MENA CSP KIP initiatives for development of CSH

Morocco
IN MOROCCO, AN AMBITIOUS ENERGY STRATEGY HAS BEEN SET TO MEET THE NATIONAL NEEDS

Energy consumption increase: ~ 6% per year

Energy dependence: ~ 95%

Objectives of the Moroccan Energy Strategy

- Securing energy supply
- Facilitation and optimization of energy access
- Rationalization of energy consumption
- Protection of the environment through clean energy

4 clear priorities

1. Diversification of energy supply
2. Development of domestic energy resources, particularly the Renewable Energy
3. Maximization of energy efficiency potential
4. Integration of regional and international energy markets
MASEN: A DEDICATED ACTOR RELYING ON A STRONG LEGAL AND INSTITUTIONAL FRAMEWORK

**Legal framework**

- **Object**
  Development of solar integrated projects with a target of at least 2000 MW by 2020

- **Legal Form**
  Limited liability company, created in March 2010

- **Shareholding**
  State, ONEE$^{(1)}$, Hassan II Fund$^{(2)}$ and SIE$^{(3)}$ - equal shares

**Institutional framework**

- **State-Masen Agreement (decree):** Conditions, technical requirements and guarantee of the financial equilibrium of Masen’s projects

- **State-ONEE-Masen Agreement:** Take or pay including terms and conditions for the purchase, supply, transport and commercialization of electricity produced

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(1) ONEE: Office National de l’Électricité et de l’Eau, the national utility
(2) Hassan II Fund for Economic and Social Development
(3) Société d’Investissements Énergétiques
(4) Except the assets dedicated to the stabilization of the grid
MORE THAN 1500 MW OF SOLAR CAPACITY HAVE BEEN LAUNCHED IN ORDER TO ACHIEVE THE 2020 TARGET

<table>
<thead>
<tr>
<th>NOORo I</th>
<th>NOORo II</th>
<th>NOORo III</th>
<th>NOOR PV I</th>
<th>NOOR Midelt</th>
</tr>
</thead>
<tbody>
<tr>
<td>In operation</td>
<td>Under construction</td>
<td>Under construction</td>
<td>Under construction</td>
<td>Under development</td>
</tr>
</tbody>
</table>

- **CSP Parabolic Through**
  - 160 MW, 3h Storage
- **CSP Parabolic Through**
  - 200 MW, >7h Storage
- **CSP Tower**
  - 150 MW, >7h Storage
- **Photovoltaïc**
  - 170 MW
- **Hybrid PV and CSP**
  - Between 150 MW and 190 MW of CSP for each project*

*PV Capacity to be defined by Bidders taking into account RfP requirements*
SOLAR CLUSTER: A DEDICATED ACTOR FOCUSING ON INDUSTRIAL DEVELOPMENT OF MOROCCAN COMPANIES

2014

Creation

- Collaborative projects
- Synergies
- Laws...

Institutional Framework

- Incentives for innovation
- Local products development
- ...

Private sector

Innovation Framework

- Industrial innovation
- Capacities building
- Advisory
SOLAR CLUSTER: A DEDICATED ACTOR FOCUSING ON INDUSTRIAL DEVELOPMENT OF MOROCCAN COMPANIES

- Innovation Framework
- Private sector
- Institutional Framework
- CLUSTER SOLAIRE
- Collaboration projects
- Synergies
- Laws...
- Industrial innovation
- Capacities building
- Advisory
- Incentives for innovation
- Local products development
- ...
CSH IN MOROCCO: PILOT PROJECTS AND REAL OPPORTUNITIES FOR A LARGE DEVELOPMENT

→ Existing CSH projects in Morocco

→ Pilot experiences in different sectors

→ Incentives: subsidies and technical assistance
CSH IN MOROCCO: PILOT PROJECTS AND REAL OPPORTUNITIES FOR A LARGE DEVELOPMENT

COPAG (50 kW) - Taroudannt

- Roof Installation
- Capacity of 50 KWth to produce 112 MWh/year
- Sterilization of milk production materials
- Savings of 10 873 m3 of gas per year
- Technical assistance and grants from GIZ, Solar Cluster
CSH IN MOROCCO: PILOT PROJECTS AND REAL OPPORTUNITIES FOR A LARGE DEVELOPMENT

- Pilot project with innovative technology of cylindro-parabolic mirrors and organic Rankine cycle
- Installed capacity 3,9 MWth to produce 1 GWh/year.
- Additional production of electricity using an organic fluid.

Ciments du Maroc (3,9 MW) – Ait Baha

- Pilot project with innovative technology of cylindro-parabolic mirrors and organic Rankine cycle
- Installed capacity 3,9 MWth to produce 1 GWh/year.
- Additional production of electricity using an organic fluid.
CSH IN MOROCCO: PILOT PROJECTS AND REAL OPPORTUNITIES FOR A LARGE DEVELOPMENT

- **Technological hub for CSP**
- **Very large scale projects**
- **What about small scale CSP projects?**
- **What about industrial uses of CSP technology?**

<table>
<thead>
<tr>
<th>Project</th>
<th>Status</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOOR I</td>
<td>In operation</td>
<td>CSP Parabolic Through 160 MW, 9h Storage</td>
</tr>
<tr>
<td>NOOR II</td>
<td>Under construction</td>
<td>CSP Parabolic Through 200 MW, 9h Storage</td>
</tr>
<tr>
<td>NOOR III</td>
<td>Under construction</td>
<td>CSP Tower 150 kW, 9h Storage</td>
</tr>
<tr>
<td>NOOR PV I</td>
<td>Under construction</td>
<td>Photovoltaïc 170 MW</td>
</tr>
</tbody>
</table>

*PV Capacity to be included and taken into account if FI requirements.*
MOROCCO CSP KIP: ONE OBJECTIVE THROUGH THREE ACTIONS

Action 1: Identify the development potential in industrial sectors
Action 2: Develop demonstrative projects
Action 3: Capacities building

Development of small scale CSP projects/CSH
**Action 1:**

**Identify the development potential in industrial sectors**

### Besoins en température des secteurs industriels sélectionnés

<table>
<thead>
<tr>
<th>Niveau de température (°C)</th>
<th>BAS</th>
<th>MOYEN</th>
<th>HAUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>50</td>
<td>100</td>
<td>250</td>
</tr>
<tr>
<td>Industrie chimique</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produit minéraux non métalliques</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agro-alimentaire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papier et Carton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrie automobile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caoutchouc et plastiques</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Textile</td>
<td></td>
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</tbody>
</table>

**Collecteurs solaires classiques**

- Petites installations de réflecteurs cylindro-paraboliques ou réflecteurs linéaires de Fresnel sans receveurs à vide

**Disques paraboliques**

- Grandes installations de réflecteurs cylindro-paraboliques ou réflecteurs linéaires de Fresnel avec receveurs à vide
MOROCCO CSP KIP: ONE OBJECTIVE THROUGH THREE ACTIONS

**Action 1**

Identify the development potential in industrial sectors

![Diagram showing the development potential in various sectors](image)
MOROCCO CSP KIP: ONE OBJECTIVE THROUGH THREE ACTIONS

**Action 2**
Develop demonstrative projects

**Action 1: Outputs**
- Projects size
- Investment capacity
- Heat demand
- Economic sectors

**Need to develop an incitative framework**
- Grant
- Technical assistance
- Networking
- Promotion

**IndUse CSP**
First call for proposals in Morocco dedicated to CSP/ CSH

**Targets of IndUse CSP**
- Industrial demonstration
- Thermal application
- Small capacity < 400 kWth

**All CSP/CSH technologies**
- Moroccan companies/ Industry & Services
- <500 kUSD

**Moroccan Engineering**

**Technology providers**
## MOROCCO CSP KIP: ONE OBJECTIVE THROUGH THREE ACTIONS

### Action 2

**Develop demonstrative projects**

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch of the call for proposals</td>
<td>Proposals Shortlist</td>
<td>Detailed projects</td>
<td>Selection of the final projects</td>
<td>Final approval and signature of the financing contract</td>
</tr>
</tbody>
</table>

#### Details:

- **Official launch**: 24/07/2018
- **Preparation of applicants**: 17/09
- **Evaluation of proposals**: End of September
- **Establishment of the shortlist**: Start of November
- **Feasibility studies**: End of November
- **Evaluation of the projects**:
- **Financial and technical feasibility projects**: (optional)
- **Presentation of the projects by the consortium**: (optional)
- **Selection of the projects**: End of November
- **Implementation of the projects**:
MOROCCO CSP KIP: ONE OBJECTIVE THROUGH THREE ACTIONS

Action 2
Develop demonstrative projects

Phase 1: Launch of the call for proposals
- Official launch: 24/07/2018
- Preparation of applicants: 17/09

Phase 2: Launch of the call for proposals

Phase 3: Detailed Projects

Phase 4: Selection of the final projects

Phase 5: Final approval and signature of the financing contract

- Evaluation of proposals
- Establishment of the shortlist
- WB approval
- Implementation of the projects
- Signature of financing contract
- Evaluation of the projects
- Selection of the projects
- Presentation of the projects by the consortium (optional)

1- Real dynamic and interest of moroccan companies, especially for CSH
2- Different economic sectors: Agribusiness, textile sector, hotels, cars industry
3- Dissemination of information
4- Reduction of investment barriers

Engineering companies that start a capacity building of HR in CSH/small scale CSP projects
MOROCCO CSP KIP: ONE OBJECTIVE THROUGH THREE ACTIONS

Action 3: Capacity building

- Workshops
- Training sessions
- Webinar
MOROCCO CSP KIP: ONE OBJECTIVE THROUGH THREE ACTIONS

Action 3
Capacity building

- First webinar: July 2018
- 5 days workshop in Casablanca, Morocco: October 2018
- Other training sessions: 2019
Thank you!