Progetto Energy Efficiency4SMEs
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Horizon Europe - Cluster 5: focus su Call in materia di sviluppo sostenibile ed energia

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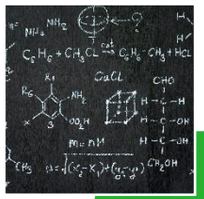
Co-funded by the European Union

What is Horizon Europe?

Horizon Europe

Horizon Europe is the EU's funding programme for research and innovation from 2021-2027 with budget of €95.5 billion.



Science & technology

- Fuel EU's scientific and technological excellence and the strengthen the ERA

Society

- tackle policy priorities, including green and digital transitions and SDGs

Economy

- boost Europe's innovation uptake , competitive ness and jobs

HE Rules for Participation

Entities eligible for participation

Art. 18: «*Any legal entity, regardless of its place of establishment, including legal entities from non associated third countries or international organisation may participate in actions under the Programme, provided that the conditions laid down in this Regulation have been met together with any conditions laid down in the work programme or call*”

Entities eligible for funding

EU COUNTRIES

- Member States (MS) including their outermost regions
- The Overseas Countries and Territories (OCTs) linked to the MS.

NON-EU COUNTRIES

- Countries associated to Horizon Europe (AC)
- Low and middle income countries: See HE Programme Guide.
- Other countries when announced in the call or exceptionally if their participation is essential

SPECIFIC CASES

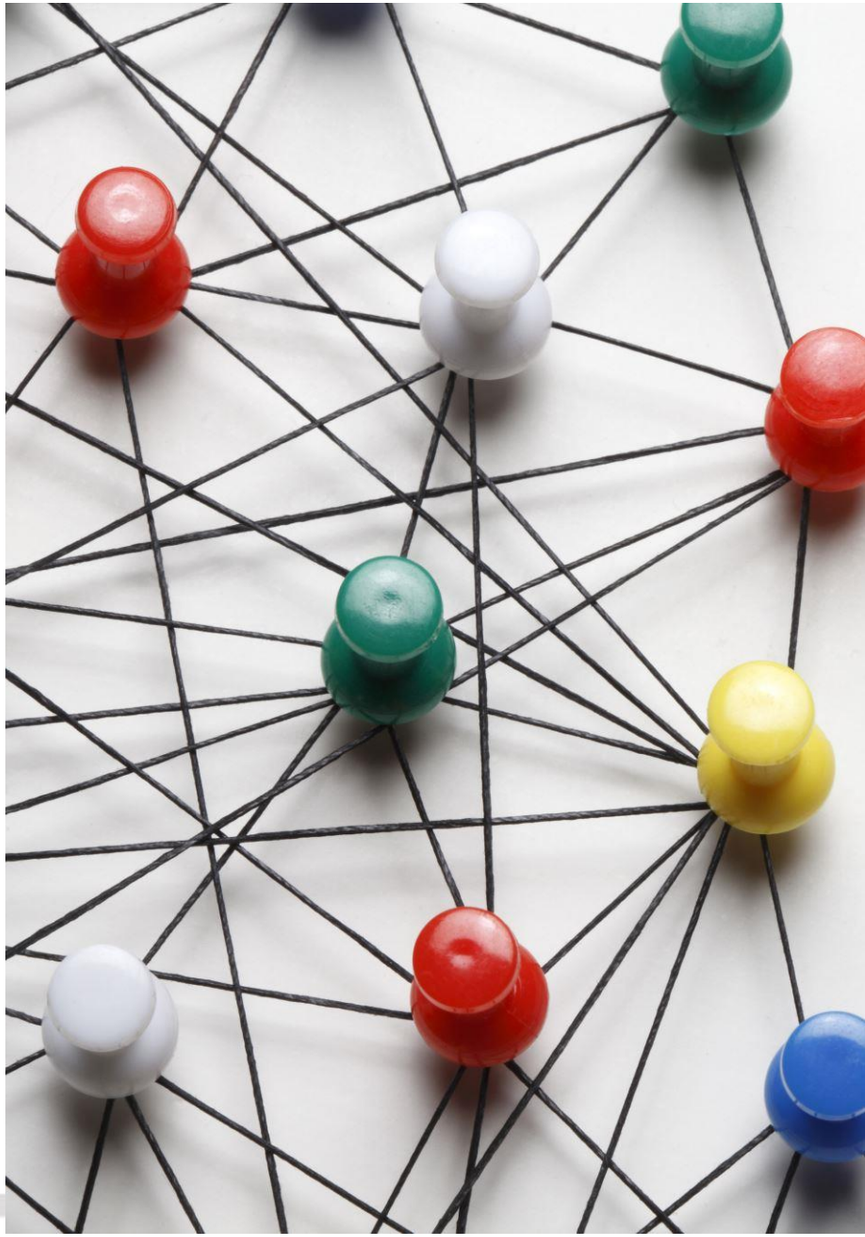
- Affiliated entities established in countries eligible for funding.
- EU bodies
- International organisations (IO):
  - International European research organisations are eligible for funding.
  - Other IO are not eligible (only exceptionally if participation is essential)
  - IO in a MS or AC are eligible for funding for Training and mobility actions and when announced in the call conditions

Minimum requirements

- Art. 18: «Entities shall be part of a consortium that shall include at least three independent legal entities each established in a different Member State or associated country and with at least one of them established in a Member State, unless the work programme provides otherwise”

SPECIAL/ADDITIONAL CONDITIONS

MAY BE OUTLINED IN TH EWORK PROGRAMME (No of participants, type of participants)



Horizon Europe architecture

HORIZON EUROPE

EURATOM

SPECIFIC PROGRAMME: EUROPEAN DEFENCE FUND

Exclusive focus on defence research & development

- Research actions
- Development actions

SPECIFIC PROGRAMME IMPLEMENTING HORIZON EUROPE & EIT*

Exclusive focus on civil applications

Pillar I
EXCELLENT SCIENCE

- European Research Council
- Marie Skłodowska-Curie
- Research Infrastructures

Pillar II
GLOBAL CHALLENGES & EUROPEAN INDUSTRIAL COMPETITIVENESS

Clusters

- Health
- Culture, Creativity & Inclusive Society
- Civil Security for Society
- Digital, Industry & Space
- Climate, Energy & Mobility
- Food, Bioeconomy, Natural Resources, Agriculture & Environment

Joint Research Centre

Pillar III
INNOVATIVE EUROPE

- European Innovation Council
- European Innovation Ecosystems
- European Institute of Innovation & Technology*

WIDENING PARTICIPATION AND STRENGTHENING THE EUROPEAN RESEARCH AREA

- Widening participation & spreading excellence
- Reforming & Enhancing the European R&I system

EURATOM

- Fusion
- Fission
- Joint Research Center

* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

European Commission

Cluster 5

Climate, Energy and Mobility

Cluster 5 Work Programme 2023-24

- aims to **fight climate change** by better understanding its causes, evolution, risks, impacts and opportunities, and **by making the energy and transport sectors climate neutral, environment-friendly, efficient, competitive, smarter, safer, resilient and useful** for citizens and society.
- Cluster 5 supports the EU's strategic objectives through activities included in the work programme (incl. Co-Programmed Partnerships) and through the support of Institutional European Partnerships which are implemented through dedicated structures.
- R&I activities under CL5 will contribute to the objectives of the European Green Deal related to the Climate Pact, the Clean energy strategy, the Strategic Energy Technology (SET) Plan , the Strategic Transport Research and Innovation Agenda (STRIA), European Circular Economy Action Plan

EU Policy priorities

Climate Action

- EU Climate Law (EU climate neutral by 2050)
- 2030 Climate Target Plan (55% GHG reduction by 2030)
- Make sectoral legislation 'fit for 55'
- EU Climate Adaptation Strategy
- Zero Pollution Action Plan

Energy

- **REPowerEU**
- EU Strategy for Energy System Integration
- Hydrogen strategy
- Renovation wave for Europe
- Offshore renewable energy

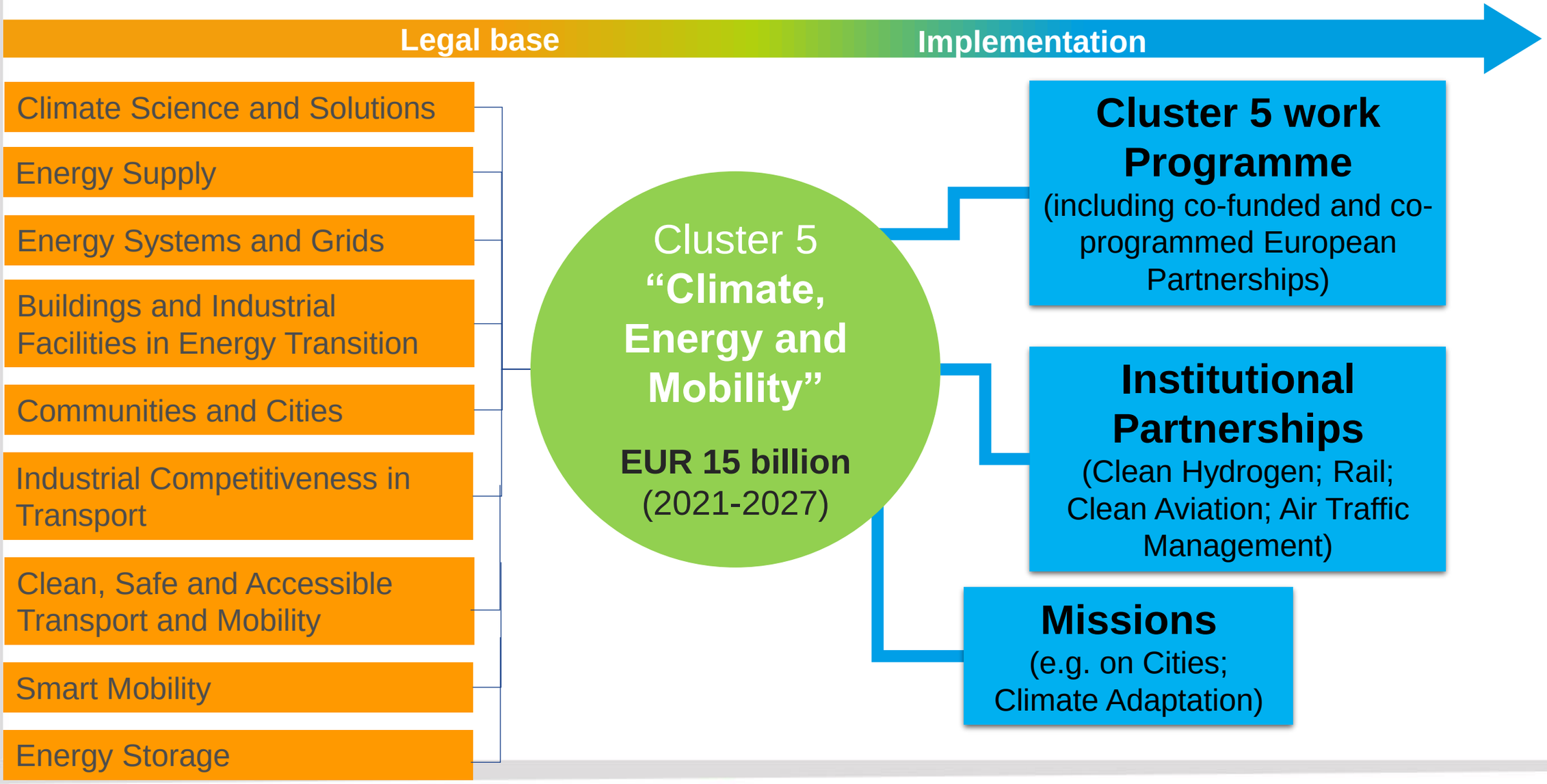
Mobility

- Sustainable and Smart Mobility Strategy

Research and Innovation

- A new European Research Area

Cluster 5 - overview



Cluster 5 European Partnerships

INSTITUTIONAL

Transforming Europe's rail system

(0.6 bn€ EU contribution;
0.6 bn€ private contributions)

Integrated Air Traffic Management

(0.6 bn€ EU contribution; 0.5 bn€ private contributions; 0.5 bn€ from Eurocontrol)

Clean Aviation

(1.7 bn€ EU contribution;
2.4 bn€ private contributions)

Clean Hydrogen

(1.0 bn€ EU contribution;
1.0 bn€ private contributions)

Total: 3.9 bn€ EU contribution

CO-FUNDED

CET | Clean Energy Transition

(210 M€ EU contribution)

DUT | Driving urban transitions to a sustainable future

(130 M€ EU contribution)

Total: 0.34 bn€ EU contribution

CO-PROGRAMMED

Built4People | People-centric sustainable built environment

(380 M€ EU contribution; 400 M€ private contributions)

ZEWT | Zero-emission waterborne transport

(530M€ EU contribution; 3300 M€ private contributions)

CCAM | Connected, Cooperative and Automated Mobility

(500 M€ EU contribution; 500 M€ private contributions)

2ZERO | Towards zero-emission road transport

(615 M€ EU contribution; 615 M€ private contributions)

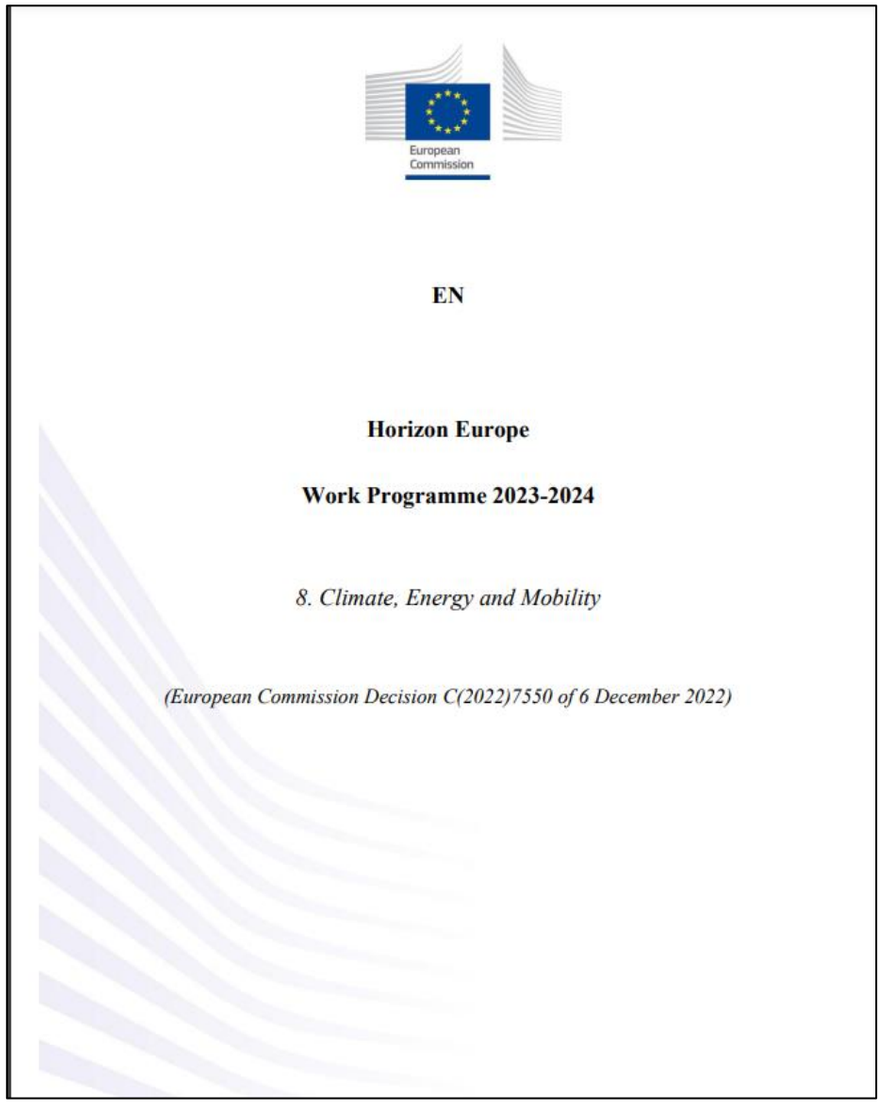
Batt4EU | Towards a competitive European industrial battery value chain

(925 M€ EU contribution; 925 M€ private contributions)

Total: 2.95 bn€ EU contribution

Total: 7.2 bn€

The Work Programme



The Work Programme (WP) is

- a document downloadable from the European Commission Funding and Tender Opportunities Portal: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/reference-documents;programCode=HORIZON
- Including all the calls for proposals open in a given time [the current WP covers 2023-24]

Work Programme 2025 is under preparation and it will be published in Spring 2025.

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- Destinations are groups of Calls for proposals
- Calls for proposals are groups of Topics

APRE

HORIZON-CL6-2021-BIODIV-01-13: Breeding for resilience: focus on root-based traits

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 16.00 million.
Type of Action	Research and Innovation Actions

Expected Outcome: In line with the objectives of the biodiversity and farm to fork strategies, a successful proposal will support the transition to more sustainable practices in agriculture by reducing the need for external inputs and supporting biodiversity in agroecosystems.

The project results are expected to contribute to all of the following expected outcomes:

- A better understanding of root-based traits (including the capacity to establish beneficial interactions with soil biota) and their genotypic variability as well as increased insight into the (adaptive) phenotypic plasticity of roots;
- Enhanced capacities for root phenotyping under controlled and on-field conditions;
- The delivery of strategies for breeding for below-ground traits capitalising on more effective interactions between plants and microorganisms in the rhizosphere;
- An increased use and valorisation of genetic resources (in situ and ex situ) for root based traits.

On the longer term projects will contribute to: the development of crops (annual and perennial) and forest trees that are more tolerant to abiotic stress conditions, require less external inputs (e.g. fertilisers and pesticides) and show an increased capacity for carbon sequestration, thereby contributing to adaptation of agriculture and forestry to climate change.

Scope: With increasing effects of climate change and a shift towards low(er) input production systems, there is the need for crops that are capable of capturing resources more efficiently and are resilient to abiotic stresses.

The root system and its interaction with soil biota is crucial for nutrient and water acquisition as well as for the capacity of plants to adapt to changing environments and to be more tolerant against pests and diseases. Phenotypic plasticity is key for plants to respond to varying soil conditions and highly dynamic distribution of soil resources. The size and architecture of the root system also determine the allocation of carbon in the soil. Breeding for root traits is therefore a promising strategy to increase plant stress resilience while also enhancing soil carbon sequestration.

Proposals should:

- Identify root traits that increase resource efficiency of plants in different environments, taking into account beneficial plant – microbe interactions and the restitution of plant-fixed carbon to the soil;
- Increase our knowledge on the (molecular and biochemical) plasticity of root responses and their metabolic mechanisms to environmental cues;
- Improve existing and/or develop new root phenotyping tools (including image analysis protocols) to be used in controlled and on-field conditions, thereby overcoming the root data bottleneck;
- Develop strategies to implement "root breeding", i.e. select for desirable root characteristics and exploit the genetic variation in root traits.

Activities should be carried out in a range of agronomically relevant soil conditions.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.

Topic title

Type of Action
Specifies what kind of actvities are to be performed

Expected outcomes
specifies the positive effects generated by the actions

Scope
specifies the focus and the boundaries of the potential action

DRAFT

Main types of action (Eligible activities)

RESEARCH AND INNOVATION ACTION (RIA)

Activities aiming primarily to establish new knowledge or to explore the feasibility of a new or improved technology, product, process, service or solution.
This may include basic and applied research, technology development and integration, testing, demonstration and validation on a small-scale prototype in a laboratory or simulated environment.

Funding rate: 100% of eligible costs

INNOVATION ACTION (IA)

Activities directly aimed at producing plans and arrangements or designs for new, altered or improved products, processes or services, possibly including prototyping, testing, demonstrating, piloting, large-scale product validation and market replication.

Funding rate: 70% (except for non-profit legal entities, where the funding rate is up to 100%) of the total eligible costs

COORDINATION AND SUPPORT ACTION (CSA)

Activities contributing to the objectives of the Horizon Europe Programme, excluding R&I activities (e.g. networking, awareness raising, coordination, stakeholder engagement)

Funding rate: 100% of the total eligible costs

(Source: the **General Annexes to the Work Programme)**

Cluster 5 Work programme - overview

Destination 1 – Climate science

- Earth system science
- Climate change mitigation
- Climate change impacts and adaptation
- Social/citizen/behavioural science
- International cooperation

Destination 2 – Cross-cutting solutions

- Batteries *[Batt4EU partnership]*
- Cross-cutting

Destination 3 – Energy supply

- Renewable energy
- Energy system, grids and storage
- Carbon Capture Utilisation and Storage

Destination 4 – Energy demand

- Buildings *[incl. Built4People partnership]*
- Industry

Destination 5 - Clean and competitive solutions for all transport modes

- Zero-emission road transport *[2ZERO partnership]*
- Aviation
- Waterborne transport *[incl. ZEWT partnership]*
- Transport-related health and environmental issues

Destination 6 - Transport and Smart Mobility services

- Connected, Cooperative and Automated Mobility *[CCAM partnership]*
- Multimodal and sustainable transport systems for passengers and goods
- Safety and resilience

Destination 1 - Climate sciences and responses for the transformation towards climate neutrality

Objectives

- **Advancing knowledge and providing solutions** in earth system science; pathways to climate neutrality; climate change adaptation including climate services; social science for climate action; and better understanding of climate-ecosystems interactions.
- Contributing substantially to key **international assessments** such as those of the Intergovernmental Panel on Climate Change (IPCC) or the European Environment Agency (e.g. European environment state and outlook reports, SOER).
- Strengthening the **European Research Area** on climate change.
- Increasing the **transparency, robustness, trustworthiness and practical usability** of the knowledge base on climate change for use by policy makers, practitioners, other stakeholders and citizens.

Issues covered in topics

- Earth system science and Earth System Model data, tipping points, Climate impacts of a hydrogen economy; climate eco-system interactions, cloud-aerosol interaction; voluntary climate change mitigation initiatives; policy; Modelling for local adaptation assessments and plans, solar radiation modification, social sciences to tackle climate change, international cooperation

Destination 2 - Cross-sectoral solutions for the climate transition

Batteries (Batt4EU Partnership)

- Supporting creation of a **competitive, circular, and sustainable European battery manufacturing value chain**
- Improvement of **technological performance** to increase application user attractiveness
- **Issues:** material processing, advanced materials, manufacturing processes, battery systems, recycling technologies, coordination activities
- Implementing **Batteries** co-programmed **Partnership**

Emerging breakthrough technologies and climate solutions

- Issues: Emerging energy technologies for a climate neutral Europe, Demonstration of knowledge and scientific proofs of the technological feasibility of concepts on high risk/high return (i.e. high technological and economic risks) technologies for transition to climate neutral economy by 2050 and beyond

Destination 3 - Sustainable, secure and competitive energy supply

Renewable energy

- Fostering **European global leadership** in affordable, secure and sustainable renewable energy technologies and services by improving their **competitiveness** in global **value chains** and their position in growth markets, notably through the **diversification** of the renewable services and technology portfolio
- **Issues**: PV, wind energy and heat pumps; Renewable fuels; decreasing the EU's dependence on fossil fuels; disruptive technologies, cost reduction, improved efficiency, de-risking, integration, export potential, sustainability, market uptake

Energy system, grids and storage

- Ensuring cost-effective **uninterrupted** and **affordable** supply of energy to households and industries in a scenario of **high penetration of variable renewables** and other new low carbon energy supply.
- Managing smart and cyber-secure **energy grids** and optimisation the interaction between producers, consumers, networks, infrastructures and vectors
- **Issues**: energy sector integration, energy system planning and operation, active consumer, markets and energy communities, digitization

Carbon Capture, Utilization and Storage

- **Accelerating** the development of Carbon Capture, Use and Storage (CCUS) as a CO_2 emission mitigation option in **electricity generation** and **industry applications** (including also conversion of CO_2 to products)
- **Issues:** CCUS hubs, application in industry, CO2 capture

TOPIC CODE	TOPIC TITLE	TYPE OF ACTION	OPENING DATE	DEADLINE	BUDGET PER GRANT Mil €	TOPIC BUDGET Mil €
HORIZON-CL5-2024-D3-02-01	Digital tools for CSP and solar thermal plants	IA	17/09/24	04/02/25	3	6
HORIZON-CL5-2024-D3-02-02	Development of next generation synthetic renewable fuel technologies	RIA	17/09/24	04/02/25	4	12
HORIZON-CL5-2024-D3-02-03	Development of smart concepts of integrated energy driven bio-refineries for co-production of advanced biofuels, bio-chemicals and biomaterials	RIA	17/09/24	04/02/25	3.5	7
HORIZON-CL5-2024-D3-02-04	Critical technologies for the future ocean energy farms	RIA	17/09/24	04/02/25	4	8
HORIZON-CL5-2024-D3-02-05	PV-integrated electric mobility applications	IA	17/09/24	04/02/25	7	14
HORIZON-CL5-2024-D3-02-06	Innovative, Community-Integrated PV systems	IA	17/09/24	04/02/25	5	10
HORIZON-CL5-2024-D3-02-07	Resource Efficiency of PV in Production, Use and Disposal	CSA	17/09/24	04/02/25	3	3
HORIZON-CL5-2024-D3-02-08	Minimisation of environmental, and optimisation of socio-economic impacts in the deployment, operation and decommissioning of offshore wind farms	RIA	17/09/24	04/02/25	5	10
HORIZON-CL5-2024-D3-02-09	Demonstrations of innovative floating wind concepts	IA	17/09/24	04/02/25	15	30
HORIZON-CL5-2024-D3-02-10	Market Uptake Measures of renewable energy systems	CSA	17/09/24	04/02/25	2	8
HORIZON-CL5-2024-D3-02-11	CCU for the production of fuels	IA	17/09/24	04/02/25	7	15
HORIZON-CL5-2024-D3-02-12	DACCS and BECCS for CO2 removal/negative emissions	IA	17/09/24	04/02/25	7	15

Destination 4 - Efficient, sustainable and inclusive energy use

Buildings

- **Technological and socio-economic breakthroughs** for achieving climate neutrality and the transition to zero pollution of the building stock by 2050, based on **inclusive and people-centric R&I**
- **Issues**: Energy performance assessment and monitoring, industrialization of deep renovation, integrated technology solutions, prefabricated renovation packages, demand response, renewable intensive homes, smart buildings, design, materials, sustainability of life-cycle
- Implementing co-programmed **Partnership "People-centric, Sustainable Built Environment"** (Built4People)

Industry

- Increased energy efficiency in industry and **reducing industry's Greenhouse Gas (GHG) and air pollutant emissions** through recovery, upgrade and/or conversion of industrial excess (waste) heat and through electrification of heat generation
- **Issues**: heat upgrade technologies, industrial excess (waste) Heat-to-Power conversion, Increasing the efficiency of the cooling systems and reducing costs, coupling the cooling systems with renewable energy sources, and harnessing available industrial waste heat

TOPIC CODE	TOPIC TITLE	TYPE OF ACTION	OPENING DATE	DEADLINE	BUDGET PER GRANT Mil €	TOPIC BUDGET Mil €
HORIZON-CL5-2024-D4-02-01	Industrialisation of sustainable and circular deep renovation workflows (Built4People Partnership)	IA	17/09/24	04/02/25	8	16
HORIZON-CL5-2024-D4-02-02	Robotics and other automated solutions for construction, renovation and maintenance in a sustainable built environment (Built4People Partnership)	RIA	17/09/24	04/02/25	4	8
HORIZON-CL5-2024-D4-02-03	BIM-based processes and digital twins for facilitating and optimising circular energy renovation (Built4People Partnership)	IA	17/09/24	04/02/25	4	8
HORIZON-CL5-2024-D4-02-04	Design for adaptability, re-use and deconstruction of buildings, in line with the principles of circular economy (Built4People Partnership)	RIA	17/09/24	04/02/25	4	8
HORIZON-CL5-2024-D4-02-05	Digital solutions to foster participative design, planning and management of buildings, neighbourhoods and urban districts (Built4People Partnership)	IA	17/09/24	04/02/25	5	10

Destination 5 - Clean and competitive solutions for all transport modes

Zero-emission road transport

- Transforming road transport to **zero-emission mobility** through a world-class European research and innovation and industrial system, ensuring **that Europe remains world leader** in innovation, production and services in relation to road transport
- **Issues**: battery management system, power electronics, optimised smart EV charging, sustainable circularity, two-weelers, microbuses
- **Implementing co-programmed Partnership "Towards zero emission road transport" (2ZERO)**

Aviation

- Accelerating the **reduction of all aviation impacts and emissions** (CO_2 and non-CO_2, including manufacturing and end-of-life, noise), developing aircraft technologies for deep reduction of greenhouse gas emissions, and **maintaining European aero-industry's global leadership** position
- **Issues**: long-term research, hydrogen-powered/electrified aviation, digital aviation technologies, policy-related research

Waterborne transport

- Accelerate the development and prepare the deployment of **climate neutral and clean solutions** in the shipping sector, **reduce its environmental impact** (on biodiversity, noise, pollution and waste management), improve its **system efficiency**, leverage digital and EU satellite-navigation solutions and contribute to the **competitiveness** of the European waterborne sector
- **Issues:** climate neutral fuels, electrification, energy efficiency and drastically lower fuel consumption of vessels, port infrastructure, inland waterway vessels, automated shipping
- **Implementing co-programmed Partnership "Zero Emission Waterborne Transport" (ZEWT)**

Transport - Health and environment

- Devising more effective ways for **reducing emissions and their impacts** through improved scientific knowledge
- **Issues:** monitoring polluting emissions, noise and particle emissions, smog prevention

Destination 6 - Safe, Resilient Transport and Smart Mobility services for passengers and goods

Connected, cooperative and automated mobility

- Accelerating the implementation of innovative connected, cooperative and automated mobility (CCAM) technologies and systems for **passengers and goods**
- **Issues**: on-board perception and decision-making technologies, safety validation, Physical and Digital Infrastructure, cyber-security, socio-economic and environmental impacts, coordination, demonstrators, occupant protection, Human behavioural model, fleet and traffic management systems, Artificial Intelligence
- **Implementing co-programmed Partnership "Connected, Cooperative and Automated Mobility" (CCAM).**

Multimodal and sustainable transport systems

- Further developing a **multimodal transport system** through sustainable and smart long-haul and urban freight transport and **logistics**, upgraded and resilient physical and digital **infrastructures** for smarter vehicles and operations, for optimised system-wide network efficiency
- **Issues**: multimodal freight transport nodes, greening the last mile, transport infrastructure (inland waterways), logistics networks integration and harmonisation, urban logistics and planning, smart enforcement, mobility services for the next decade, multimodal network and traffic management, construct, maintain and decommission transport infrastructure, resilient freight transport and logistics networks

Safety and resilience

- Drastically decreasing the number of **transport accidents, incidents and fatalities** towards the EU's long-term goal of moving close to zero fatalities and serious injuries by 2050 even in road transportation (Vision Zero) and increase the **resilience** of transport systems
- **Issues:** safe lightweight vehicles, human-technology interaction, road safety in low and medium income countries in Africa, infection on large passenger ships, safe automation and human factors in aviation, vulnerable road users, resilient aircraft and increased survivability, containership fires

GREENET

The CL5 NCPs Network

GREENET in a nutshell

- Funded by Horizon Europe
- Launched on the 1st July 2022
- Closing in 2027
- The **aim** is to improve the professionalisation of the CL5 NCPs across Europe, **simplifying applicants' access to Horizon Europe calls and raising the average quality of submitted proposals:**
  - Raising the general standard of support to applicants by **enhancing the competences of the Cluster 5 NCPs**.
  - **Raising applicants' awareness on HE funding opportunities as well as their knowledge** by the provision of a **suite of tools** to better tackle the challenges posed by the CL5 of HE.
  - **Lowering the entry barriers** for newcomers and participants from widening countries.
  - Increasing the quality and inclusiveness of international consortiums **supporting matchmaking among the CL5 applicants**.

GREENET- The network of CL5 NCPs

TOOLBOX

Infographics, Guides & factsheets, videos

PARTNER SEARCH SYSTEM

Organisations' profiles' database for consortia preparation

STAKEHOLDER DIRECTORY

This tool should enable you to identify what the roles of the different R&I CL5-related organisations are and which are the ones that you should be engaging with.

EUROPEAN CL5 DOCUMENT REPOSITORY

Repository of roadmaps, strategies, white papers, position papers published by relevant organisations/associations/platforms from the CL5-related sectors

CONTACTS

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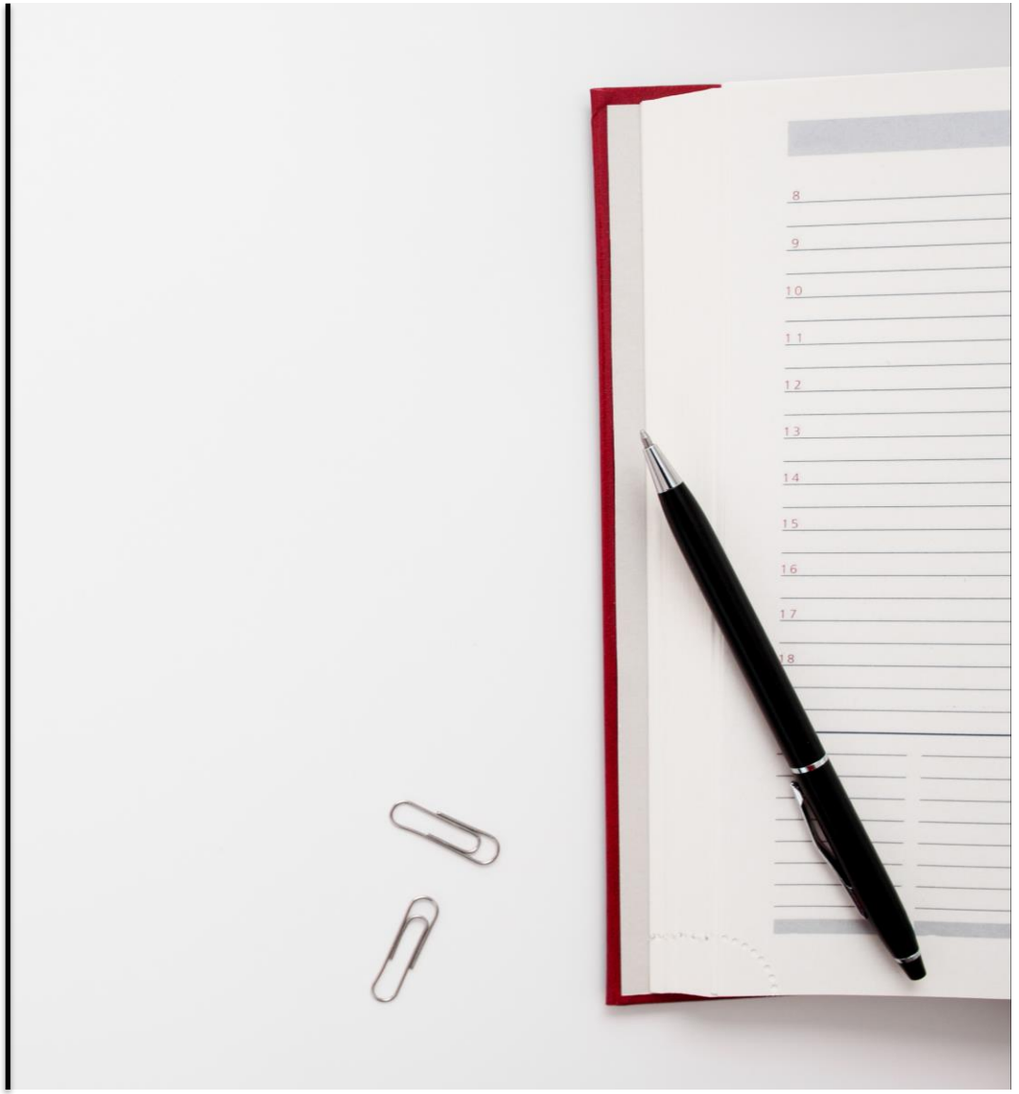

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