

Africa LEDS Partnership 2016 Annual Workshop

Implementation of Morocco's Solar Energy Plan



Moroccan Solar Energy Plan.
Kigali, 27 June 2016

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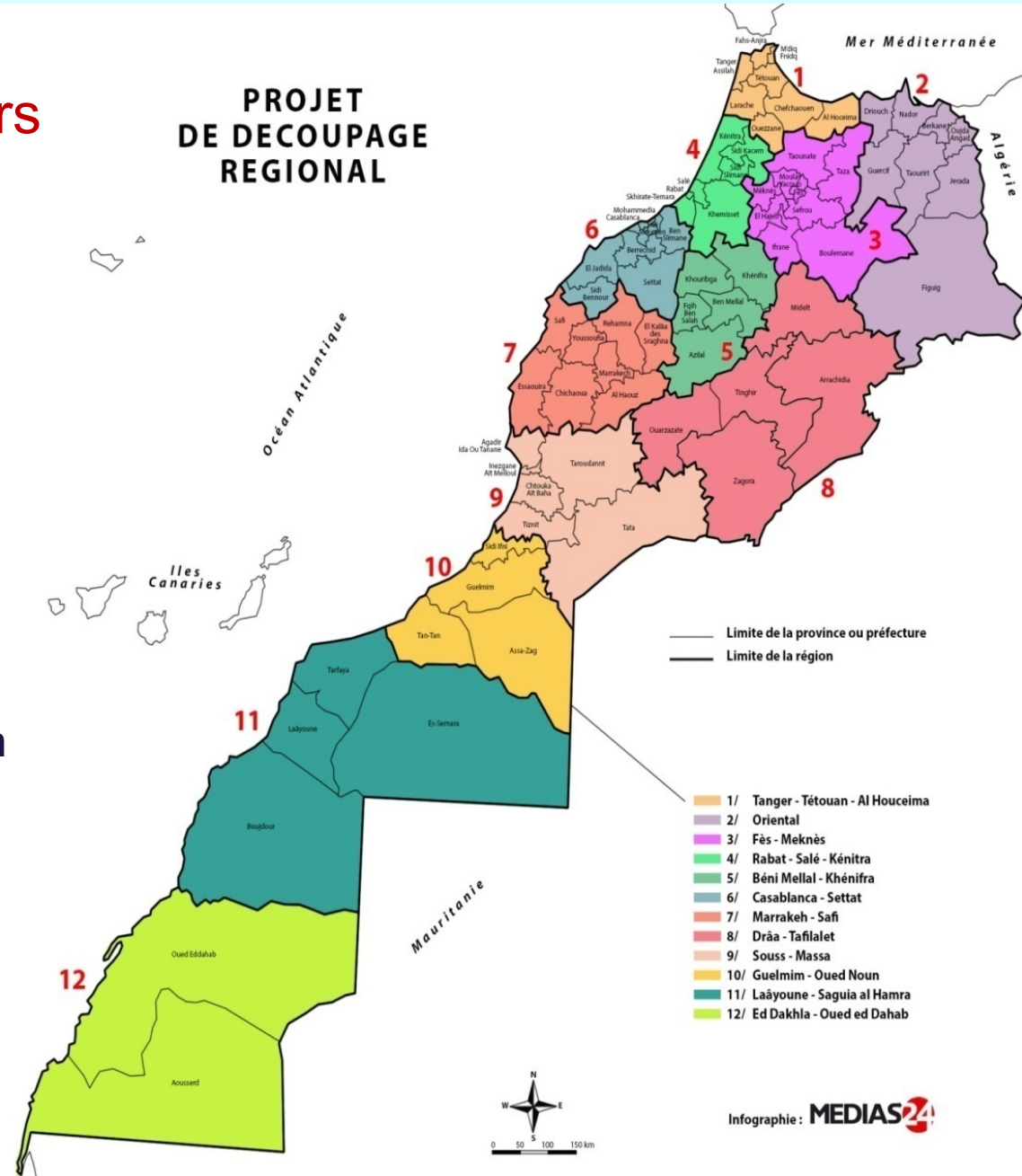
Morocco' Solar Energy Plan

Outline

1. Morocco in few numbers
2. Moroccan Institutions in the Energy Sector
3. The legal framework
4. The Moroccan 'Solar Energy Plan' (NOOR)
5. Programmes of the 'Solar Energy Plan'
6. Implementation of the SEP by MASEN

1. Morocco in few numbers

- Country's area 710,800 km²
- Population 34 million
- Pop. growth rate 1.25 %
- Urbanization rate 60%
- Pop. Rabat : 565,000
- Pop. Casablanca : 3.5 Million



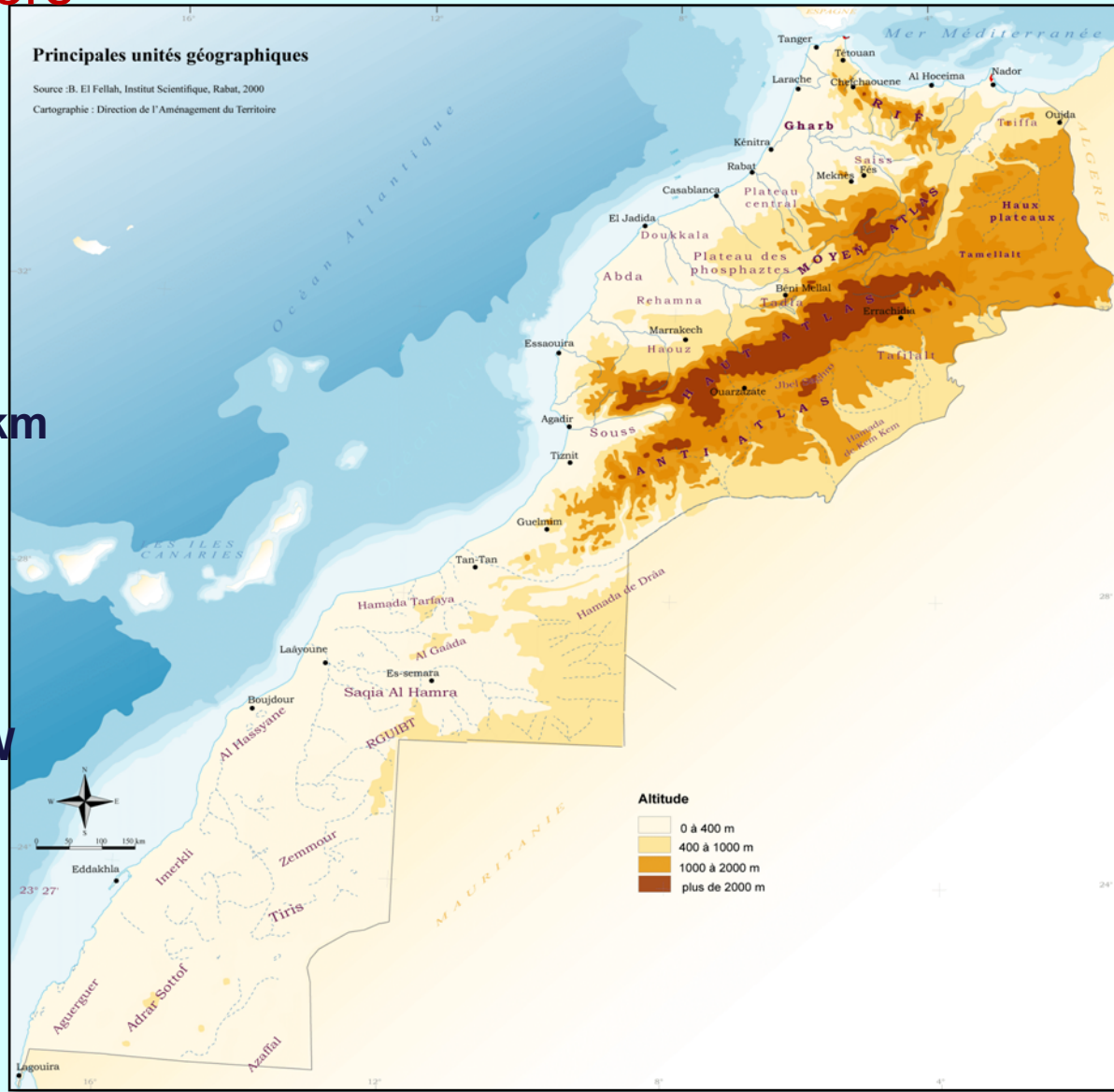
1. Morocco in few numbers

- 4 mountain ranges
 - Rif 2,465 m
 - Anti-Atlas 2,531 m
 - Middle Atlas . 3,326 m
 - High Atlas4,165 m

- Length of coastline 3,400 km

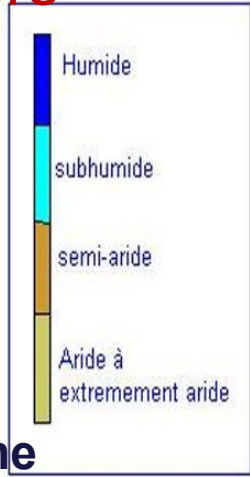
- Wind speed at 40 m along the coast
7.5 - 9.0 m/s

- Wind energy potential 25 GW

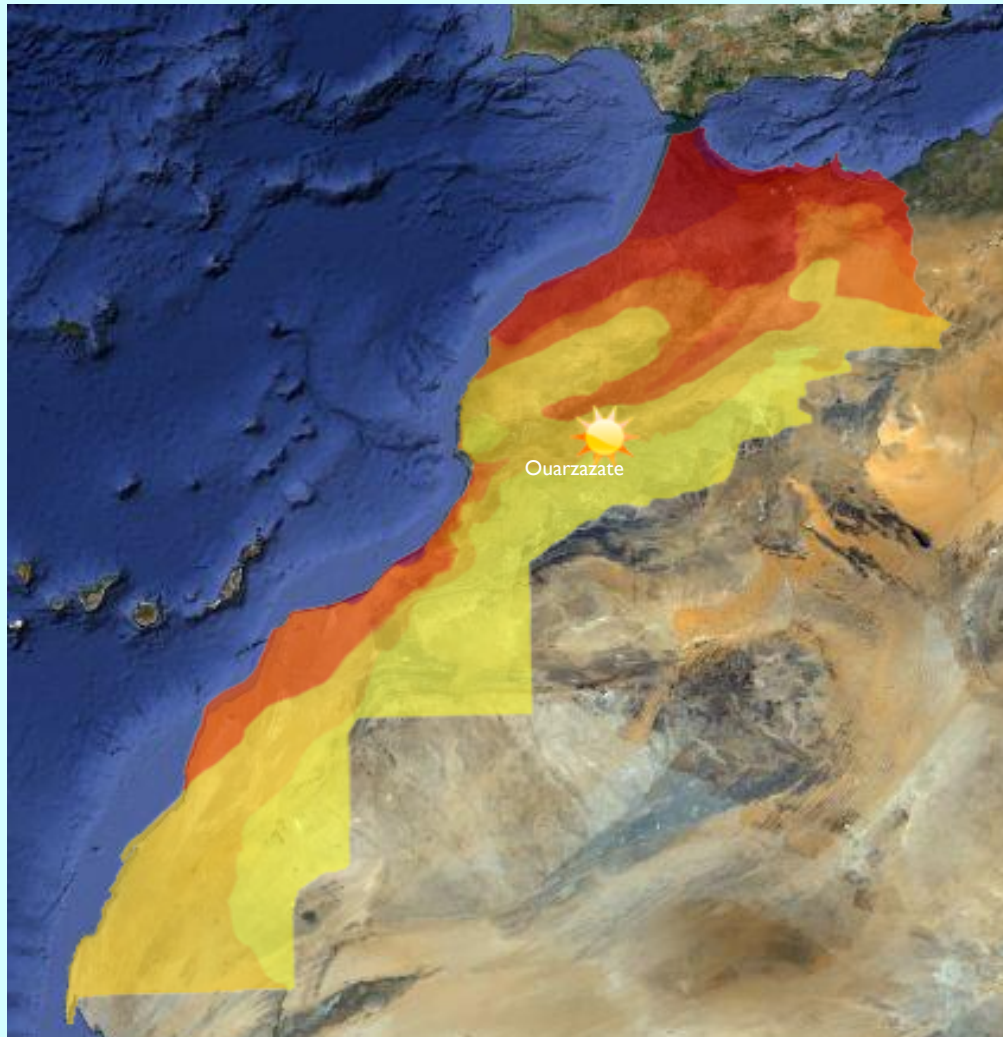


1. Morocco in few numbers

- **3 climate zones :**
 - **Subhumid**
 - **Semi-arid**
 - **Arid**
- **3000 hours / year of sunshine**
- **Irradiation of ~ 5 kWh / m² / day**
- **Energy consumption per capita 0.54 toe / yr**
- **Electricity 980 kWh / ca /yr**
- **GHG emissions / capita 3.1 tCO₂e in 2012**



1. Morocco in few numbers



insolation map



Rayonnement solaire
direct annuel

2. Moroccan Institutions in charge of the Energy Sector

- Ministry of Energy Mines Water & Environment
- ONEE : Office National de l'Eau et de l'Electricité
- **MASEN** : Moroccan Agency for **Solar** Energy (2010)
- ADEREE : Agence de Développement des EnR et de l'Efficacité Energétique
- IRESEN: Institut de Recherche en Energie Solaire et Energies Nouvelles
- SIE: Société d'Investissement Energétique

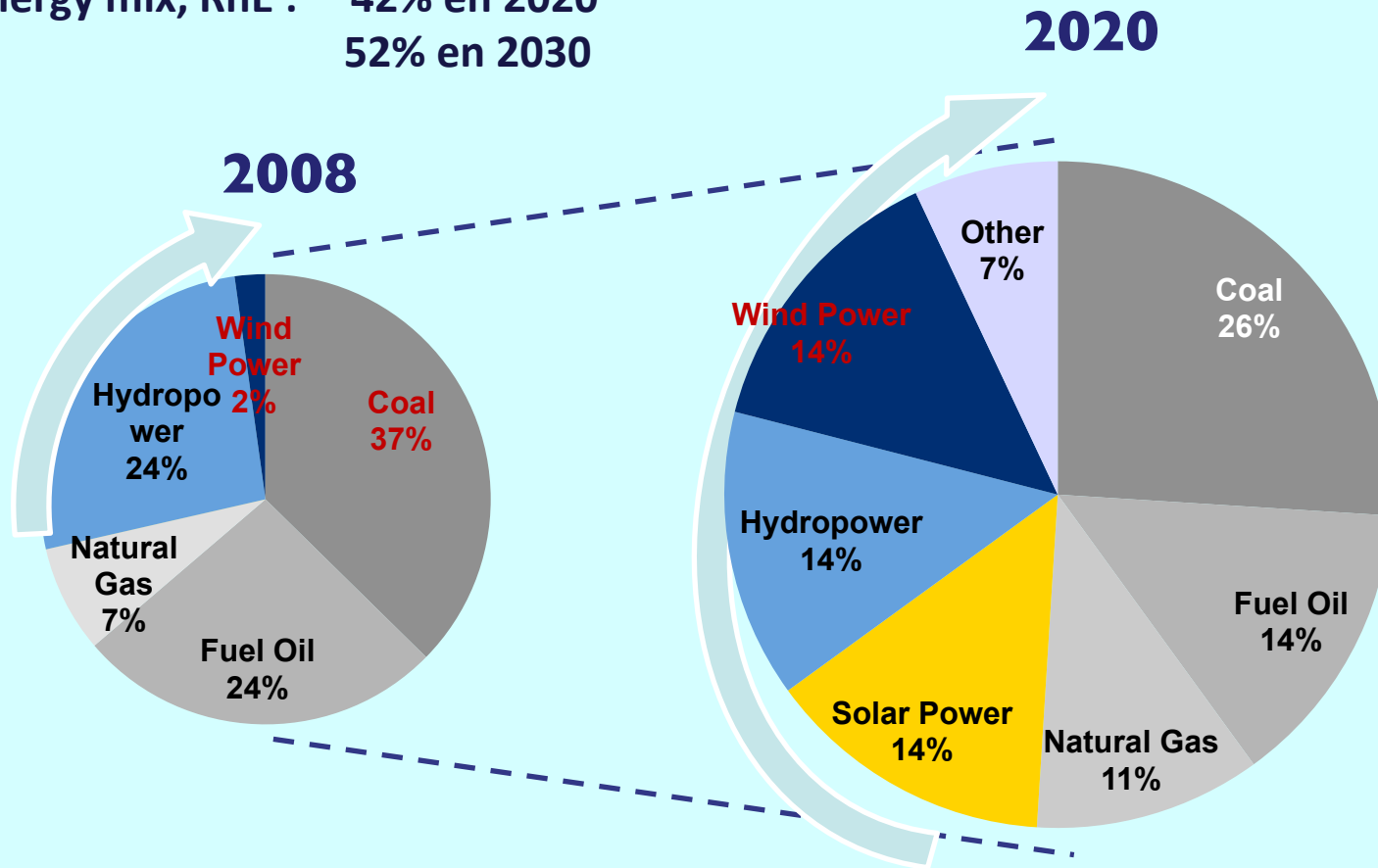
3. Legal Framework for renewables

- The bill 13-09 on renewable energy (Feb. 2010) completed by the bill 58-15

Opens the electricity market to renewables by promoting the production, sale and export of green power by public and private entities.

4. Moroccan Solar energy plan : NOOR

In the energy mix, RnE : 42% en 2020
52% en 2030



4. Moroccan Solar energy plan : NOOR

- Goal of the Solar plan by 2020 : 2000 MW (launched)
- 2016 : 160 MW achieved (Ouarzazate site) + small scale PV
- Solar capacity that would be achieved:
 - By 2025 1000 MW
 - By 2030 1000 MW

Moroccan Solar Plan in the INDC

In the Moroccan INDC, by 2030

- Solar power
 - CSP + PV : 2000 MW Solar Plan
 - PV, MV : 1000 MW Conditional
 - PV, LV : 1000 MW Conditional
- Solar water heaters
 - 1.7 M m² (installed in 2015: 400,000 m²)



5. Programmes of the SE Plan: NOOR

Ouarzazate Solar Power Plant programme

projects	Tech nology	Capacity MW	Start building	Start operation
Noor 1	CSP	160	2013	2016 (Feb)
Noor 2	CSP	200	2015	2018
Noor 3	CSP+Tw	150	2015	2018
Noor 4	PV	70	2017	2019
Total		530 MW		

5. Programmes of the SE plan: NOOR

Midelt Solar Power Plant programme

project 1 : 400 MW CSP + PV

building to start by 2017/18

operation by 2020/21

project 2 : tbd



5. Programmes of the SE plan: NOOR

Noor Programme PV1

Site	Capacity MW	Start building	Start operation
Ouarzazate	70	2017	2019
Laayoune	80	2017	2019
Boujdour	20	2017	2019
Total	170 MW		2020



Noor Programme PV2 underway

6. Implementation of the SEP NOOR

MASEN in charge of the implementation of

- the solar energy plan NOOR
- the wind energy plan (soon, instead of ONEE)

MASEN implements its prog with three visions

- local development (education, health, environment,...)
- industrial integration (cluster of solar enterprises, ...)
- international North-South-South cooperation
(MoUs with Senegal, Tunisia, Côte d'Ivoire,
underway with Benin, Burkina Faso, Mali, Djibouti, ...)

6. Implementation of the SEP NOOR

MASEN implements and finances its programs with

- the government's policy support
- participation and the guarantee of the SIE
- International finance (CIF, WB, ADB, EIB, KfW, AFD)
- Bilateral technical assistance (GIZ)

- Accreditation of MASEN by the GCF is underway

6. Implementation of the SEP NOOR

How MASEN operates ? In 3 steps :

1. Technical & operational aspects

- Land identification and acquisition
- Site qualification (through measurements & studies)
- Technical configuration (technology, capacity, ...)
- Putting in place the infrastructure

2. Institutional structuring

- Institutional set up
- Business model

3. Call for tenders (call for expression of interest, short list, tendering & select on of contractor)



Thermal Solar Power Unit of Ouarzazate (Noor 1, 450 ha)



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