

The Leading Engine for Innovation and Entrepreneurship in Sustainable Energy

MSc Renewable Energy RENE

innovation and entrepreneurship in renewable energy



Entrepreneurship
Leadership
Innovation
Research

Barcelona
Stockholm
Lisbon
Paris

Prof. Enrique Velo
February 2015

The Leading Engine for Innovation and Entrepreneurship in Sustainable Energy

Programme Overview



solar photovoltaic
concentrated solar power
hydropower
wind energy
ocean energy
energy vectors
grid integration

IST

UPC

ParisTech

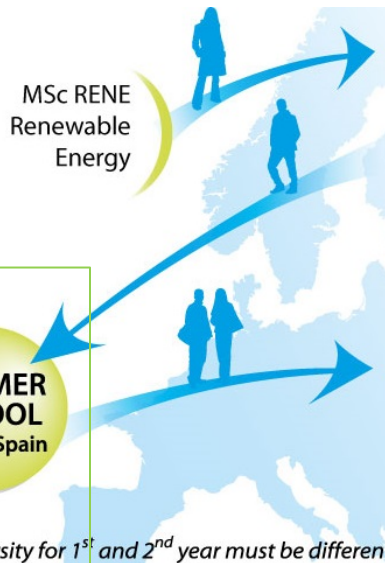
KTH



Top technical universities, a business school and energy related corporations involved in the programme

two-years full-time programme (120 ECTS)

top performing students
entrepreneurial spirit



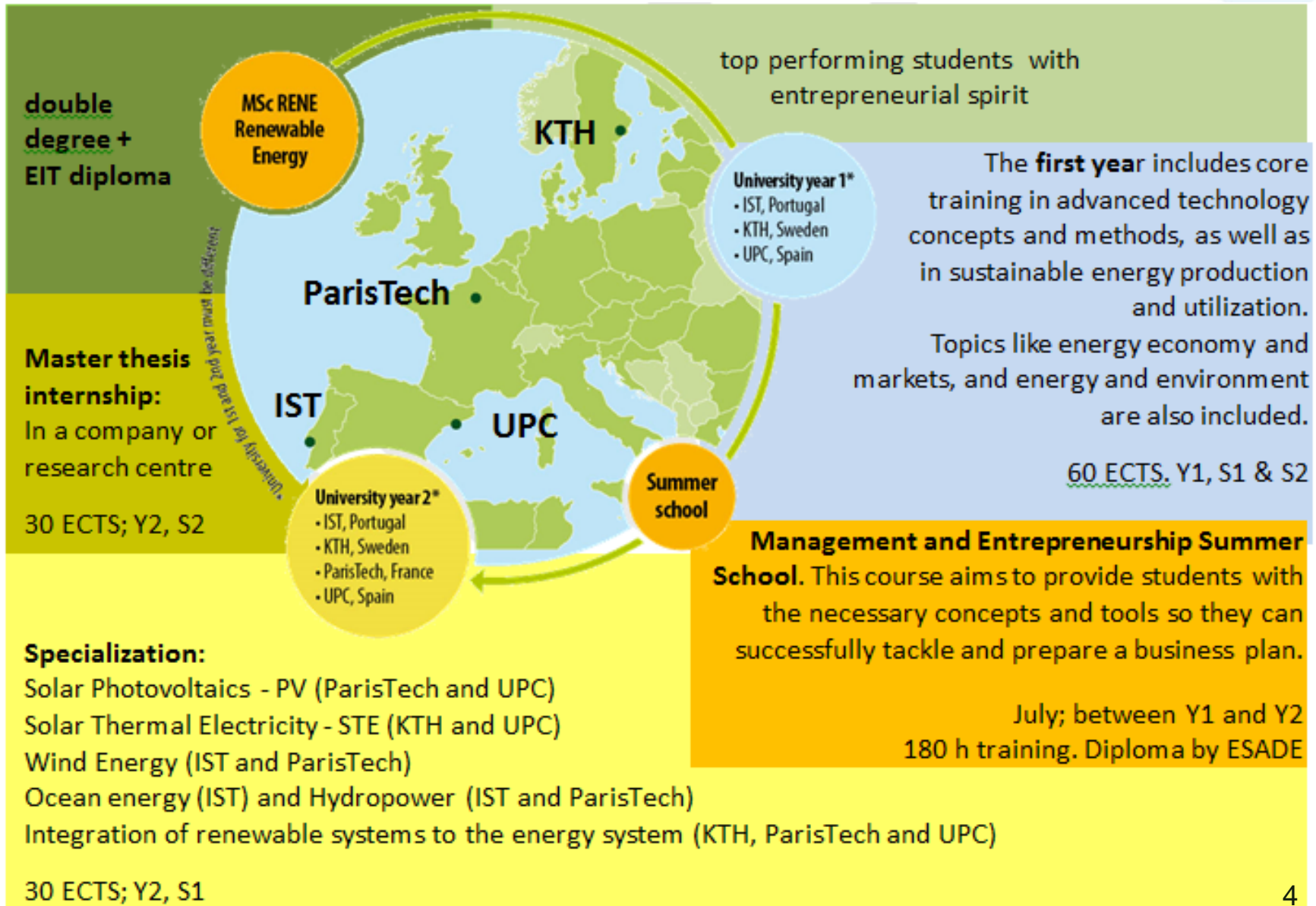
Management and Entrepreneurship Summer School

This course aims to provide the students with the necessary concepts and tools so they can successfully tackle and prepare a business plan.

<p>core training</p> <p><input checked="" type="checkbox"/> UNIVERSITY YEAR 1</p> <ul style="list-style-type: none"> <input type="checkbox"/> UPC, Spain <input type="checkbox"/> ParisTech, France <input type="checkbox"/> KTH, Sweden <input type="checkbox"/> IST, Portugal 	<p>The first year includes core training in advanced technology concepts and methods, as well as in sustainable energy production and utilization. Topics like energy economy and markets, and energy and environment are also included.</p>
<p>specialization</p> <p><input checked="" type="checkbox"/> UNIVERSITY YEAR 2*</p> <ul style="list-style-type: none"> <input type="checkbox"/> IST, Portugal <input type="checkbox"/> KTH, Sweden <input type="checkbox"/> ParisTech, France <input type="checkbox"/> UPC, Spain 	<p>polygeneration (KTH)</p> <p>wind Energy (IST and ParisTech)</p> <p>hydropower (IST and ParisTech)</p> <p>ocean energy (IST)</p> <p>energy vectors (ParisTech)</p> <p>solar PV (ParisTech and UPC)</p> <p>Grid Engineering (ParisTech and UPC)</p> <p>concentrated solar power – CSP (UPC)</p>
<p>master thesis</p> <p>internship</p>	

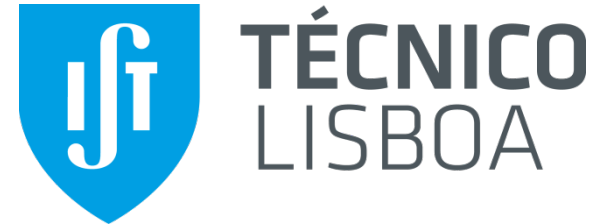
double degree + EIT diploma 3







MSc in Energy Engineering



Master Degree (MSc) in Energy Engineering and Management



Master of Science



EIT KIC InnoEnergy diploma

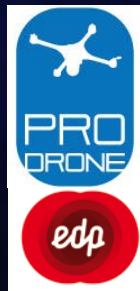


MSc in Energy Science
Specialization in Renewable Energy
Science and Technology

More details about RENE:

http://kic.upc.edu/training/msc-rene/files-and-templates/msc_rene_booklet_2014

MSc RENE. Companies committed to offer master thesis internships





UPC at a glance



Public higher education and research institution

Specialized in the fields of architecture, science and engineering.

1. Barcelona
2. Castelldefels
3. Igualada
4. Manresa
5. Mataró
6. Sant Cugat del Vallès
7. Terrassa
8. Vilanova i la Geltrú



Hub of talent, innovation, technology transfer and regional development:

- 2009: **Barcelona Knowledge Campus (BKC)**, a project carried out with the University of Barcelona
- 2011: Campus of Excellence with the **UPC Energy Campus project**

22 schools in 7 campuses
42 departments
10 research institutes




2,547 teaching and research staff members (59% PhD holders)

1,480 administrative and service staff members

126 research groups recognised by the Catalan government

20 research centres belonging to the **TECNIO** network





33,128 undergraduate and postgraduate students

bachelor's, master's and doctoral degree courses

68 bachelor's degrees
65 master's degrees (26 taught in English)
100 international double-degree agreements
332 doctoral theses defended

- research and innovation projects
- technology-based companies,
- spin-offs and start-ups.



ENERGY TO EXCEL

Energy Campus is aimed at leading the transformation of the energy sector with clear local impact and wide international recognition. In this campus, knowledge and technology will generate innovation for a more sustainable economy, and it will become a reference in the field of governance and social responsibility.



Positive feedback of the first years of Energy Campus



The International Commission appointed by the Ministerio de Educación, Cultura y Deportes, has highly assessed the progress of the Campus of International Excellence project led by the **Universitat Politècnica de Catalunya·BarcelonaTech** in the field of energy. [+]

Energy Campus is supported by several units and departments to drive innovation, research valorisation and knowledge transfer:

Programa Innova

Programa Innova aims to promote the research carried out in the campus, to encourage a culture of innovation and entrepreneurship among researchers, students and teachers, and to help increase the innovative potential of their groups and units, favoring the creation of new companies and valuation instruments fruit of knowledge.

Oficina de Patents i Llicències UPC

The Office of Patents and Licensing is responsible for the protection and exploitation of intellectual property rights in all research activities carried out by members and groups of the university community, and in the process of knowledge and technology transfer developed in the framework of these activities.

Parc UPC

Parc UPC was conceived with the mission to become a dynamic socioeconomic agent between university, government and businesses, and to promote the social commitment of the university by encouraging research, innovation, transfer of results and technological progress.



Technology Offers is the online catalog of available technology in campus launched to give visibility to the portfolio of patents resulting from research activity, a window of the R&D performed at the university in scientific and technological emerging areas such as energy and environment.



The purpose of the UPC Technology Center (CIT UPC) is to create better conditions for the transfer of research results and technology developed by the TECNIO centres to the business world for commercialisation and, by extension, to society at large.

RESEARCH & INNOVATION

> Technology Concept

> Innovation concept

> **UPC Energy Research Map**

▪ Alphabetic order

▪ **Energy topics**

▪ UPC Research Document

> CC Project Organization

Energy topics

Energy Topics List

- ▶ Wind Energy
- ▶ Solar PV
- ▶ Solar Thermal
- ▶ Smart Grids
- ▶ Bioenergy & Biomass
- ▶ CO2 Storage and Absorption/Desorption
- ▶ Nuclear Energy
- ▶ Energy Efficiency
- ▶ Transport Management & Innovation
- ▶ Sustainable Architecture
- ▶ Hydropower
- ▶ Materials for Energy Applications

ESCOLA TÈCNICA SUPERIOR
ENGINYERIA
INDUSTRIAL

UPC Study Track

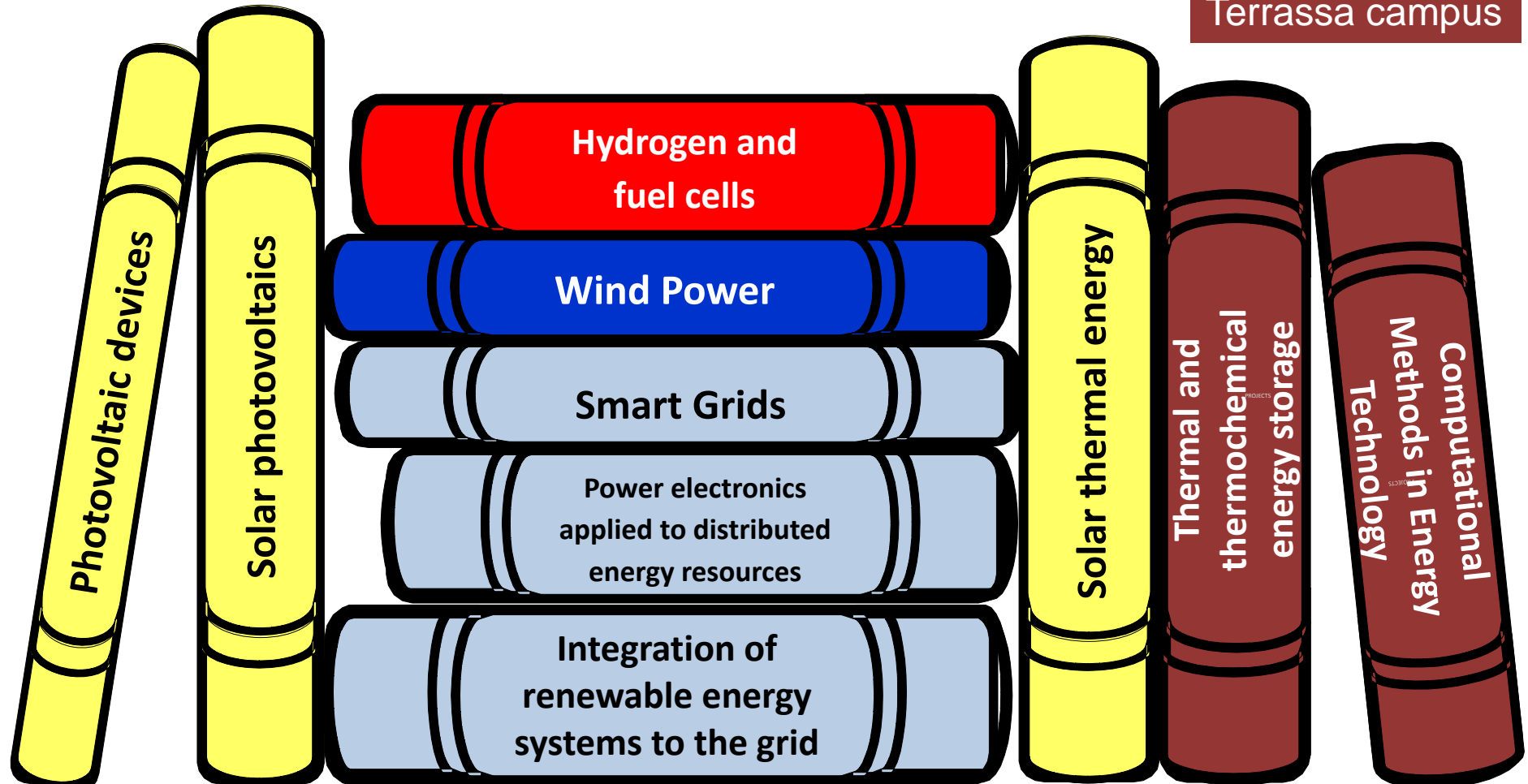
Year 2

Specialization	60	ECTS
Mandatory		30
Elective		30

Code	Courses	ECTS	Year	Sem.	Type
RENE Specialization		30			
820739	<u>Wind power</u>	5	1	1	Elective
820740	<u>Solar photovoltaics</u>	5	1	1	Elective
820743	<u>Photovoltaic devices</u>	5	2	1	Elective
820744	<u>Solar thermal energy</u>	5	2	1	Elective
820747	<u>Integration of renewable energy systems to the grid</u>	5	2	1	Elective
820748	<u>Hydrogen and fuel cells</u>	5	2	1	Elective
820750	<u>Power electronics applied to distributed energy resources</u>	5	2	1	Elective
820755	<u>Smart grids</u>	5	2	1	Elective
820757	<u>Computational Methods in Energy Technology</u>	5	2	1	Elective
820763	<u>Thermal and thermochemical energy storage</u>	5	2	1	Elective
Master Thesis		30			
240SEL41	<u>Master Thesis</u>	30	2	2	Mandatory

students choose 6 elective courses

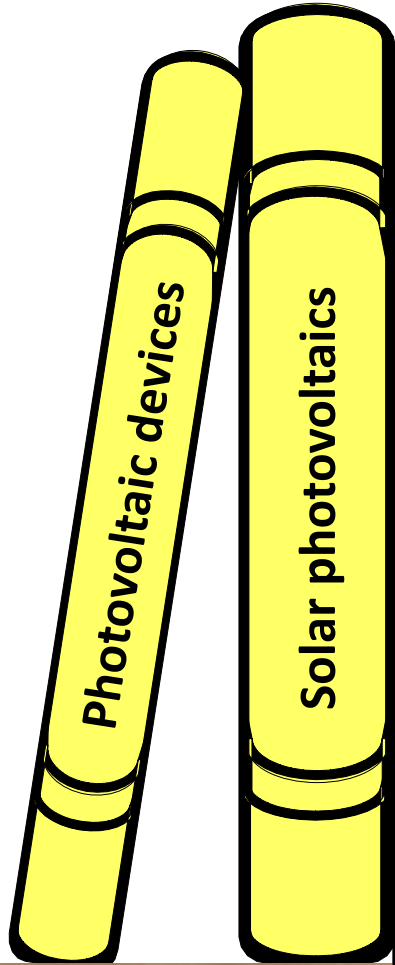
Terrassa campus



Timetable overlapping



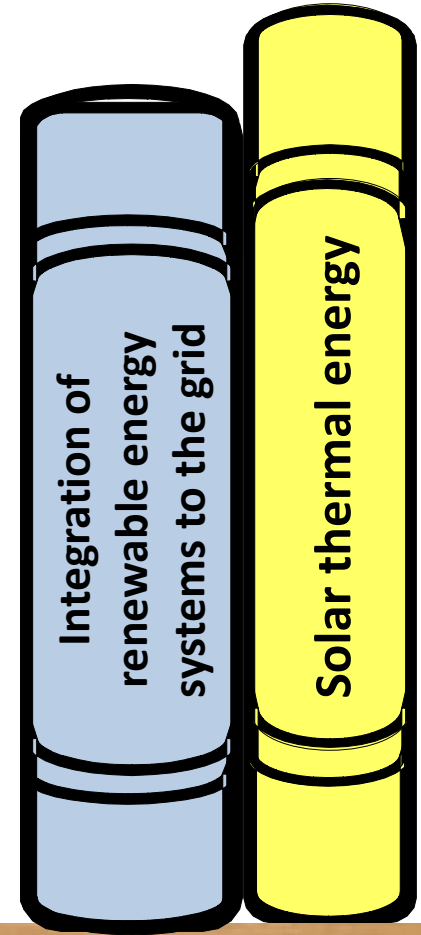
Time	Monday	Tuesday	Wednesday	Thursday	Friday
3 to 5 p.m.	820750 - Power electronics applied to distributed energy resources	820755- Smart grids	820747 - Integration of renewable energy systems to the grid	820739 - Wind power	Lab
	820757 - Computational Methods in Energy Technology (Terrassa)	820744 - Solar thermal energy		820748-Hydrogen and fuel cells	
5 to 7 p.m.	820763- Thermal energy storage (Terrassa)	820743- Photovoltaic devices	820745 - Geothermal Energy	820740 - Solar photovoltaics	Lab

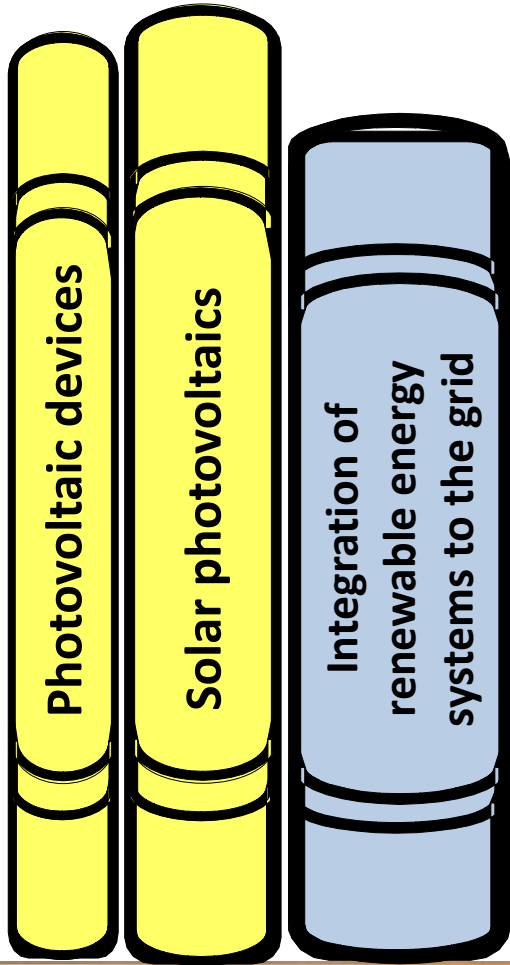
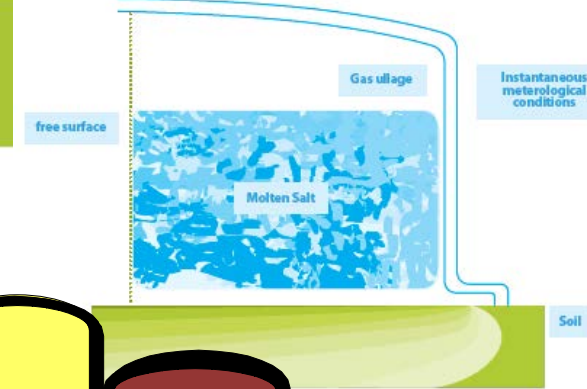


Fabrication and
characterization of
photovoltaic solar cells

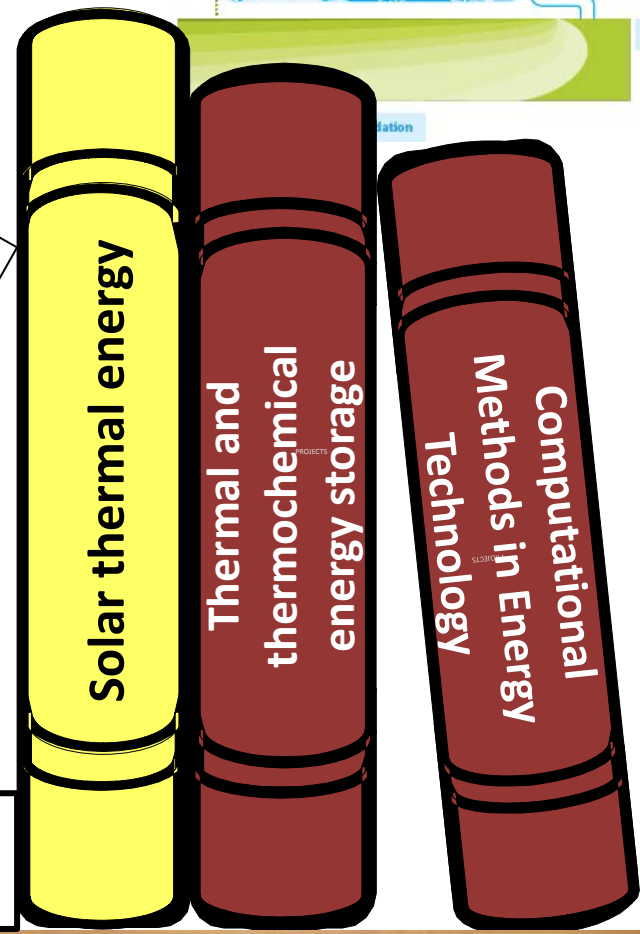


Center for Research in
NanoEngineering of UPC





Logos of partner institutions: gasNatural fenosa, tecnalia Inspiring Business, TOTAL, and KTH ROYAL INSTITUTE OF TECHNOLOGY. A central tilted box contains the project title: **TESCONSOL - THERMAL STORAGE FOR SOLAR CONCENTRATING PLANTS**. Below the logos is a box with the text: Heat and Mass Transfer Technological Center.



Department of Heat Engines

Terrassa campus

HVDC systems for offshore wind
Offshore wind power plant concepts and control
Operation and control of isolated microgrids



ALSTOM

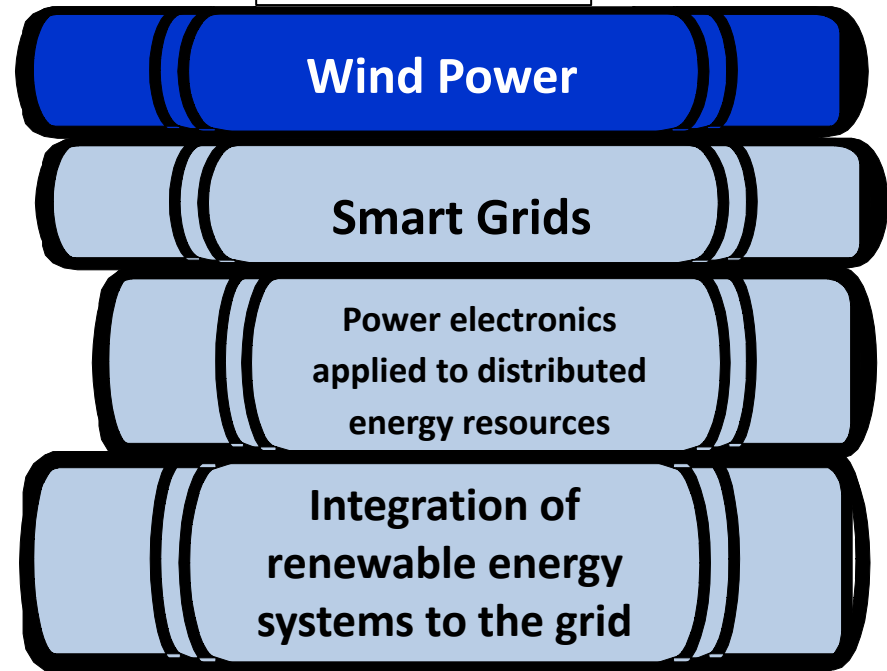


IBERDROLA



edp renováveis

CITCEA-UPC

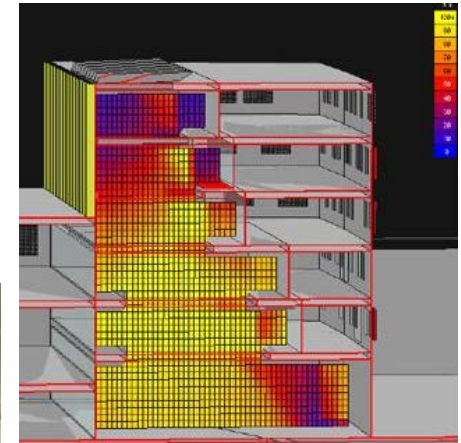
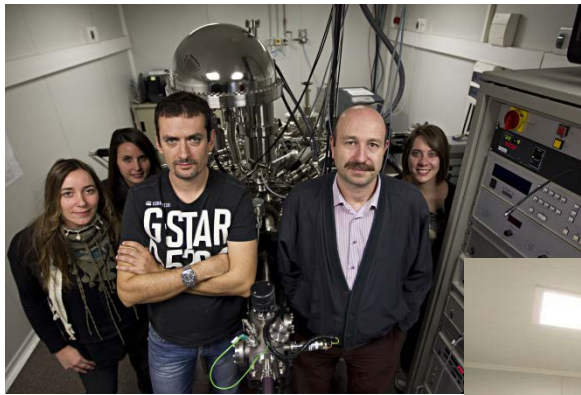
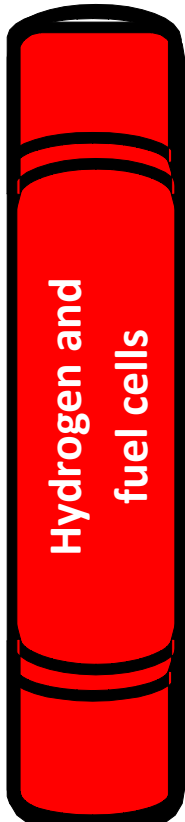


Department of Electrical Engineering

Catalytic hydrogen production from agricultural waste



ECOS-Energy Efficiency of Systems, Buildings and Communities group



Hydrogen Laboratory



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