



HORIZON EUROPE

THE EU RESEARCH & INNOVATION PROGRAMME

2021 – 2027

**NATIONAL INFO DAY ON HORIZON
EUROPE WORK PROGRAMME 2023-2024**

Wednesday 18 January 2023, 8:15-17.00

Ktima Kousiouri, Nicosia, Cyprus



THE HORIZON EUROPE
FRAMEWORK PROGRAMME



Cluster 5: Climate, Energy and Mobility

Marco CITELLI – Policy Officer
European Commission
RTD C.5 “Ecological and Social Transitions”



Pre-publication, adoption, publication, call opening

Text of **CL5 WP 23-24** available on the [Funding & Tenders Portal](#):

Pre-publication: 28 November 2022

Adoption: 6 December 2022

Publication: 7 December 2022

Opening of 2023 calls: 13 December 2022



and here: [Horizon Europe work programmes \(europa.eu\)](#):



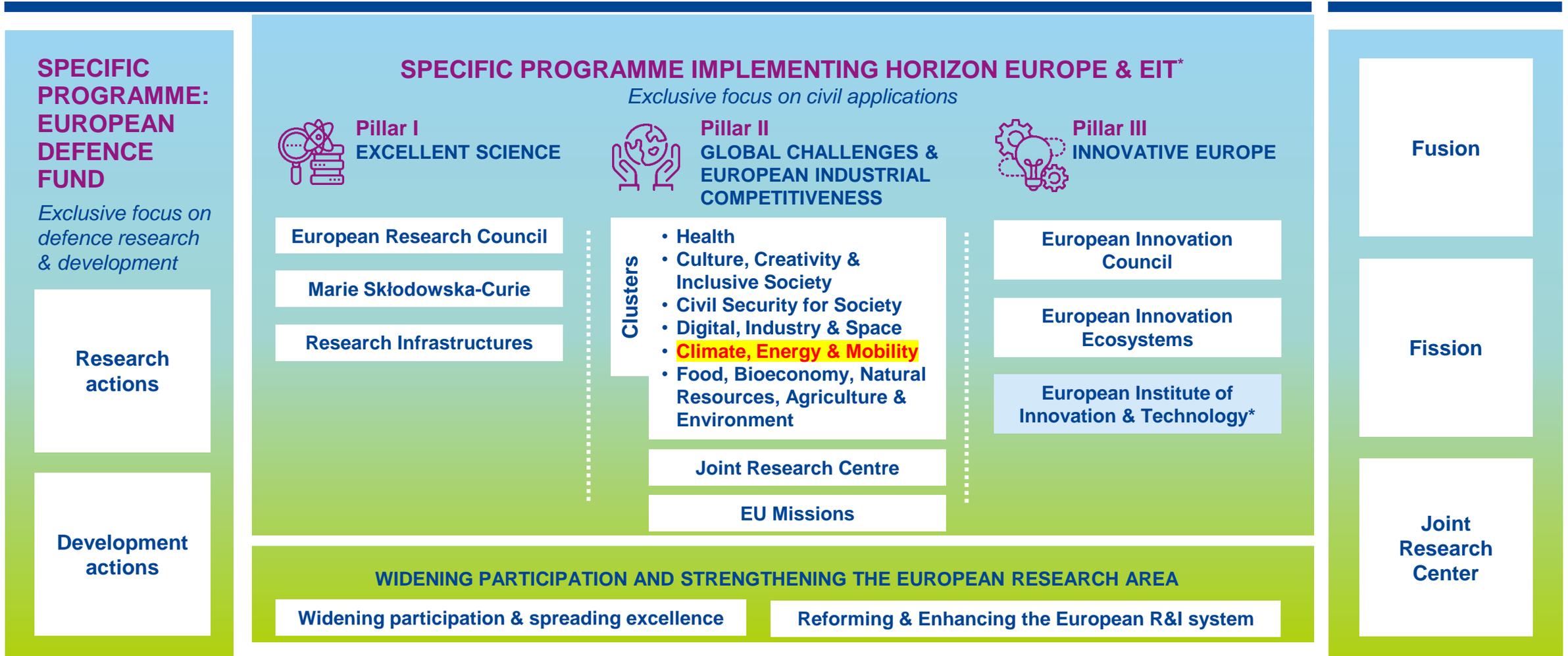
Horizon Europe work programmes

What work programmes are, what they cover, download available Horizon Europe work programmes.



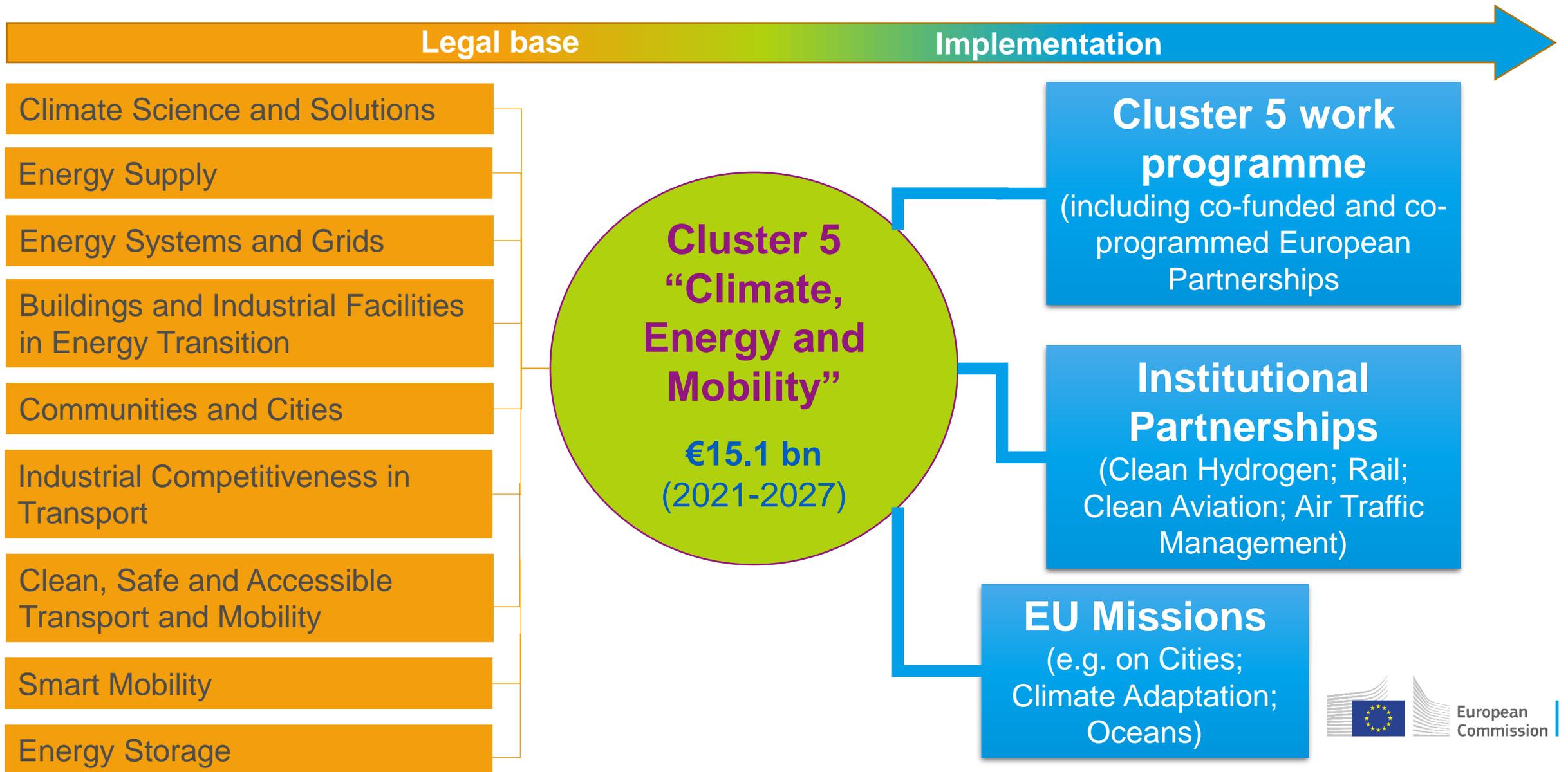
HORIZON EUROPE

EURATOM



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

Overview



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)

CO-FUNDED

CET | Clean Energy Transition

(210 M€ EU contribution)

DUT | Driving urban transitions to a sustainable future

(130 M€ 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)

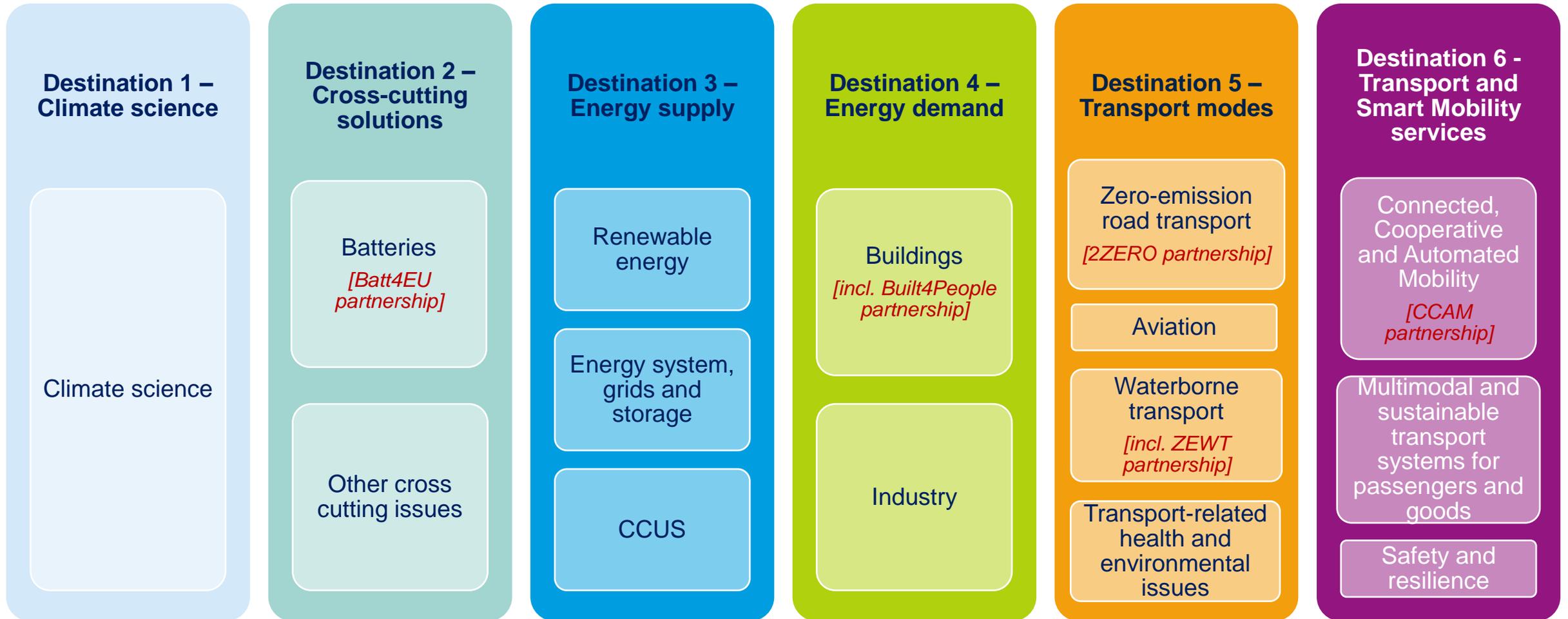
Total: 3.9 bn€ EU contribution

Total: 0.34 bn€ EU contribution

Total: 2.95 bn€ EU contribution

Total: 7.2 bn€

Cluster 5 work programme – Overview



CLUSTER 5 WORK PROGRAMME 2023-2024

Strategic priorities



Overarching expected impacts for Cluster 5

Destination 1

Transition to a climate-neutral and resilient society and economy enabled through **advanced climate science**, pathways and responses to climate change (mitigation and adaptation)

Destination 2

Clean and sustainable transition of the energy and transport sectors towards climate neutrality facilitated by innovative **cross-cutting solutions**

Destination 3

More efficient, clean, sustainable, secure and competitive **energy supply** through new solutions for smart grids and energy systems based on more performant renewable energy solutions

Destination 4

Efficient and sustainable **use of energy**, accessible for all is ensured through a clean energy system and a just transition

Destination 5

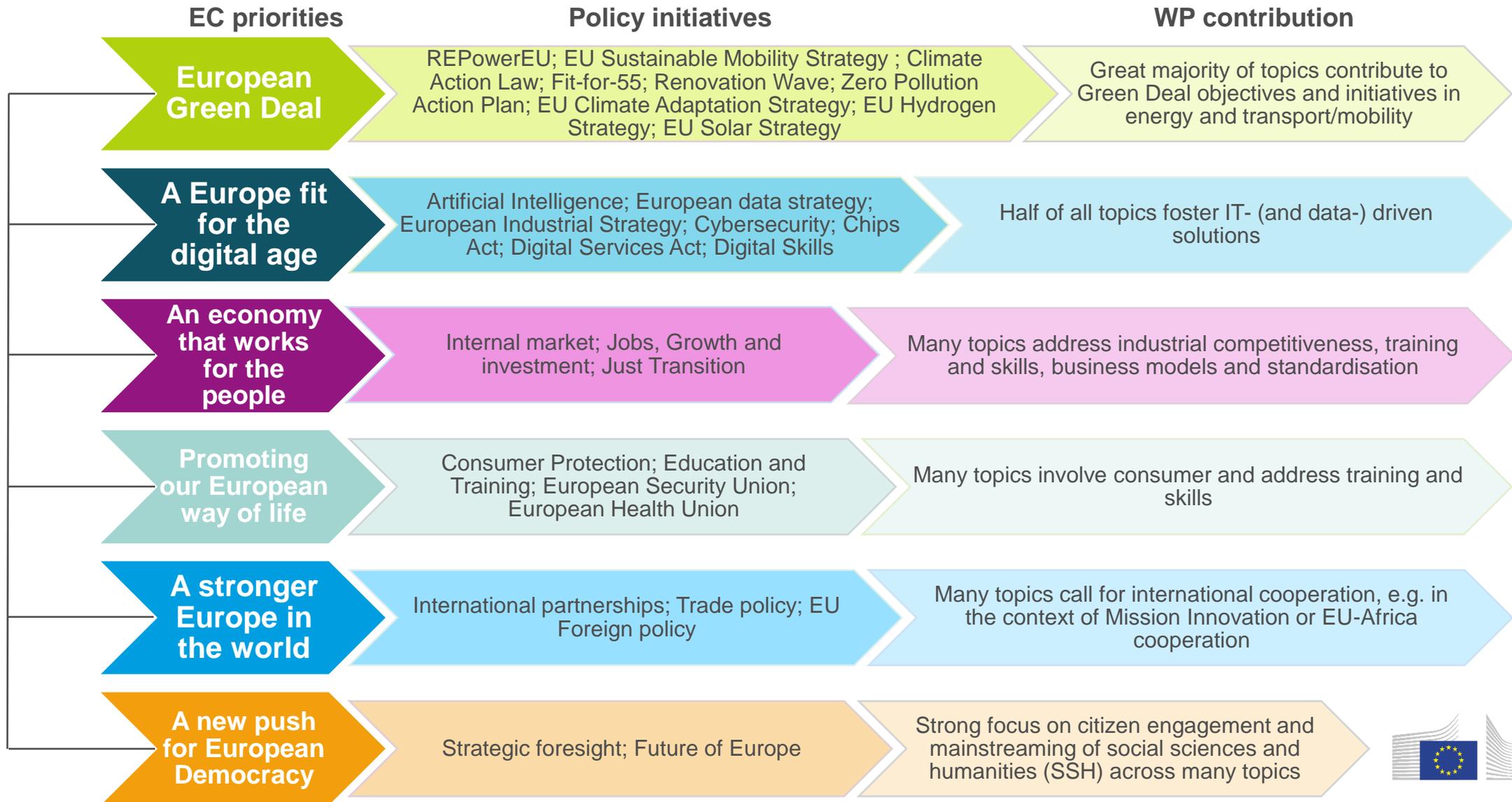
Towards **climate-neutral and environmental friendly mobility** through clean solutions across all transport modes while increasing global **competitiveness** of the EU transport sector

Destination 6

Safe, seamless, smart, inclusive, resilient, climate neutral and sustainable **mobility systems** for people and goods



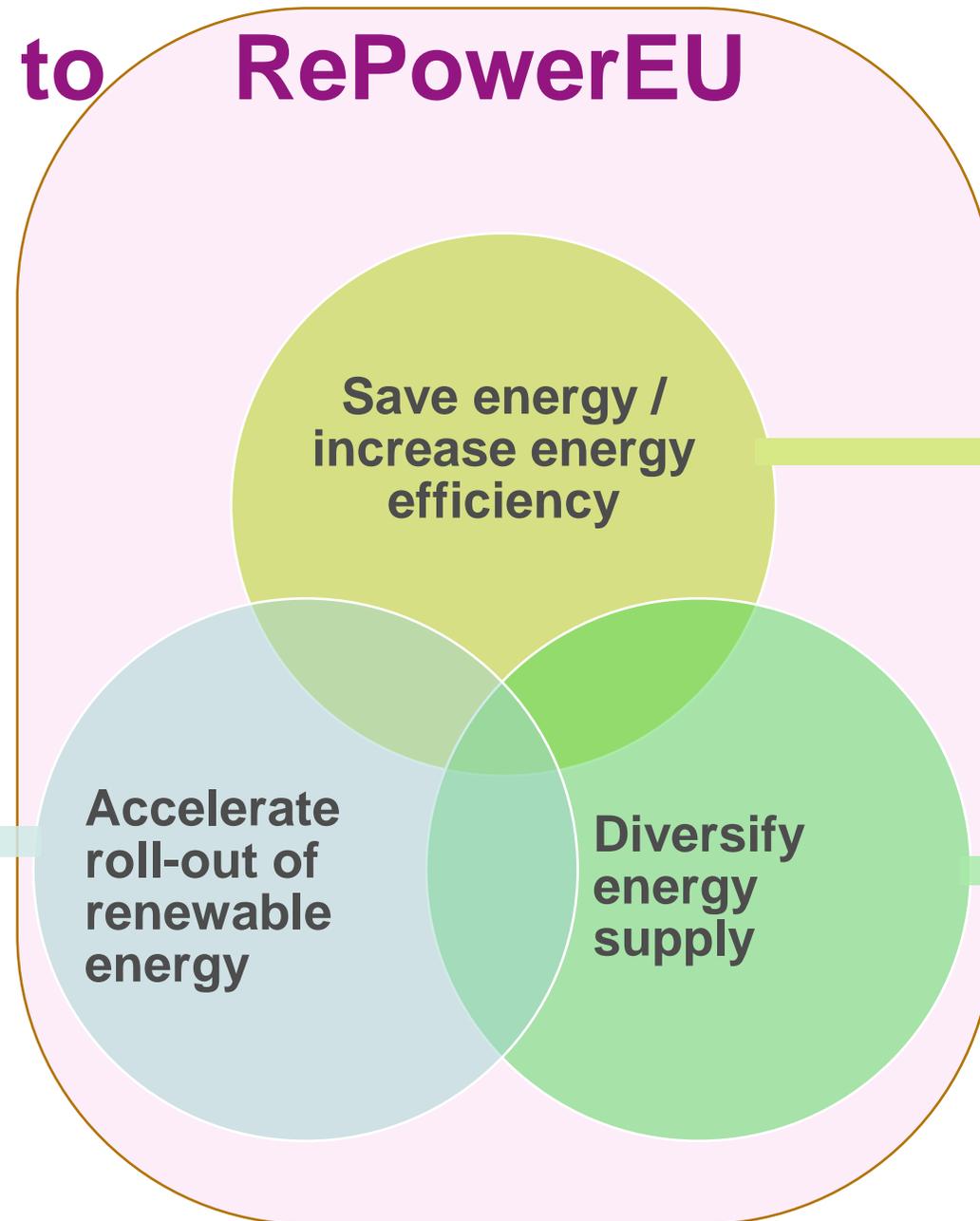
WP 2023-2024: EU policy objectives



Contribution to RePowerEU

Destination 2, 3, 4

- Cheaper and more performant renewable energy technologies (solar energy, wind energy, ocean energy, geothermal energy, hydro power, renewable fuels, heat pumps, solar heating)
- More flexible and resilient energy grids
- Better and smarter energy storage solutions



- More energy-efficient building stock
- Increased energy efficiency in industry
- More efficient mobility solutions
- Cleaner and more efficient transport modes

Destination 2, 4, 5, 6

- Broad portfolio of renewable energy technologies
- Maturing hydrogen-based solutions

Destination 3, 5

RePowerEU flagships

40M€

Renewable Energy Valleys to increase energy security while accelerating the green transition in Europe

20M€

Hydrogen-powered aviation

25M€

Innovative solutions for cost-effective decarbonisation of buildings through energy efficiency and electrification

20M€

Supporting the development of a digital twin to improve management, operations and resilience of the EU Electricity System in support to REPowerEU

30M€

Demonstration of innovative, large-scale, seasonal heat and/or cooling storage technologies for decarbonisation and security of supply

34M€

Demonstrations to accelerate the switch to safe use of new sustainable climate neutral fuels in waterborne transport

In total, at least **77 topics (1.18 bn€)** of CL5 WP 2023-2024 contribute to REPowerEU

How to maximise impact of R&I activities in CL5?

European Partnerships

Around 30% of topics and budget support industry priorities in industry-led Partnerships

Innovation Actions

Almost 45% of topics are Innovation Actions targeting TRL 6 or higher

Large-scale demonstration

100 M€ of support together with the Breakthrough Energy Catalyst Fund (in 2023-2024)

Standardisation

37 topics contribute to standardisation

Societal dimension

52 topics (28% of all topics) require active societal engagement and integration of social sciences and humanities in project preparation and implementation (including in 'technical' topics)

International cooperation

44 topics (23% of all) foster international cooperation in multilateral initiatives (e.g. Mission Innovation, IPCC) or target specific regions (e.g. Africa) or countries

EU Hydrogen Strategy

EU Solar Strategy

Cluster 5 work programme 2023-2024

Covering the whole hydrogen value chain:

- Climate impact of the hydrogen economy
- Hydrogen test bed
- Storage
- Energy production
- Fuel production (aviation, waterborne transport)

In total 17 topics for a total of 284,5 M€

+ Activities of the Clean Hydrogen Joint Undertaking

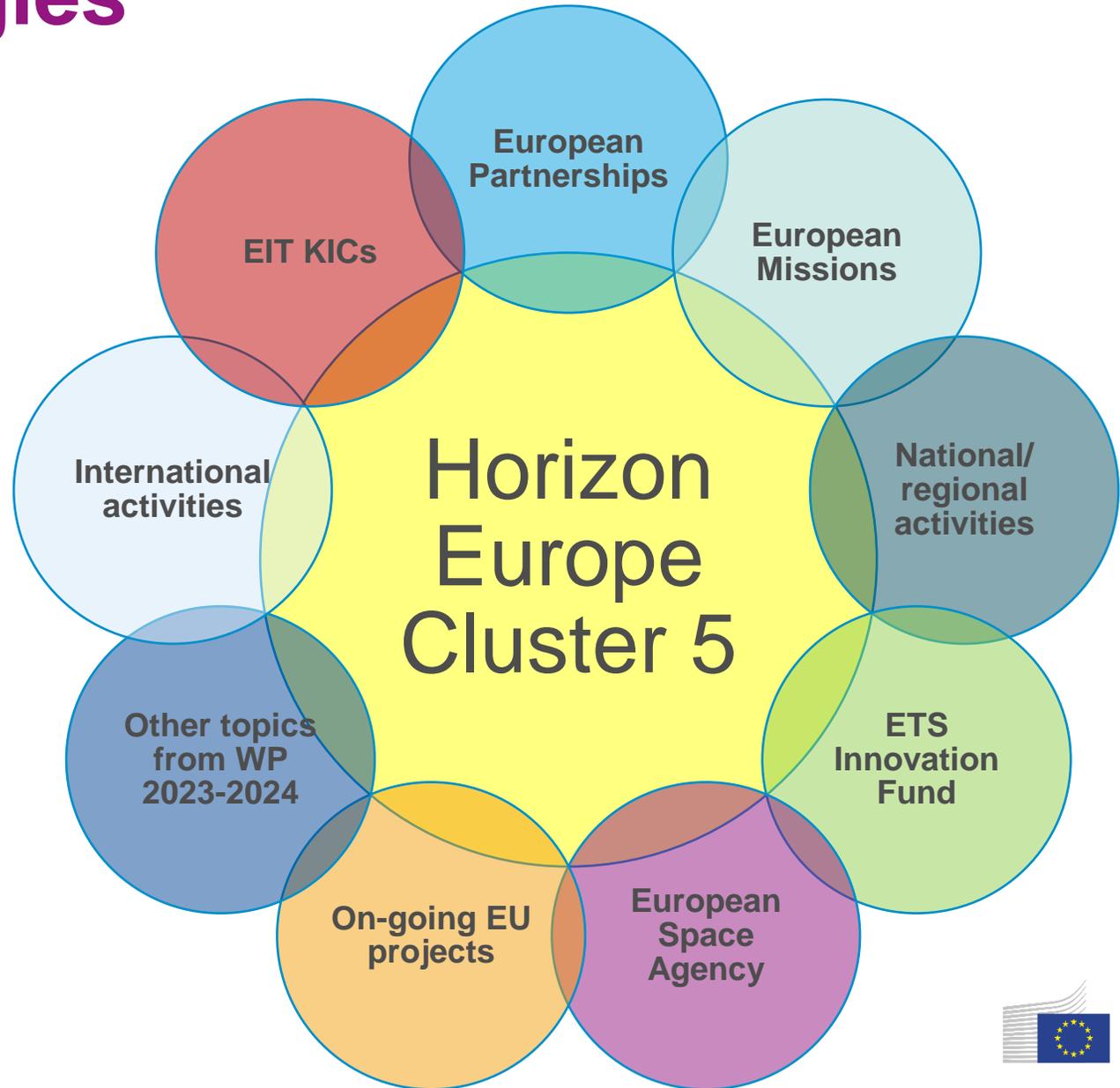
Horizon Europe *Flagship Initiative* for the Solar Strategy covers:

- Concentrated Solar Power (CSP)
- Photovoltaics (PV)
- Solar Heat & Power

In total 14 topics for a total budget of 151 M€

Fostering synergies

Around $\frac{1}{4}$ of all topics with a total budget of some **730 M€** (~30% of the total budget) refer explicitly to “synergies”



Concrete examples of synergies

With Missions

- **Adaptation to Climate Change**
 - Topic on Modelling for local resilience in support of local adaptation assessments and plans
 - Topic on Behavioural change and governance for systemic transformations towards climate resilience
- **Climate-neutral and Smart Cities**
 - Topic on PV integration in buildings and infrastructure
 - Topic on user-centred and co-designed shared, automated and zero-emission mobility systems and services for people and goods
 - Topic on shaping the future transport and mobility systems
- **Oceans**
 - Topic on Demonstrations to accelerate the switch to safe use of new sustainable climate neutral fuels in waterborne transport

Between and with Partnerships

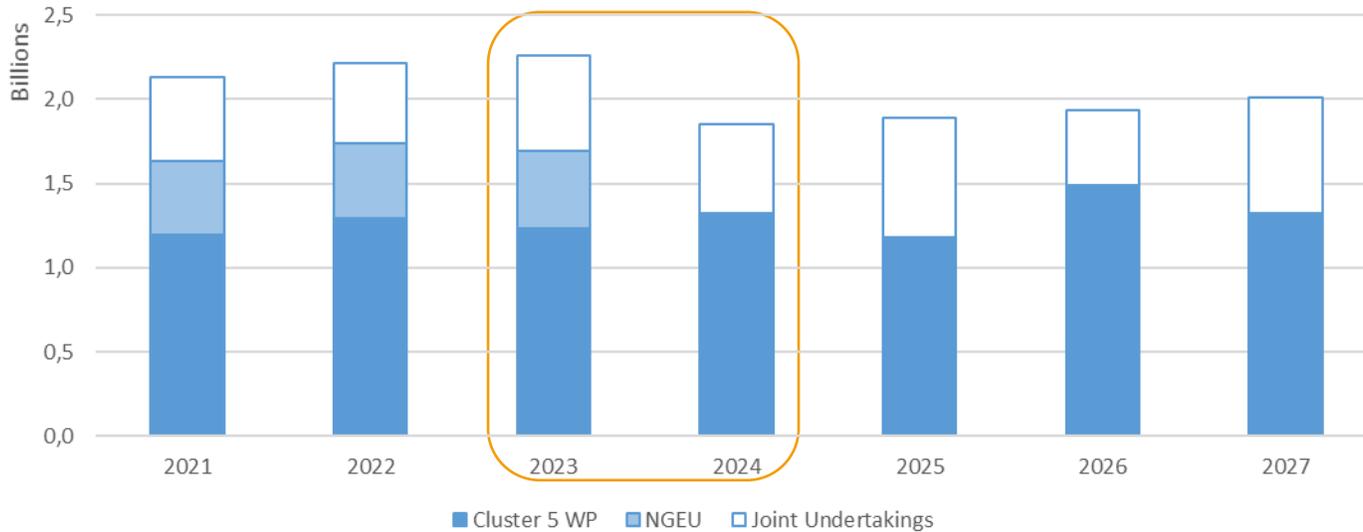
- Collaboration *between* European Partnerships (e.g. Batteries and 2ZERO; CCAM and 2ZERO)
- Collaboration *with* Partnerships (e.g. ZEWT and Batteries/Hydrogen; Multimodal freight transport and CCAM, ZEWT, EU Rail JU)

With Innovation Fund

- 15 topics (in Renewable Energy and Batteries) require exploitation plans that may facilitate further funding through the Innovation Fund
- Topic facilitating mature projects from Horizon 2020 to reach deployment phase by means of developing synergies with other EU funding programmes, in particular the ETS Innovation Fund

Main figures of the CL5 WP 23-24

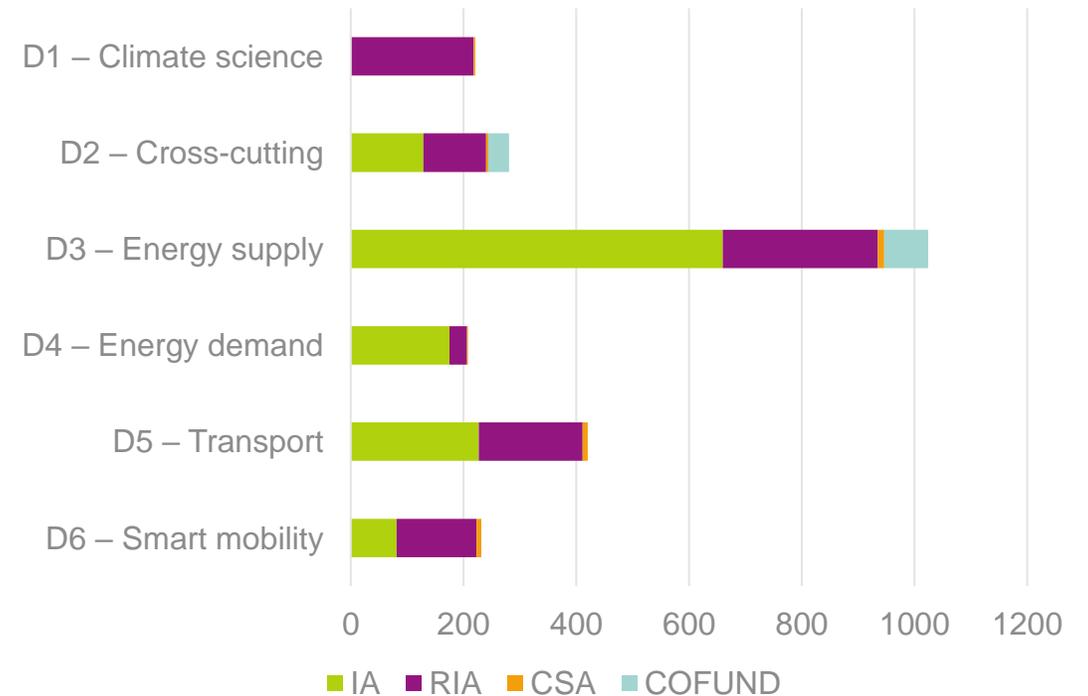
Budget *planning* of Cluster 5 budget 2021-2027



Budget distribution in calls for proposals for 2023-2024

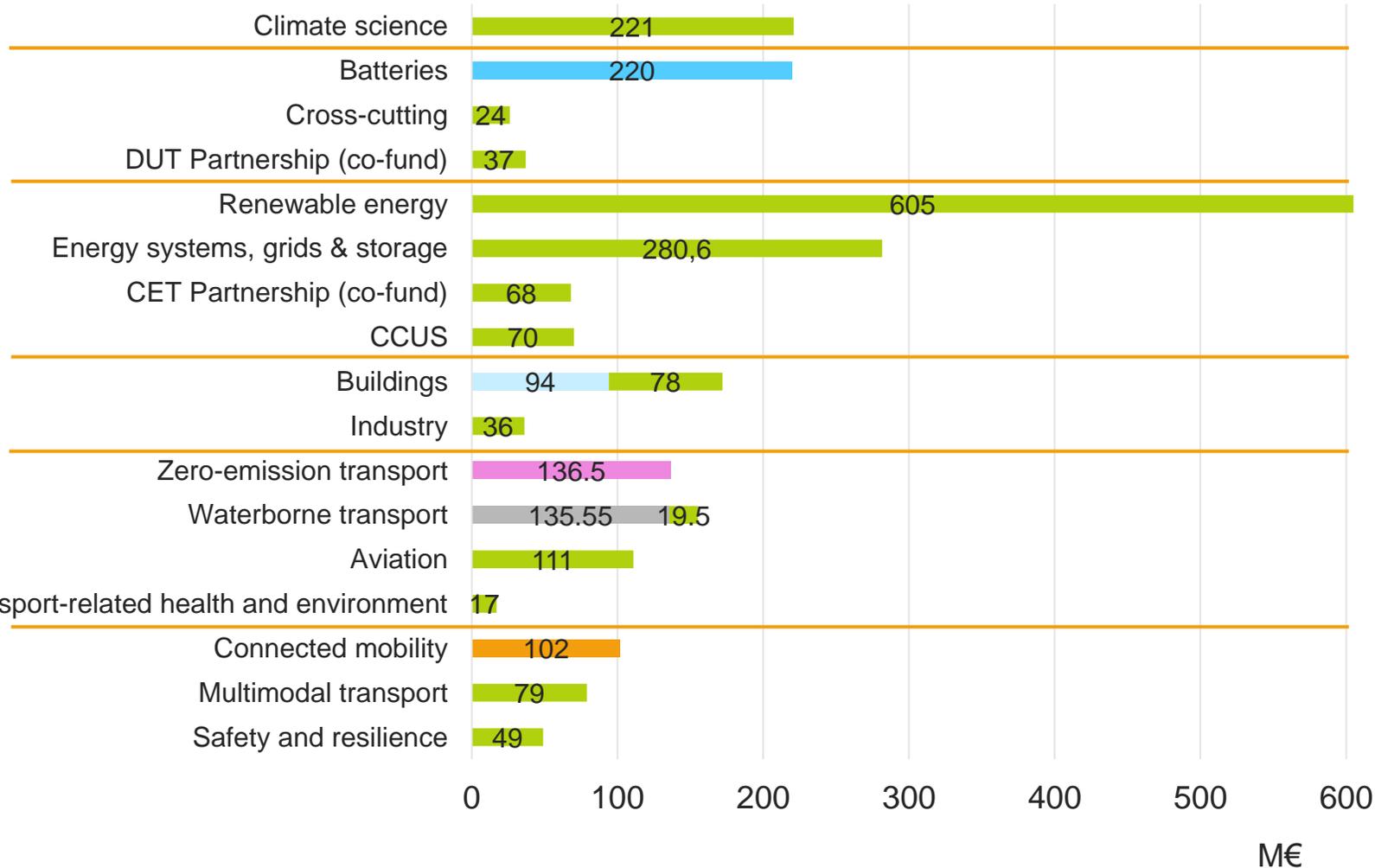
	Budget (M€)	Budget share	Number of topics	Topics share
D1 – Climate science	220,5	9%	20	11%
D2 – Cross-cutting	281,0	12%	19	10%
D3 – Energy supply	1.023,6	43%	69	37%
D4 – Energy demand	208,0	9%	19	10%
D5 – Transport	419,1	18%	37	20%
D6 – Smart mobility	231,0	10%	25	13%
TOTAL	2.383,2	100%	189	100%

EU contribution per Destination and type of action (2023-2024, in M€)



Budget distribution

EU contribution per thematic area (2023-2024, in M€)



European Partnerships:

- 60 out of 189 topics (32% of all cluster 5 topics)
- 688 M€ out of 2 383 M€ (29% of cluster 5 budget)

■ standard topics

Co-programmed Partnerships:

■ CCAM

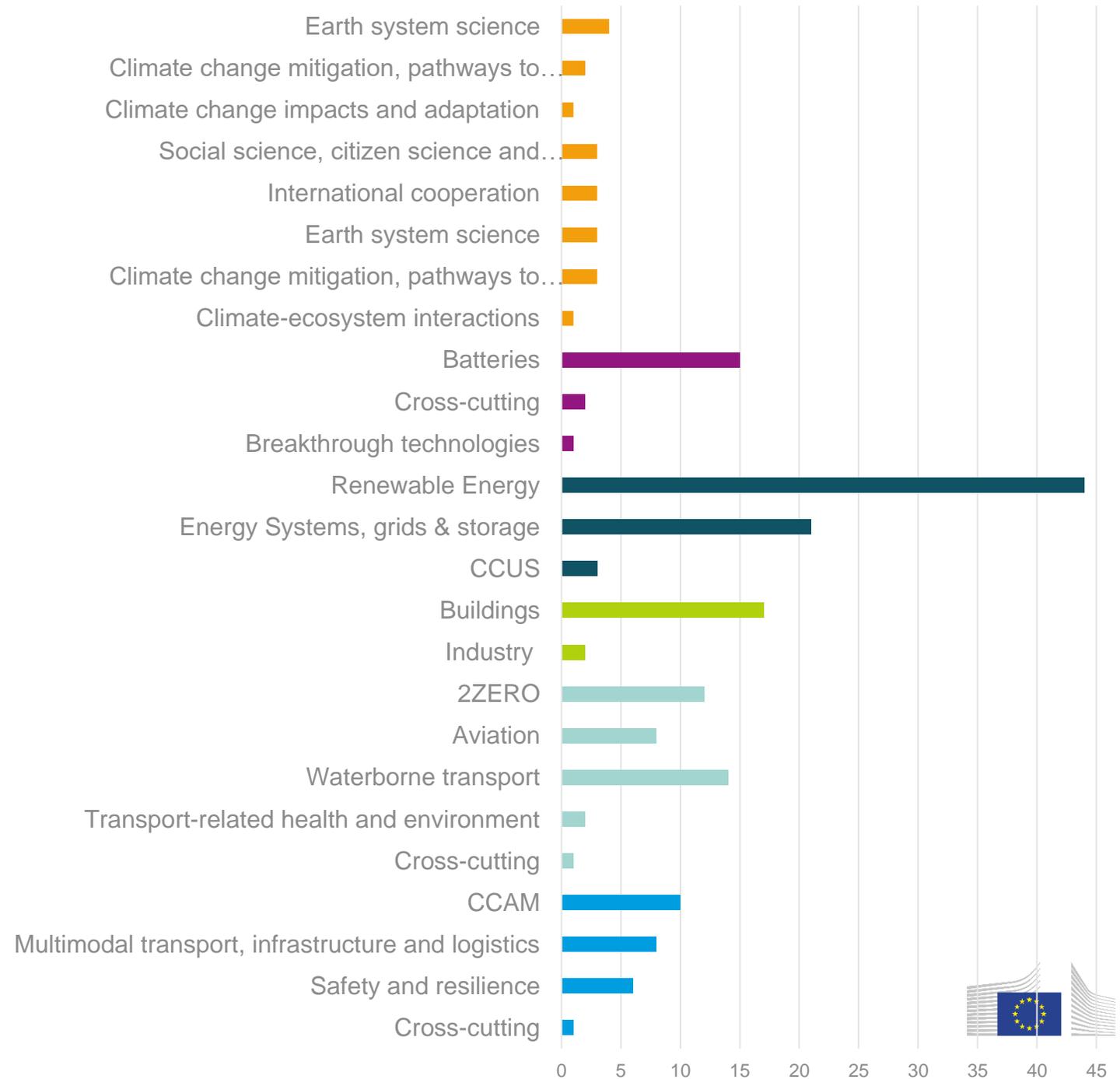
■ 2ZERO

■ Batt4EU

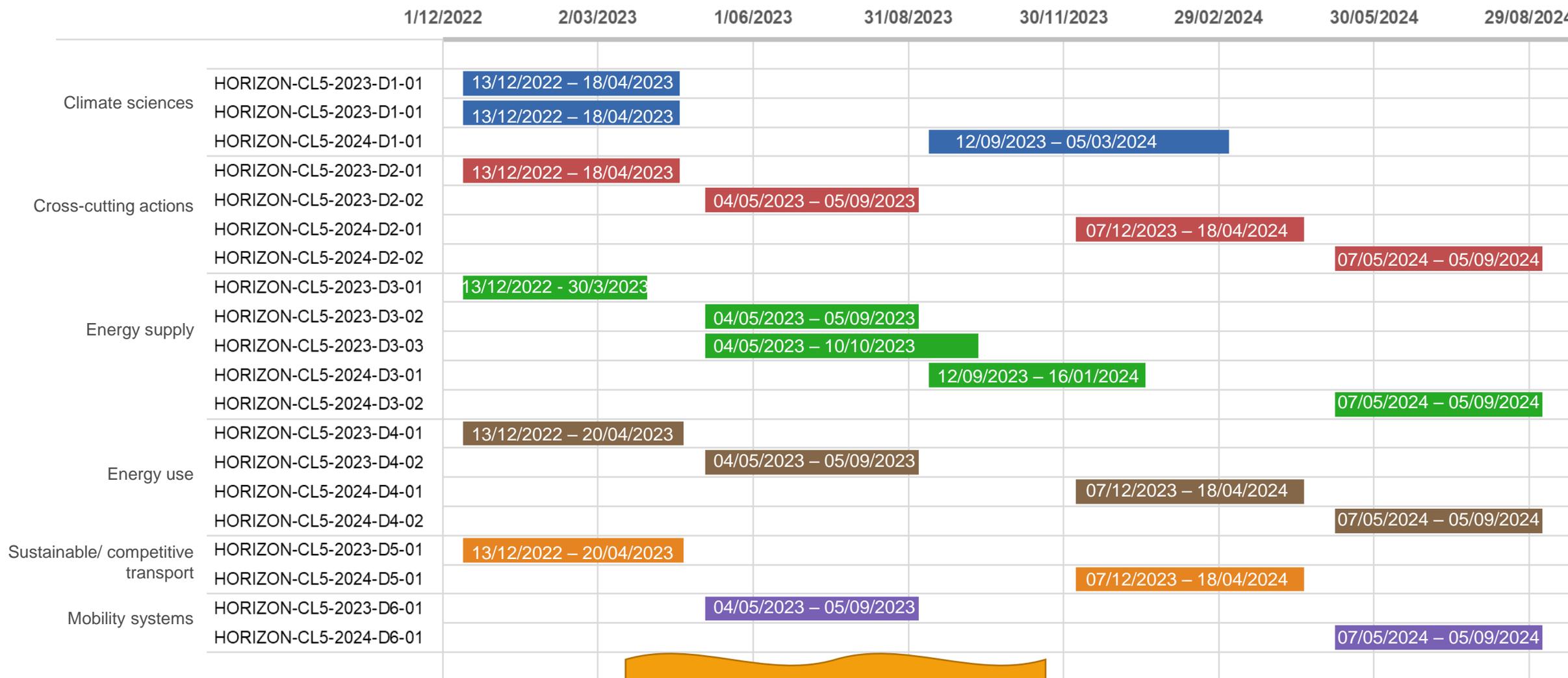
■ Built4People

■ ZEWT

Number of topics per area



Cluster 5 call structure 2023-2024



Implemented by **CINEA**

CLUSTER 5 WORK PROGRAMME 2023-2024

Thematic areas



Destination 1 – Earth system science

Objectives

- **Advancing knowledge about the Earth system**
- **Contributing to key international assessments**, e.g. Intergovernmental Panel on Climate Change (IPCC)
- Increasing the **transparency, robustness, trustworthiness and practical usability** of the knowledge base on climate change



Issues covered in topics 2023-2024

- advanced science and technologies for analysing Earth system data, tipping points, cloud-aerosol interactions, role of hydrogen in the climate system, methane emissions and sinks, inland ice (cryosphere), paleoclimate, ecosystem-climate interactions

Implementation

- 1 call in 2023 – 4 topics (total budget: 54 M€)
- 1 call in 2024 – 4 topics (total budget: 72 M€)

Destination 1 – Climate change mitigation, pathways to climate neutrality

Objectives

- **Advancing solutions to reduce human interference with the climate system**
- Contributing substantially to key **international assessments**, e.g. Intergovernmental Panel on Climate Change (IPCC)
- Increasing the **transparency, robustness and relevance** of the knowledge base on emission pathways, including integrated assessment models for use by policy makers, practitioners and citizens



Issues covered in topics 2023-2024

- Transition pathway analysis including NDCs, impacts of trade policies, climate foresight for raw material supply, voluntary climate change initiatives, ‘blue carbon’, including co-operation with China

Implementation

- 2 calls in 2023 – 4 topics (total budget: 25.5 M€)
- 1 call in 2024 – 3 topics (total budget: 31 M€)

Destination 1 – Adaptation to climate change, social and behavioral science

Objectives

- **Advancing knowledge on climate impacts**
- Support **better policy design** and more effective implementation **through behavioural insights**
- Contributing to **international assessments**, e.g. Intergovernmental Panel on Climate Change (IPCC)
- Supporting the **Mission on Adaptation**



Issues covered in topics 2023-2024

- Modelling for local resilience, needs-based adaptation in Africa, behavioural change for systemic transformation, climate change education, governance of research on solar radiation modification

Implementation

- 1 call in 2023 – 5 topics (total budget: 38 M€)

Destination 2 – A competitive and sustainable European battery value chain

Objectives

- Nurture a world-class European research and innovation eco-system on batteries along the **value chain** based on sustainable pathways.
- Support the creation of a **competitive, circular, and sustainable European battery manufacturing value chain**

Issues covered in topics 2023-2024

- Raw material processing, advanced materials, recycling technologies, Li-ion batteries, solid state batteries, new generation technologies, manufacturing technologies, smart functionalities, testing, battery management, coordination activities

Implementation

- 2 calls in 2023 – 8 topics (total budget: 119 M€)
- 2 calls in 2024 – 7 topics (total budget: 101 M€)



All topics contribute
to the co-
programmed
Partnership
BAtt4EU

Destination 2 – Emerging breakthrough technologies and climate solutions

Objectives

- Emergence of **unanticipated technologies** enabling emerging zero-greenhouse gas and negative emissions in energy and transport
- Development of **high-risk/high return** technologies to enable a transition to a net greenhouse gas neutral European economy
- Contribution to establishing a solid **long-term dependable innovation** in Europe.



Issues covered in topics 2023-2024

- Energy distribution and transmission, long-term energy storage, novel energy generation/conversion methods

Implementation

- 1 call in 2024 – 1 topic (total budget: 10 M€)

Destination 2 – Cross-cutting actions

Objectives

- Contribution to the European Hydrogen strategy, development of an innovative **hydrogen production** technology, creation of an **industrial ecosystem of green hydrogen production** technology providers
- Bring demo systems to **deployment stage**, create **synergies** between different EU R&I funding programmes, contribute to the **REPowerEU action plan** and other EU climate targets.



Issues covered in topics 2023-2024

- Open Pilot Line/Test Bed for hydrogen; Support for the deployment of R&I results for climate mitigation (synergies with the ETS Innovation Fund)

Implementation

- 1 call in 2023 – 2 topics (total budget: 14 M€)

Destination 2 – Communities and cities

Objectives

- Enable the EU to achieve targets set out by the European Green Deal and fulfil its commitments related to the **UN Agenda 2030**, the **Urban Agenda for the EU**, the **Habitat III New Urban Agenda** and the **Paris Agreement**.
- European cities need to engage urgently in sustainability and climate-neutrality transitions.

Issues covered in topics 2023-2024

- sustainable urban development (enhanced multi-level R&I cooperation, strengthen Europe as a role model), inclusive urban governance, policy and decision-making, local actors' engagement and empowerment

Implementation

- 1 call in 2023 – 1 topic (total budget: 37 M€)



This area is
dedicated to the co-
funded partnership
**Driving Urban
Transition**

Destination 3 – Global leadership in renewable energy

Objectives

- Foster 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
- **Diversify EU gas supplies** and **reduce the EU's dependence** on fossil fuels following the **RePowerEU** action plan

Issues covered in topics 2023-2024

- Renewable valleys, solar energy, wind energy, ocean energy, hydro energy, biofuels, bioenergy, synthetic renewable fuels, geothermal energy, CHP, storage
- Disruptive technologies, cost reduction, improved efficiency, de-risking, integration, export potential, market uptake

Implementation

- 2 calls in 2023 – 24 topics (total budget: 339 M€)
- 2 calls in 2024 – 20 topics (total budget: 266 M€)



This area includes the co-funded partnership **Clean Energy Transition**

Destination 3 – Energy systems, grid & storage

Objectives

- Increased **resilience, flexibility** and **stability** of the energy system for high penetration of **variable renewables** and other **new low carbon energy supply**
- Innovative **data-driven services for consumers** that empower them to **engage in the energy transition**
- Development of **cyber-security** and **privacy** tools and technologies tailor-made for the energy system



Issues covered in topics 2023-2024

- Energy sector integration; energy system planning and operation; grid resilience and reliability; power electronics; active consumer; markets and energy communities; digitisation; thermal energy storage

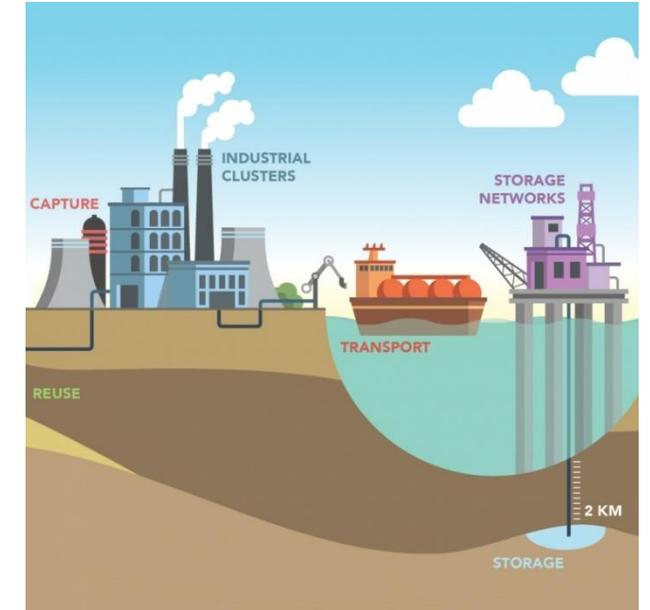
Implementation

- 2 calls in 2023 – 14 topics (total budget: 193 M€)
- 1 call in 2024 – 7 topics (total budget: 88 M€)

Destination 3 – Carbon Capture, Utilisation and Storage (CCUS)

Objectives

- Accelerating the development of Carbon Capture, Use and Storage (CCUS) as a CO₂ emission mitigation option in **electricity generation and industry applications**
- Accelerated rollout of **infrastructure** for CCUS hubs and clusters
- **Reduced cost** of the CCUS value chain



Issues covered in topics 2023-2024

- CCU for the production of fuels, CO₂ removal/negative emissions, CO₂ transport and storage

Implementation

- 1 call in 2023 – 1 topic (total budget: 40 M€)
- 1 call in 2024 – 2 topics (total budget: 30 M€)

Destination 4 – Highly energy-efficient and climate neutral EU building stock

Objectives

- Support **EU ambition** on energy **efficiency** and **independence**, with a stronger link between **innovation in technology** and **practices, policy drivers and instruments**
- 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 covered in topics 2023-2024

- Energy performance assessment and monitoring, industrialisation of deep renovation, integrated technology solutions, prefabricated renovation packages, demand response, renewable intensive homes, smart buildings, design, materials, sustainability of life-cycle

Implementation

- 2 calls in 2023 – 10 topics (total budget: 102 M€)
- 2 calls in 2024 – 7 topics (total budget: 70 M€)



Many topics contribute to the co-programmed partnership **Built4People**

Destination 4 – Industry

Objectives

- 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 covered in topics 2023-2024

- Integration of renewable heat or industrial waste heat in heat-to-cold conversion systems to generate cold for industrial processes; Alternative heating systems for efficient, flexible and electrified heat generation in industry

Implementation

- 1 call in 2023 – 1 topic (total budget: 20 M€)
- 1 call in 2024 – 1 topic (total budget: 16 M€)

Destination 5 – Zero-emission road transport

Objectives

- 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 (more detailed information below).



Issues covered in topics 2023-2024

- User-centric design, battery system management and integration, circular economy approaches, power electronics, optimised smart EV charging, heavy duty/light commercial vehicles, advanced digital tools and softwares

Implementation

- 1 call in 2023 – 6 topics (total budget: 60 M€)
- 1 call in 2024 – 6 topics (total budget: 77 M€)

Topics contribute
to the co-
programmed
partnership
2ZERO

Destination 5 – Aviation

Objectives

- Accelerating the **reduction of all aviation impacts and emissions** (CO₂ and non-CO₂, 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 covered in topics 2023-2024

- Hydrogen-powered aviation, electrified aviation, digital aviation technologies, advanced materials, flying test-bed

Implementation

- 1 call in 2023 – 4 topics (total budget: 54 M€)
- 1 call in 2024 – 4 topics (total budget: 57 M€)



Complementary substantial activities are funded under the Institutional European Partnerships **Clean Aviation and Air Traffic Management**

Destination 5 – Waterborne transport

Objectives

- 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 covered in topics 2023-2024

- climate neutral fuels, electrification, integrated digital solutions, reduction of shipping environmental impact, automated shipping, inland waterway vessels, business and industrial models, harmonisation of national policies

Implementation

- 1 call in 2023 – 7 topics (total budget: 93 M€)
- 1 call in 2024 – 7 topics (total budget: 61 M€)

Most topics
contribute to the
co-programmed
partnership **ZEWT**

Destination 5 – Transport-related health and environment

Objectives

- Devising more effective ways for **reducing emissions and their impacts** through improved scientific knowledge



Issues covered in topics 2023-2024

- Advanced transport emissions monitoring networks, assessment of air pollutant emissions from low-carbon fuels in the heavy-duty, aviation, and maritime sectors

Implementation

- 1 call in 2023 – 1 topic (total budget: 10 M€)
- 1 call in 2024 – 1 topic (total budget: 7 M€)

Destination 6 – Connected, cooperative and automated mobility

Objectives

- Accelerating the implementation of innovative **connected, cooperative and automated mobility (CCAM)** technologies and systems for passengers and goods

Issues covered in topics 2023-2024

- 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

Implementation

- 1 call in 2023 – 5 topics (total budget: 50 M€)
- 1 call in 2024 – 5 topics (total budget: 52 M€)



All topics
contribute to the
co-programmed
Partnership **CCAM**

Destination 6 – Multimodal transport, infrastructure & logistics

Objectives

- 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 covered in topics 2023-2024

- Zero-emission e-commerce and freight delivery, operational automation to support multimodal freight transport; urban logistics and planning; climate resilient and safe maritime ports, optimisation of multimodal network and traffic management, logistics networks, improved transport infrastructure performance through digital tools, transport and mobility-related governance and policies

Implementation

- 1 call in 2023 – 4 topics (total budget: 31 M€)
- 1 call in 2024 – 4 topics (total budget: 48 M€)

Destination 6 – Safety and resilience

Objectives

- 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 covered in topics 2023-2024

- Infrastructure safety on rural roads, aviation safety, reduction of injuries and long-term consequences in road crashes, safety, resilience and security of waterborne digital systems, societal impacts of disruptive changes in transport, traffic safety improvement in the EU, reduced energy dependency of transport

Implementation

- 1 call in 2023 – 3 topics (total budget: 26 M€)
- 1 call in 2024 – 3 topics (total budget: 22 M€)

Cluster 5 Info Days & Brokerage Event

- Cluster 5 Info Days – online (15/16 December):
- The recordings of the sessions, together with the related PPTs are available on the event’s website. In order to access the presentations, please click on “**Show details**” on the respective session’s page:
- [Events | The research and innovation community platform \(europa.eu\)](#)
- [Cluster 5 NCP project pitching session – online \(16 December\):](#)
- The PPT of the projects’ ideas presented are available at: <https://greenet-brokerage-event-2023.b2match.io/page-4481>



Follow us and keep up to date via:

HorizonEU

Commissioner Mariya Gabriel: Twitter @GabrielMariya

DG Research and Innovation: Twitter @EUScienceInnov @HorizonEU

<https://www.facebook.com/EUScienceInnov/>

Horizon Magazine: @HorizonMagEU

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

European Innovation Council: <http://ec.europa.eu/research/eic>

European Research Council: <https://erc.europa.eu/>





Thank you!

#HorizonEU

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



© European Union 2021

Unless otherwise noted the reuse of this presentation is authorised under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license. For any use or reproduction of elements that are not owned by the EU, permission may need to be sought directly from the respective right holders.

Image credits: © ivector #235536634, #249868181, #251163013, #266009682, #273480523, #362422833, #241215668, #244690530, #245719946, #251163053, #252508849, 2020. Source: Stock.Adobe.com. Icons © Flaticon – all rights reserved.