REPUBLIC OF TUNISIA

SOCIETE NATIONALE D' EXPLOITATION ET DE DISTRIBUTION DES EAUX

MESSE MÜNCHEN
DWA INNOVATION FORUM WATER: WATER AND ENERGY

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ENERGY EFFICIENCY IN SONEDE

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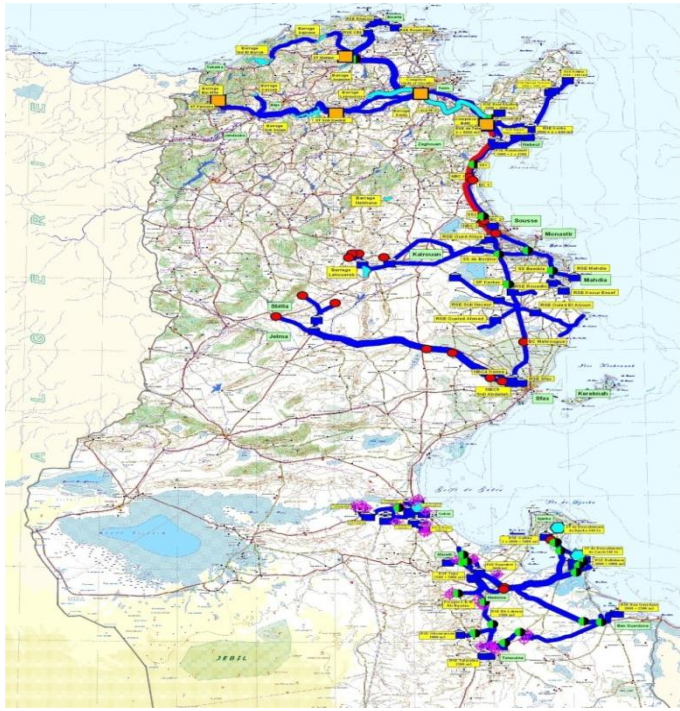
SONEDE

1- PRESENTATION OF THE SONEDE

SONEDE mission is to supply drinking water to all the Tunisian territory, she worked for decades for the development, operation, maintenance and renewal of a big and complex water infrastructure covering the entire countries with a combined length of 50000 km of water pipelines and with 1300 stations and 1100 tanks which achieved a coverage rate of 100% in urban zone and 94% in rural zone

designation	Results in 2013
Number of customers	**2,6 Millions**
Supply rate	**98 % : 100% for urbain zone & 94% for rural zone**
Total Product Volume	**612 Millions m3**
Surface water	**57%**
Underground water	**40%**
Desalinated water	**3%**
Global network performance	**74,4 %**
Network length	**50 000 km**
Number of Tanks	**1100 (with a total capacity of 1 Million m3)**
Number of pumping and production stations and wells	**1300**

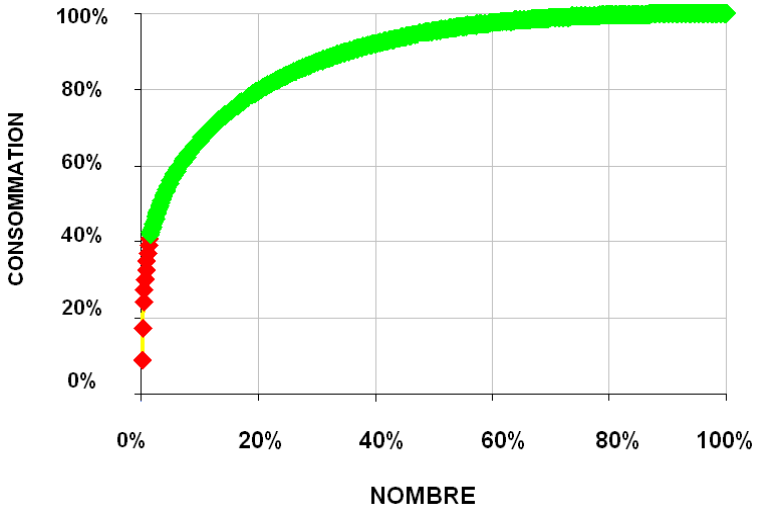
2- ENERGY CONSUMPTION IN SONEDE



With such infrastructure SONEDE is placed as one of the biggest energy-consumer companies in Tunisia.

His consumption reached in 2013 360 GWh, this equivalent to **26 million €**, which represent **20%** of turnover of the company , distributed as follows:

consumer	Consumption in GWh	percentage	kWh/m3
desalination	24	7 %	1,2
Pumping surface water	213	59 %	0,4
Pumping brackish water	117	32 %	0,5
Administrations	6	2 %	
TOTAL	360	100 %	0,6



20% of stations consume 80% of energy

3- RESULT OF ENERGY EFFICIENCY ACTIONS (1997 - 2013)

3-1 Actions

SONEDE realized for several years a lot of actions to control energy costs through:

-Judicious choice of electricity supply contracts based on preferential tariffs STEG and optimization of pumping schedules (periodic meetings at regional level with consumer services)

- Improved maintenance programs, essentially by strengthening technical operations diagnostics,

-procurement of more efficient equipment

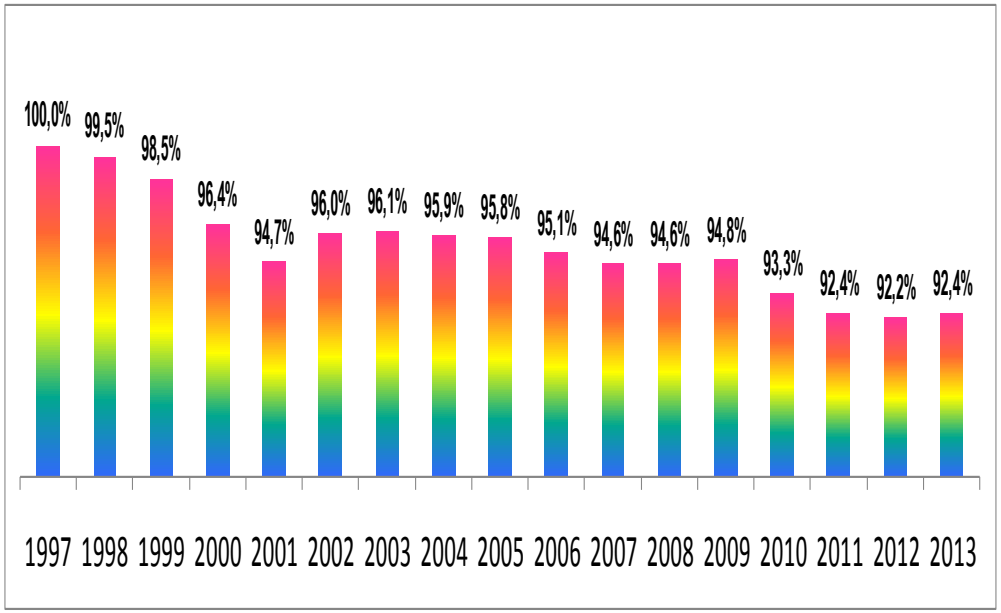
-Strengthening the energy component in choosing water supply systems

-Continuous process improvement :eg change desalination membranes (cellulose acetate with composite polyamide) and installation of variable speed drives

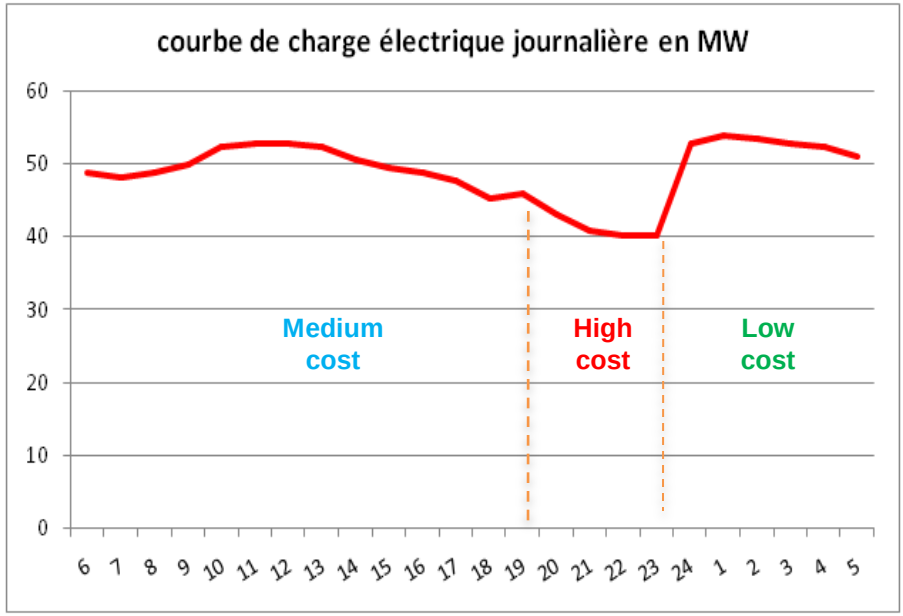
-Training on energy efficiency techniques.

3- RESULT OF ENERGY EFFICIENCY ACTIONS (1997 - 2013)

3-2 Results



(base tariff of 1997: without taking into account the evolution of the electricity tariff)



Daily electrical load curve of SONEDE:

Reduced energy costs due to :

- **optimizing of the choice of electricity contracts**
- **better pumping scheduling according to the electric tariff.**

we can see :

-the voluntary reduction of electrical demand during the most expensive tariff period,

- while promoting the operation during the low tariff

This program was applied to the 1300 stations of SONEDE

3- RESULT OF ENERGY EFFICIENCY ACTIONS (1997 - 2013)

3-2 Results (exemple of action)

Improving the energy performance of pumping stations:

we have do internal energy audit of all pumping stations in the North Region (350 stations)

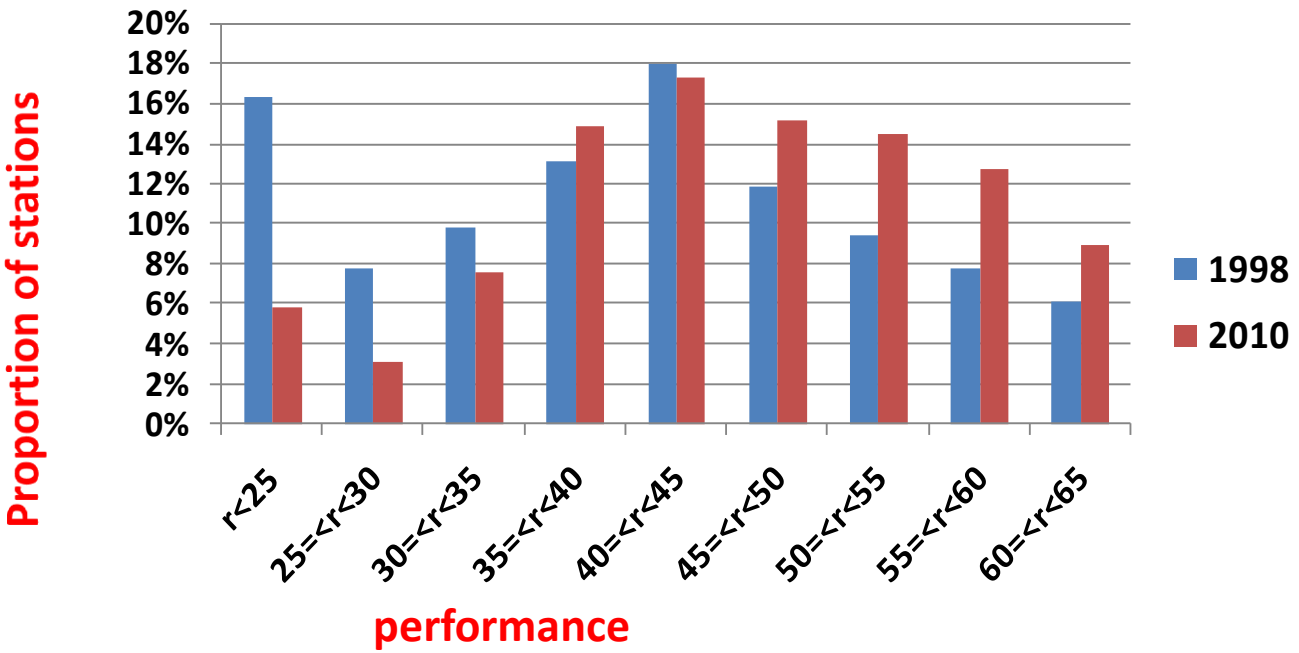
actions:

-Change outdated equipment

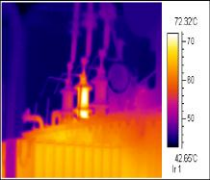
-adapting equipment to operating conditions

-improved suction and discharge lines

Performance of motor –pump units (nominal motor power: from 2.2kW to 160 kW)



The specific consumption (Wh/m3/m) was reduced of 15%



3- RESULT OF ENERGY EFFICIENCY ACTIONS (1997 - 2013)

3-2 Results (exemple of action: internal energy auditing)

- **a) energy audit of SP'1 Ghdir station el Golla**

Station with 6 centrifugal pumps driven by motors 5.5 kV:

4 x 1 000 kW + 2 x 520 kW

Results :

Good energy ratios, in the standards of this type of equipment (efficiency: between 78% to 80%)

Stable energy ratios between 2009 and 2013
=> No significant wear pumps in 4 years

Energy check periodically by qualified and specialized technical staff

- **b) energy audit of SP Belli**

Station with 8 centrifugal pumps driven by motors 5.5 kV:

4 x 450 kW + 4 x 560 kW
(efficiency: between 57% to 64%)

- **c) energy audit of SR Belli**

Station with 7 centrifugal pumps driven by motors 5.5 kV:

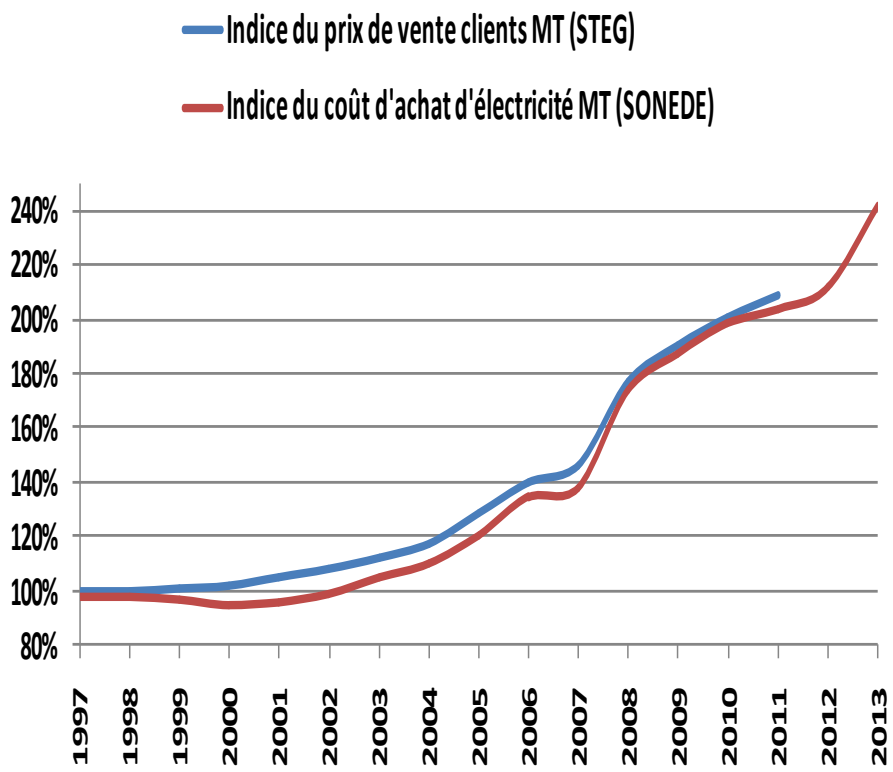
4 x 710 kW + 3 x 622 kW

(efficiency: between 60% to 78%)

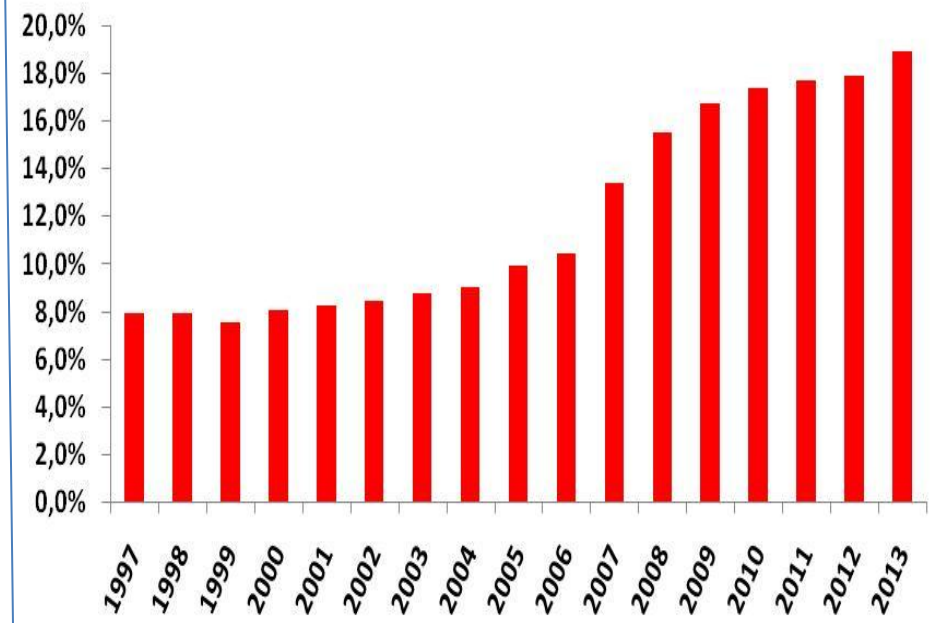
Tender in 2014 to change equipments with best performances

3- RESULT OF ENERGY EFFICIENCY ACTIONS (1997 - 2013)

3-2 Results



Price indices in common currency: basic selling price of STEG for Medium voltage in 1997



evolution of the ratio: energy costs /turnover of SONEDE

4- FUTURE ENERGY PERSPECTIVE

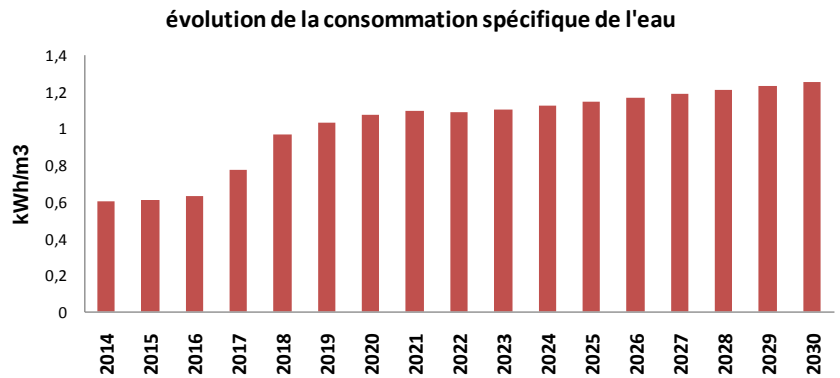
4.1 water supply Problematic

- Continuous decline of conventional resources: **will reach 350m3/an/habitant 2030**
- accentuation on regional disparity of drinking water resources
-Increased water demand

4.2 water supply solutions

To meet with this situation and to secure current and future drinking water demand in Tunisia, SONEDE will invest **1 billion €** in 10 years in high energy use projects, essentially:

-Reinforcing the transfer of water over long distances
- Desalination of seawater



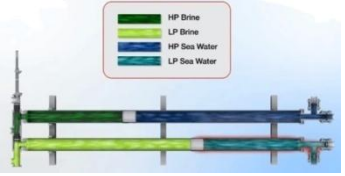
4.3 Future energy problematic

In fact:
-specific consumption will double to reach 1.2 kWh/m
- energy consumption will reach 1500 GWh
-energy prices will continue to increase

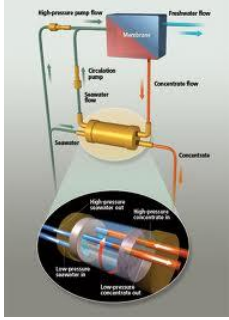
4-4 Energy Management Plan: 2012-2030

Faced with this situation and perspectives inducing significant energy consumption and electricity prices persistently high and volatile, SONEDE implemented a plan of energy management in the following areas:

- **Energy Efficiency**
- **Renewable energy**
- **Establishment of a energy management system (compliant with ISO 50001)**



4- FUTURE ENERGY PERSPECTIVE



4-4 Energy Management Plan: 2012-2030

➢ a) Energy Efficiency:

❖ **OBJECTIVE**

- reduce the specific consumption (Wh/m3) 85% of its expected value in a normal evolution 2030 scenario.
- Reduce by 10% by 2020, the cost of purchasing electricity
- Reduce by 15% by 2016, the fuel consumption of vehicles compared to 2012.

❖ **ACTIONS**

- Conducting energy audits (launch of a first tender in June 2014 for 65 major stations).
- Adoption of best technology for production and pumping of water (example: pressure exchanger for desalination (tender of Jerba plant), high efficiency motors, ...)
- Installation of equipment and the use of technologies to improve energy efficiency and pressure control (we have launched in 2013 a tender for installing frequency drives in 44 boosting stations).
- Installation of smart tariff systems for optimization scheduling pumping (forecasting the demand of water, ...).
- Establishment of a GPS management system for vehicles. (500 vehicles have been equipped in 2013)

4-4 Energy Management Plan: 2012-2030

- **b) Renewable energy:**
  - **OBJECTIVE**

- i ntegrate renewable energy up to 30% of total energy consumption in 2030
  - **ACTIONS**

- The projects include:
  - photovoltaic
  - micro hydropower
  - wind energy

4- FUTURE ENERGY PERSPECTIVE

➢ b) Renewable Energy: photovoltaic energy

SONEDE inaugurated in June 2013 the largest photovoltaic power plant in Tunisia (212kWp) located in the site of the desalination plant Ben Guerdan (south of Tunisia)

We have planned other projets :

- Tender in 2014 for 100kWp at the desalination plant Gallela (Jerba)
- Extension of the central of Ben Guerdane with new 200 kWp in 2015
- 500 kWp Lessouda (Sidi Bouzid) in 2016
- 500 kWp to Site PK11 (Sfax) in 2016
- Floating Platform 1MW (Ghdir el golla) in 2017 (water treatment plant for the capital Tunis)

Ben guerdan Jerba ghdir el golla sidi bouzid sfax

(near the evaporation pond)

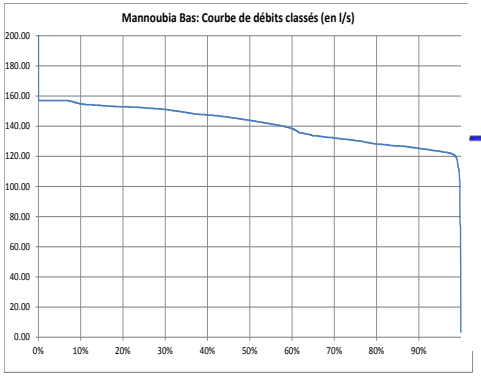
4- FUTURE ENERGY PERSPECTIVE

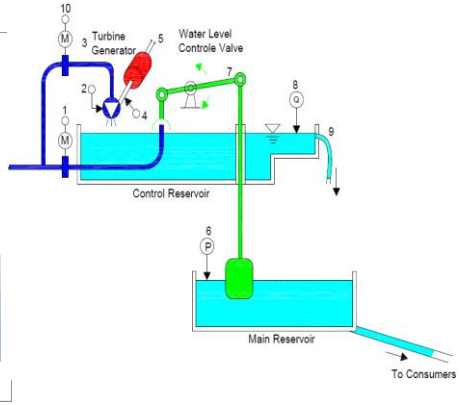
➢ b) Renewable Energy: The micro hydropower

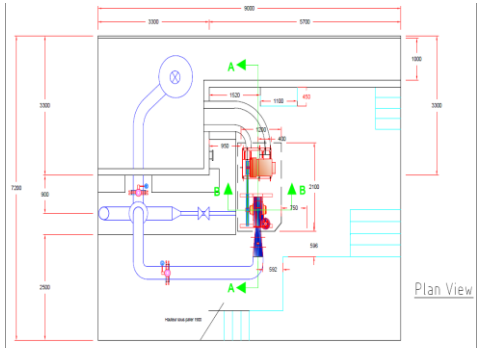
Within the framework of cooperation with the ANME and GIZ :

- Identification of hydro-electric potential at breezes expenses: 2MW
- Hydroelectric study micro power station of 50 kW (will product 300 MWh / year)

The project will be implemented in 2015



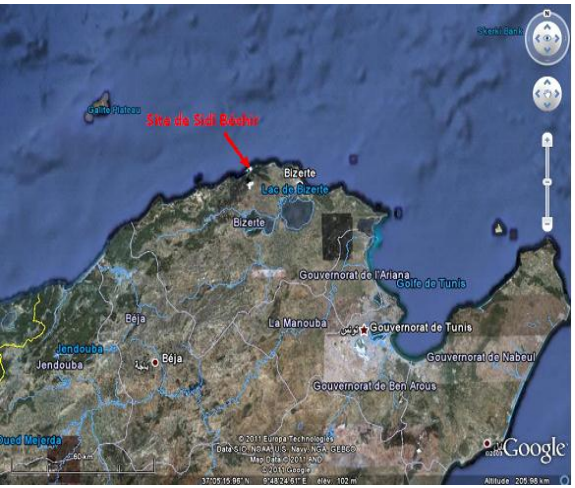


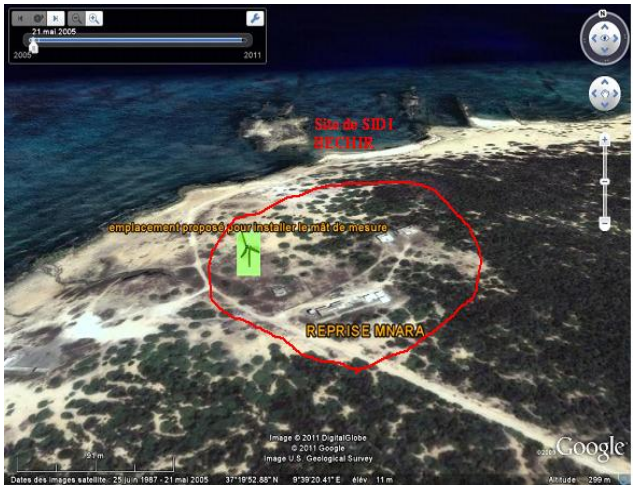


- **Large water transfer projects offer opportunities for electricity generation by turbine**

4- FUTURE ENERGY PERSPECTIVE

➢ b) Renewable energy: Wind energy

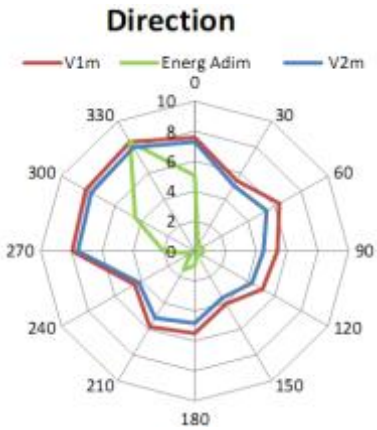


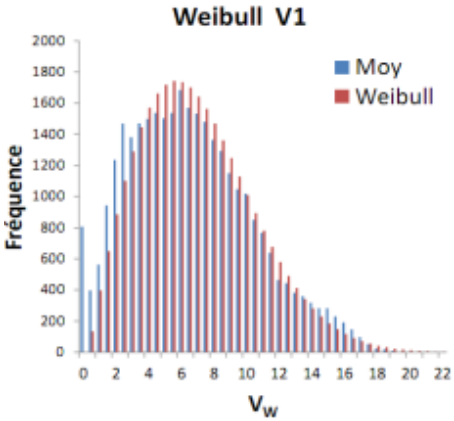


SONEDE had do, in 2012, a Study of wind energy potential with the assistance of ANME and GIZ in the site of Sidi el Bechir (Bizerte) .

The result shown that :

- the average wind speed estimated at 24m height is about 8m/s
- the load factor is high: about 40%





Actually we are preparing a tender for a 1.2 MW pilot project (tender 2015).

- And in 2015 we are going to start preliminary study of a wind farm (40MW), operation in 2019
- In 2025, we project a 100 MW wind farm

5- CONCLUSION

Achieving significant energy efficiency projects and use of renewable energy on a large scale is a strategic opportunity for SONEDE.

In particular, the integration of renewable energy will limit the impact of energy charges on the cost of water in the future,

However, the set up of these projects:

- require the mobilization of relatively substantial funding (15 years): **200 million euros**,
- and pose challenges in terms of projects, technology and operations.

To succeed in this energy transition is needed:

- start a fruitful framework and partnership between SONEDE and all stakeholders.
- implement a network to transfer experiences in these fields (training, work groups, seminars….)

Beyond meeting future needs, this ambitious plan will SONEDE to contribute strongly in the national program of energy management as well as in the areas of sustainable development.

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