



HORIZON EUROPE

THE EU RESEARCH & INNOVATION PROGRAMME

2021 – 2027

Horizon Europe Information Days – Cluster 4

29 Nov – 01 Dec 2021

Destination “Increased autonomy in key strategic value chains for resilient industry”



Cluster 4 - Vision

*Competitive technologies respecting the boundaries of our planet,
and reflecting human needs*

Green and digital 'twin' transitions

Industrial and digital transformation

- mastering technologies
- deploying technologies and technology infrastructures
- securing autonomy in strategic value chains



Climate-neutral, circular and clean industry

Major contribution to inclusiveness and resilience

- human-centred and ethical developments
- engagement with users, workers, citizens
- social innovation

**WORK PROGRAMME 2021-2022 – DESTINATION
“CLIMATE NEUTRAL, CIRCULAR AND DIGITISED
PRODUCTION”**

Call

**A DIGITISED, RESOURCE-EFFICIENT AND RESILIENT
INDUSTRY 2022**

HORIZON-CL4-2022-RESILIENCE-01

Opening: 12 Oct 2021

Deadline: 30 Mar 2022 (17.00.00 Brussels local time)

Call - A DIGITISED, RESOURCE-EFFICIENT AND RESILIENT INDUSTRY 2022

Novel paradigms to establish resilient and circular value chains

- HORIZON-CL4-2022-RESILIENCE-01-01: Circular and low emission value chains through digitalisation (Processes4Planet Partnership) (RIA)

HORIZON-CL4-2022-RESILIENCE-01-01: Circular and low emission value chains through digitalisation (Processes4Planet Partnership) (RIA)

Projects are expected to contribute to the following outcomes:

- Demonstrate an increase in the waste reduction by application of digital technologies
- Demonstrate optimisation of use of secondary raw materials in the value chains.

Indicative budget of the call: EUR 25.30 million

EU contribution per project: EUR 6-8 million

Type of Action: Research and Innovation Action

TRL: Start at 3 and achieve 6

Call - A DIGITISED, RESOURCE-EFFICIENT AND RESILIENT INDUSTRY 2021

Green and Sustainable Materials

- HORIZON-CL4-2022-RESILIENCE-01-10: Innovative materials for advanced (nano)electronic components and systems (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-11: Advanced lightweight materials for energy efficient structures (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-12: Functional multi-material components and structures (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-23: Safe- and sustainable-by-design organic and hybrid coatings (RIA)

HORIZON-CL4-2022-RESILIENCE-01-10: Innovative Materials for advanced (nano) electronic components and systems (RIA)

Projects are expected to contribute to the following outcomes:

- Develop innovative new components and systems with enhanced and new functionalities and improved performance enabling added value to the European industry in sectors such as healthcare and wellbeing, mobility and transportation, aeronautics, environment monitoring, security and safety energy, smart cities, smart textiles and manufacturing;
- Impacts are also envisaged to smart grids, efficient through life performance monitoring, smart manufacturing and digital industry with increased computing performance and efficient data storage.

Indicative budget of the call: EUR 20.00 million

EU contribution per project: EUR 3–5 million

Type of Action: Research and Innovation Action

TRL: Start at 4 and achieve 6

HORIZON-CL4-2022-RESILIENCE-01-11: Advanced lightweight materials for energy efficient structures (RIA)

Projects are expected to contribute to the following outcomes:

- Reduced cost for production of renewable lightweight materials, 25 % lower cost than currently used materials;
- Light-weight products containing >50% sustainable, bio-based materials;
- Up to 30% lightweight potential through tailored functionality for a range of extreme environment (energy, infrastructures, aeronautics, space) applications and in surface transport;
- Reduction in CO2 emissions (LCA) of at least 20 %;
- Business models and circular value chains for lightweight bio based components;
- Improved time-to-market for European providers of lightweight solutions.

Indicative budget of the call: EUR 20.00 million

EU contribution per project: EUR 3–5 million

Type of Action: Research and Innovation Action

TRL: Start at 3 and achieve 5

HORIZON-CL4-2022-RESILIENCE-01-12: Functional multi-material components and structures (RIA)

Projects are expected to contribute to the following outcomes:

- Contribute to energy efficiency, increase competitiveness of new multi-materials items and multi-functional materials and products for a wide range of applications in the additive manufacturing industries and in specific industrial sectors e.g. transport including aeronautic, and maritime, consumer customised goods, communications, biomaterials, health and energy;
- Develop optimised structures in terms of operational performance and weight with a goal of reducing weight by 50% compared to traditional designs;
- Reduced lead-time of multimaterial products of 20% compared to today's design of multimaterial products that creates an increased competitiveness for the EU's industry;
- Strengthening of the EU's manufacturing industry through the intensive implementation of innovative and unconventional technologies along the EU's manufacturing value chain;
- Combine materials with high uniformity and with high mobility in industrial quantities with high reproducible quality;
- Increase of the product performance by at least 30% whilst retaining the product price;
- Dissemination of the challenges and benefits of functional multi-material components and structures in the relevant industrial sectors.

Indicative budget of the call: EUR 20.00 million

EU contribution per project: EUR 4–6 million

Type of Action: Research and Innovation Action

TRL: Start at 3 and achieve 6

HORIZON-CL4-2022-RESILIENCE-01-23: Safe- and sustainable-by-design organic and hybrid coatings (RIA)

Projects are expected to contribute to the following outcomes:

- Projects are expected to contribute to the following outcomes:
- A set of computational tools (including first-principles-based, data-driven, physics based and hazard, transport and fate models) to be used for supporting Safe- and Sustainable- by Design of materials (e.g. organic coatings and additives to replace PFAS);
- At least 2 novel materials (including bio-based ones) assessed in terms of their performance (function), human and environmental hazards (end-points determined based on the application areas) as well as their carbon and water footprints, recovery and recyclability, and overall environmental impact (LCA). Reaching at least 25% reduction in environmental impacts with <20% cost increase for production;
- Contribute to the development of safe- and sustainable-by-design criteria and guiding principles and apply them to organic or hybrid coatings;
- Enhance the social acceptance of the new developed materials by evidence basis compiled for consumer attitudes towards, and willingness to pay for, products that are less harmful to the environment, are sustainable, low carbon etc.;
- Certification programme (or equivalents) for sustainable containing products, along the whole value-chain;

Indicative budget of the call: EUR 20.00 million

EU contribution per project: EUR 3–5 million

Type of Action: Research and Innovation Action

TRL: Start at 3 and achieve 5

Call - A DIGITISED, RESOURCE-EFFICIENT AND RESILIENT INDUSTRY 2021

Materials for the benefit of society and the environment and materials for climate-neutral Industry

- HORIZON-CL4-2022-RESILIENCE-01-13: Smart and multifunctional biomaterials for health innovations (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-14: Membranes for gas separations - membrane distillation (IA)
- HORIZON-CL4-2022-RESILIENCE-01-16: Building and renovating by exploiting advanced materials for energy and resources efficient management (IA)
- HORIZON-CL4-2022-RESILIENCE-01-24: Novel materials for supercapacitor energy storage (RIA)

HORIZON-CL4-2022-RESILIENCE-01-13: Smart and multifunctional biomaterials for health innovations (RIA)

Projects are expected to contribute to the following outcomes:

- Offer solutions through the development of multifunctional biomaterials to address and mitigate multiple bottlenecks in response to unmet clinical needs;
- Provide improved biocompatibility, biospecificity and longevity of medical devices or if relevant, improved bioactivity and/or biodegradability; physiological and biomechanical constraints and implications should also be considered.
- Show that the regulatory and IPR strategies are compatible with the overall research objectives.

Indicative budget of the call: EUR 20.00 million

EU contribution per project: EUR 3–5 million

Type of Action: Research and Innovation Action

TRL: Start at 3 and achieve 5

HORIZON-CL4-2022-RESILIENCE-01-14: Membranes for gas separations - membrane distillation (IA)

Projects are expected to contribute to the following outcomes:

- The next generation membrane materials, delivering smart solutions for greening of industrial plants;
- Advanced membrane materials for recycling of waste streams from industrial plants to support the Zero Pollution strategy;
- Better materials with outstanding separation performance and/or superior properties either in chemical, mechanical or thermal stability compared to commercial materials;
- Reduction of the water footprint of 10% in industrial plants for the preservation of freshwater resources;
- Up-scaling the desalination process by solar powered membrane distillation systems and coupling membrane distillation with solar / photovoltaic collectors;
- Energy saving by 10% through the application of a new generation of membranes.
- End-of-life issues

Indicative budget of the call: EUR 21.00 million

EU contribution per project: EUR 6–8 million

Type of Action: Innovation Action

TRL: Start at 4 and achieve 7

HORIZON-CL4-2022-RESILIENCE-01-16: Building and renovating by exploiting advanced materials for energy and resources efficient management (IA) 1/2

Projects are expected to contribute to the following outcomes:

- Buildings are responsible for approximately 40% of energy consumption and 36% of CO2 emissions in the EU. Renovation of existing old buildings has the potential to lead to significant energy savings – potentially reducing the EU's total energy consumption by 5-6% and lowering CO2 emissions by about 5%;
- Compared to state of the art materials and components, the newly developed materials should deliver:
 - Reduction by at least 30% of the embodied energy and CO2 at component level;
 - Improvement by at least 20% of insulation properties;
 - Reduction by at least 15% of the total costs compared to existing solutions;
 - Demonstration of at least a 5% reduction of the energy spent during the whole life cycle of a building.
 - Increased durability and lifetime, lower maintenance costs and environmental footprint.
- Demonstrate innovative retrofitting solutions using the building insulation materials as real cases approaching net zero energy standards and their replicability potential;
- Improvement of the quality of information from product manufacturers to facilitate better decision making;
- Strengthening of the competitiveness of the European construction sector in the field of “green” construction technologies;

HORIZON-CL4-2022-RESILIENCE-01-16: Building and renovating by exploiting advanced materials for energy and resources efficient management (IA) 2/2

Projects are expected to contribute to the following outcomes:

- Sustainable building materials will be supporting the circular design. Self-sustaining buildings in respect to energy usage;
- New insulation materials should be cost effective, environmentally safe, fire resistant and can be easily applied on existing surfaces (e.g. spray coating);
- Return on investment should be below 7 years for deep retrofitting of buildings;
- Advent of a new generation of skilled workers and SME contractors in the construction sector aware of the need of a systemic approach towards energy efficiency should be promoted through the proposed activities.

Indicative budget of the call: EUR 21.00 million

EU contribution per project: EUR 5–7 million

Type of Action: Innovation Action

TRL: Start at 5 and achieve 7

HORIZON-CL4-2022-RESILIENCE-01-24: Novel materials for supercapacitor energy storage (RIA)

Projects are expected to contribute to the following outcomes:

- New supercapacitors with energy densities comparable to batteries in environmentally friendly electrolytes able to recharge in a fraction of the time required for current batteries, have no loss of performance over time and longer life;
- Substantial impact to energy storage systems solutions for applications ranging from consumer goods to electrification of transport and reduction of emissions;
- Innovative management systems for supercapacitors;
- Establish new industrial value chains with new energy storage products, tailored to meet the application requirements.

Indicative budget of the call: EUR 23.00 million

EU contribution per project: EUR 4–6 million

Type of Action: Research and Innovation Action

TRL: Start at 3 and achieve 6

Call - A DIGITISED, RESOURCE-EFFICIENT AND RESILIENT INDUSTRY 2021

Materials and data cross-cutting actions

- HORIZON-CL4-2022-RESILIENCE-01-19: Advanced materials modelling and characterisation (RIA)
- HORIZON-CL4-2022-RESILIENCE-01-20: Climate Neutral and Circular Innovative Materials Technologies Open Innovation Test Beds (IA)
- HORIZON-CL4-2022-RESILIENCE-01-25: Optimised Industrial Systems and Lines through digitalisation (IA)

HORIZON-CL4-2022-RESILIENCE-01-19: Advanced materials modelling and characterisation (RIA)

Projects are expected to contribute to the following outcomes:

- Develop an open repository for knowledge transfer, data sharing for integration between advanced materials characterisation (material properties/functionalities) and modelling (data and physics based, engineering modelling), allowing full interoperability between data and workflows (CHADA, MODA and EMMO), with direct connection to manufacturing process;
- Develop characterisation techniques supporting key European technology area strongholds. The developed characterisation methods should be complemented with and validated by modelling tools;
- Enable a model-based innovation processes covering all stages from materials design (including several scales, e.g. from molecular to macroscale) to product development, including validation, characterisation and life cycle assessment, with the aim, in particular, of translating industry needs into innovation challenges and provide solutions;
- Increase the efficiency and effectiveness of materials and product development by reducing costs and time for product design, time-to-market and regulatory compliance, which will enable the transition to a decarbonised economy;
- Improve handling of missing data by means of artificial intelligence/machine learning methods and/or simulation;

Indicative budget of the call: EUR 18.00 million

EU contribution per project: EUR 4–6 million

Type of Action: Research and Innovation Action

TRL: Start at 3 and achieve 5

HORIZON-CL4-2022-RESILIENCE-01-20: Climate Neutral and Circular Innovative Materials Technologies Open Innovation Test Beds (IA)

Projects are expected to contribute to the following outcomes:

- Increase significantly the large-scale deployment and demonstration of Climate Neutral and Circular Innovative Materials Technologies across sectors and the single market, as well as to build and maintain new innovative value chains;
- Reduce the technological risk of innovative materials and products, thus attracting more investors, and cut the time to market;
- Support companies, especially SMEs, to become world leaders in clean products and technologies by setting up a new generation of Open Innovation test Beds focused on the creation of Business Opportunities and Sustainability. Enhancing ownership and engagement of the society through active collaboration and empowering people and communities as actors of the climate neutral and circular transition ;
- Translation of industrial needs into scientific problems and concrete solutions, increased awareness and uptake by industry, and effective access of relevant stakeholders to know-how and advanced tools/infrastructure.

Indicative budget of the call: EUR 34.00 million

EU contribution per project: EUR 10–12 million

Type of Action: Innovation Action

TRL: Start at 5 and achieve 7

HORIZON-CL4-2022-RESILIENCE-01-25: Optimised Industrial Systems and Lines through digitalisation (IA)

Projects are expected to contribute to the following outcomes:

- Support the transition towards industrial digitalisation;
- Increase speed of innovation by optimising the use of existing research results and facilitating uptake of new projects results;
- Design digital tools for industry (e.g. cloud systems, simulation-based twin technologies, data driven approaches, AI-based and reinforcement learning solutions) to enhance efficiency and product quality, as well as to increase the capability for better and faster reaction to market changes;
- Contribute to the development of advanced material modelling solutions in particular for manufacturing industry;
- Enhance data interoperability and new type of services related to the data analysis, simulations and/or visualisation techniques in each stage of the material value chain (design, processing, manufacturing, etc.) using FAIR data principles.

Indicative budget of the call: EUR 15.00 million

EU contribution per project: EUR 4–5 million

Type of Action: Innovation Action

TRL: Achieve 6



European
Commission

Thank you for your questions

HorizonEU

<http://ec.europa.eu/horizon-europe>



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