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Innovative solutions for energy transition in the Tunisian island of Djerba

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National Agency for Energy Management -ANME-

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Summary

1) Tunisian energy transition strategy and main Tools,

2) Tunisian Islands: Kerkenah et Djerba

3) Case study of Djerba: Innovative Energy Transition solutions: Ideas and programs

Tunisian energy transition strategy and main Tools

National Energy Transition

- Important issues of security of energy supply, especially for the electricity sector
- Important economic issues

Worsening energy deficit

4,1 Mtep in 2017

44% of the primary energy demand

Energy security and dependence

Natural Gas: 97% of the power demand

Power Sector

Deficit of the Trade Balance

Energy bill : 21 %

Need for an energy transition policy

- **EE Development**
- **Diversification of the Mix by strengthening RE**

Tunisian energy transition strategy and main Tools

Energy transition strategy

- 30% of RE in the electricity generation by 2030 :Tunisian Solar plan
- 30% of primary energy consumption reduction compared to the Business as Usual Scenario by 2030,
- 41% carbon intensity reduction to the horizon 2030, compared to 2010
- 2.5 millions m² of installed solar water heater by 2030

Tools

- Institutional: ANME, crated in 1985
- Fiscal : Exemption of EE and RE from TVA and customs duties
- Financing: Energy transition Fund, created in 2005 and providing advantages to EE and RE measures : An extension of the eligibility and manner of intervention

-Subsidies
-Soft Credit line
-Investment fund
-Guarantee fund

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Main current programs

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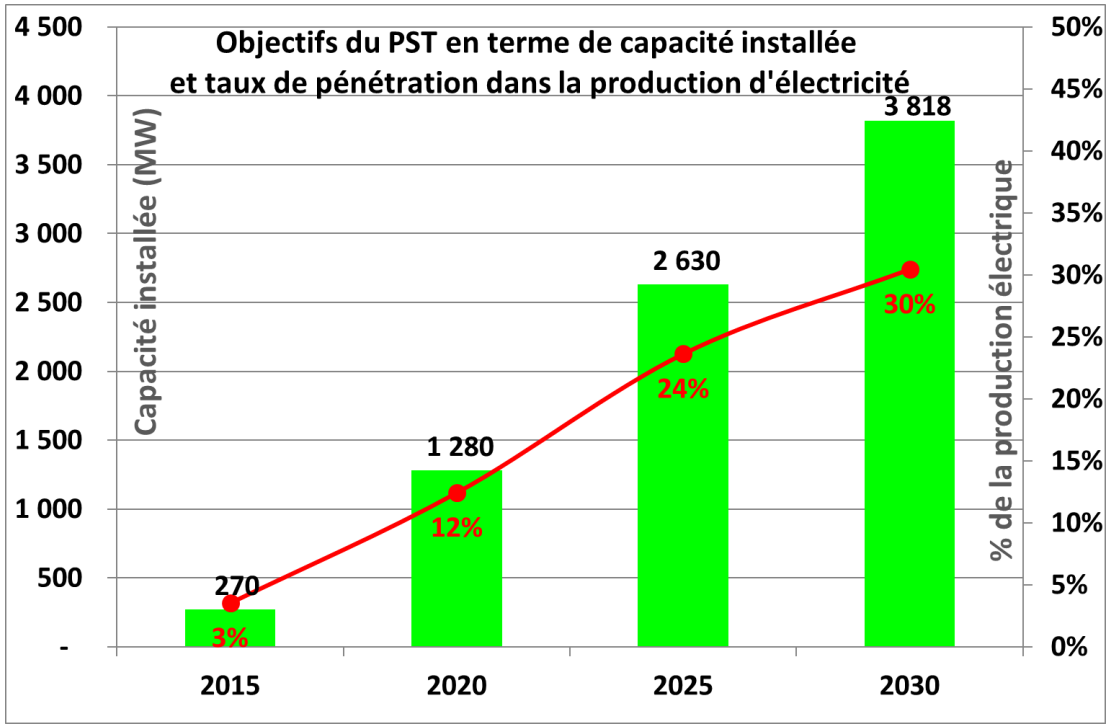
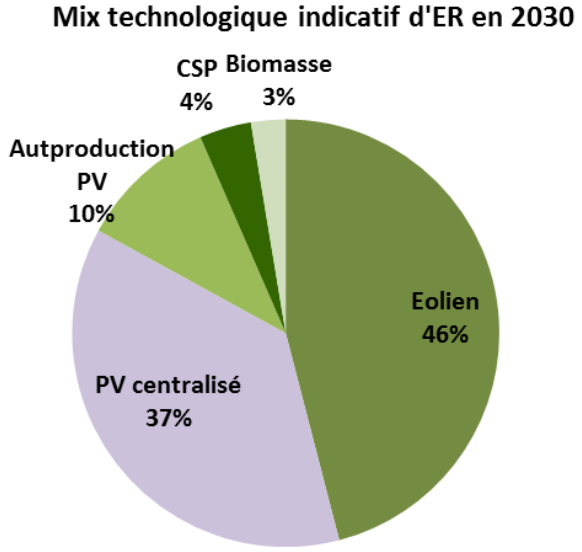
- Private Independent Power Generation from small and medium PV and wind facilities (less than 10 MW for PV and 30 MW for wind)
- PV and wind concession of large facility (1000 MW under bidding)
- Prosol solar water heater: around 70.000 m² per year
- Prosol PV rooftop (LV net metering) : around 15 MW per year
- PromoLed: 4 millions LED with public subsidy
- Promo-Isol: insulation of 65000 roofs,
- Promo-Frigo: Replacement of 400,000 old refrigerators over 10 years old,
- ACTE (Alliance of Municipalities for the Energy Transition): energy audit of the totality of the municipalities (350 municipalities), 11 pilots municipalities,

Objectif du PST

Objectifs du Plan Solaire Tunisien



Mix technologique indicatif du PST



New announced capacity

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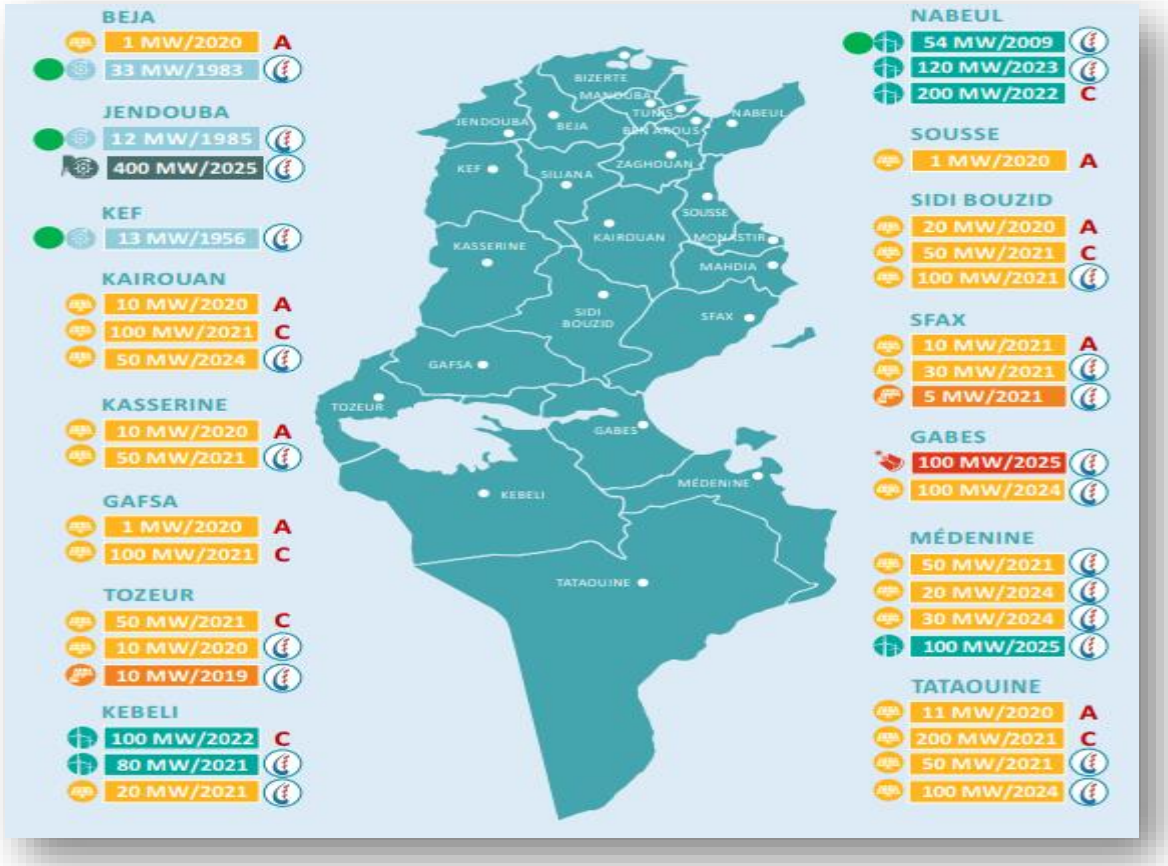

2200 MW
Capacité cumulée

1880 MW
Capacité additionnelle à installer

2 Milliards USD
Investissement Global

22%
Part des ENRs par rapport à l'énergie produit

20/80
Part des investissements Public/Privé

40/60
Part des investissements Public/Privé

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Tunisian Islands
(about 60 islands and islets)

Iles de Kerkennah (1/2)

Area : 160 km²
Number of islands : 14
Main island (s): Chergui et Gharbi
Population : 15 501 hab. (2014)

Kerkennah island(2/2)

- Energy Potential Study of the City of Karkennah is underway
- Consumption 2018 : 21.8 GWH
- Potential RE : 5 MW according to a first estimate. Then 10 MW (information remains unofficial)

- Problem: used infrastructure (cable between Kerkennah and Sfax 12 km in bad condition (cable cost 30 Million dinars (submarine)
- In the study: Reflection on the use of a wind turbine: 7 MW on the island (problem of the infrastructure due to the reactive power)
- Reflection on the long-term offshore (problem of cost !!!)

Îles de Djerba

- Localization: South east of Tunisia
- Area: 517km^2
- 160000 habitants
- Average 1 million of tourists per year
- About 100 hotels including (40739 beds) over 45 km of coastline > The tourism sector absorbs 13736 employees.

Main Challenges of Djerba

Socio-economic challenges

- Tourism based economy
- Seasonal employment
- Crises of the other economy sectors

Environmental challenges : Vulnerability to climate change

- Sea level rise and land submersion (50 cm by 2050)
- Degradation of beaches and decline of seaside tourism (75 to 135 cm/year in case of sea level rise of 50 cm
- Risk of decline of summer tourism because of temperature increase

Energy challenges:

- High cost of supply
- Lack and cost of lands to build power stations, particularly PV power plants

Main energy consumption features of Djerba

Energy consumption of the island

- Total final energy: around 85000 toe
- Electricity consumption: around 300 GWh

Residential sector

- Total final energy: 30000 toe
- Electricity consumption: 67 GWh

Hotels

- Total final energy: 25000 toe
- Electricity consumption: 70 GWh

Water desalination

- Date of starting : 2019 (on going)
- Capacity: 50000 m3 /day

EE and RE potential and realization

Potential

Solar water heater

- Tertiary sector: around 60000 m²
- Residential : around 80000 m²

Energy efficiency

- Primary energy: 20000 toe per year
- Electricity : around 90 GWh per year

Main realizations

Solar Water heaters

- Hotels : More than 1000 m² mainly in hotels
- Residential : more than 9000 m²

Djerba, pilot city for LED (ongoing with FEM/UNEP)

- Distribution of 624,000 LED lamps in hotels
- Replacement of 1400 street lighting lamps with 120 W LEDs
- Distribution of 400,000 lamps for housholds

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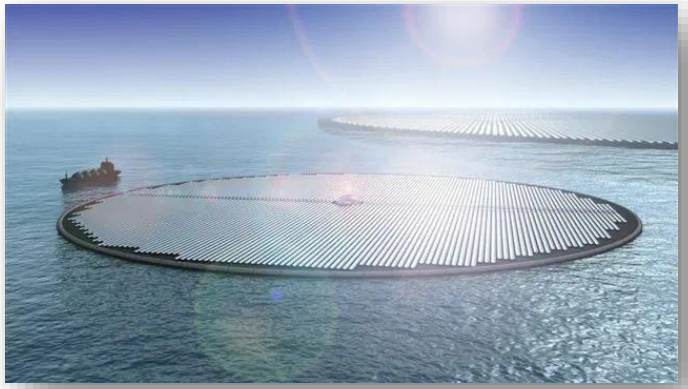
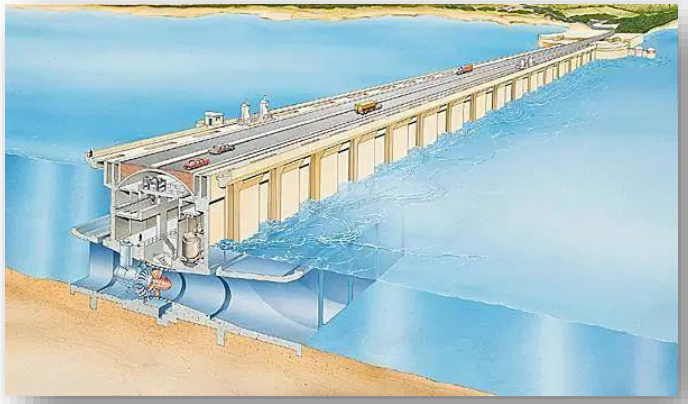
Innovative Energy Transition solutions in Djerba:Ideas and programs

Some future ideas for 100% green Island

- floating Solar PV to supply the Island with power: At prefeasibility phase
  - Advantages: reduce the problem of lack of lands
  - Disadvantage: High cost



- Tidal installation
  - Under the Roman road Djerba-Zarzis or under the Ajim-Jorf bridge
  - Issues: high cost, marine environmental impact



The Zarzis-Djerba eco-solar village project: Renewable energies for sustainable development since 2012

Fig. 2 : Vue virtuelle d'aménagement du projet, selon le concept de rameau d'olivier, sur image Google

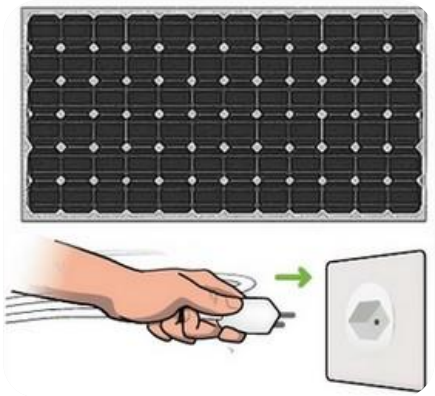
Fig. 3 : Vue virtuelle du village alliant architecture locale et aménagement intérieur selon les standards internationaux.

Create a competitiveness cluster in the region around a technopole dedicated to renewable energies, energy efficiency and biological agriculture.

Rénovation du parc des anciens réfrigérateurs Programme « PROMO-FRIGO »

Relamping LED Programme « PROMO-LED »

Promotion de l'autoproduction d'électricité PV: Programme « PROSOL-ELEC Social »



Programme « ACTE»

Suggestions "to a Green Islands in Tunisia"

- Faisability study: state of art (RE&EE, all sector s and stakeholders included),
- Schare experiences with the north slide(Greece, italy..): dévelop a twining program,
- Sustainable Action Plan,
- Pilot Project: Djerba green Island or Island friend of the environment (potentiel, main solutions RE&EE, finanicing, communication),
- Plans-Climat Energie-Territoire (PCET)

We must act imediately to save islands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1985 - 2015
30 ans au service de l'économie nationale
الوكالة الوطنية للتحكم في الطاقة
2015 - 1985
30 سنة في خدمة الإقتصاد الوطني

THANK YOU