

ENERGY

PRODUCTION

PHOTOVOLTAIC ENERGY

- Photovoltaic reconfigurable systems for energy extraction optimization
- Modular power conversion architectures
- Grid-connected photovoltaic systems
- Modelling and control of PV inverters and converters
- Refrigeration and thermal management of PV panels
- Hybridization of PV power facilities with other energy sources

SOLAR THERMAL ENERGY

- Integration of solar ponds: energy storage and energy production
- Solar collectors using transparent insulation materials (TIM)
- Receivers in concentrating solar power plants
- Thermal storage in concentrating solar power plants
- Grid integration of solar power

WIND ENERGY

- Transmission systems for offshore wind power plants
- Analysis and design of advanced controllers for wind turbines
- Analysis of harmonics flow in wind power plants and design of mitigation measures
- Analysis of the performance of wind power plants
- Design of mini-wind generators
- Wind turbine blade virtual wind tunnel

OCEAN ENERGY

- Wave energy resource assessment
- Wave energy balance in wave models
- Testing of wave energy capture devices
- Optimization of buoy geometry design
- Fluid–structure interaction for buoys and waves
- Overtopping devices

HYDROPOWER

- Vibration analysis and diagnostics in machinery
- Predictive maintenance
- Advanced monitoring and damage detection
- Structural dynamics, effects of fluid on structural response
- Experimental and numerical investigation of cavitating flows
- Numerical simulation in turbulent flows
- Hydropower plant performance
- Production analysis of mini hydropower plants

GEOTHERMAL ENERGY

- Very low enthalpy geothermal energy (up to 30°C)
- Low enthalpy geothermal energy (from 30°C to 90°C)
- Medium enthalpy geothermal energy (from 90°C to 150°C)

BIOENERGY & BIOFUELS

- Microbial fuel cells in constructed wetlands
- Biofuel production from algal biomass
- Low-cost anaerobic digester
- Hydrogen production from biomass

NUCLEAR ENERGY & SAFETY

- Nuclear safety. Probabilistic risk assessment
- Nuclear instrumentation
- Nuclear power plants
- Nuclear fusion reactors
- Nuclear waste characterization

ENERGY

DISTRIBUTION & CONSUMPTION



ENERGY EFFICIENCY IN INDUSTRY

- Saving energy through design
- Integration and intensification of processes
- Integration and circular economy in chemical processes
- Energy storage systems (heat storage tanks and accumulators, thermochemical storage)
- Heat recovery and alternative heating
- Heat exchangers

CONSUMERS IN THE ENERGY SYSTEM – SMART GRIDS

- Smart grid architecture and big data
- Power systems design
- Power electronics and mechatronics
- Electrical power conversion and AC/DC grids
- Integration of new power sources: renewable power
- Study of demand response management schemes
- Advanced control of electrical systems

ENERGY EFFICIENCY IN BUILDINGS

- Bioclimatic architecture
- Energy-efficient illumination systems
- Building envelope, building insulation technologies
- Building energy management solutions

REFRIGERATION AND HVAC SYSTEMS

- Compressors
- Valves and capillary tubes
- Refrigeration cycle analysis
- Virtual household refrigerator
- Domestic and industrial air-conditioning
- Vapor compression heat pump as alternative heating
- Sprays/evaporative cooling design
- Fan performance analysis (virtual and tunnel)



ELECTRIC VEHICLES (EV)

- Intelligent management of EV
- Modelling EV battery aging for second life business models
- Cooling of batteries
- Electric traction and mechatronics for EV
- Energy efficiency, industrial electronics and high voltage systems for EV
- Design of charging stations

FUEL CELLS & HYDROGEN

- Modelling and control of systems based on proton exchange membrane fuel cell-based systems
- Fuel cell control laboratory, modelling and experimental characterization
- Fuel cell efficiency and durability analysis
- Ethanol reformers for hydrogen production
- Fuel cell systems controller design
- Fuel cell integration into vehicles
- Catalytic and photocatalytic production of hydrogen as a fuel for fuel cells

ENVIRONMENT

RECYCLING, UPCYCLING, TREATMENT

GAS EMISSIONS AND AIR POLLUTION CONTROL

- Gas sensors and contaminant detection
- Modelling odor episodes and atmospheric quality
- Industrial emission assessment tools, systems and models
- Modelling, diagnosis and control of sources of air pollution
- Characterization and treatment of gaseous emissions
- Removal, filtration and/or valuation of air pollutants and gases (NH₃, H₂S, CO₂, CO, VOCs and cinder, amongs others)

PLASTICS

- Recycling and recovery of plastic materials
- Plastic recycling by means of hyperspectral techniques
- Conversion of plastic waste (monomers) into new plastics
- Development in bioplastics and biocomposites

CLIMATE CHANGE MITIGATION

- Ecotechnologies and nature-based solutions
- Models and proposals for climate change mitigation
- Multilateral governance
- Global carbon budget and climate justice
- Advice on the Paris Agreement
- Life cycle assessment
- Green and circular economy

ORGANIC

- Characterization and composting of organic waste for agricultural recovery
- Valorization of incineration waste
- Recovery of bio-active components from food and agrowaste
- Sustainable management of cork waste generated in the cork industry
- Development of bio or synthetic organic waste to obtain new materials, for use in the construction industry, transport and packaging
- (Bio) processes of transformation of waste and organic by-products



ELECTRONICS

- Circular economy of digital devices
- eReuse: reuse of electronics to ensure final recycling
- Bioleaching of low-rank ores and e-waste for valuable metals recovery
- Research on the traceability of digital devices across their lifespan



OTHERS

- Co-gasification and pyrolysis of residual material (including municipal solid waste and forest waste)
- Construction and demolition waste management and recovery
- Mining, urban and industrial waste recovery
- Management, compaction and recovery of the waste process

ENVIRONMENT

ECOSYSTEM PRESERVATION



WASTEWATER TREATMENT

- Real-time control of sewage systems and wastewater treatment plants
- Natural low-cost bioprocesses for wastewater and sludge treatment
- Design of constructed wetlands for wastewater treatment
- Numerical simulation of bioprocesses to remove contaminants from wastewater
- Life cycle assessment and economic evaluation of products and technologies for wastewater treatment, sludge management and biogas production
- Use of cork to clean wastewater and produce electricity
- Urban and industrial wastewater treatments and related technologies

TERRESTRIAL ECOSYSTEMS

- Application technique of phytosanitary products to reduce the risk of environmental pollution
- Application technique for organic fertilizers to reduce environmental impact
- Efficiency in composting systems and optimization of agricultural productivity. Sustainable agriculture
- Studies to evaluate risk to human health and ecosystems
- Landslide risk management
- Ecosystem services and sustainable resource management

URBAN ECOSYSTEM

- Urban contaminants and the environment
- Green building architecture and materials
- Noise pollution

DRINKING WATER

- Real-time monitoring and operational control of drinking water systems
- Improvement in the efficiency of water use, energy consumption, water loss minimization and water quality
- Modelling and simulation of drinking water networks
- Optimization of water transport and distribution networks

MARINE AND COASTAL ECOSYSTEMS

- Engineering and physical oceanography
- Port and coastal structures. Coastal zone management
- Morphodynamics and coastal processes
- Maritime research and experimentation wave flume
- Data acquisition system design and automation of marine system measurements
- Development of multifunctional sensors for in-situ monitoring of the marine environment
- Development of mobile and fixed ocean observing platforms



ENVIRONMENTAL IMPACT AND TECHNOLOGICAL RISK

- Risk analysis in the process industry
- Wildland fires monitoring and prediction
- Compartment fires modelling
- Floods and flash-floods, forecasting and derived impact
- Ecotoxicology

CONTACT INFORMATION

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