Capacity Building: Institutions, Education and Training Programs in Tunisia

Session: Knowledge Transfer and Capacity Building

Hichem M'Saad, Ph.D.
CEO
VOLTA PV/SOLAKTA SOLAR

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Engineering Education Statistics for Tunisia

- 232 Public & Private University institutions offering 953 programs among which:
  - 12 directly related to Renewable Energy
  - 26 related to Mechanical, Electrical, Industrial & Process Engineering
  - An average of 2500 university engineering graduates per year
  - An average of 1500 post-graduate engineering students enrolled in Research and Development

Research Structures in Renewables and Related subjects

Structure	RE	Related	Total	Researchers		Students	
				Professors	Assistants	Master	Thesis
RL	4	5	9	50	135	143	86
RU	8	9	17	52	140	167	107
Total	12	14	26	102	275	310	193

	2005	2006	2007	2008
Publications	39	51	25	62
Habilitations	1	3	9	9
PhD Thesis	7	11	14	18
Master Thesis	34	36	40	48
Licence			1	
Conferences			3	7

Research output has been increasing at a steady rate

Research Projects (PRF)

Title	Nbr of Groups	Nbr of Partners	Allocated Budget (k€)
Gas Air conditionner	4	3	120
Wind Energy Potential	5	4	120
Wind turbine development	4	4	120
Solar cooling	6	2	240
SDWH	4	1	240
Hydrogen storage	4	4	280
Fuel cell	5	5	380
Solar desalination	5	2	170
TOTAL			1710

SUMMARY: EDUCATION

- Good number of university graduates in engineering-related fields
- No specific programs in CSP plant operations
- Private universities have announced or are in the process of designing course programs in energy
  - ESPRIT, ULT, SMU
- Students are showing greater interests in energy programs due to advertisement in the press about DESERTEC, TSP, and the popularity of PROSOL ELEC (the solar-roof on-grid PV).

Examples of Research Projects

- Solar absorption cooling system
- Modeling and performance evaluation of ground-air heat exchanger for passive cooling
- Solar water desalination for irrigation (ENIT)
- Development of high power solar pumping controller (INSAT/ENIT)
- CEA (Centre de l'Energie Atomique) CPV initiative

STRENGTHS OF THE TUNISIAN UNIVERSITY SYSTEM IN ENERGY

- Core strength and exposure in thermal and mechanical sciences.
  - ENIT can be a test-bed for early R&D concepts; 1.5 hectares are available
- Industrial base for solar water heating
- Nascent industrial base for wind energy

SHORTCOMINGS AND AREAS OF IMPROVEMENT OF THE CURRENT EDUCATION SYSTEM IN RENEWABLES

- No critical mass: Effort is scattered through many universities-
- Lack of exposure of engineering students to the **economic** aspects of renewables (cost analysis, etc.)
- No focus on Materials Science; light/matter interaction, coatings, interfaces, adhesion, delamination, thin films physics
- No focus on **reliability** testing, lifetime testing, MTTF…
- Environmental effects of RE (CSP need of water, water recycling)

THANK YOU

FOR YOUR ATTENTION