R&D IN THE CIRCULAR ECONOMY AT THE UPC

2025

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Generalitat de Catalunya

Cofinançat per la Unió Europea

CONTENT

01.

THE UPC

The Universitat Politècnica de Catalunya - BarcelonaTech (UPC) is a public university dedicated to research and higher education in the fields of engineering, architecture, sciences and technology. It has a significant presence and active involvement in the industrial centres of the region. The UPC participates in the innovation system of Catalonia with projects and contracts for research, development, knowledge valorisation and technology commercialisation.

RESEARCH, DEVELOPMENT AND INNOVATION ACTIVITY AT THE UPC 2023

141
research groups

15
TECNIO research centres

331
theses

€118.9 million
income from projects

€18.35 million
income from contracts

1,011
research, development and innovation projects

1,033
contracts and agreements

14
patents

13
new technology-based companies

2,425
articles in journals

02.
CIRCULAR ECONOMY

The circular economy is an economic model that preserves resources through continuous cycles of transformation, eliminates the concept of waste and maintains its value. It is based on three principles: eliminate waste and reduce pollution, promote the circulation of products and materials, and regenerate nature.

It rethinks the traditional system of extraction, production and disposal to establish circular value chains, with the aim of creating a more efficient, resilient and regenerative production and consumption system.

THREE PRACTICAL APPLICATIONS OF THE CIRCULAR ECONOMY

Biodiversity, climate and energy

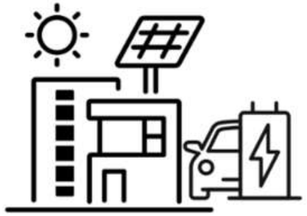
Biodiversity loss, largely caused by our extractive linear economy, can be slowed by circular economy principles. By eliminating waste and pollution, recycling materials and regenerating nature, we can **reduce greenhouse gas emissions and promote biodiversity.**

In agriculture, for example, regenerative practices such as rotating crops and reducing food waste could halve food system emissions by 2050, while improving carbon sequestration and soil health.

Architecture, building construction and mobility

The built environment, which includes buildings and infrastructure, **is responsible for a significant portion of global greenhouse gas emissions.**

For example, the CO_2 emissions of construction materials could be reduced by 38% by applying circular economy principles and reducing the demand for steel, aluminium, cement and plastic. This too **would increase the resilience of the sector,** in the face of possible disruptions and volatility in the price of raw materials, and **materials would be maintained in the economy**, reducing waste and pollution and improving sustainability and urban quality of life.



Manufacturing: textiles, metals and plastics

The circular economy also addresses the **waste crisis, as in the case of the textile industry and the metals and plastics sectors.** Through **innovation** and **ecodesign of products** so that they can be reused or recycled, we can transform the way we produce and use materials, thereby reducing waste and greenhouse gas emissions.

For example, a circular economy for plastics could reduce the amount of plastics reaching the oceans by 80% and generate significant economic savings and new jobs.

CIRCULAR ECONOMY CONCEPTS

CIRCULAR DESIGN

Circular design involves **rethinking products and services from the start and integrating sustainability and circularity principles** in all stages of their life cycle. This includes selecting sustainable materials, designing products so that they are easily repairable, recyclable or reusable, and optimising processes to minimise resource and energy consumption.

The goal is **create solutions that generate economic and environmental value in the long term to avoid generating waste from the start.**

USE OPTIMISATION

The goal of use optimisation is to **maximise the functionality and durability of products** through strategies such as repair, reuse and remanufacturing. **It also promotes innovative business models based on servitisation**, in which users access the benefits of a product without having to own it, as in the case of rental, subscription or sharing.

This reduces the demand for new resources, while encouraging a **more efficient and collaborative economy.**

REVALORISATION

Revalorisation consists in **giving new life to materials and resources at the end of their useful life, thus preventing them from becoming waste.** It includes processes such as advanced recycling, energy recovery to convert waste into energy sources and water recovery in industrial processes.

These strategies contribute to a more circular economy, in which materials retain their value for as long as possible and **their environmental impact is reduced, and sustainability is improved overall.**

CIRCULAR ECONOMY CONCEPTS

TECHNICAL AND BIOLOGICAL CYCLE

Separation of material flows into two categories: the technical cycle, which includes materials and components designed for reuse and industrial recycling, and the biological cycle, which allows materials to be safely reintegrated into the biosphere through processes such as composting.

ECODESIGN

A product design strategy that integrates environmental criteria in all stages of the life cycle, which optimises the efficiency of materials and facilitates their reuse, repair and recycling in a circular context.

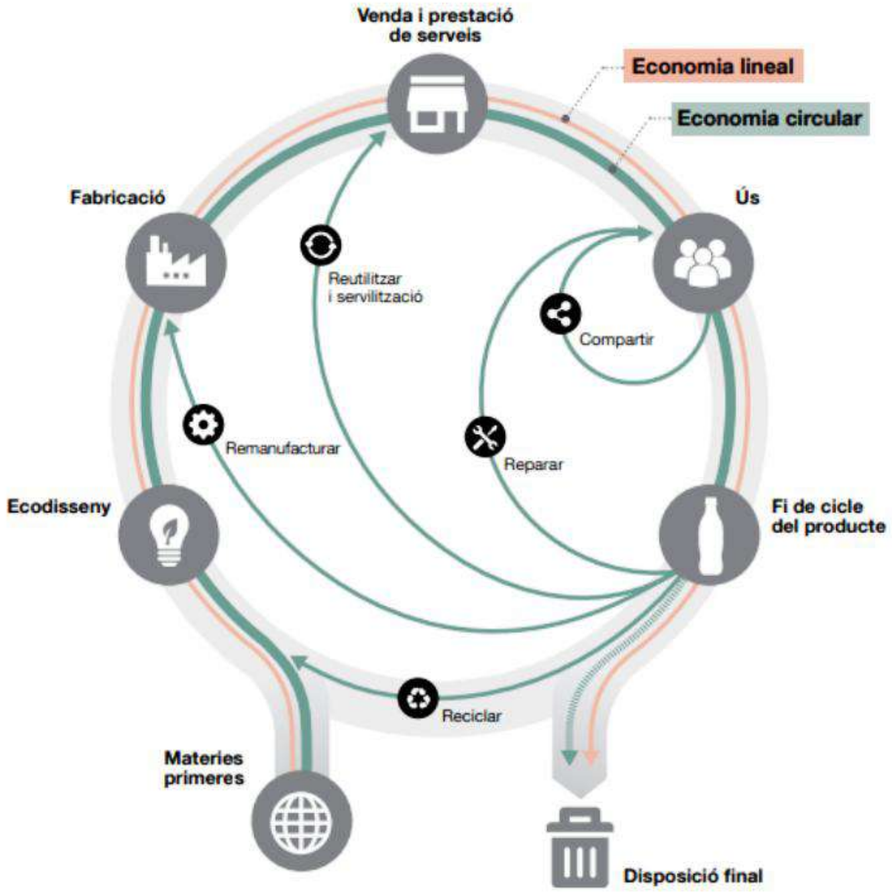
THE FUNCTIONAL ECONOMY

Recycling is the process of transforming used materials or waste into new products or raw materials via physical, chemical or biological processes, in order to reduce the need for natural resources and minimise the environmental impact.

INDUSTRIAL SYMBIOSIS

A model of collaboration between companies and industrial sectors in which the waste, by-products or resources of one company are used as raw materials for others, with which exchanges of materials, energy and production flows are established. This process creates a closed circular economy system that optimises the use of resources, reduces waste and minimises the global environmental impact, taking advantage of synergies to improve the economic and ecological efficiency of industrial processes.

CIRCULAR ECONOMY INFOGRAPHICS



Source: ACCIÓ. Report "L'economia circular a Catalunya" (December 2021).

03.
RESEARCH AND INNOVATION

Through the research groups distributed across its schools, the UPC has facilities and resources to provide its own services in the areas of diagnosis, advice, development, demonstration, training, promotion and support to industry, the public sector and civil society in promoting and deploying innovation technologies in the circular economy field.

EXAMPLES OF ACTIVITY I

Development of sustainable alternatives to replace conventional plastics in packaging.

Research on techniques for producing green hydrogen using recycled metals, which contributes to the decarbonisation of hydrogen production and the sustainability of metallurgical industries.

Characterisation of recycling cycles and efficiency in the recovery of materials.

Research and application of circular strategies for reusing and recycling materials from construction and demolition.

Optimisation of waste recovery and conversion processes using techniques such as composting or chemical recycling.

Optimisation of efficiency in solar panels and power converters.

Study and optimisation of industrial processes to identify and use by-products in order to reduce waste and improve resource efficiency through industrial symbiosis systems.

EXAMPLES OF ACTIVITY II

Development of computational models to simulate the impact of the transition to a circular economy in sectors such as construction or automotive engineering.

Use of microalgae to remove contaminants and pathogens from water, recover regenerated water and generate bioproducts such as biofuels and bioactive compounds.

Recovery of phenols from agri-food by-products using advanced techniques such as nanofiltration and reverse osmosis.

Construction of roads from industrial waste from the cellulose and paper industry.

Development of biological processes for decontaminating water using microalgae, which eliminate pollutants and pathogens, and simultaneously recovering regenerated water and producing bioproducts such as biofuels and bioactive compounds.

Extraction of metals and minerals from brine using advanced separation processes.

Valorisation of batteries of electric vehicles.

UPC CIRCULAR ECONOMY RESEARCH GROUPS AND SUBGROUPS

Research groups

- ARIENS - Architecture, Industry, Engineering and Sustainable Society
- ATEM - Analysis and Technology of Structures and Materials
- BRCMSE - Barcelona Research Center in Multiscale Science and Engineering
- CITES - Sustainability Science and Technology Research Group
- eb-POLICOM - Ecological and Biodegradable Polymers and Composites
- EC - Construction Engineering
- ENMA - Environmental Engineering
- EPIC - Energy Processing and Integrated Circuits
- GEMMA - Environmental Engineering and Microbiology Group
- GICITEC - Interdisciplinary Group on Building Science and Technology
- GRIC - Construction Research and Innovation Group
- GRU - Urbanism Research Group
- IMEM CIEFMA-UPC - Innovation in Materials and Molecular Engineering. Centre for Structural Integrity, Micromechanics and Reliability of Materials
- IMP - Information Modeling and Processing
- MATCAR - Construction Materials and Roads
- POL - Advanced Industrial Polymers and Technological Biopolymers
- POLQUITEX - Polymeric Materials and Textile Chemistry
- R2EM - Resource Recovery and Environmental Management
- RIIS - Research Group on Intelligent and Sustainable Resources and Industries
- SEER - Renewable Electrical Energy Systems
- SIC - Intelligent Control Systems
- SMArT - Sustainability and Metabolism in Architecture and Technology
- TECTEX - Textile Technology Research Group

Research subgroups

- BIOGAP - Biological Treatment of Gaseous Pollutants and Odours Group
- CDEI - Industrial Equipment Design Centre
- CEPIMA - Process and Environmental Engineering Centre
- CIEFMA - Centre for Structural Integrity, Micromechanics and Reliability of Materials
- GCM - Materials Characterisation Group
- GIIP - Project Engineering Research Group: Design and Sustainability
- GREMS - Sustainable Mining Research Group
- LABSON - Fluid Power Systems Laboratory
- LITEM - Laboratory for Technological Innovation in Structures and Materials
- LMIT-CT - Laboratories of Mechanical Engineering Innovation and Technology
- PSEP - Synthetic Polymers: Structure and Properties. Biodegradable Polymers

UPC CIRCULAR ECONOMY RESEARCH CENTRES

AGROTECH-UPC
Agri-Food Technology Research Centre

AGROTECH-UPC aims to bring together research in the agri-food field at the UPC to promote innovation in agronomy, technology and sustainability, and has become a benchmark in research, education and transfer in this field.

CATMech
Centre for Advanced Technologies in Mechanics

CATMech offers competitive solutions to industry through analysis, modelling and experimentation in mechanics that integrate Industry 4.0 technologies and promote greener and more circular engineering to improve business competitiveness through R&D.

CD6
Centre for Sensor, Instrument and Systems Development

The CD6 is a technological innovation centre that specialises in optical and photonic engineering. Its mission is to generate knowledge and transfer it to the market through collaborations with industry, consortia, intellectual property licences and the creation of technology companies.

CEBIM
Molecular Biotechnology Centre

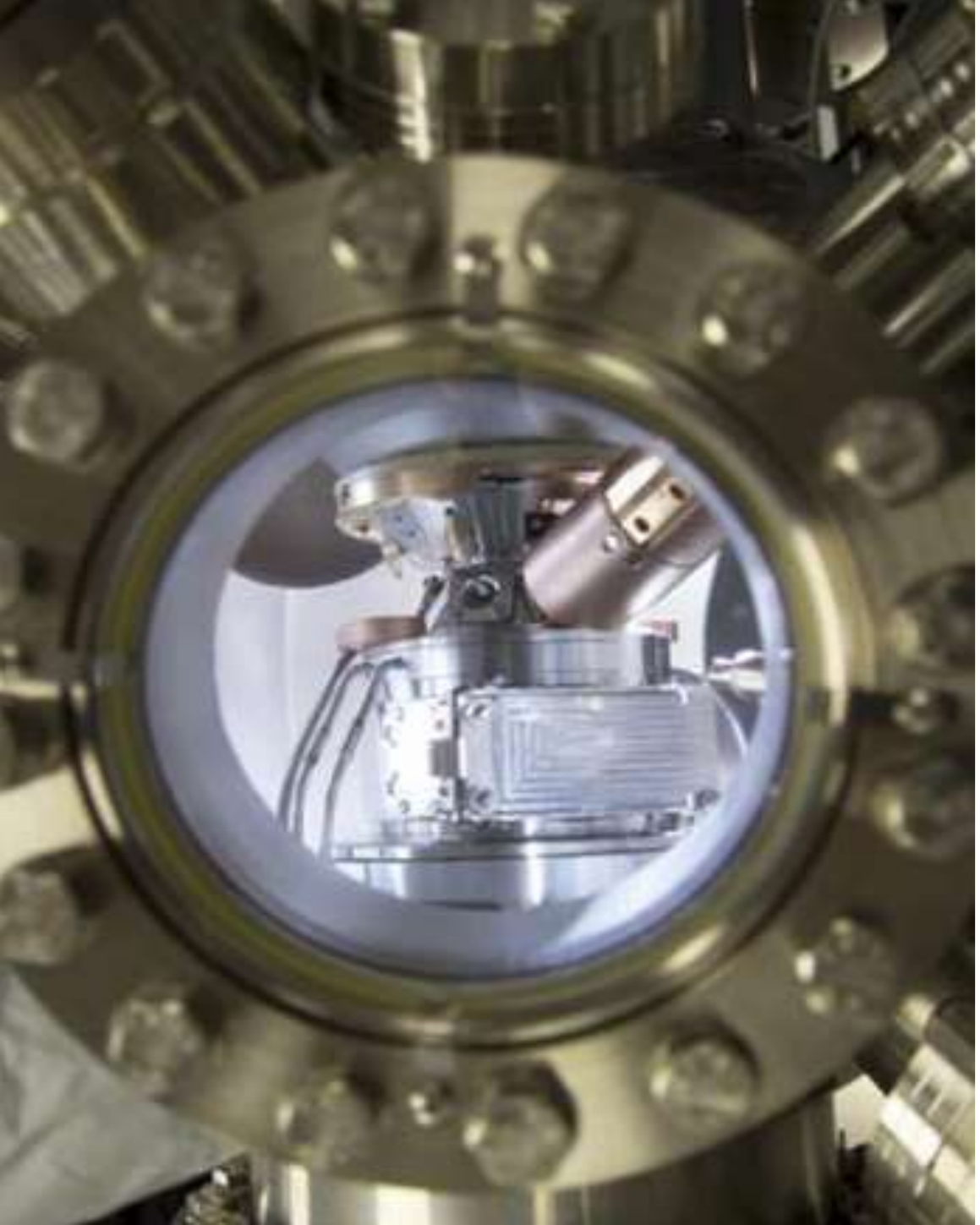
The CEBIM is dedicated to promoting research in biotechnology, especially in molecular aspects and their applications, from genetic informatics to molecular biotechnological processes.

CER-H2
Specific Centre for Hydrogen Research of the UPC

The CER-H2 promotes research and knowledge transfer in hydrogen technologies. Its areas of action include energy storage, network flexibility and the use of hydrogen in high-temperature industrial processes, transport and as a raw material in the chemical industry, with the aim of decarbonising the economy.

SSR-UPC
Smart Sustainable Resources

The SSR-UPC is a research centre that specialises in the use of mineral resources and waste and sustainable mining within the circular economy, using biotechnology and advanced monitoring technologies. Its objective is to consolidate itself as a benchmark in research and knowledge transfer in these areas, in order to improve efficiency and sustainability in the management of natural resources.



SCIENTIFIC AND TECHNICAL FACILITIES

Polymer and Advanced Material Characterisation Laboratory

Located on the EEBE campus and part of the Barcelona Research Centre in Multiscale Science and Engineering, the PSEP research group has the necessary facilities and equipment for the analysis of the thermal (DSC, TGA), mechanical (tension and deformation), chemical composition (NMR, UV-vis, IR) and structure-morphology (GPC, SEM, TEM) properties of the polymers and materials developed. It also conducts biocompatibility and antimicrobial testing and biodegradation studies.

Mineral Processing Laboratory

The Mineral Processing Laboratory is managed by the SSR-UPC research centre. It has advanced facilities for efficient and sustainable mineral processing to optimise separation, classification and concentration for responsible use. Its state-of-the-art technology facilitates experimentation and analysis at different processing stages, and it collaborates with the mining and metallurgy sector to improve processes, foster recycling and promote the circular economy.

It has laboratories for developing and integrating technologies up to TRL 5, including membrane-based processes with commercial modules.

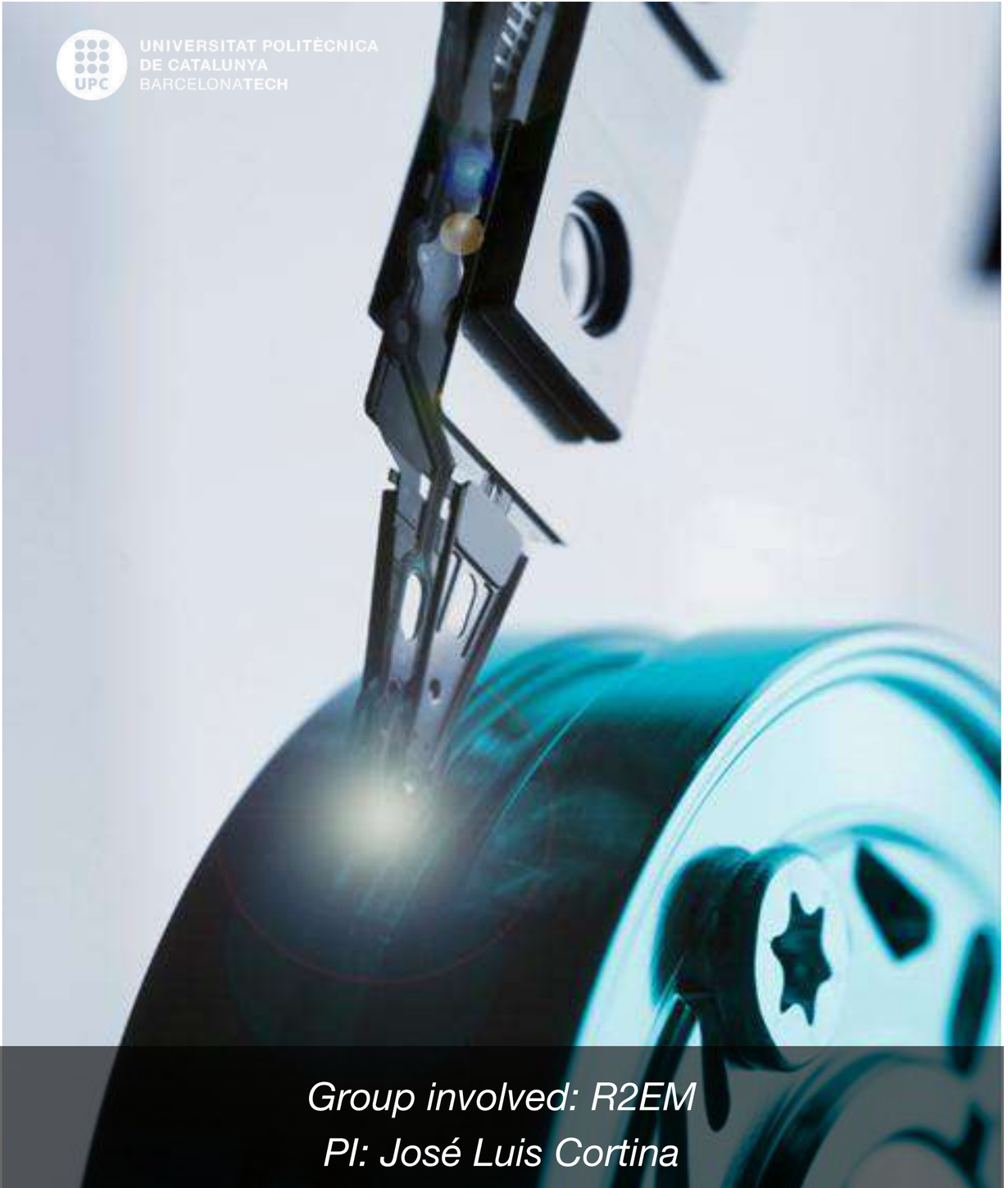
04.

UPC R&D PROJECTS

R&D projects combine research, development and innovation to generate and apply new knowledge in developing innovative products, services and processes. Their goal is to advance science and technology by providing improvements and new solutions.

5 things that represent an R&D project at the UPC:

- Generation of new knowledge (research).
- Application of this knowledge to create prototypes (development).
- Significant improvement of existing products or processes.
- Introduction of new technologies or methods.
- Innovation that reaches the market or improves competitiveness.



Group involved: R2EM
PI: José Luis Cortina

PROJECTS OF EXCELLENCE

NEO-CYCLE - UPCYCLING OF NdFeB MAGNETS IN THE EU FOR GREEN APPLICATIONS

The aim of the NEO-CYCLE project is to demonstrate the sustainable recycling of NdFeB magnets from hard drives (HDD) in TRL 6 by obtaining high-quality final products for the pharmaceutical, ammonia, fertiliser and plastic industries.

This project includes purification processes, development of industrial catalysts, validation of final products, digitalisation of processes and sustainability assessments that demonstrate the technical, economic and social viability of the solutions proposed. It involves the creation of new business models, training for inclusion and job creation, and a communication and dissemination strategy to guarantee the adoption of solutions in the market.

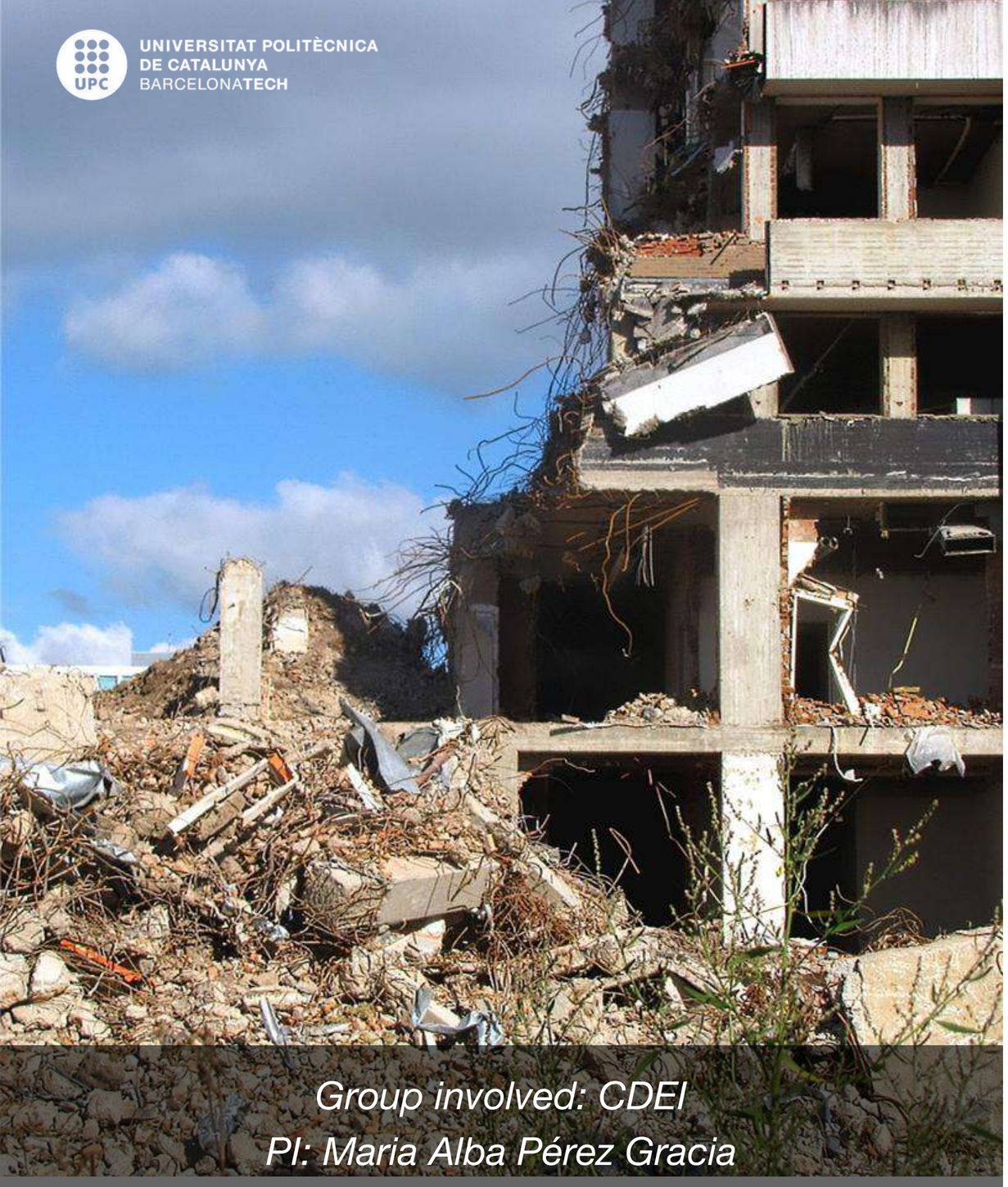
Group and centre involved: ENMA and CER-H2
PI: Víctor López Grimau and Jorge Macanás de Benito

PROJECTS OF EXCELLENCE

WhATTer - Hidrógeno a partir de efluentes residuales: circularidad energética y del agua en la industria textil

The objective of the WhATTer project is to improve textile industry processes through an electrochemical system that treats wastewater to generate green hydrogen, which reduces dependence on fossil fuels and increases efficiency in water use. The proposed method contributes to the circular economy, to CO_2 reduction and to improving sustainability, and includes the recirculation of water and the use of hydrogen as a heat source.

This optimises the system on a laboratory scale, more efficient materials can be found, the environmental and economic benefits can be analysed, and the technology can be scaled up for industrial use.



Group involved: CDEI

PI: Maria Alba Pérez Gracia

PROJECTS OF EXCELLENCE

DISCOVER - Digital, autonomous, Intelligent and Synchronous system for Continuous identification, Optimization and Value Extraction of Resources from the end-of-use built environment

The objective of DISCOVER is to develop an autonomous, synchronous, continuous and intelligent system for the identification and analysis of materials and products in built works that are at the end of their life cycle. The proposed approach will provide key people (academic researchers and representatives of the construction industry) with data-based information to make deconstruction more efficient, optimise resources, improve the environmental footprint and enhance the circularity of construction and demolition, in order to convert end-of-life works into banks of materials.

The expected results include an autonomous robotic platform with continuous identification tools to scan constructed works and provide quantitative and qualitative data on materials, including complex elements. Artificial intelligence algorithms will allow rapid analysis of component characteristics and automatic BIM.

Group involved: GEMMA
PI: Enrica Uggeti

PROJECTS OF EXCELLENCE

REAL-MAC - Reutilización de Efluentes Agroalimentarios para la producción Microalgas y su aplicación en Agricultura Circular para el territorio

The objective of the REAL-MAC project is to develop prototypes of organic agricultural products following a circular strategy based on the cultivation of microalgae in agri-food effluents.

Throughout the project, the potential of microalgae production as a biological solution to recover nutrients in three types of agri-food effluents will be demonstrated, and sustainable technologies will be applied to transform algal biomass into fertilisers, biostimulants and biofungicides.

These prototypes of bio-based products will be tested in organic agriculture and hydroponics, against agricultural diseases with economic repercussions and taking into account environmental factors related to climate change.

Groups involved: FLUMEN and MATCAR
PI: Ernest Bladé i Castellet

PROJECTS OF EXCELLENCE

BITSDRAIN - Mezclas bituminosas porosas para el drenaje sostenible en entornos urbanos

Urban expansion has increased soil sealing and reduced vegetation, which has increased runoff and the risk of flooding, exacerbated by climate change. Traditional drainage systems are often insufficient and sustainable urban drainage systems (SUDS) are presented as a necessary solution, although permeable paving is uncommon in urban bituminous mixtures.

The BITSDRAIN project investigates the use of porous bituminous mixtures to store and transport water, which reduces surface runoff and drainage saturation. This minimises the risk of flooding and improves road safety. The aim is to develop simulation tools and recommendations for application in urban environments.

Groups involved: BRCMSE, R2EM, CER-H2, GReCEF
PI: César Alberto Valderrama

PROJECTS OF EXCELLENCE

SEA4VALUE - Development of radical innovations to recover minerals and metals from seawater desalination brines

SEA4VALUE is developing a modular process to recover valuable metals and minerals from brines produced in seawater desalination plants. The project will demonstrate the viability of new technologies for recovering elements such as Mg, B, Sc, In, Li, Rb and Mo and establish the foundations for their integration in existing and future plants.

The consortium of 15 members will work for four years to demonstrate that these solutions are competitive and contribute to the circular economy and sustainability. In addition, the project will scale up some technologies, such as selective membranes, 3D printed adsorbents and advanced metallurgical solutions to improve the recovery of materials from brines.

ARTICLES

Armengol, Marina; Pascua, Laia; Soler, Lluís; Serrano, Maria Isabel; Llorca, Jordi [et al.]. *Enhancing the performance of a novel CoRu/CeO2 bimetallic catalyst for the dry reforming of methane via a mechanochemical process*. "Applied Catalysis B: Environmental", 15 May 2024, vol. 345, art. no. 123624. DOI: 10.1016/j.apcatb.2023.123624

This paper investigates the mechanochemical synthesis of CoRu nanoparticles supported on CeO_2 for dry methane reforming, analysing the effect of Ru addition, and the synthesis method on catalytic activity, metal dispersion and metal-support interactions, to demonstrate that the CoRu catalysts obtained using this method are more efficient and more stable at high temperatures.

Bellver, Marta; Ruales, Evelyn; Ferrer, Ivet [et al.]. *Natural pigments and biogas recovery from cyanobacteria grown in treated wastewater. Fate of organic microcontaminants.* "Water research", 2025, vol. 273, art. no. 123005. DOI: 10.1016/j.watres.2024.123005

The article deals with obtaining value-added products, such as phycobiliproteins, carotenoids and biogas, from cyanobacteria grown in treated wastewater, in addition to evaluating the presence of micropollutants in pigment extracts and the biochemical potential of biomass methane.

Ramírez, Pablo; Iglesias, Nieves; Dorado, Antonio. *Modeling copper leaching from non-pulverized printed circuit boards at high concentrations of bioregenerated ferric sulfate*. "Minerals engineering", 1 October 2024, vol. 217, art. no. 108913. DOI: 10.1016/j.mineng.2024.108913

The article deals with the study of copper leaching from PCB waste using iron sulphate at high concentrations and temperatures. The aim is to improve the efficiency of the process for an industrial application by optimising operating conditions to increase copper extraction compared to previous works.

Arias, Brenda; Lacasta, Ana; Haurie, Laia. *Bibliometric analysis of research on thermal, acoustic, and/or fire behaviour characteristics in bio-based building materials*. "Construction and building materials", 21 June 2024, vol. 432, art. no. 136569. DOI: 10.1016/j.conbuildmat.2024.136569

The article offers a bibliometric analysis of the thermal, acoustic and fire behaviour properties of bio-based construction materials, highlighting their ability to reduce the environmental footprint by valorising plant waste.

DOCTORAL THESES

Etxandi, Maite (2024). ***A new approach for End of Life Estimates in Electric Vehicle Batteries: Maximizing Battery Usage*****. Co-supervisors: Canals Casals, Lluc; Corchero, Cristina Corchero.**
The thesis proposes a new method for estimating the end of life of the batteries of electric vehicles that replaces the fixed state of health (SoH) criterion with the state of function (SoF) criterion and takes real driving conditions into account. This approach allows batteries' life cycle to be managed more efficiently, extends their use and reduces the waste generated during recycling.

Berigüete, Fanny Esther (2024). ***Participación del tejido social en el espacio urbano: Aproximación a un sistema de indicadores para la evaluación de la sostenibilidad de iniciativas ciudadanas.*** **Co-supervisors: Rodríguez, Inmaculada; Palumbo, Mariana.**
This thesis analyses methods for evaluating citizen initiatives' impact on sustainability, with the aim of improving existing evaluation systems to holistically evaluate their role in social transformation towards sustainable cities.

Habibi, Saeid (2023). ***Low-cost intelligent refurbishment of façades. A study of Barcelona public school building façades.*** **Co-supervisors: Pons, Oriol; Peña, Diana.**
The article develops a tool that validates initial designs and compares the use of materials, to evaluate the sustainability of shade devices made from waste for publicly funded schools, thereby promoting circular construction techniques.

García Díaz, Yineth Paola (2023). ***Activación alcalina de residuos urbanos e industriales para la construcción de piezas prefabricadas*****. Co-supervisors: Segura, Ignacio; De la Fuente, Albert.**
This thesis investigates the use of industrial and urban by-products, especially non-recyclable glass, as precursors for alkaline activated materials (AAM), establishing optimal activation conditions and demonstrating their potential for the manufacture of precast concrete with a low carbon footprint, despite regulatory limitations for using them as the sole cementitious agent.

COLLABORATORS

Companies

SEAT

ELECTRIFYINGFUTURE BeePlanet factory

GREMI DE CONSTRUCTORS D'OBRES

CELSA GROUP

acciona

electrorecycling

soriguē

VEnvirotech

Research centres and institutes and public entities

IREC
Shaping Energy for a Sustainable Future

CETAQUA
CENTRO TECNOLÓGICO DEL AGUA

AMB Àrea Metropolitana de Barcelona

BOMBERS BARCELONA

IPREM
Institut des sciences analytiques et de physico-chimie pour l'environnement et les matériaux

UNIVERSITAT DE BARCELONA

eurecat
Centre Tecnològic de Catalunya

CASE WESTERN RESERVE UNIVERSITY

05.
EDUCATION

The UPC of the future is based on three main pillars: bachelor's, master's and doctoral students, with its commitment to training competent professionals who can join the productive fabric and promote the economic progress of our country, and who put people's lives and the planet's sustainability at the heart of what they do.

It offers education of excellence in research and technology transfer that engages the young, creative and courageous talent that must tackle and solve social and environmental challenges in a not so distant future.

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

BACHELOR'S DEGREES

Architecture, Urbanism and Building Construction

- Bachelor's degree in Architectural Technology and Building Construction (EPSEB)
- Degree in Architecture Studies (ETSAV and ETSAB)

Civil Engineering

- Bachelor's degree in Environmental Engineering (ETSECCPB and EEABB)
- Bachelor's degree in Mineral Resource Engineering and Mineral Recycling (EPSEM)

Industrial Engineering

- Bachelor's degree in Industrial Design and Product Development Engineering (EPSEVG and ESEIAAT)
- Bachelor's degree in Energy Engineering (EEBE)
- Bachelor's degree in Materials Engineering (EEBE)
- Bachelor's degree in Textile Technology and Design Engineering (ESEIAAT)
- Bachelor's degree in Industrial Technology Engineering + master's degree in Industrial Engineering (ESEIAAT and ETSEIB)
- Bachelor's degree in Chemical Engineering (EPSEM, EEBE and ESEIAAT)

More information on bachelor's degrees

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

BACHELOR'S DEGREES

Biosystems and Agri-Food Engineering

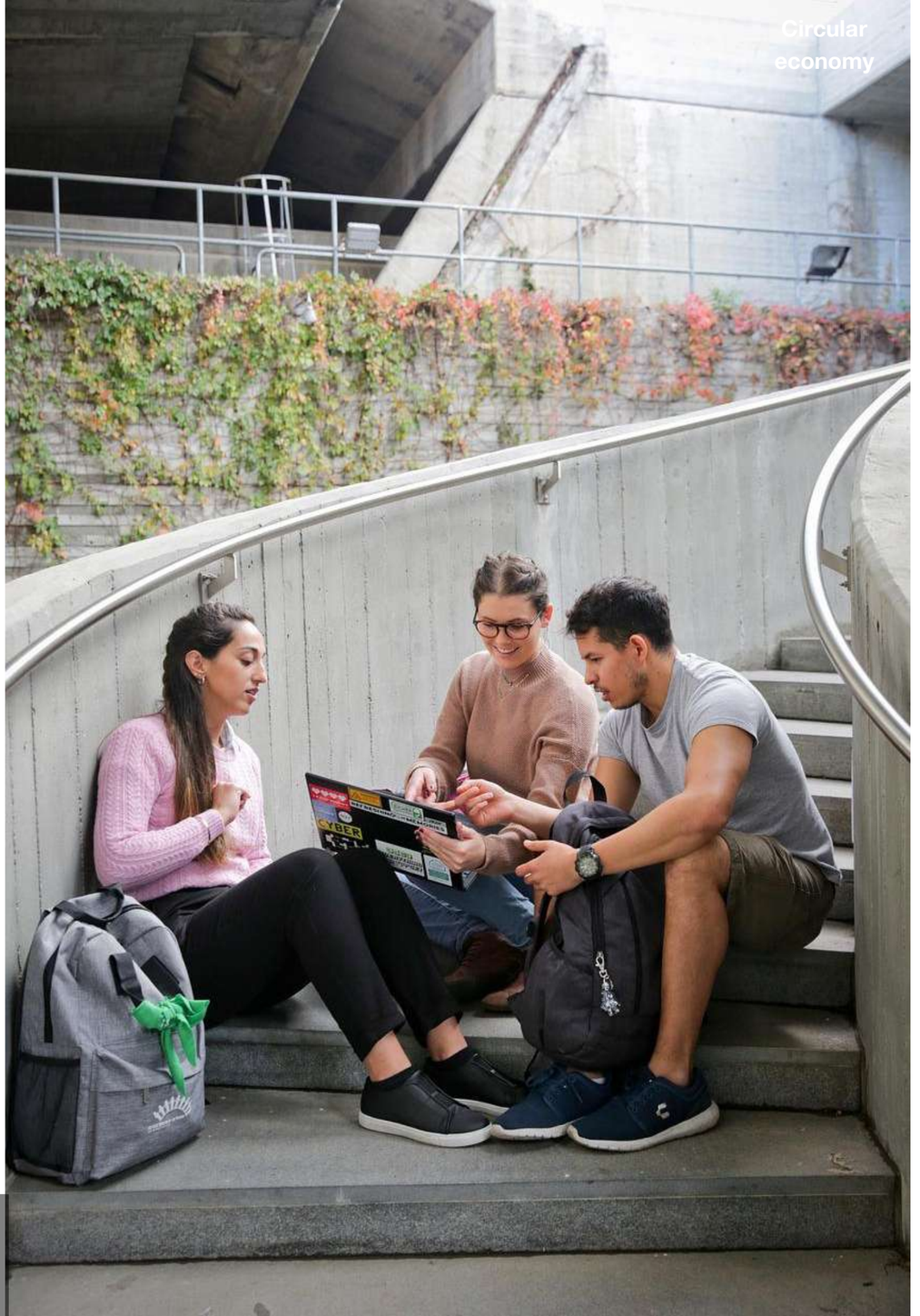
- Bachelor’s degree in Food Engineering (EEABB)
- Bachelor’s degree in Agronomic Science Engineering (EEABB)
- Bachelor’s degree in Biosystems Engineering (EEABB)
- Bachelor's degree in Landscape Architecture (EEABB)

Applied Sciences

- Bachelor’s degree in Marine Sciences and Technology (ETSECCPB, EEABB and EPSEVG)

Naval, Marine and Nautical Engineering

- Bachelor's degree in Marine Technologies (FNB)



More information on bachelor's degrees

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

MASTER'S DEGREES

Architecture, Urbanism and Building Construction

- Master's degree in Architecture (ETSAB and ETSAV)
- Master’s degree in Advanced Building Construction (EPSEB)
- Master’s degree in Diagnosis and Intervention Techniques in Building Construction (EPSEB)
- Master's degree in Advanced Studies in Architecture-Barcelona (MBArch) (ETSAB)
- Master's degree in Sustainable Intervention in the Built Environment (MISMeC) (ETSAV)
- Master's degree in Landscape Architecture (MBLandArch)
- Master’s degree in Architectural Design Ecology in the Digital Age (ETSAV)

Civil Engineering

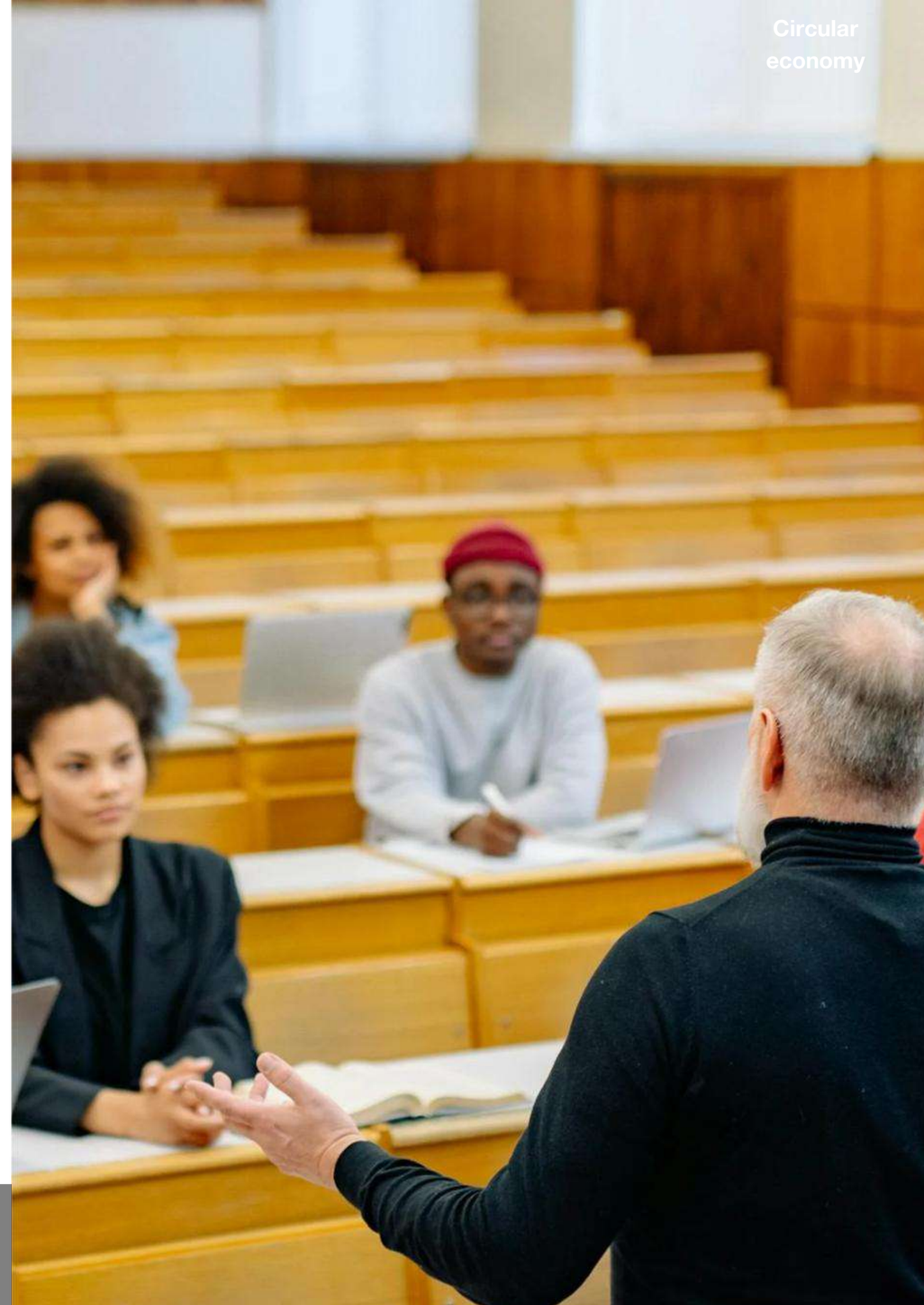
- Erasmus Mundus master's degree in Coastal and Marine Engineering and Management (CoMEM) (ETSECCPB)
- Master's degree in Civil Engineering (ETSECCPB)
- Master's degree in Water Engineering (ETSECCPB)
- Master's degree in Mining Engineering (EPSEM)

More information on master's degrees

MASTER'S DEGREES

Industrial Engineering

- Erasmus Mundus master's degree in Dynamics of Renewables-based Power Systems (ETSEIB)
- Erasmus Mundus master's degree in Advanced Materials Science and Engineering (AMASE)
- Erasmus Mundus master's degree in Decentralised Smart Energy Systems (DENSYS) (ETSEIB)
- Erasmus Mundus master's degree in Hydrogen Systems and Enabling Technologies (HySET)
- Erasmus Mundus master's degree in Sustainable Systems Engineering (EMSSE)
- Master's degree in Chemical Engineering (EEBE)
- Master's degree in Advanced Materials Science and Engineering (EEBE)
- Master’s degree in Textile Design and Technology (ESEIAAT)
- Master’s degree in Paper and Graphics Technology (ESEIAAT)
- Master's degree in Polymers and Bioplastics (EEBE)
- Master's degree in Interdisciplinary and Innovative Engineering (EEBE)



More information on master's degrees

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

MASTER'S DEGREES

Biosystems and Agri-Food Engineering

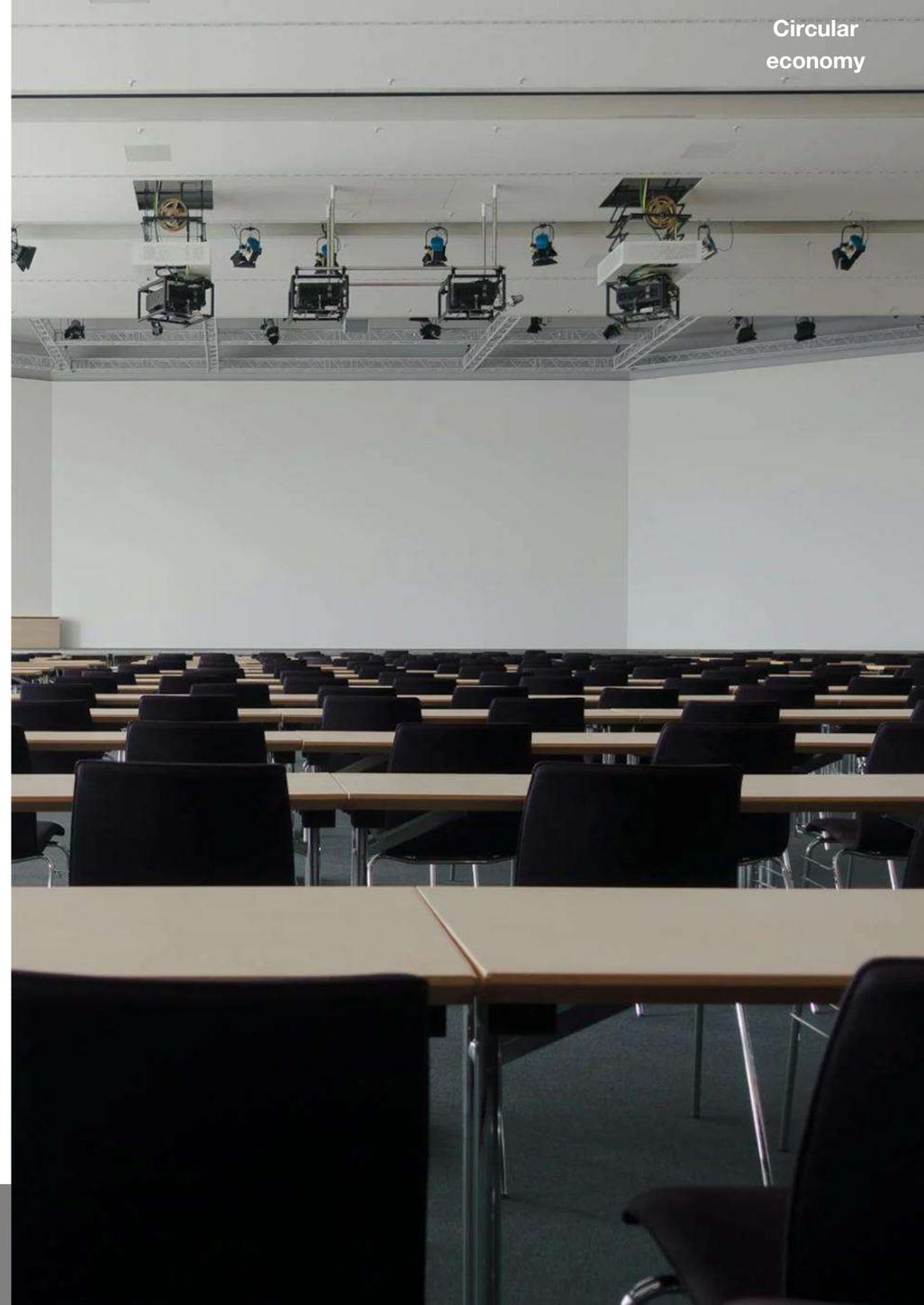
- Master's degree in Agronomic Engineering (EEABB)
- Master's degree in Enabling Technologies for the Food and Bioprocessing Industry (TECH4AGRI+FOOD) (EEABB)

Environment, Sustainability and Natural Resources

- Master's degree in Sustainability Science and Technology (ISUPC)
- Master's degree in Environmental Engineering (ETSECCPB)
- Master's degree in Natural Resource Engineering (EPSEM)
- Master's degree in Sustainable Intervention in the Built Environment (MISMeC)

Naval, Marine and Nautical Engineering

- Master’s degree in Naval Architecture and Ocean Engineering (FNB)
- Master's degree in the Management and Operation of Marine Energy Facilities (FNB)



More information on master's degrees

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

DOCTORAL PROGRAMMES

- Architecture, Energy and Environment
- Architectural, Building Construction and Urbanism Technology
- Architectural, Civil and Urban Heritage and Refurbishment of Existing Buildings
- Construction Engineering
- Sustainability
- Environmental Engineering
- Civil Engineering
- Chemical Process Engineering
- Textile and Paper Engineering
- Materials Science and Engineering
- Agri-Food Technology and Biotechnology
- Polymers and Biopolymers
- Natural Resources and Environment
- Electric Energy Systems

More doctoral programmes

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

UPC SCHOOL

CONTINUING EDUCATION MASTER'S DEGREES AND POSTGRADUATE COURSES

Master's degrees

- Urban Planning and Sustainability
- Housing and the City
- Architecture and Environment: Urban Space, Light and Energy Integration in Architecture
- Product and Manufacturing Process Engineering

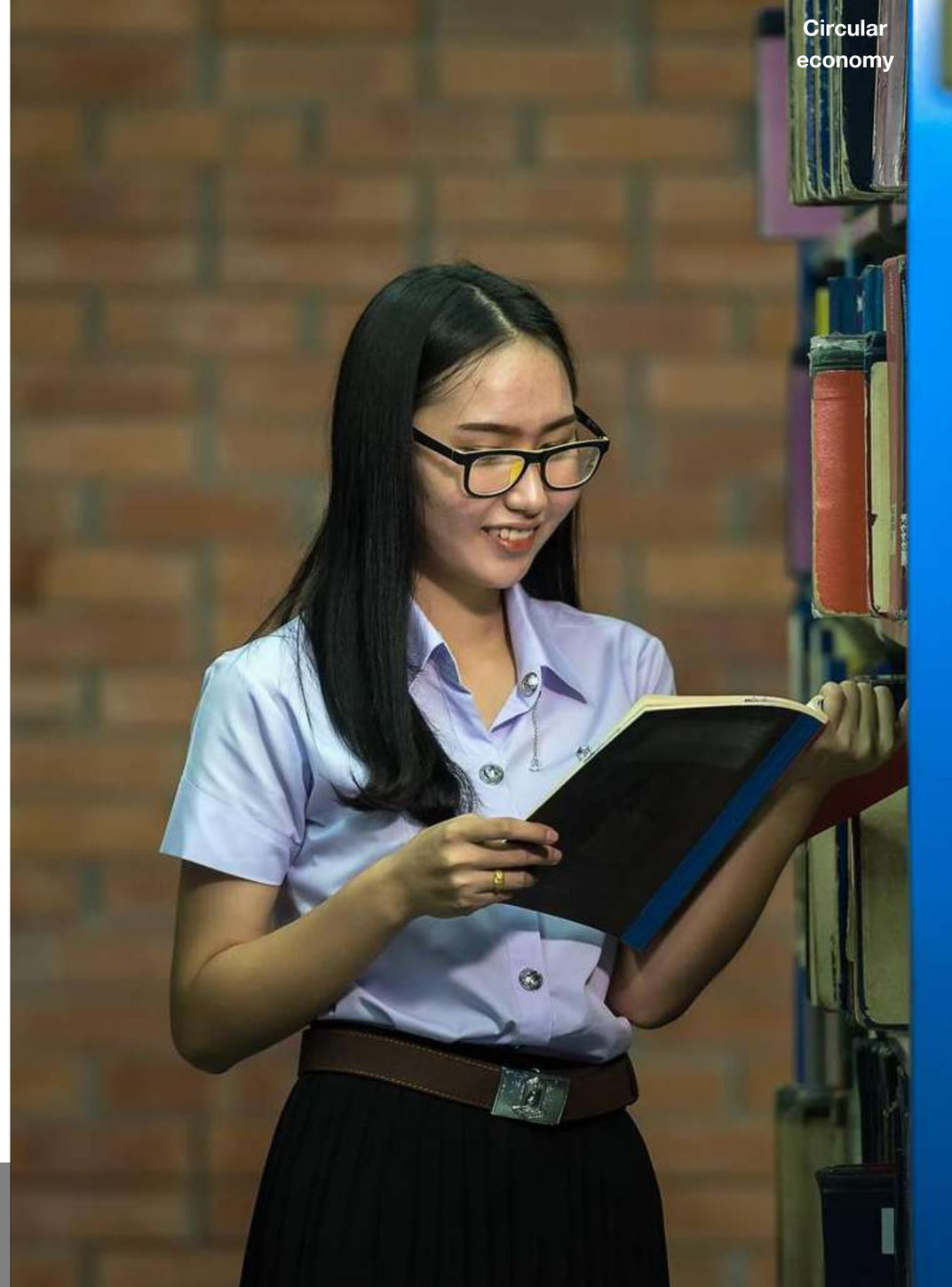
Postgraduate courses

- Circular Economy. Sustainable Business Transition Tools and Strategies
- Renewable Energies in Architecture
- Digital Sustainability in Construction
- Sustainable Urban Space
- Urban Environment and Sustainability

Continuing education

- Strategic Vision of the Circular Economy
- Urban Climate and Climate Change

More master's degrees and postgraduate programmes



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