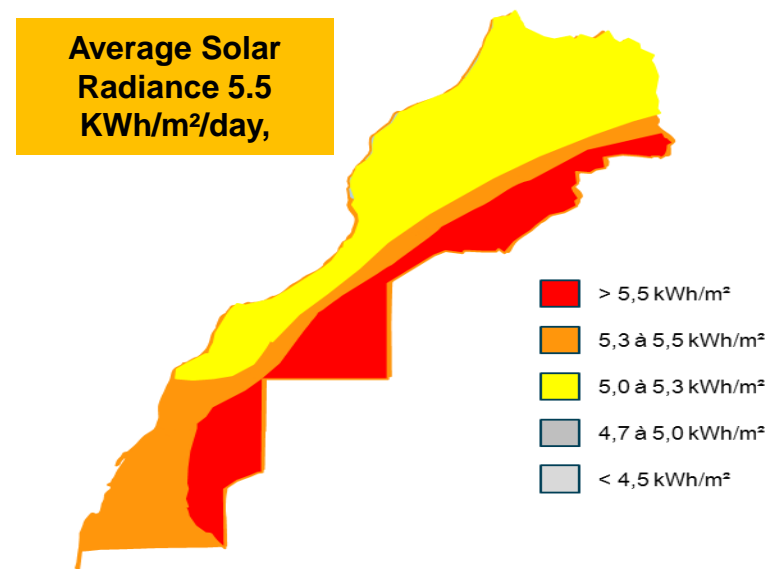
Planned Capacity to develop:
18 200 MW with more than
56% in RE.

RE Potential

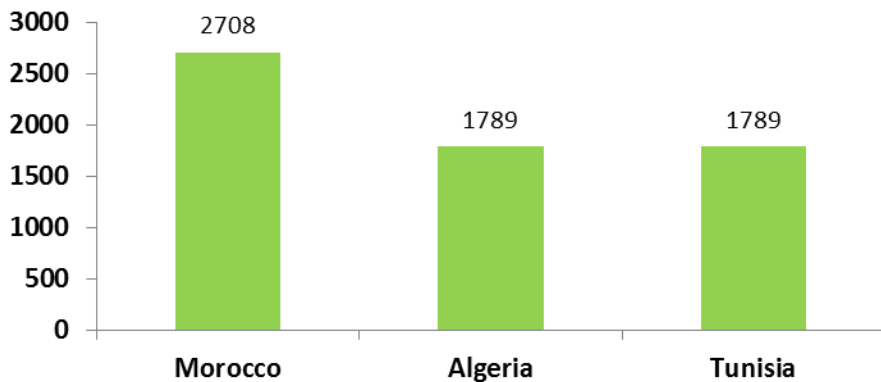
Wnd Potential Map



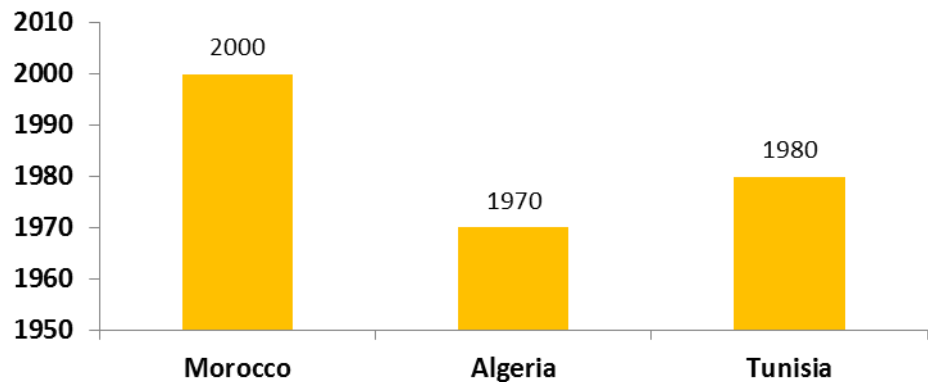
Solar Potential Map



Wind Full Load (Hours/year)



Solar GHI (kWh/m²/year)



Current Policy Status

Challenges of Moroccan Power Sector

- ❑ Demand Growth (quadrupling by 2030)
- ❑ Strong Dependency on foreign supply (more than 93% of energy consumption is imported)
- ❑ High volatility of energy prices
- ❑ Environmental issues
- ❑ Concerns to preserve citizens' purchasing power and to strengthen the competitiveness of local companies

Current Policy Status

Moroccan Energy Strategy

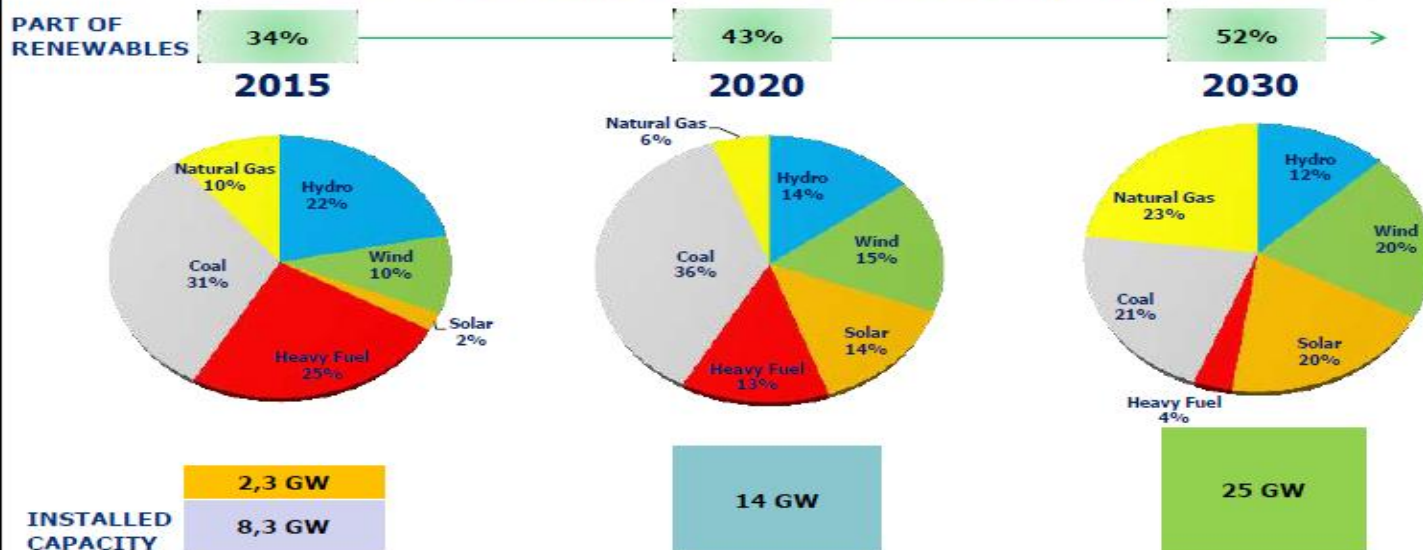
MAIN GOALS

- 1 Security of Supply
- 2 Generalized access to the electricity at moderate prices
- 3 Demand side management
- 4 Environmental protection issues

STRATEGIC ORIENTATIONS

- 1 A mix diversified and optimized around a choice of reliable and competitive technologies
- 2 Mobilization of national resources by increasing renewables part in the energy mix
- 3 Energy efficiency as a national priority
- 4 Regional integration

RENEWABLES will increase up to 52% of the Capacity Mix by 2030



30 Billions US\$: Total Investments between 2015 and 2030

Current Policy Status

Regulatory Framework

- ❖ **LAW 16-08,**
Self-production threshold to 50 MW (from 10 MW) / granted access to the grid
- ❖ **THE RENEWABLE ENERGY LAW (NO. 13-09):**
Promote RE production (Public & private)
- ❖ **THE LAW (NO. 58-15 AMENDING THE EXISTING LAW 13-09 OF RENEWABLE ENERGY:**
Raise the minimum capacity of hydro power project from 12 MW to 30 MW
Open of access to Low Voltage distribution network,
- ❖ **LAW 54-14 (DAHIR OF 1ST OF JULY 2015) MODIFYING THE PROVISIONS ON SELF-PRODUCTION (FOR ALL GENERATION SOURCES)**
Open access to Self-Producers with global capacity of more than 300 MW
- ❖ **THE DECREE N° 2-15-772 OF 28 OCTOBER, 2015 RELATED TO ACCESS TO MV GRID (5.5 KV AND 22 KV)**
Specify the conditions and processes of access to Medium Voltage Grid
- ❖ **LAW 58-15 AMENDING THE RENEWABLE ENERGY LAW N° 13-09**
Introduces a net metering schemes for solar and wind power plants connected to low voltage level

Current Policy Status

Supporting Institutions

ADEREE (*)

Develop and promote RE and EE

MASEN (*)

carry out a program for developing integrated solar power generation projects with a minimum 2 000 MW in total capacity

SIE

created in 2009 to help accelerate deployment of efficient energy solutions

IRESEN

Founded in 2009 to promote research, development and innovation of RE technologies.

ANRE

National Authority for Electricity Regulation (**ANRE**) created, in April 2016; Ensure well-functioning of RE market & regulate access to the grid.

(*) By a new law,

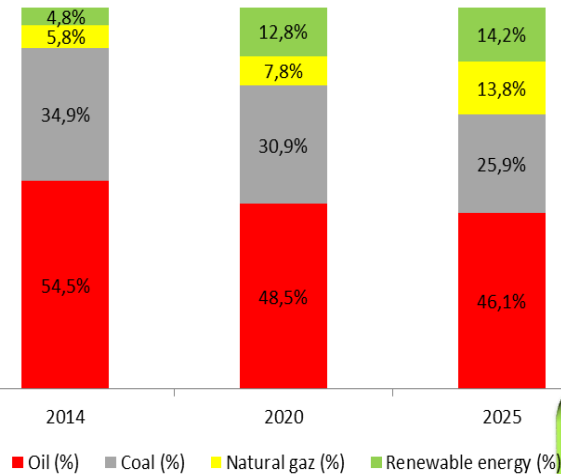
- MASEN is now in charge of the realization of all RE projects
- ADEREE is renamed “Moroccan Agency of Energy Efficiency” and focus on EE

Impact on Policy Measures

Reduction of GHG emissions to **32%** below BAU emission levels by 2030

MITIGATION CLIMATE CHANGE AND ADAPTATION

Energy Balance 2020-2025



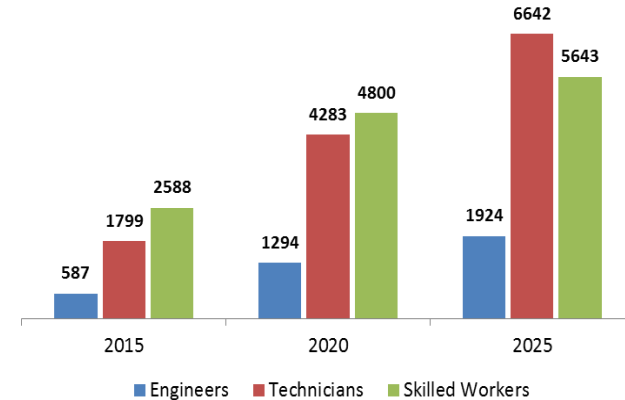
Reduction of Dependency from **94%** in 2014 to **85%** in 2025

Impact on Policy Measures

PROMOTING ENERGY SECURITY AND RESILIENCE

LOCAL ECONOMY AND JOB CREATION

-Job creation potential of RE over **23 000 jobs** in 2020.
 -Training needs in RE by 2020 : **4,300** technicians, **4800** skilled workers and **1,300** engineers



Policy Design Consideration

1. INCREASING ENERGY DEMAND:

Expected to double by 2020 and to triple by 2030

2. ENERGY IMPORT DEPENDENCE:

Current dependency: 94%.

3. ENERGY PRICES FLUCTUATIONS:

The energy imports affect negatively Morocco's trade balance

4. INCREASING CO2 EMISSIONS:

The energy consumption is highly dominated by fossil fuels.

5. THE GEOGRAPHICAL LOCATION OF MOROCCO

6. THE HIGH POTENTIAL OF RE THROUGHOUT THE TERRITORY

Policy Design Consideration

7. THE WELL SETUP AND DESIGN OF THE RE PROGRAMS
8. THE SUCCESS IN BUILDING UP STRONG AND EFFECTIVE PARTNERSHIP
9. THE SETUP OF AN INNOVATIVE AND VERY EFFECTIVE BUSINESS MODELS
10. ESTABLISHMENT OF A TRANSPARENT AND ADEQUATE LONG-TERM AGENDA FOR THE PLANNED PROJECTS;
11. SETTING UP LOCAL CONTENT REQUIREMENT
12. VERY COMPETITIVE MARKET

Barriers still to be removed

ECONOMICS AND FINANCIAL BARRIERS

- ❖ Lack of accessible financial support for small scale projects
- ❖ High initial capital

POLITICAL, INSTITUTIONAL AND REGULATORY BARRIERS

- ❖ Barriers to entry for smaller producers
- ❖ Lack of cooperation and synergetic collaboration between the various stakeholders

TECHNICAL BARRIERS

- ❖ Intermittency management of renewable energies

Conclusions

❖ The major issues that Morocco is faced:

water stress, land degradation, strong energy dependence, vulnerability to climate change

❖ Green Economy as a strategic orientation

Targets: **42% of RE by 2020 and 52% by 2030**

❖ Major progress:

Institutional level (MASEN, ADEREE, SIE, IRESEN, ANRE)

Major Projects (Ouarzazate CSP 160 MW, Integrated Wind Program of 850 MW, 797 MW of Wind installed capacity)

Legislative framework: Law 13-09 and decrees

❖ Moroccan Business Model: Public-Private Partnership

The know-how of the private sector

Financial arrangements combine domestic and foreign public and private funds

Successful model to duplicate for African and Arab countries

Recommendations

❖ **Connect RE to Low Voltage (LV) grid:**

- Set up a suitable legal framework and financial mechanism (RE connected to LV grid)
- Set up of a connection code of the RE system to the LV grid
- Introduce Smart metering and smart grid technologies.

❖ **Support for technical measures:**

- Enlargement & improvement of the network infrastructure,
- Generation flexibility,
- Demand-Response mechanisms,
- Storage
- Forecasting tools of RE.
- Sizeable capacities of hydro pumped storage and thermal storage

❖ **Support for financing:**

Mechanisms and national/international micro-financing tools for small scale renewable energy projects.

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