R+D+I ON ENERGY AT UPC

2023

UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

CONTENT

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01 THE UPC

The Universitat Politècnica de Catalunya (UPC) is a public institution of research and higher education in the fields of engineering, architecture, sciences and technology, and one of the leading technical universities in Europe.

The UPC participates in the innovation system of Catalonia with projects and contracts for research, development, valorization of knowledge and commercialization of technology.

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BARCELONATECH

RESEARCH, DEVELOPMENT AND INNOVATION ACTIVITY AT THE UPC 2022

141
Research groups

15
TECNIO Research centers

305
PhD theses

78,1 M€
Projects income

1.011
Ongoing research, development and innovation projects

2.526
Magazine articles

1.422
Contracts

13
Registered patents

6
New UPC spin-offs

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02 ENERGY

Energy is the ability to perform work, that is to say, the intervention of energy is necessary to do anything that involves a change, such as a movement, a temperature variation, a transmission of some, etc.

In the field of research, development and innovation (R+D+I), there are several areas and disciplines related to the field of energy.

MANIFESTATIONS AND ENERGY SOURCES

KINETIC ENERGY

Kinetic energy is the ability to do work associated with the movement of bodies.

THERMAL ENERGY

Thermal energy is the manifestation of kinetic energy, the sum of the microscopic contributions of the particles that make up a substance, related to the temperature of the substance.

POTENTIAL ENERGY

The **potential energy** accumulated in certain circumstances according to the specific configuration of a body with respect to a system of bodies. So, bodies have the capacity to do work, even if they are not in motion and without taking into account the amount of thermal energy they possess due to the agitation of their molecules.

ENERGY SOURCES

There are several sources of energy: **wind** (when it comes from the wind), hydraulic (when it comes from water), **solar thermal** (when the heat from the sun's rays is used) and **solar photovoltaic** (when the sunlight into electricity). We also have other non-renewable energy sources such as oil, natural gas and coal and uranium (nuclear energy). A separate case is electrical energy, and its accumulation and storage.

Basic concepts (Termcat)

Renewable energy

"Energy that is obtained from inexhaustible or renewable sources. For example, wind energy, solar thermal energy, photovoltaic solar energy and biomass energy are considered renewable energies."

Nonrenewable energy

"Energy that is obtained from exhaustible or non-renewable sources. For example, fossil fuels, because their formation process lasts millions of years; nuclear fuels, because they are limited, and agrofuels, because they compete with food, require a high volume of fertilizers and pesticides, and are produced in monocultures."

Energy efficiency

"The degree to which an optimal relationship is achieved between the resources used in energy management and the results obtained."

Electrification

"Transformation of an activity or a sector so that its main source of energy is electricity, as an alternative to burning fossil fuels."

Energy transition

"Progressive abandonment of energy that comes from fossil fuels in favor of energy that comes from renewable energy sources."

03

RESEARCH AND INNOVATION

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Since 2010, the Universitat Politècnica de Catalunya (UPC) has been the main partner of one of the first knowledge and innovation communities funded by the European Commission: EIT InnoEnergy.

One of the tools derived from these projects was the systematic collection of information on the energy research capacity of the UPC's different centers and collectives.

The result of this effort is this document, which briefly and synthetically summarizes a first approximation of the University's Energy Research Map.

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Activity examples I

Modeling and control of complex systems, as well as in its application to problems related to the network and automotive systems.

Research into architecture from an environmental point of view, considering the environmental parameters that affect human comfort and perception, as well as the impact that construction can have on cities and the environment.

Analysis and design of structures with the development of conceptual and numerical models and the performance of tests to evaluate the safety, functionality and durability of structures under static loads, seismic and environmental actions.

Obtaining useful nuclear data to improve **knowledge of the nuclear fuel cycle** during the operation of nuclear power plants and in the transmutation of radioactive waste, preserving nuclear safety.

Consolidation and improvement of skills in the field of **nuclear power plant simulation** to independently analyze possible scenarios in the power plants.

Network monitoring and traffic analysis, digital identity and electronic signature, energy efficient networks and nano-communications.

Activity examples II

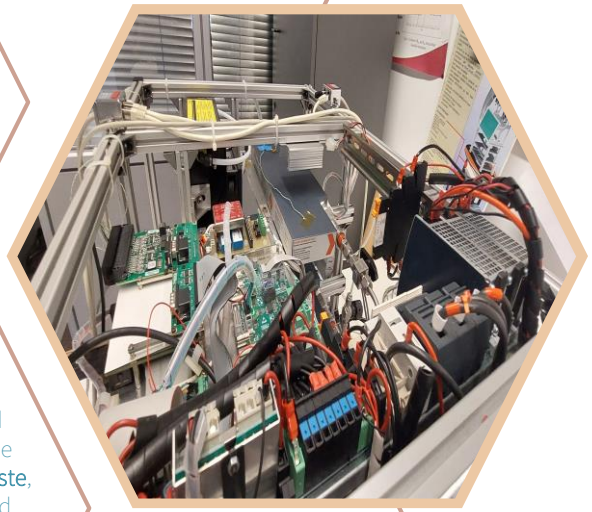
Study of the excitations generated by a fluid and the structural response to determine the vibrational behaviors and deformations in hydraulic turbomachines.

Design, obtaining and characterization of new ferroelectric materials based on low environmental impact oxides for energy harvesting and storage.

Creation of new structures of electric machines fed through power converters for energy saving in electric drives.

Obtaining models and multi-criteria tools for the design of isolated electrification systems with renewable energies, thus ensuring that the solutions obtained are efficient and sustainable over time.

Development of sustainable and innovative biotechnologies for the treatment of water and organic waste, which eliminate conventional and emerging pollutants and which can produce bioenergy.



Development of thermal systems that allow sustainable growth, minimizing the consumption and impact of conventional energies.

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UPC RESEARCH GROUPS IN ENERGY

A

ACaPE - Advanced Control and Power Electronics Systems
ACC - Architecture, City and Culture. Reality and Transformation of Contemporary Urban Space
ACES - Advanced Control of Energy Systems
ADR&M - Architecture, Design: Representation and Modelling
AiEM - Architecture, energy and environment
ANT - Advanced Nuclear Technologies
ARIENS - Architecture, Industry, Engineering and Sustainable Society
ATEM - Analysis and Technology of Structures and Materials

B

BIOGAP - Biological Treatment of Gaseous Pollutants and Odors
BIT - Barcelona Innovative Transportation

C

CCP - Catalan Plastic Center
CDEI-DM - Industrial Equipment Design Center - Machine Dynamics
CDIF - Center for Industrial Diagnostics and Fluid Dynamics
CELBIOTECH - Sustainable Biotechnology and Bioremediation
CEPIMA - Center for Process and Environment Engineering
CERTEC - Center for Technological Risk Studies
CITCEA-UPC - Center for Technological Innovation in Static Converters and Drives
CITES - Science and Technology of Sustainability
CoDAlab - Control, Data and Artificial Intelligence
CPSV - Center for Land Policy and Valuations
CRAHI - Center for Applied Research in Hydrometeorology
CRESCA - Center for Research in Food Safety and Control
CREDA-UPC-IRTA - Center for Research in Economics and Agri-Food Development
CSC - Components and Systems for Communications
CTTC - Technological Center of Heat Transfer

D

DAMA-UPC - Data Management Group
DiCEA - Design and calculation of architectural structures

E

eb-POLICOM - Ecological and Biodegradable Polymers and Composites
EC - Construction Engineering
EGEO - Geomatic Engineering
ENCORE - Energy Catalysis Process Reaction Engineering
EnGeoModels - Monitoring and Modelling in Engineering Geology
ENMA - Environmental Engineering
EPIC - Energy Processing and Integrated Circuits
e-PLASCOM - Ecological Plastics and Composites
EXIT - Engineering, Networks, Infrastructures, Territory
EXPLORATORI - EXPLORATORY of Natural Resources

F

FLUMEN - Fluvial Dynamics and Hydrological Engineering

G

GAECE - Electric Drives with Electronic Switching
GAECEQS - Electromechanical Drives, Energy Conversion and Quality of Supply
GBMI - Molecular and Industrial Biotechnology
GCEM - Electromagnetic compatibility
GCO - Optical Communications
GEMMA - Environmental Engineering and Microbiology
Geo2Aqua - Monitoring, modelling and geomatics for hydro-geomorphological processes
GGMM - Geotechnics and Mechanics of Materials
GHS - Underground Hydrology
GICITED - Interdisciplinary Group of Science and Technology in Building
GiES - Geophysics and Seismic Engineering
GIIP - Project Engineering: Design and Sustainability
GILDA - Group for Innovation and Logistics Teaching Architecture
GPI - Image and Video Processing

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UPC RESEARCH GROUPS IN ENERGY

G

GRBIO - Biostatistics and Bioinformatics
GReCEF - Fluid Science and Engineering
GREENTECH - Renewable Technologies
GREiP - Building and Heritage
GREMS - Sustainable Mining
GREP - Power Electronics
GRIC - Construction Research and Innovation
GRU - Research in Urbanism

H

HABITAR - HABITAR
HorPTA - Horticulture: production, transformation and utilization

I

IFLUIDS - Barcelona Fluids & Energy Lab
IMEM CIEFMA-UPC - Innovation in Materials and Molecular Engineering Center for Structural Integrity, Reliability and Micromechanics of Materials
IMEM-BRT - Innovation in Materials and Molecular Engineering - Biomaterials for Regenerative Therapies
IMP - Information Modeling and Processing
InLab FIB
ISI - Instrumentation, Sensors and Interfaces

L

LAB - Laboratory of Bioacoustic Applications
LEAM - Acoustic and Mechanical Engineering Laboratory
LESEC - Laboratory of Social Studies of Civil Engineering
LITEM - Laboratory for Technological Innovation of Structures and Materials

M

MACROM - Crystallography, Structure and Function of Biological Macromolecules
MCIA - Motion Control and Industrial Applications
MECMAT - Mechanics of Materials
MICROTECH LAB - Microtechnology for the Industry
MNT-Solar - Micro and Nano Technologies for Solar Energy
MSR - Soil and Rock Mechanics

N

NEMEN - Nanoengineering of materials applied to energy

P

POL - Advanced Industrial Polymers and Technological Biopolymers
POLQUITEX - Polymeric Materials and Textile Chemistry
POLY2 - Polyfunctional polymeric materials

Q

QSE - Quality of Electricity Supply
QURBIS - Quality of Urban Life: Innovation, Sustainability and Social Engagement

R

R2EM - Resource Recovery and Environmental Management
REARQ - Rehabilitation and Architectural Restoration
RIIS - Resources and Intelligent and Sustainable Industries

S

SAC - Advanced Control Systems
SARTI-MAR - Remote Data Acquisition Systems and Information Processing in the Marine Environment
SEER - Renewable Energy Electrical Systems
SISCOM - Smart Services for Information Systems and Communication Networks
SMArT - Sustainabilty and Metabolism in Architecture and Technology
SOC-STEM - Social Impact of STEM
SPAq - Aquaculture Production Systems
SUMMLab - Sustainability Measurement and Modeling Lab

T

TECTEX - Textile Technology
TIEG - Terrassa Industrial Electronics Group
TRANSMAR - Maritime transport and port logistics
TUAREG - Turbulence and Aerodynamics in Mechanical and Aerospace Engineering

U

UMA - Agricultural Mechanization Unit

SPECIFIC UPC RESEARCH CENTERS

AGROTECH - Specific Center for Research in Agricultural Technology

The Specific Center for Agricultural Technology Research (AGROTECH-UPC) aims to bring together research groups and research staff from the UPC to carry out activities around agri-food technology, both from a side of agronomy as from a more technological or sustainability aspect.

CatMech - Advanced Center of Mechanical Technologies

CATMech's mission is to provide competitive solutions to industry, from a search for excellence based on the analysis and modeling of physical phenomena, as well as experimentation within the mechanical field.

CD6 – Sensors, Instrumentation and Systems Development Center

The CD6 develops its activity in the field of Optical Engineering and Photonics. Its activity is aimed at creating value through innovation. The applied research developed is defined with the intention that the new knowledge that is generated reaches the market in the form of new products or new processes.

CEBIM – Molecular Biotechnology Center

The CEBIM is a Specific Research Center (CER) of the Universitat Politècnica de Catalunya dedicated to the promotion of research in the field of biotechnology with special emphasis on its molecular aspects.

SPECIFIC UPC RESEARCH CENTERS

CER-H2 – Specific Hydrogen Research Center

The CER-H2 aims to cover research and knowledge transfer needs in the field of hydrogen technologies, making a special effort to align with the Horizon Europe plan and the NextGenerationEU recovery plan. This includes technologies for the generation, storage and use of hydrogen in all fields of application: energy, industry, transport, housing...

CPSV – Policy Center of Soil and Valuations

The mission of the CPSV is to satisfy the demand from the professional field, the administration and the private company, for new methodologies, technological applications, optimization and improvement of instruments, impact measures in the field of urban performance, real estate and urban management aspects as well as the training of professionals specialized in these fields.

CRAL – Center for Research and Services for Local Administration

The CRAL brings together the research, knowledge transfer and innovation capacity of the teaching staff and directs it towards projects and research programs in the field of architecture, the city and the territory, as well as collaboration agreements with the administration, the social fabric and the productive sector with the aim of producing reflection and generating knowledge in actions for housing, rehabilitation, regeneration, infrastructure, public space, environment, landscape or heritage.

CREMIT – Motors and Installations Research Center

Union of two groups already consolidated and specialized in the fields of thermal engines (CREMIT), and in refrigeration machines, heat pumps and heat transfer processes (CER).
The objectives are: - the generation of knowledge expressed in scientific publications in the aforementioned areas, and - the transfer of research results to companies and institutions through specific collaboration agreements and conventions.

SPECIFIC UPC RESEARCH CENTERS

CS2AC – Supervision, Security and Automatic Control

Multidisciplinary group of professors from the Universitat Politècnica de Catalunya (UPC) - Barcelona Tech - and researchers from the Superior Council of Scientific Research (CSIC) dedicated to the wide world of automatic control and system supervision.

LIM – Maritime Engineering Laboratory

Formed by highly qualified researchers from various technical and scientific disciplines. The lines of work are: coastal and estuarine hydrodynamics, climate and quality of the marine environment, oceanographic physics and engineering, coastal engineering and morphology, port engineering, and management of the coastal zone and coastal resources.

PERC-UPC – Power Electronics Research Center

The objectives of the PERC are:
a) Bring together the efforts of the UPC groups that work in the field of power electronics in order to constitute a competitive R+D+I organization for the generation of knowledge and support for the industry.
b) Promote research in this wide-ranging multidisciplinary field.
c) To achieve, through research and service projects, close collaboration between PERC members, industry and the public sector. d) Support teaching.

SSR-UPC – Smart Sutainable Resources

It aims to consolidate the research activity carried out by SSR staff and to position itself as a point of reference in this research at the UPC, in general, in its geographical area of influence.

04

UPC EXCELLENCE PROJECTS

In this document, projects of excellence are considered those in which:

- The scientific process is rigorous and meets high quality standards.
- They are strategic and tractors.
- They acquire a commitment to social challenges and have a great scientific and socio-economic impact.
- They have an impact on the territory.
- They have different entities participating in the quadruple helix, which makes the projects multidisciplinary.

UPC excellence projects are financed by various programs, such as the State Plan or Horizon Europe.

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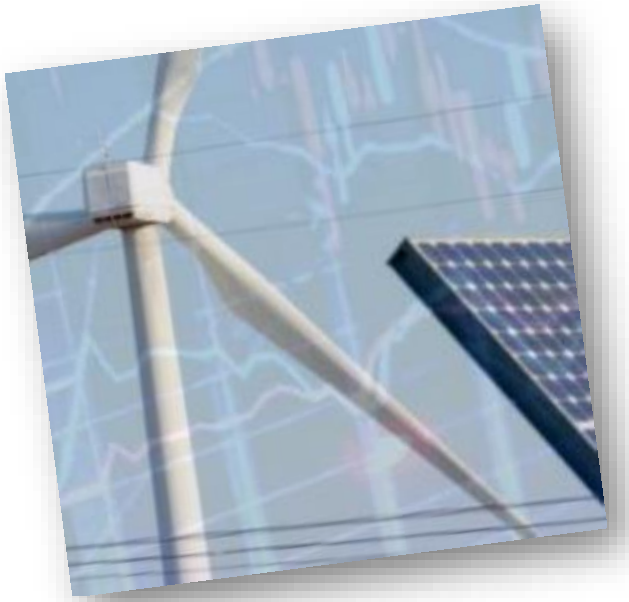
UPC EXCELLENCE PROJECTS

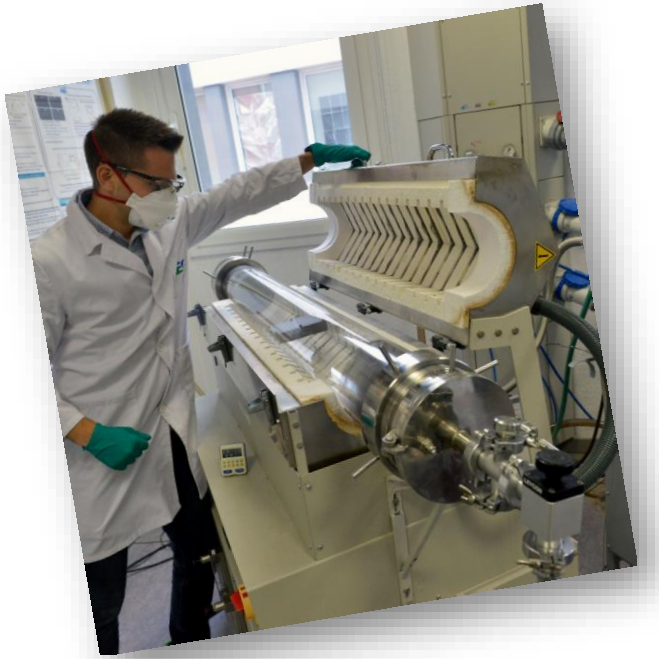


FLEX4FACT - Industrial Cluster FLEXibility platform for sustainable FACTories to reduce CO2 emissions and to enable the Energy Transition

The Flex4fact project aims to develop a comprehensive ecosystem that adopts a modular approach to enable flexible manufacturing in industry and create the necessary conditions for an energy transition in which all stakeholders can participate.

UPC research group involved: CITCEA-UPC - Center for Technological Innovation in Static Converters and Drives

UPC EXCELLENCE PROJECTS



SENSATE - Low-dimensional semiconductors for optically tunable solar collectors

SENSATE proposes innovative ideas and concepts that combine highly innovative low-dimensional thin film materials and highly asymmetric selective contacts with dipoles, for the development of universal and non-intrusive solar energy harvesters. Material, process and device design innovations will be combined in a simple way, in order to develop the next generation of cost-effective and highly stable/optically tunable photovoltaic (PV) devices.

UPC research group involved: Department of Electronic Engineering

UPC EXCELLENCE PROJECTS

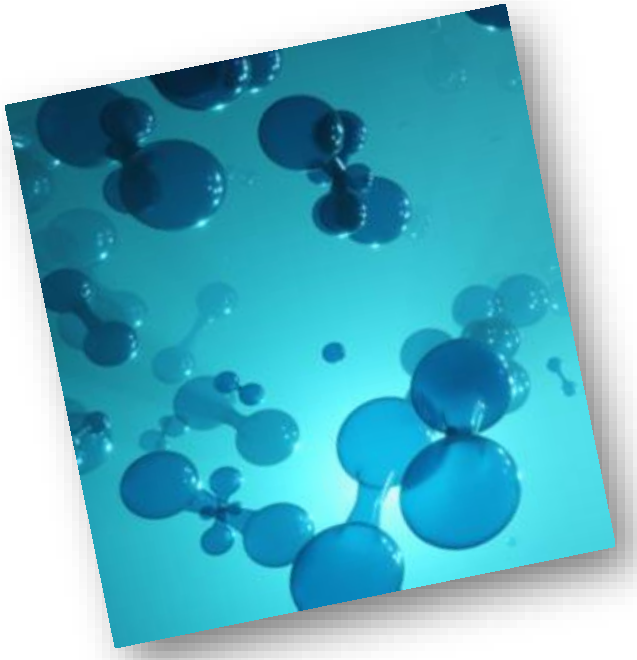
Image courtesy of EF Solare Italia

SYMBIOSYST - Low-dimensional semiconductors for optically tunable solar collectors

It is an initiative focused on agrovoltaic activity, called agri-PV, which consists of a dual use of land for agriculture and the generation of solar energy.
The project will represent an advance in research and the multidisciplinary transfer of knowledge in the field of technicization of the garden sector, at a time when the agricultural sector requires the incorporation of technologies and technological processes in order to grow, through sustainable photovoltaic panels, AI and robots. The production of food with a low carbon and water footprint and products with high added value linked to the territory will also be encouraged. At the same time, the project aims to promote awareness-raising actions to increase interest in agri-PV technology and attract more investments.

UPC research group involved: Department of Agricultural Engineering and Biotechnology

UPC EXCELLENCE PROJECTS



HYNTERCAT - Hydrogen energy technologies driven by interface engineering of amorphous/crystalline catalysts

The reasoning behind the HYNTERCAT project considers that, typically, the unique properties desired for a particular catalyst cannot be achieved by a well-defined ordered material alone, but requires a clever combination of crystalline and amorphous phases in a catalytic composite . In this project we will fabricate a new generation of catalysts for hydrogen production and purification reactions based on a controlled interface engineering approach of amorphous and crystalline phases aimed at creating unprecedented active sites with unique properties. Compared with the most studied crystalline materials, amorphous catalysts have the uniqueness of atomic-scale structural flexibility and abundance of defects, which are two important aspects in catalysis design.

UPC research group involved: INTE – Institute of Energy Techniques

UPC EXCELLENCE PROJECTS

ADOreD - Accelerating the deployment of offshore wind using DC technology

This PhD consortium, ADOreD, will recruit and train 15 researchers collaborating with 19 academic and industrial organizations. It aims to address the academic and technical challenges in the areas of transmission of offshore wind energy to the AC grid by using AC/DC technologies based on power electronics. In doing so, it will equip researchers, through their doctoral studies, with the essential knowledge and skills to face a rapid energy transition in their future careers. The project covers 3 key aspects of research: offshore wind (including wind turbines, wind energy harvesting and wind farm design and control); DC technologies (including AC/DC converters, HVDC control and DC network operation and protection); and AC network (including stability and control of converter-dominated AC networks under different control modes.

UPC research group involved: CITCEA-UPC - Center for Technological Innovation in Static Converters and Drives

UPC EXCELLENCE PROJECTS

MECATEN - Mechanochemical preparation of catalysts for energy applications: methane activation and hydrogen production

In this subproject, catalysts based on metals supported on inorganic oxides will be prepared using mechanochemical methods and their capacity to transform the methane molecule (natural gas) and for the photocatalytic production of hydrogen as an energy vector will be studied. We will study in detail the preparation of Pd-CeO2 catalysts as well as Pd-M-CeO2 bimetallic systems to achieve robust catalysts in natural gas transformation, and TiO2-supported transition metal catalysts for photocatalytic hydrogen production. Among other variables to be considered, supports of different morphology will be used to study the effect of the exposed crystallographic planes on the mechanochemical synthesis and on the catalytic behavior of the resulting materials, as well as preformed metallic nanoparticles with known properties.

UPC research group involved: INTE – Institute of Energy Techniques

UPC EXCELLENCE PROJECTS

iPLUG - Distributed multiport converters for the integration of renewable energy, storage and load systems while improving the performance and resiliency of modern distributed networks

iPLUG proposes the development of new power electronics solutions based on multiport converters in order to improve the integration of multiple renewable sources, energy storage systems and loads. The proposed converters, installed in various optimal locations, can facilitate a massive integration of renewables by avoiding grid congestion and enabling the provision of functionality to both end users and the distribution network.

UPC research group involved: CITCEA-UPC - Center for Technological Innovation in Static Converters and Drives

UPC EXCELLENCE PROJECTS

FusionCat – Fusion in Catalunya

It is an alliance to establish an active nuclear fusion community in Catalonia that includes leading research institutions, universities and industrial partners.

It consists of 11 original R&D projects, organized into 3 focused work packages based on recognized complementary fields of expertise. It aims to establish the transfer of technology from partners to industry in order to develop industrial skills in Catalonia for the realization of fusion energy.

UPC research groups involved:
Heat Transfer Technology Center (CTTC)
Nanoengineering of materials applied to energy (NEMEN)
Advanced Nuclear Technologies (ANT)

SOME PUBLICATIONS

Moyón, L. [et al.]. Early detection of main bearing damage in wind turbines. "Renewable energy and power quality journal", Setembre 2022, vol. 20, p. 773-777. https://futur.upc.edu/34202481 The article presents the application of a new algorithm to treat the data emitted by wind turbines and detect main bearing failures, which are an important concern to increase their reliability and availability.

Díaz-González, F. [et al.]. A hybrid energy storage solution based on supercapacitors and batteries for the grid integration of utility scale photovoltaic plants. "Journal of energy storage", 1 Juliol 2022, vol. 51, p. 104446:1-104446:16.
https://futur.upc.edu/34195856
This paper presents a 2-level controller that manages a hybrid energy storage solution (HESS) for grid integration of photovoltaic (PV) plants in distribution networks.

Coronas, S.; de la Hoz, J.; Alonso, À.; Martín, H. 23 Years of Development of the Solar Power Generation Sector in Spain: A Comprehensive Review of the Period 1998–2020 from a Regulatory Perspective. "Energies", 2022, 15, 1593.
https://futur.upc.edu/32838751
The article provides a 23-year review of the evolution of the solar energy sector in Spain, highlighting both its boom and bust phases, driven by government policies and regulatory changes. It underlines the importance of support mechanisms and provides information for other countries pursuing renewable energy development.

Marti, J. [et al.]. Nucleation of helium in liquid lithium at 843 K and high pressures. "Materials", 13 Abril 2022, vol. 15, núm. 8, p. 2866:1-2866:18.
https://futur.upc.edu/33083794
This study investigates the behavior of lithium and helium mixtures under fusion reactor conditions, emphasizing the formation of helium droplets, a critical factor for reproductive mantle performance.

05 FORMACIÓ

UNIVERSITAT POLITÈCNICA
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BACHELOR'S DEGREES - UPC

- Bachelor's Degree in Building Engineering and Construction (EPSEB)
- Bachelor's Degree in Architecture (ETSAB)
- Bachelor's Degree in Architecture (ETSAV)
- Bachelor's Degree in Landscape Architecture (EEABB i ETSAB)
- Bachelor's Degree in Marine Sciences and Technologies· Specializations: Marine Sciences / Marine Technologies (ETSECCPB, EEABB & EPSEVG)
- Bachelor's Degree in Aerospace Technologies Engineering (ESEIAAT)
- Bachelor's Degree in Environmental Engineering (ETSECCPB & EEABB)
- Bachelor's Degree in Civil Engineering (ETSECCPB)
- Bachelor's Degree in Mineral Resources Engineering and Recycling (EPSEM)
- Bachelor's Degree in Agronomic Sciences Engineering (EEABB)
- Bachelor's Degree in Biological Systems Engineering (EEABB)
- Bachelor's Degree in Telecommunications Technologies and Services Engineering (ETSETB)
- Bachelor's Degree in Electronic Telecommunications Engineering (ETSETB)
- Bachelor's Degree in Automotive Engineering (EPSEM)
- Bachelor's Degree in Industrial Design and Product Development Engineering (EPSEVG)
- Bachelor's Degree in Industrial Design and Product Development Engineering (ESEIAAT)
- Bachelor's Degree in Energy Engineering (EEBE)
- Bachelor's Degree in Materials Engineering (EEBE)
- Bachelor's Degree in Electrical Engineering (EPSEVG)
- Bachelor's Degree in Electrical Engineering (EEBE)
- Bachelor's Degree in Electrical Engineering (ESEIAAT)
- Bachelor's Degree in Systems and Naval Technology Engineering (FNB)
- Bachelor's Degree in Nautical and Maritime Transport (FNB)

MASTER'S DEGREES – UPC I

- University Master's in Architecture (ETSAB)
- University Master's in Architecture (ETSAV)
- University Master's in Advanced Construction in Building (EPSEB)
- University Master's in Diagnosis and Intervention Techniques in Building (EPSEB)
- University Master's in Advanced Studies in Architecture - Barcelona (MBArch) (ETSAB)
- University Master's in Building Management (EPSEB)
- University Master's in Sustainable Intervention in the Built Environment (MISMeC) (ETSAV)
- University Master's in Landscape Architecture (MBLandArch) (EEABB & ETSAB)
- Erasmus Mundus master's degree in Coastal and Marine Engineering and Management (CoMEM) (ETSECCPB)
- Erasmus Mundus master's degree in Flood Risk Management (ETSECCPB)
- Erasmus Mundus master's degree in Hydroinformatics and Water Management (EuroAquae) (ETSECCPB)
- University Master's in Mining Engineering (EPSEM)
- University Master's in Oceanography and Marine Environment Management (ETSECCPB)
- Master's degree in Urban Mobility (ETSAB, ETSECCPB, ETSETB, ETSEIB & FIB)
- Master's degree in Aquaculture (EEABB)
- Master's degree in Agronomic Engineering (EEABB)
- Erasmus Mundus master's degree in Dynamics of Renewables-based Power Systems (ETSEIB)

MASTER'S DEGREES – UPC II

- Master's degree in Automotive Engineering (ETSEIB)
- Master's degree in Energy Engineering (linked to the InnoEnergy program) (ETSEIB)
  This Master's is part of the educational project InnoEnergy with the following international Master's programs: Environomical Pathways for Sustainable Energy Systems (SELECT) / Renewable Energy (RENE) / Energy for Smart Cities / Smart Electrical Networks and Systems (SENSE)
- Master's degree in Automatic Systems and Industrial Electronics (ESEIAAT)
- Master's degree in Chemical Engineering (EEBE)
- Master's degree in Electric Power Systems and Drives (ETSEIB)
- Master's degree in Nuclear Engineering (linked to the InnoEnergy program) (ETSEIB)
- Master's degree in Thermal Engineering (ETSEIB)
- Master's degree in Naval and Ocean Engineering (FNB)
- Master's degree in Management and Operation of Maritime Energy Facilities (FNB)
- Master's degree in Science and Technology of Sustainability (ISUPC)
- Master's degree in Environmental Engineering (ETSECCPB)
- Master's degree in Natural Resources Engineering (EPSEM)
- Master's degree in Sustainable Intervention in the Built Environment (MISMeC) (ETSAV)

PHD PROGRAMMES

- Architecture, Energy, and Environment
- Marine Sciences
- Environmental Engineering
- Civil Engineering
- Construction Engineering
- Chemical Process Engineering
- Nuclear Engineering and Ionizing Radiations
- Thermal Engineering
- Urban and Architectural Management and Valuation
- Architectural, Civil, Urban Heritage, and Rehabilitation of Existing Constructions
- Natural Resources and Environment
- Electric Power Systems
- Sustainability
- Agri-food Technology and Biotechnology

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UPC-SCHOOL

- Master of Permanent Training in Smart Energy. Renewable Energies and Digitization
- Postgraduate in Digital Energy
- Postgraduate in Energy Economics
- Postgraduate in Renewable Energy in Architecture
- Postgraduate in Renewable Energies and Electric Mobility
- Permanent Training Course in Electrification and Railway Energy
- Permanent Training Course in Nature-based Solution for the Energy Transition

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