Promoting Renewable Energy Pumping Systems in Agriculture Sector

-Tunisian case study -

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……Why renewable energy application is important for agriculture sector?

- Promotion of sustainable agriculture is one of the most priority development goal set by UN and many countries for achieving the food security.
- Substantial technological advancements based on RE have been made and play a critical part in ensuring sustainable agriculture by adding value to agricultural products and satisfying energy demands (machinery, irrigation)
- Most of rural population (1/3 of total population depend significantly on agriculture) and generally settled on the most fragile land with meager and/or highly variable WR
- In Agriculture : Promising future for RE (315 MWC for PV)

Energy status of agriculture sector in Tunisia

Big farms (>20ha, 4%)

- **Electricity by grid (MV) or fuel (Diesel);**
- **Important property assured and stable;**
- **Access to credits without problems**

Small and medium farms (between 1 and 20 ha, 68%)

- **Electricity by grid (MV or LV) or Fuel (Diesel)**

Micro- farms (<1ha, 28%)

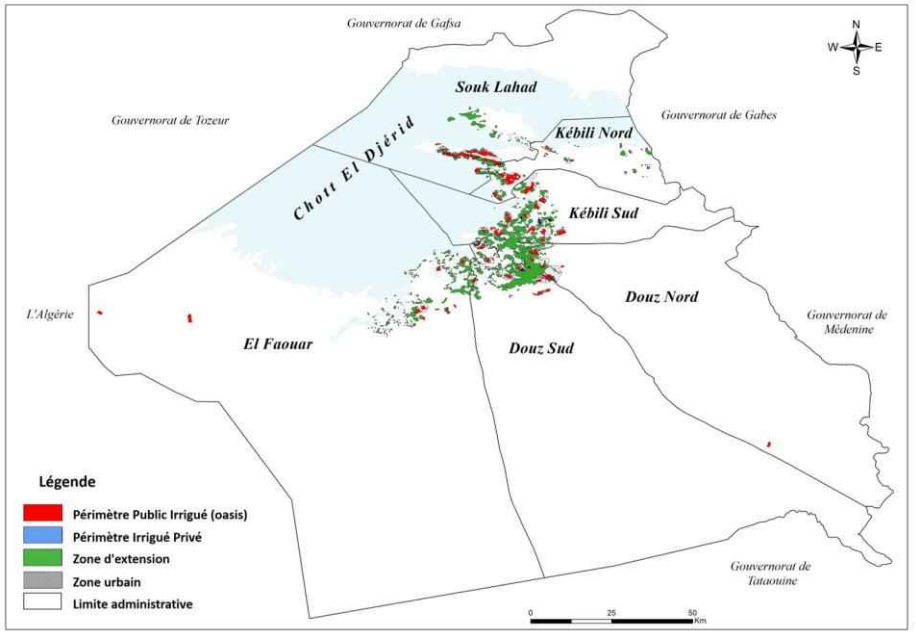
- **Diesel fuel;**
- **Low economic productivity**
- **Lack of technical, financial and human capacities**

-Difficulties in accessing credit facilities

-Lack of technical assistance

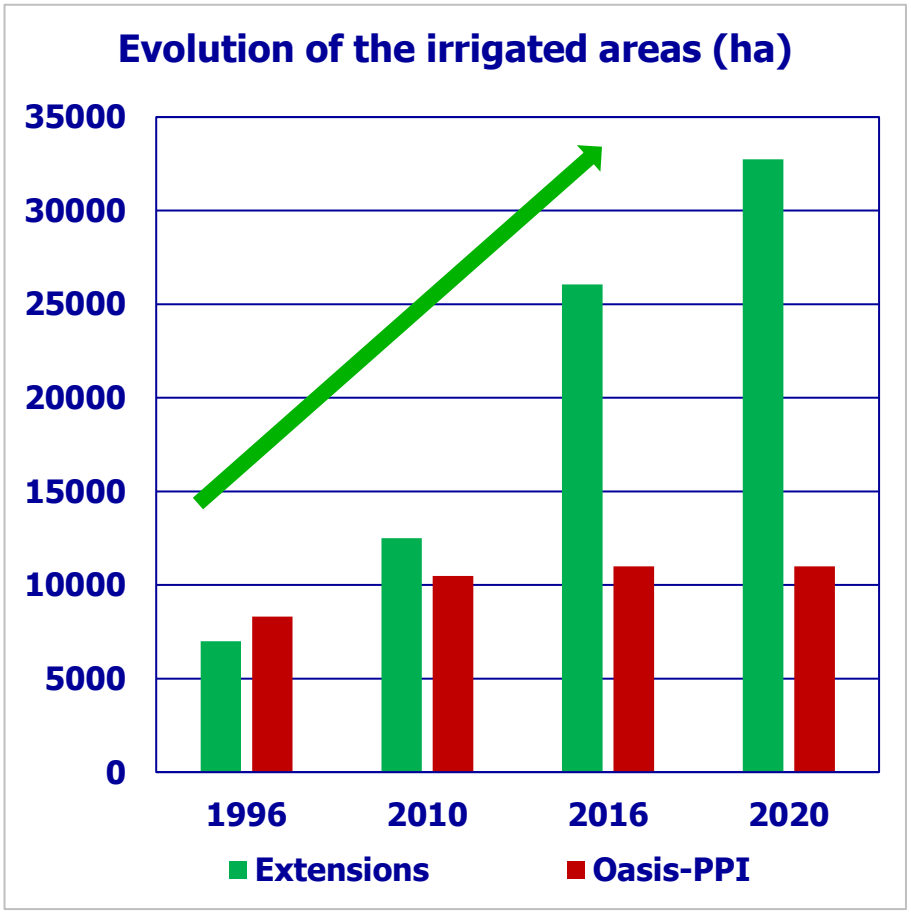
(Source: GIZ; 2016)

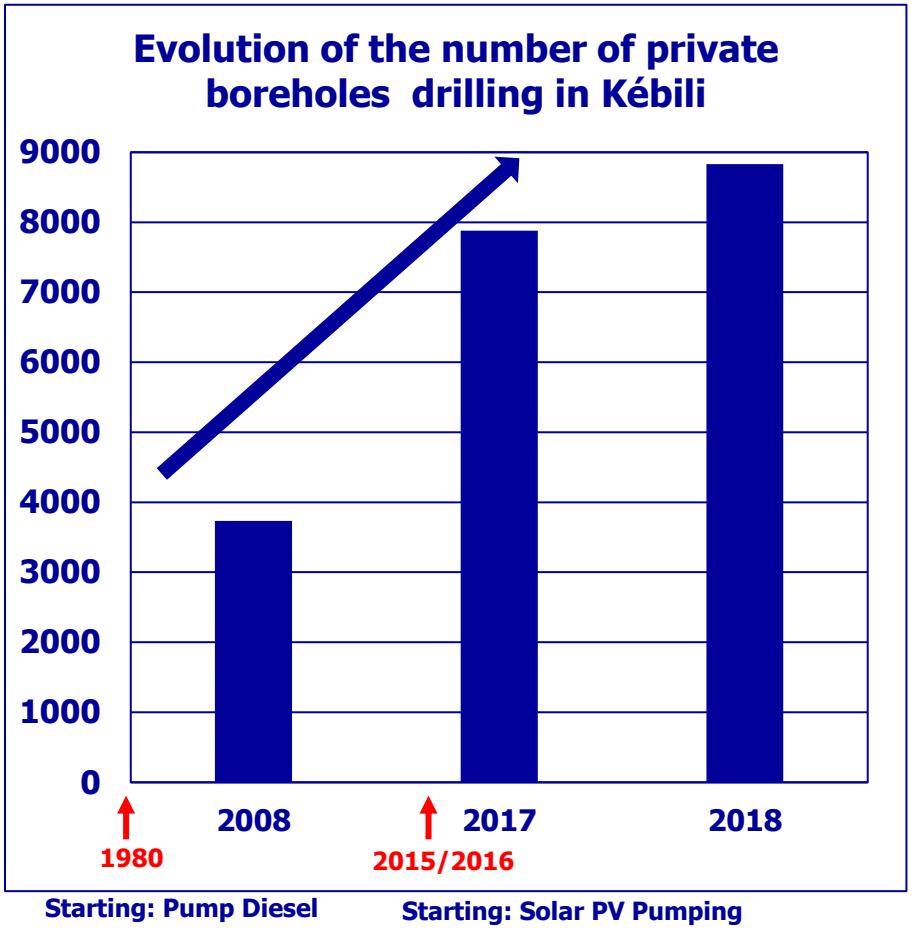
Irrigated areas of Kébili (Irrigated Public Perimeters (PPI) and extensions)



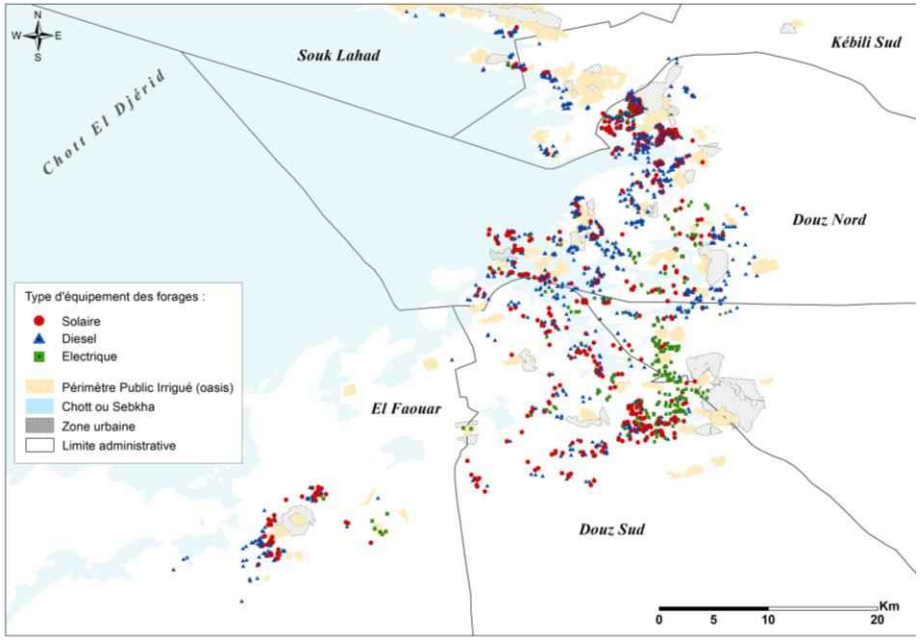
- The region is mostly based on traditional oasis agriculture, (Deglet Nour variety plays a key role)
- The region is dependent on intensive irrigation that is completely dependent on the Sahara's septentrional aquifer system's (SASS) (hardly renewable) .
- 80% of the National Deglet Nour production
- About 70% of total national Dates production
- 70% of the total National oasis area (38 000 ha)

Trends in Agriculture water withdrawal: Areas and Access

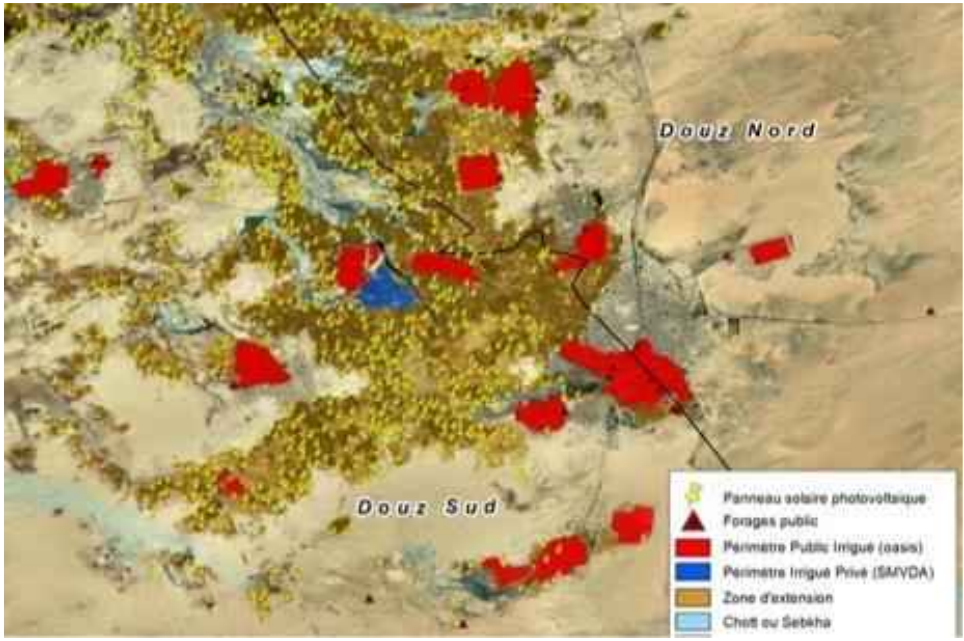




4, 6 times increase of irrigated areas in 25 years (7000 ha to 32000 ha)
2,4 times increase of number of Boreholes in 10 years (3733 to 8830)



Overall distribution of pumping systems types in the region



Distribution of PV systems in the region

- **Small and medium systems: Energy production between 5 and 11 KWc,**

→ Possible production of about 25 MWc in the region

…..Opportunity

Significant achievement of agriculture sector development

Three vegetation layers (date palms, fruit trees, annual crops)

Solar powered water points for livestock watering

Illicite and illegal SPIS

The illegal SPIS are unregulated by the administration's technical control operations.
The absence of it causes:

- **Groundwater quality degradation owing to intensive aquifer exploitation;**
- **Non-compliance with technical requirements and safety regulations;**
- **Appearance of "fake" installers (non-accredited installers);**
- **Risk of infiltration of low-quality equipment on the market.**

Environmental impacts



- **Significant drop in groundwater level (deeper pumping, availability of water during pick periods**
- **Overexploitation of deep aquifers inducing movement for more saline waters to these aquifers from soil surface to the subsoil**



The missing drainage often resulted in an increase of the water table and soil salinization

- PV powered irrigation systems is a technically mature option;
- About 13 000 shallow wells widespread in Tunisia with a potential of about 24 MWC;
- Strong link with PV systems connected to the grid for other applications (lighting, electrification,….)
- Strong and engaged actors and more than 200 companies to develop the sector

Finding the right financial mechanisms, regulatory instruments and law, business models, institutional arrangements, and best technology options to support PVIS are a major challenge

Integrated approaches such as the water-energy-food nexus and sustainable livelihoods to fill the information gaps regarding PVIS performance and feasibility

Efforts to cooperate and structure the development of competences for professional in the design and the implementation of PVIS

THANK YOU!

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