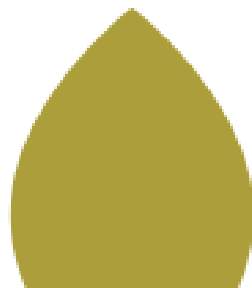


Technological Centre

Capabilities Horizon Europe

HORIZON-CL HORIZON-CL4-2023



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HORIZON-CL4-2023-TWIN-TRANSITION-01-11 Intelligent data acquisition and analysis of materials and products in existing built works (RIA)

TOPIC DEADLINE 07/03/2023	BUDGET PER PROJECT 6 M€	TOTAL BUDGET 12 M€	EXPECTED NUMBER OF PROJECTS 2	TYPE OF ACTION RIA
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New techniques and technologies to rapidly identify materials, construction products and components of existing built works, or works that have undergone demolition

Computer vision systems for visual identification of the materials based in appearance, colour, texture and other physical characteristics.

Solutions that rapidly analyse the properties and characteristics of materials construction products and components

Non-destructive testing (NDT): NDT methods use various techniques to evaluate the material's properties without causing any damage. These methods include ultrasonic testing, radiographic testing, and thermal imaging

Solutions to digitally record, categorise and tag existing materials, construction products and elements for their eventual use on the market. Presenting the elements in a user-friendly manner to relevant actors.

Database development to store the collected information. The database should be designed in a way that allows for easy classification and labelling of materials, products and items. This may involve creating records for each individual material, product or item and entering the relevant information in the appropriate fields.

AI-based algorithm to identify correlations or detect different patterns in the collected information.

CETIM has participated in several proposals regarding the construction demolition waste like the national project KEOPS where CETIM develops blockchain networks in circular economy solutions for the revaluation of construction waste.

HORIZON-CL4-2023-RESILIENCE-01-32 Bioinspired and biomimetic materials for smart fabrics and sustainable textiles (IA)

TOPIC DEADLINE 07/03/2023	BUDGET PER PROJECT 8 M€	TOTAL BUDGET 32 M€	EXPECTED NUMBER OF PROJECTS 4	TYPE OF ACTION IA
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High performance bio-based polymeric materials with functions of natural polymers adaptability, self-healing, adhesiveness, surface super-hydrophobicity, chiral recognition, and bioactivity.

Obtention of advanced lignocellulosic materials with enhanced natural functions from lignin, hemicellulose and cellulose sources. Materials can be obtained from a wide portfolio of techniques that include:

- Extraction (organosolv, kraft...), purification and derivatization of lignin, hemicellulose and cellulose from lignocellulosic materials.
- Mechanical treatments to obtain lignin microparticles and its functionalization by several methods such as cationization, amination or sulfomethylation.
- Enzymatic and mechanical treatments to obtain cellulose nanofibers and its modification (silanization, cationization, amination, etc).
- Functionalized lignin (cationised, aminated, sulfomethylated) to be used as carrier for textile dyes.
- Nanocellulose as textile structure reinforcement
- Modification of nanocellulose for textile coating with superhydrophobic and antimicrobial properties (silanised, cationised, aminated).



Scalability of materials production

Pilot extrusion equipment Lab-Compounder KETSE 20/40 from Brabender, 20 kg/h, with side and main feeders) which is designed to be a versatile solution for most of the compounding tasks because of the adaptability of the machine's configuration to different applications such as the production of fabrics or waste yarns.

Several equipment units for pilot scale production of advanced materials from the mentioned sources (reactors, homogenizers, spray dryer, etc).

Implementation of the Safe and Sustainable by Design framework

- Implementation of eco-design and Safe & Sustainable-by-design strategies to biobased materials, chemicals, and processes. Health, Safety and Risk assessment of novel processes and materials.
- Sustainability Assessment of processes and products comprising the three pillars involved (environmental, economic, and social); Life Cycle Assessment (LCA), Life Cycle Costing Assessment (LCC) and Social Life Cycle Assessment.
- Assessment of biodegradability (water, soil, compost...) and recyclability tests to assess sustainability and safety of novel product's end-of-life.

CETIM has developed several projects related with the obtention of lignocellulosic materials for several applications like composites in DICKENS, lignin compounds in LIGNOPRIZED and projects in the textile sector developing new kinds of fabrics like NATURATEX.

HORIZON-CL4-2023-TWIN-TRANSITION-01-40 Sustainable and efficient industrial water consumption: through energy and solute recovery (Processes4Planet partnership) (RIA)

TOPIC DEADLINE 20/04/2023	BUDGET PER PROJECT 10 M€	TOTAL BUDGET 30 M€	EXPECTED NUMBER OF PROJECTS 3	TYPE OF ACTION RIA
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Existing and novel water treatment technologies

- Advanced oxidation processes, membrane technologies, biological treatments, electrochemical processes, adsorption/absorption technologies and nature-based solutions as potential treatments for industrial water.
- Resource recovery by electrochemical processes: Li, metals.
- Contaminant elimination: microplastics and heavy metals.
- Regeneration of effluents and water reuse.
- Production of energy from biogas, production of H₂.

Smart monitoring technologies with new sensors

Development of sensors for consumption monitoring and also for water quality monitoring in case it is possible to reuse it in another application.

Artificial Intelligence and Digital Twins

Use of Artificial Intelligence with predictive algorithms for optimisation of water use and combine it with Digital Twins to create simulation models or connect in real time with the real model to make decisions based on sensor information that lead to optimisation.

CETIM has developed several projects in water treatment (**NICE, INDIA-H₂O**) and recovery of solutes from water (**REWAISE**) and water reuse (**LIFE DRAIN RAIN, LIFE GREEN SEWER**).

HORIZON-CL4-2023-TWIN-TRANSITION-01-42 Circular economy concept: Upcycling large volumes of secondary resources (Processes4Planet partnership) (RIA)

TOPIC DEADLINE 20/04/2023	BUDGET PER PROJECT 10 M€	TOTAL BUDGET 30 M€	EXPECTED NUMBER OF PROJECTS 3	TYPE OF ACTION RIA
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Technologies to upgrade secondary resources: separation techniques

Technologies for aqueous media secondary sources: electrochemical processes for resources recovery, adsorption/absorption technologies to capture high value compounds.

Bio-catalysts (bacteria, fungi, microalgae, enzyme) for biorecovery processes (protein extraction, fatty acids, valuable metals...).

Tools to ensure quality and safety of the recyclates

Sustainability Assessment of processes and products comprising the three pillars involved (environmental, economic, and social); Life Cycle Assessment (LCA), Life Cycle Costing Assessment (LCC) and Social Life Cycle Assessment.

Sorting technologies and digitalisation, development of databases

Development of blockchain solutions to categorise the secondary resources, complementarity with sensors to monitor the key parameters of the secondary sources.

Development of interoperable database based on blockchain information to share the knowledge between process and recycling companies.

CETIM has developed several projects related with technologies to recover high added value substances from secondary resources like **BIORECOVER**, where CETIM obtains CRM from secondary mining and industrial sources.

HORIZON-CL4-2023-RESILIENCE-01-02 Innovative technologies for sustainable and decarbonised extraction (RIA)

TOPIC DEADLINE 20/04/2023	BUDGET PER PROJECT 5 M€	TOTAL BUDGET 25 M€	EXPECTED NUMBER OF PROJECTS 5	TYPE OF ACTION RIA
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Mobilisation techniques for metals including rare earths, transitional metals and Mg group metals.

Bioprocesses for metal extraction, bioleaching processes, recuperation of CRM (Mg, rare earths, Platinum group metals) from mining sources and mining waste at pilot scale.

Sustainability, health and safety

Tools to ensure the sustainability, health safety and economic viability of the developed processes.

Sustainability Assessment of processes and products comprising the three pillars involved (environmental, economic, and social); Life Cycle Assessment (LCA), Life Cycle Costing Assessment (LCC) and Social Life Cycle Assessment.

CETIM coordinates the H2020 project **BIORECOVER**, where CETIM obtains CRM from secondary mining and other industrial sources.

HORIZON-CL4-2023-RESILIENCE-01-03 Technologies for processing and refining of critical raw materials (IA)

TOPIC DEADLINE 20/04/2023	BUDGET PER PROJECT 7 M€	TOTAL BUDGET 22 M€	EXPECTED NUMBER OF PROJECTS 3	TYPE OF ACTION IA
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Refining technologies for better recovery of critical raw materials from low grade ores including extractive waste and other industrial sources

Bioleaching processes from mining waste based in bacteria, fungi, proteins and/or microalgae. Flexible processes that could work with waste streams from different mining cases including Mg mines, bauxite mines and Platinum group metal mines. Biorecovery of critical raw materials like Mg, Rare Earths, Paladium, Platinum, Cobalt among others.

Recovery of Li from brines via electrochemical processes in aqueous media.

Processing of waste streams

Alternatives in water treatment to recover specific metals by different separation techniques.

Process sustainability, health and safety and economic viability

Tools to ensure the sustainability, health safety and economic viability of the developed processes.

Sustainability Assessment of processes and products comprising the three pillars involved (environmental, economic, and social); Life Cycle Assessment (LCA), Life Cycle Costing Assessment (LCC) and Social Life Cycle Assessment.

CETIM coordinates the H2020 project **BIORECOVER**, where CETIM obtains CRM from secondary mining and other industrial sources.

HORIZON-CL4-2023-RESILIENCE-01-05 Recycling technologies for critical raw materials from EoL products (RIA)

TOPIC DEADLINE 20/04/2023	BUDGET PER PROJECT 7 M€	TOTAL BUDGET 28 M€	EXPECTED NUMBER OF PROJECTS 4	TYPE OF ACTION RIA
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Biotechnological solutions to recover critical raw materials from different sources including WEEE, end-of-life vehicles

Bioleaching processes from mining waste based in bacteria, fungi, proteins and/or microalgae. Flexible processes that could work with waste streams from different mining cases including Mg mines, bauxite mines and Platinum group metal mines. Biorecovery of critical raw materials like Mg, Rare Earths, Paladium, Platinum, Cobalt among others.

Recovery of Li from brines via electrochemical processes in aqueous media.

Recycling and recovery of CRM of waste streams

Alternatives in water treatment to recover specific metals by different separation techniques.

Process sustainability, health and safety and economic viability

Tools to ensure the sustainability, health safety and economic viability of the developed processes.

Sustainability Assessment of processes and products comprising the three pillars involved (environmental, economic, and social); Life Cycle Assessment (LCA), Life Cycle Costing Assessment (LCC) and Social Life Cycle Assessment.

CETIM coordinates the H2020 project **BIORECOVER**, where CETIM obtains CRM from secondary mining and other industrial sources. CETIM also participates in the project **REWAISE** recovering Li from brines. A previous experience in WEEE is the project **BIOMAT RECOVER** and regarding the end-of-life vehicles CETIM is developing the project **RELOAD**.

HORIZON-CL4-2023-RESILIENCE-01-33 Smart sensors for the Electronic Appliances market (RIA)

TOPIC DEADLINE 07/03/2023	BUDGET PER PROJECT 8 M€	TOTAL BUDGET 31 M€	EXPECTED NUMBER OF PROJECTS 4	TYPE OF ACTION RIA
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Development of chemical sensors based on molecular imprinted polymers (MIPs) and nanocellulose

- Molecular imprinted polymers (MIPs) synthesis on demand of the interested chemicals (metals, antioxidants, pesticides, fertilizers, drugs, etc.)
- Enzymatic and mechanical treatments to obtain cellulose nanofibers and its modification (silanization, cationization, amination, etc) that can be used to capture chemicals: sorbent materials.

Implementation of the Safe and Sustainable by Design framework

- Implementation of eco-design and Safe & Sustainable-by-design strategies to biobased materials, chemicals, and processes. Health, Safety and Risk assessment of novel processes and materials.
- Sustainability Assessment of processes and products comprising the three pillars involved (environmental, economic, and social); Life Cycle Assessment (LCA), Life Cycle Costing Assessment (LCC) and Social Life Cycle Assessment.
- Assessment of biodegradability (water, soil, compost...) and recyclability tests to assess sustainability and safety of novel product's end-of-life.

HORIZON-CL4-2023-RESILIENCE-01-34 Advanced (nano and bio-based) materials for sustainable agriculture (RIA)

TOPIC DEADLINE 07/03/2023	BUDGET PER PROJECT 8 M€	TOTAL BUDGET 32 M€	EXPECTED NUMBER OF PROJECTS 4	TYPE OF ACTION RIA
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Biodegradable sustainable nanomaterials and delivery systems based on lignin and cellulose

Agrochemical development based on lignin such as slow/controlled fertiliser realiser by means of lignin modification by different reactions such as amoxidation, amination and other chemical modifications

R&D on nano-scale carriers for the development of nanopesticides to improve the biological activity of synthetic or natural (botanical) pesticides while reducing their adverse effects on the environment:

Obtention of nano-lignin with improved functionality by cationization. Nano-lignin provides ultraviolet protection, antioxidant and antimicrobial activities being an excellent nanocarrier. Formulations using lignin can be obtained from agricultural byproducts of low cost, being circular and sustainable.

Application of lignin nanoparticles for environmental decontamination: development of nanopesticides based on nanolignin that reduce the energy process, avoiding the use of toxic organic solvents and surfactants and resulting in more ecofriendly formulations for agricultural applications.

Enzymatic, chemical or mechanical treatments to obtain cellulose nanofibers or nanocrystals and its modification (silanization, cationization, amination, etc) to be used as vehicle for enhanced efficiency fertilizers. Nanocellulose to increase to the adherence of fertilizers to leaves.

R&D on lignin and nanocellulose-based delivery systems. Lignin and cellulose nanoencapsulation for enhancing insecticidal, pesticide activities. Protection of bioactive constituents by their encapsulation on nanocellulose, lignin or derived systems such as chitosan-nanocellulose.

Hemicellulose purification for fertilizer synthesis

Biodegradable sustainable nanomaterials and delivery systems based on novel formulation, biocides, biopolymers and biodegradable polymers

Research on new biocides formulations of essential oils based on soybean, thyme and camelina oils having antimicrobial activity.

Development of biobased thermoplastic (mainly based on PLA and PHB) and thermoset composites using biomatrixes, biofillers and bioadditives obtained from renewable sources: lignin (lignin modification through oxypropylation, amination, sulfometilation, glyoxilation...etc by green chemical routes) and oils (camelina, jatropha or waste frying oil throughout epoxidation, hydroxylation, acrylation and ciclocarbonation reactions by green chemical routes) to obtain additives, micro and nano lignin particles as fillers and matrix components (thermoplastic (PE, PP, TPU...) and thermoset (PU, NIPUs, epoxy, formaldehyde based resins, acrylics, polyesters) of polymer formulations; cellulose (enzymatic and mechanical treatments to obtain nanocellulose fibres and their chemical modification) to obtain nano fibres for polymer, coatings, binders and adhesives.

Obtention of biofertilizers and other biopolymers

Obtention of formulations of biofertilizers from different sources (sludge, biowaste, agricultural waste, etc.). Obtention of biopolymers as potential carriers by bacteria and other biotechnological means.

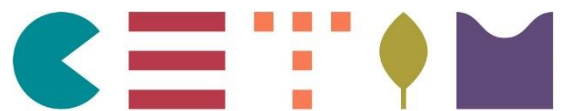
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Facilities to develop CETIM's activities at pilot and laboratory scale

- Non-pressurized reactor (lab and pilot scale up to 120 L)
- Pressurized reactor (lab scale and pilot scale up to 5 L)
- Blade mill and ball mill.
- Bar coating equipment
- Pulper and ultraturrax (lab scale)
- High pressure homogenizers (lab and pilot scale)
- Spray dryer (pilot scale)



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