Promotion of energy research, innovation and entrepreneurship by bilateral and international projects between Tunisian research center and private/public European institutions

Dr. Eng Mohamed BARBOUCHE

Research and Technologies Centre of Energy CRTEn
Tunisia

Maseru
Wednesday, 24 January 2018

OUTLINE

- Introduction
- CRTEn
- International cooperation
- Bilateral cooperation
- Conclusion

With global energy demand growing, International cooperation is more and more crucial in responding to global energy challenges

- **Carbon emission,**
- **Climate change,**
- **Volatile prices of energy**
- **…**

Tunisian government is focusing on international cooperations especially with EU in the field of RE

Tunisia

North of Africa, on mediterranean sea

Population : 11 Millions

Electrification: more than 99%

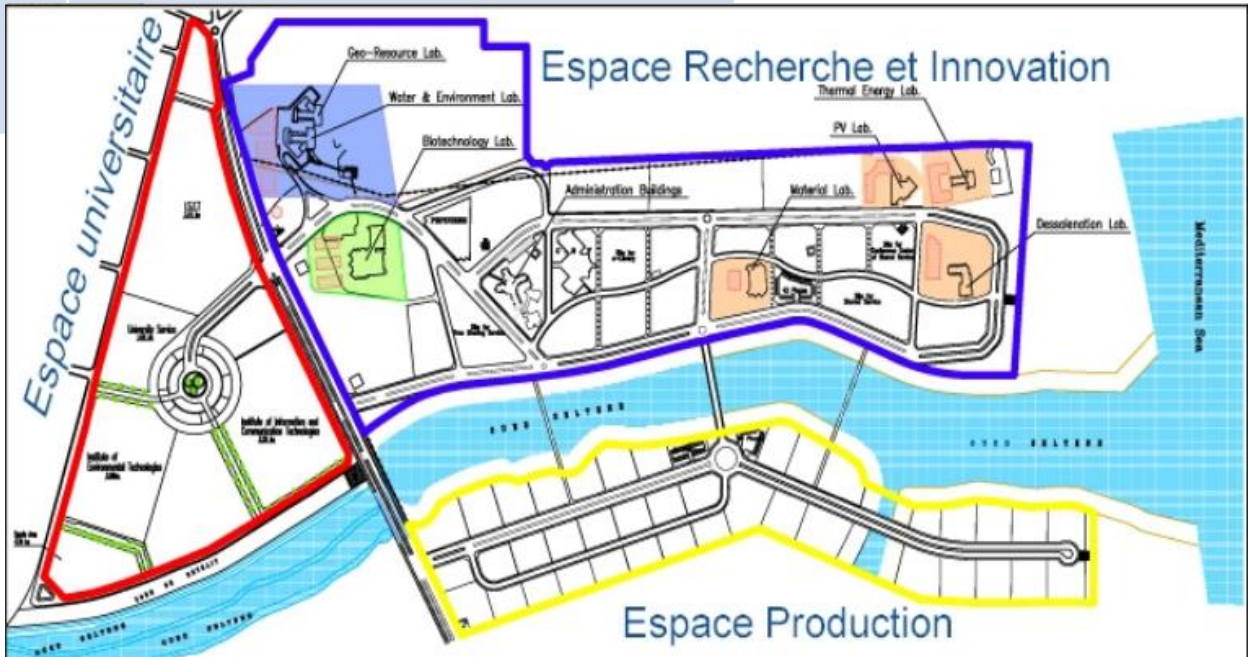
2030: 30% Renewable energy

Since 2016 : Associated country to EU - first African country

Technopark of Borj Cedria

RERIS 2018

3 Universities	4 Research Centres	> Ten industrial companies
-Environment - Information technology - Advanced technologies	- Water - Biology - Materials - Energy (CRTEn)	



CRTEn is a research and development structure operating under the supervision of the Ministry of Higher Education and Scientific Research (MESRS).

Based on a knowledge and experience of more than 30 years, the main objectives of the Centre

to support the development of the national industry in the field of energy,

to meet the various demands for expertise inherent to renewable energies,

to make R & D an engine of growth…

CRTEn also contributes effectively to post-graduate training in order to create a new generation of jobs.

LPV: Photovoltaic Laboratory

LANSER: Laboratory of Nanotechnoloy and Systems for Renewable Energy

LSNTA: Laboratory of Semiconductors, Naostructures and Advanced Technologies

LEEMVED: Laboratory of Mastery of Wind Energy and Energetic Valorization of Waste

LPT: Laboratory of Thermal Processes

More than 90 publications in 2017

The services rendered by the CRTEn at the laboratory level

- **Expertise in the field of semiconductors useful for PV conversion of solar energy.**
- **Study and development of pollution sensors and photonic devices.**
- **Development of new inorganic nanocomposites for PV conversion and solar photo-catalysis.**
- **Development of organic nanocomposites applied to photovoltaics, fuel cells and energy storage.**
- **Development of high efficiency electronic converters for a photovoltaic chain.**
- **Sizing and optimization of hybrid systems.**

RERIS 2018

- **Valorization of agri-food products by new processes of dehydration.**
- **Development of Energy Storage and Recovery Tools in Phase Change Materials (MCPs)**
- **Theoretical tools, study and optimization of concentration systems (CSP).**
- **Expertise in the production of biogas for the production of electricity.**
- **Valorization of solid waste by thermochemical process.**
- **Production of biofuels from waste oils and fats.**
- **Study, design and realization of wind accelerators and turbines.**

TTO: Transfer Technology Office

- Technology transfer
- Marketing Research Results (RR) and Services of CRTEn
- Detection of innovative projects
- Accompaniment, guidance and advice to innovative project promoters (financing, assembly of projects, ...)
- Partnerships with the socio-economic environment at national and international level

Consortium

Polytech
Nantes
France

CNR – ITAE
Messina
Italy

CRTEn
Borj Cedria
Tunisia

InnovaBic
Messina
Italy

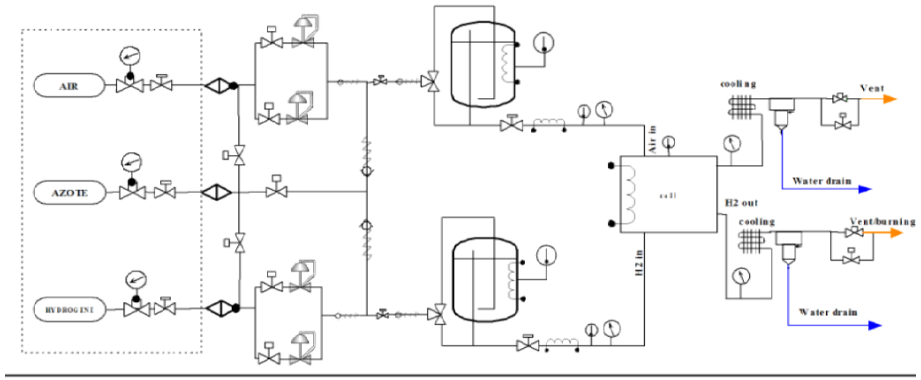
Specific objectives

- **Enhancing CRTEn expertise and know-how on fuel cells and hydrogen technologies.**

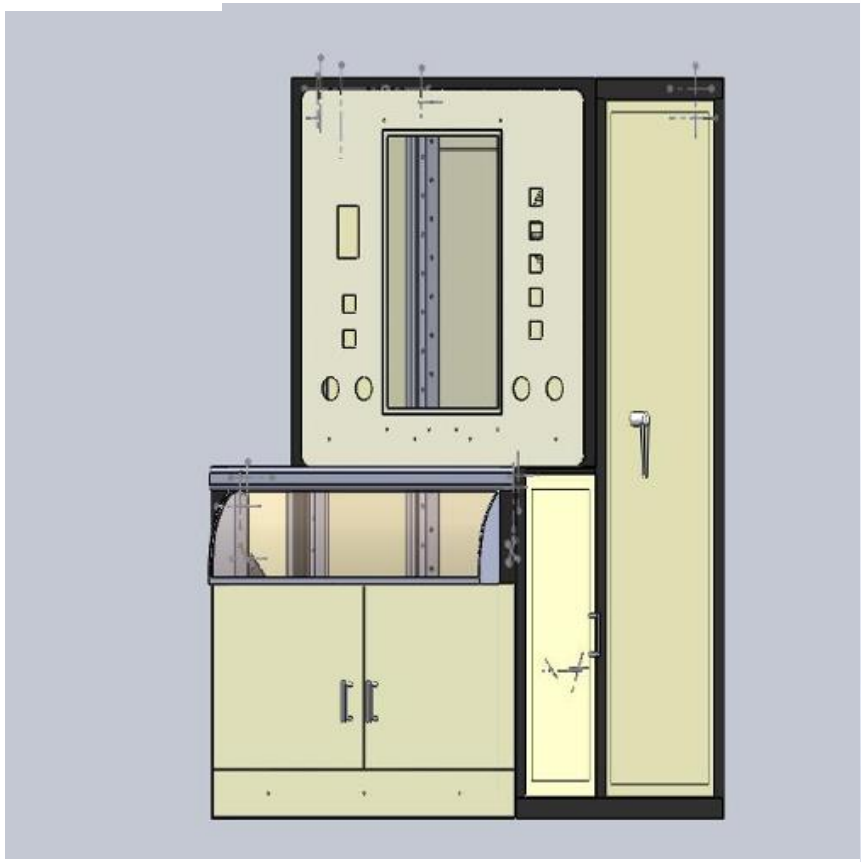
- **Strengthening CRTEn human resources and research capacities.**

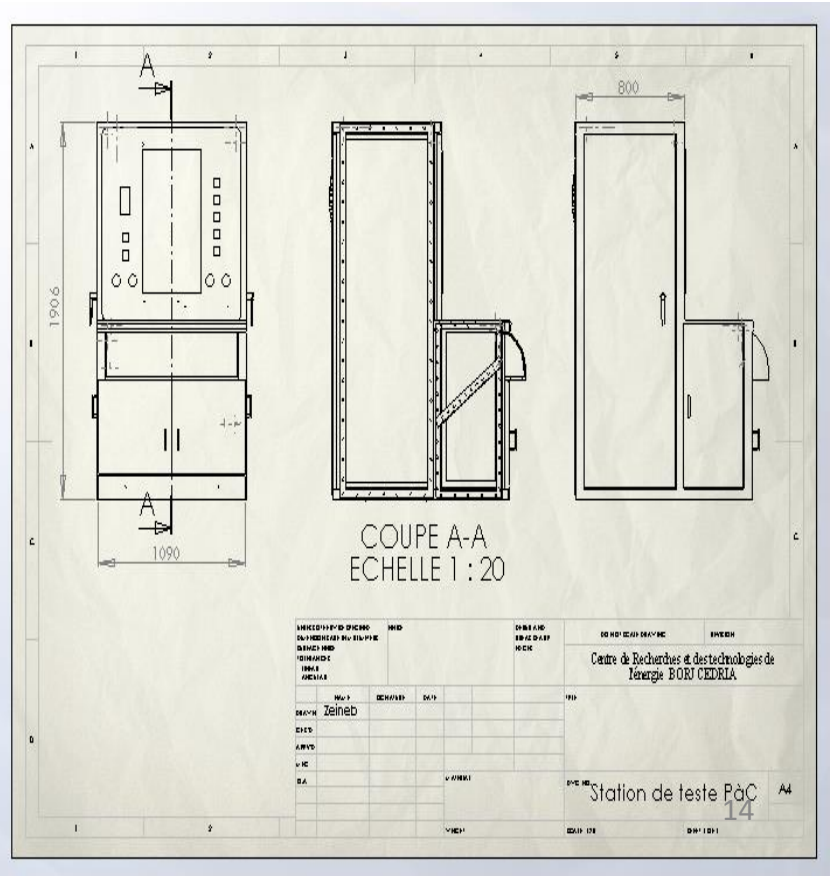
- **Improving technological CRTEn equipment related to fuel cells.**

- **Boost the access into the international scientific and technology community.**

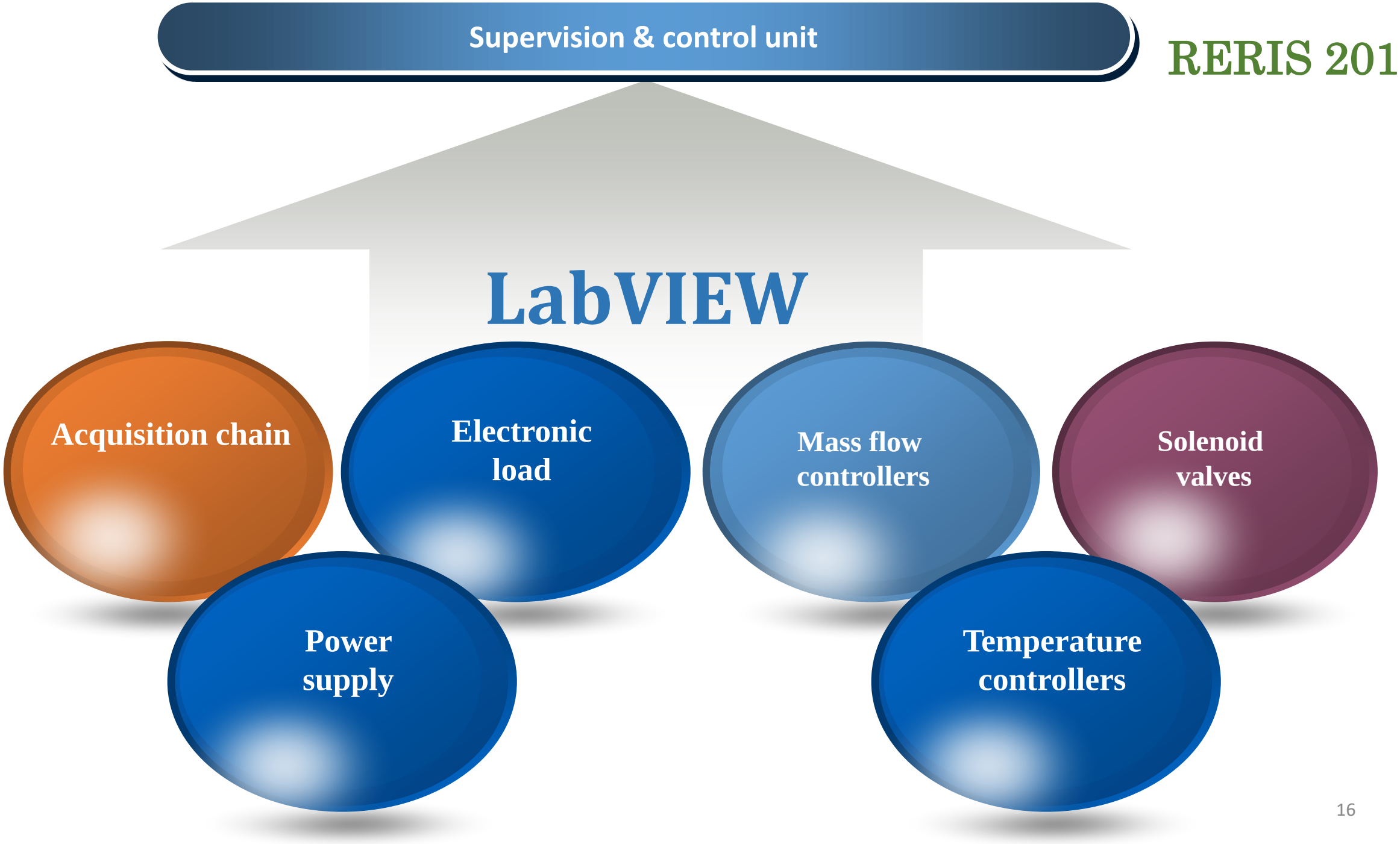


	Mass flow controller		temperature sensor		one way valve
	Two way manual valve		pressure meter		cooling
	Two way solenoid		gas filter		heating element
	Back pressure regulator		by-pass		gauge and pressure regulator





RERIS 2018


Supervision & control unit
LabVIEW
Acquisition chain
Electronic load
Mass flow controllers
Solenoid valves
Power supply
Temperature controllers

Conducted by a team of twelve organizations from nine different countries in Europe, Africa and Middle East.

The ETRERA_2020 idea is to improve S&T and entrepreneurial relationship between European Member States and the neighbouring Mediterranean countries in the strategic field of renewable energy production, distribution and storage by a range of activities targeted to bridging the existing gap between research and innovation.

ETRERA_2020 consists of a comprehensive partnership of stakeholder groups: Research center, Technology transfer, Business center.

ETRERA_2020 is a EU project aimed at tackling the future energy needs by creating a Euro-Mediterranean research alliance for the development of a Research and innovation network on Renewable Energy and for improving Research-Industry cooperation.

ETRERA_2020 targets the following technologies:

- **Wind**
- **Photovoltaic**
- **Solar thermal**
- **Hydrogen and fuel cells**
- **Smart grid**

Specific goals

- **Improving human resources & know how of Mediterranean Partner Countries RTD organizations;**
- **Increasing the networking opportunity among the main actors of RE systems;**
- **Increasing of public – private partnership;**
- **Increasing the accessibility to research facilities;**
- **Increasing the project/partners visibility in order to attract potential research/industry partners.**

Open-gain project

Germany

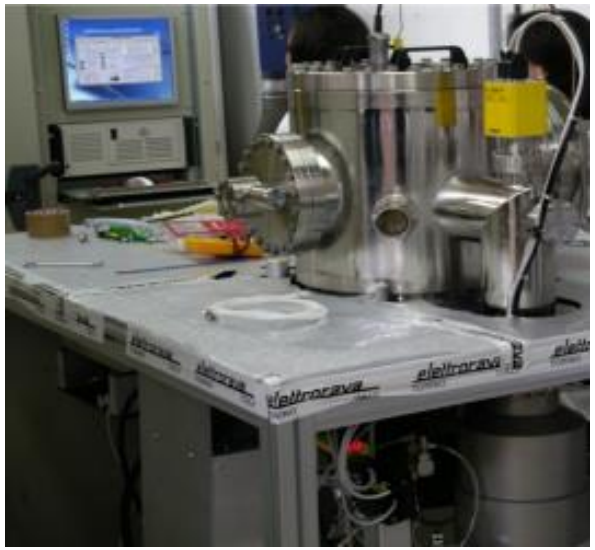
France

Spain

Electricity generation

Sea water dessalination

Tunisia – Turkey bilateral cooperation

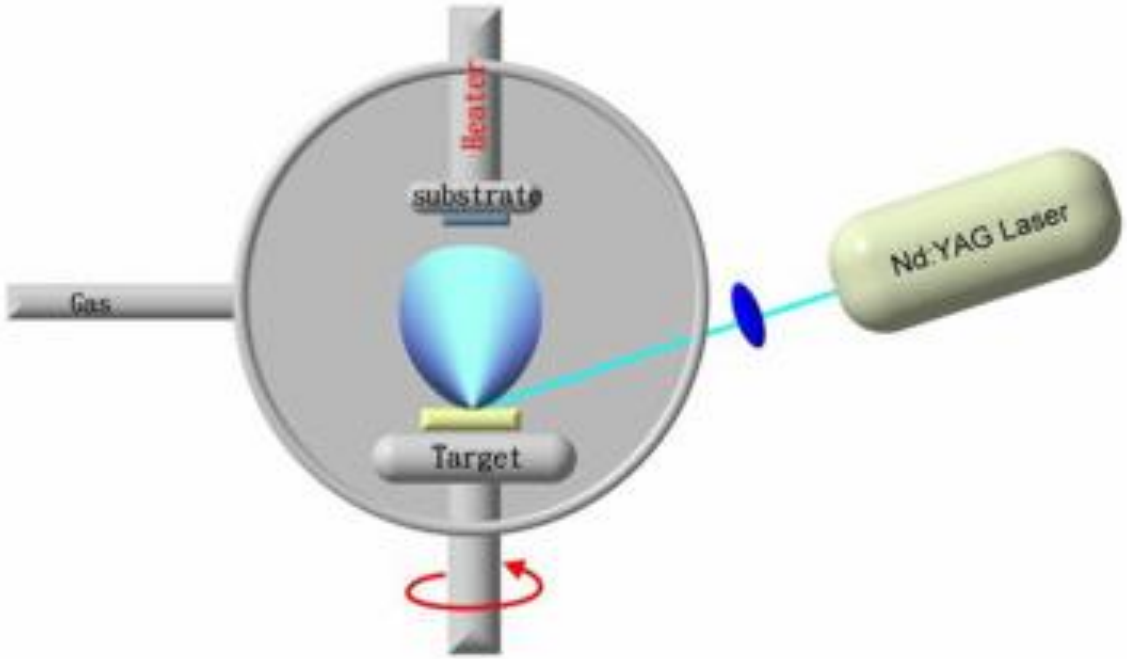


- **High efficiency solar cells (21%)**

- **Solar concentration systems**

Tunisia – Italy bilateral cooperation

- **Private companies (Technoasi srl, Dynamai,…)**
- **Research laboratories**



PLD system

Tunisia – Italy bilateral cooperation

Municipality of Valderice
CRTEn
University Consortium of Trapani Province
Free Consortium of the City of Trapani

PV: 15 KW Off-grid and grid connected

Wind: 1 KW

Solar thermal system:

CRTEn
Centre de Recherches et des Technologies de l'Energie

PTB
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

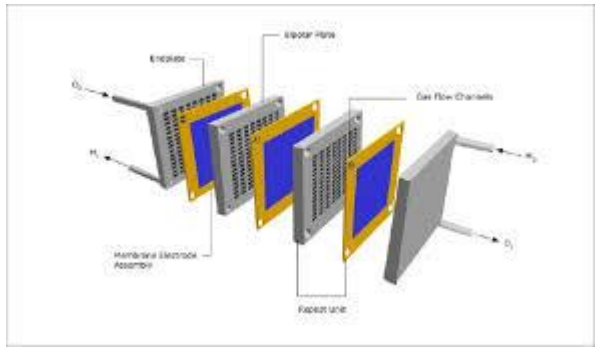
Wind tunnel facility

Accreditation ISO 17025

Test of anemometers

CRTEn - Technical University of Ostrava (UTO)

Photovoltaic



Fuel cells

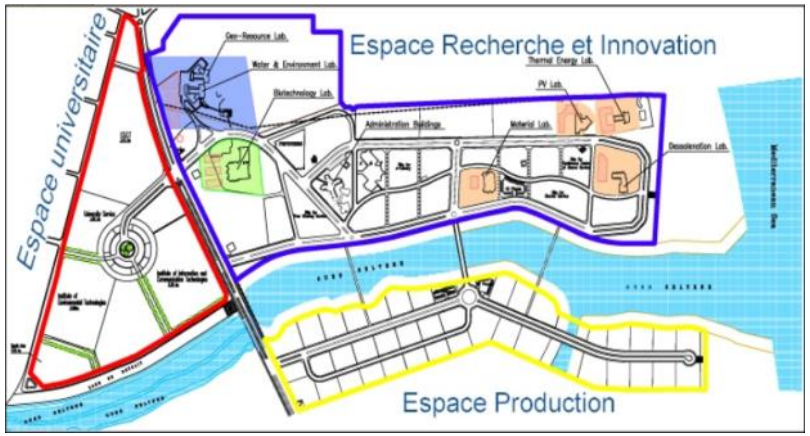
Electromobility

RERIS 2018

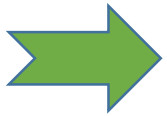
4D-3D SOLUTIONS PROVIDER

CRTEn Centre de Recherches et des Technologies de l'Energie

Vacuum technology Company



CRTEn – Public/private European institutions



- ✓ **Joint scientific publications**
- ✓ **Exchange students**
- ✓ **Exchange staff**
- ✓ **Conferences organisations**
- ✓ **Business creation**
- ✓ **Tests Labs accreditation**

Thank you for your attention

barbouchemed@gmail.com