



# HORIZON EUROPE

---

## THE EU RESEARCH & INNOVATION PROGRAMME

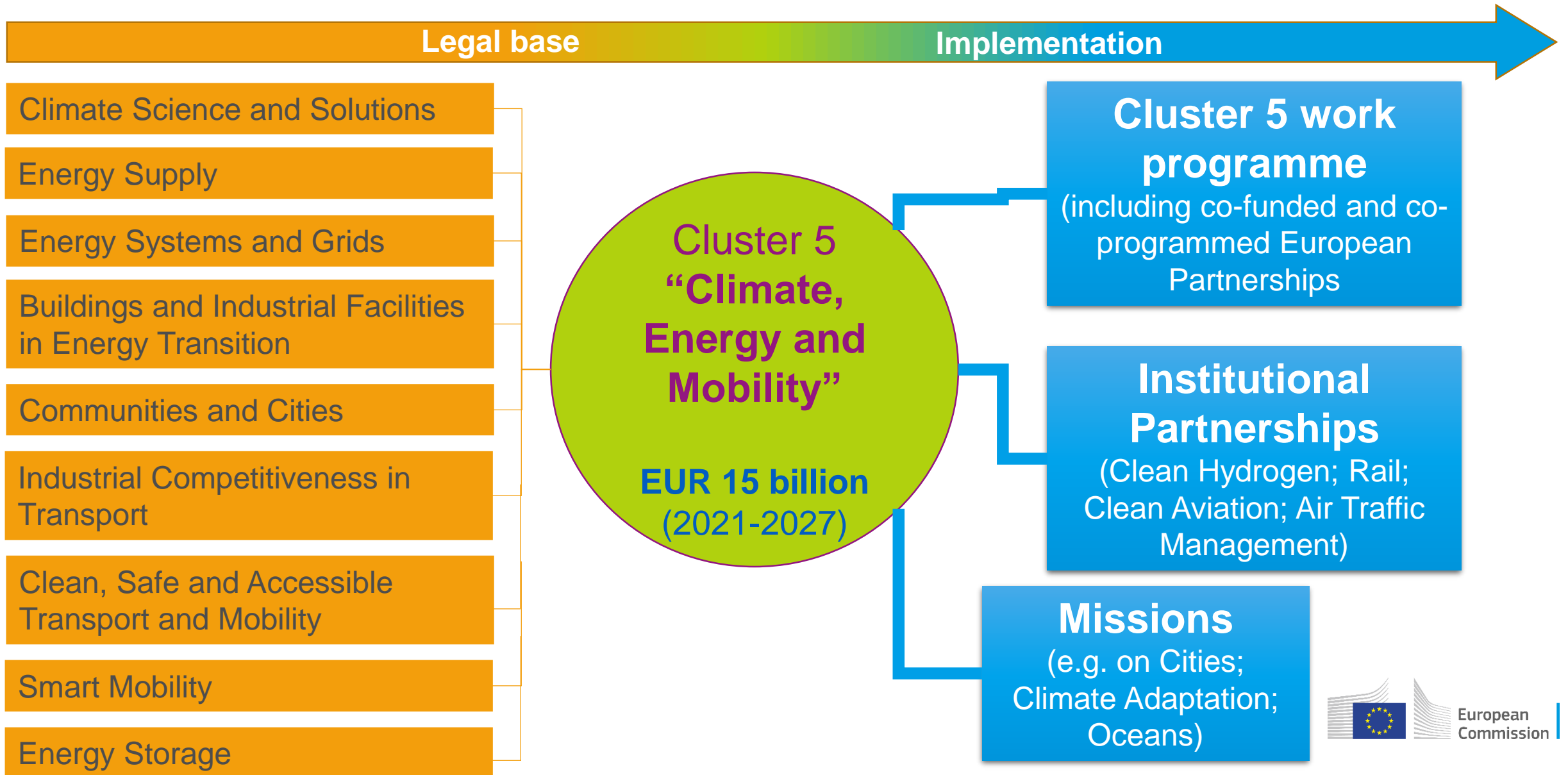
---

2021 – 2027

---



# Cluster 5 - overview



# Cluster 5 Partnerships

## Institutional Partnerships

- Transforming Europe's rail system
- Integrated Air Traffic Management
- Clean Aviation
- Clean Hydrogen

## Co-funded Partnerships

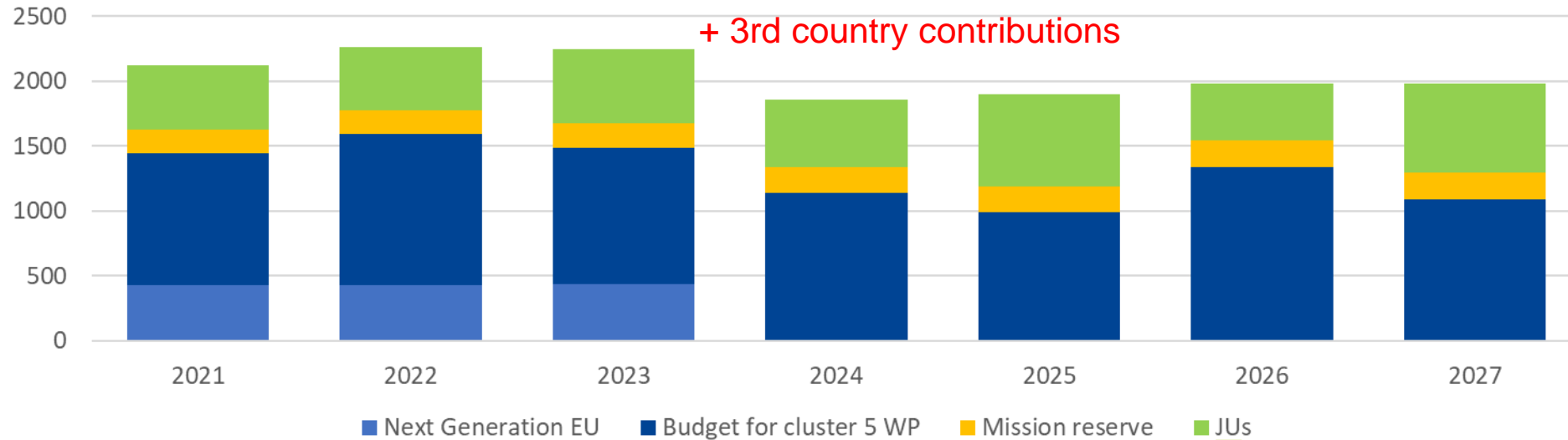
- Driving urban transitions to a sustainable future (DUT)
- Clean Energy Transition

## Co-programmed Partnerships

- Built4People | People-centric sustainable built environment
- Towards zero-emission road transport (2ZERO)
- Batteries: Towards a competitive European industrial battery value chain for stationary applications and e-mobility
- Zero-emission waterborne transport
- Connected, Cooperative and Automated Mobility (CCAM)

# Cluster 5 – budgetary overview 2021-2027

Cluster 5 operational budget; 2021-2027 (Mio EUR)



Total operational budget: 14.2 bn€ (+ third country contributions)

- **Transforming Europe's rail system:** 600 M€ EU contribution + 650 M€ contributions from Private members/Associated Partners
- **Integrated Air Traffic Management:** 600 million € EU contribution + 1000 million € contributions from Private members/Associated Partners
- **Clean Aviation:** 1700 million € EU contribution + 3000 million € contributions from Private members/Associated Partners
- **Clean Hydrogen:** 1000 million € EU contribution + 1030 million € contributions from Private members/Associated Partners

# Programme intervention logic



# EU Policy priorities

## European Green Deal

- Climate Action; Clean Energy; Sustainable Mobility; Eliminating pollution; Building and renovating; Biodiversity; Sustainable Industry

## A Europe fit for the digital age

- Artificial Intelligence; European data strategy; European Industrial Strategy; Cybersecurity

## An economy that works for the people

- Internal market; Jobs, Growth and investment

## Promoting our European way of life

- European Security Union; European Health Union

## A stronger Europe in the world

- International partnerships; Trade policy; EU Foreign policy

## A new push for European Democracy

- Strategic foresight; Future of Europe

## Recent Commission initiatives:

### 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

### Energy

- 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 – Expected impacts

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

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

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

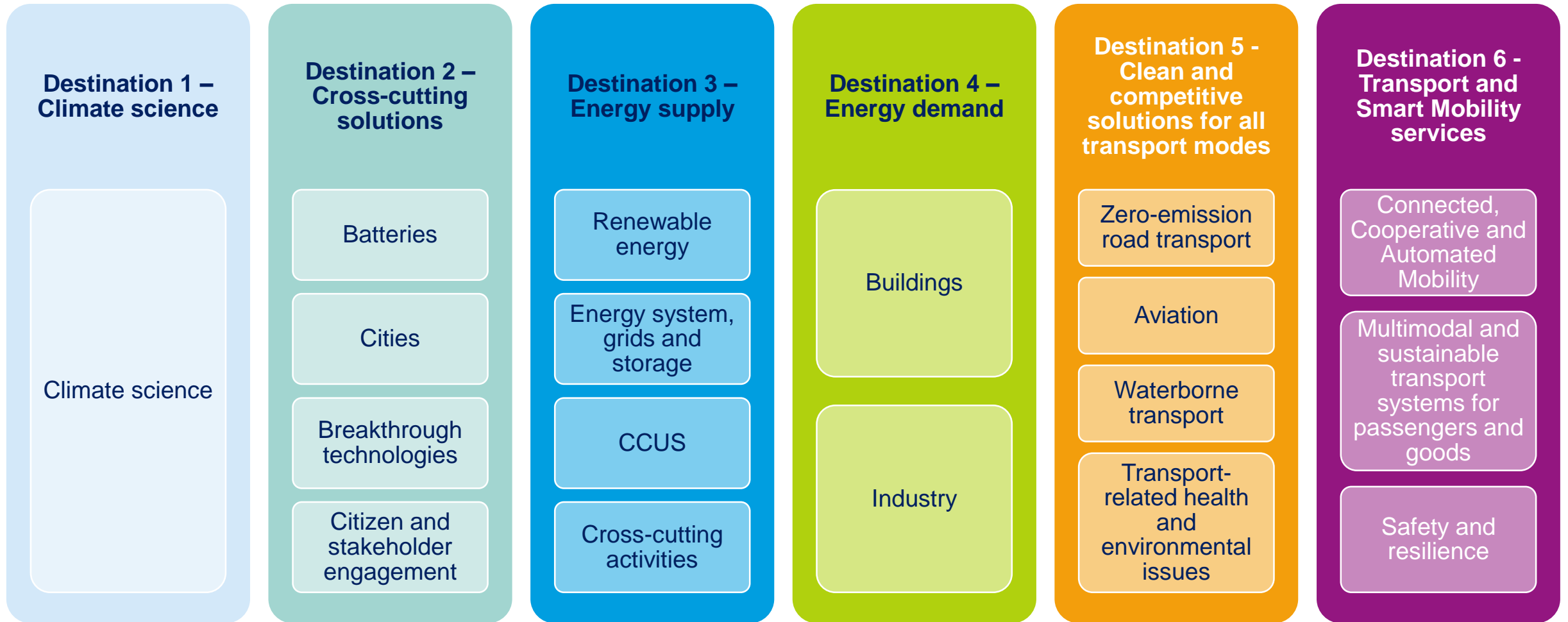


More efficient, clean, sustainable, secure and competitive **energy supply** through new solutions for smart grids and energy systems based on more performant renewable energy solutions

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

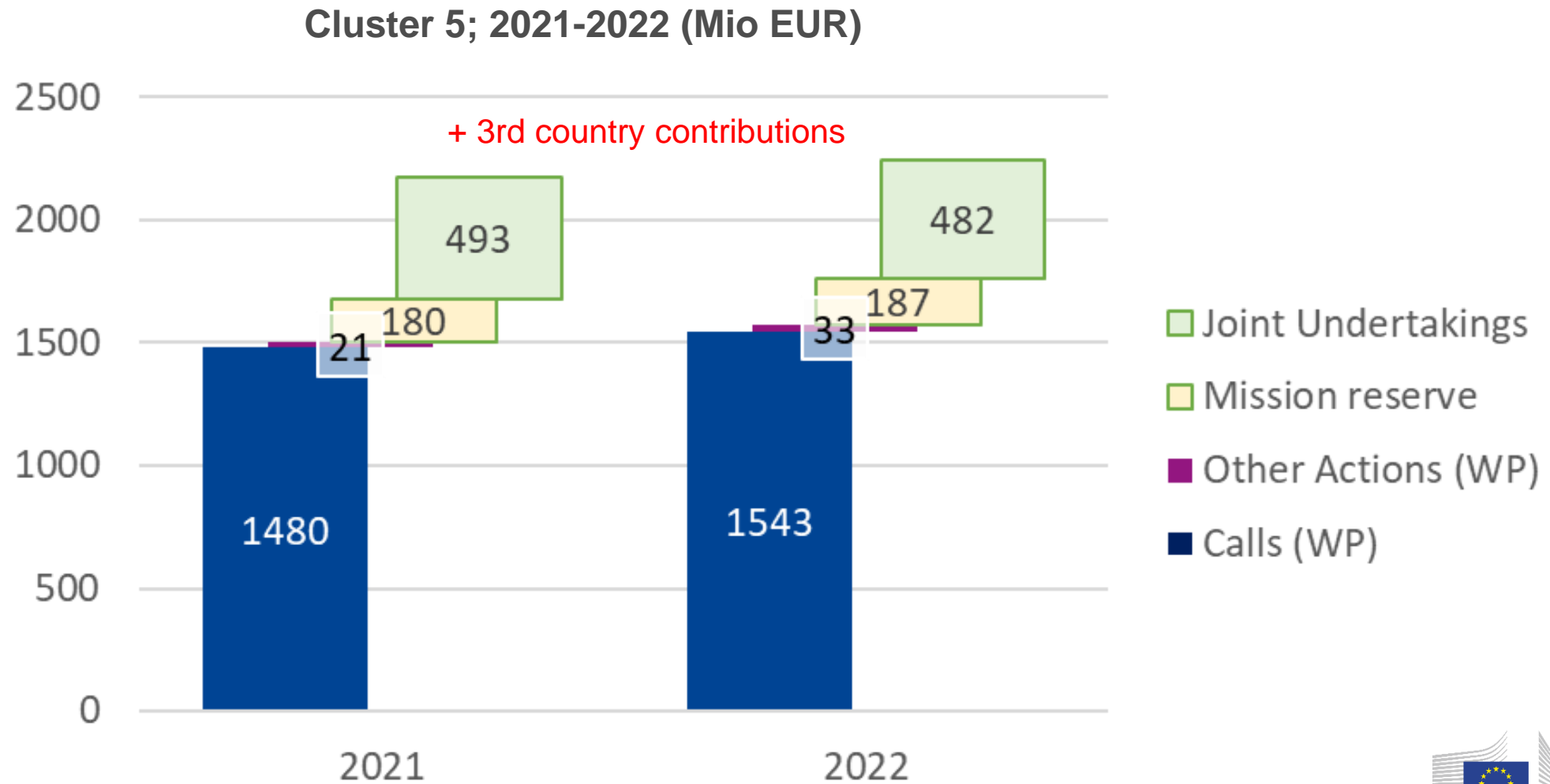
Towards **climate-neutral and environmental friendly mobility** through clean solutions across all transport modes while increasing global **competitiveness** of the EU transport sector

# Cluster 5 Work programme - overview



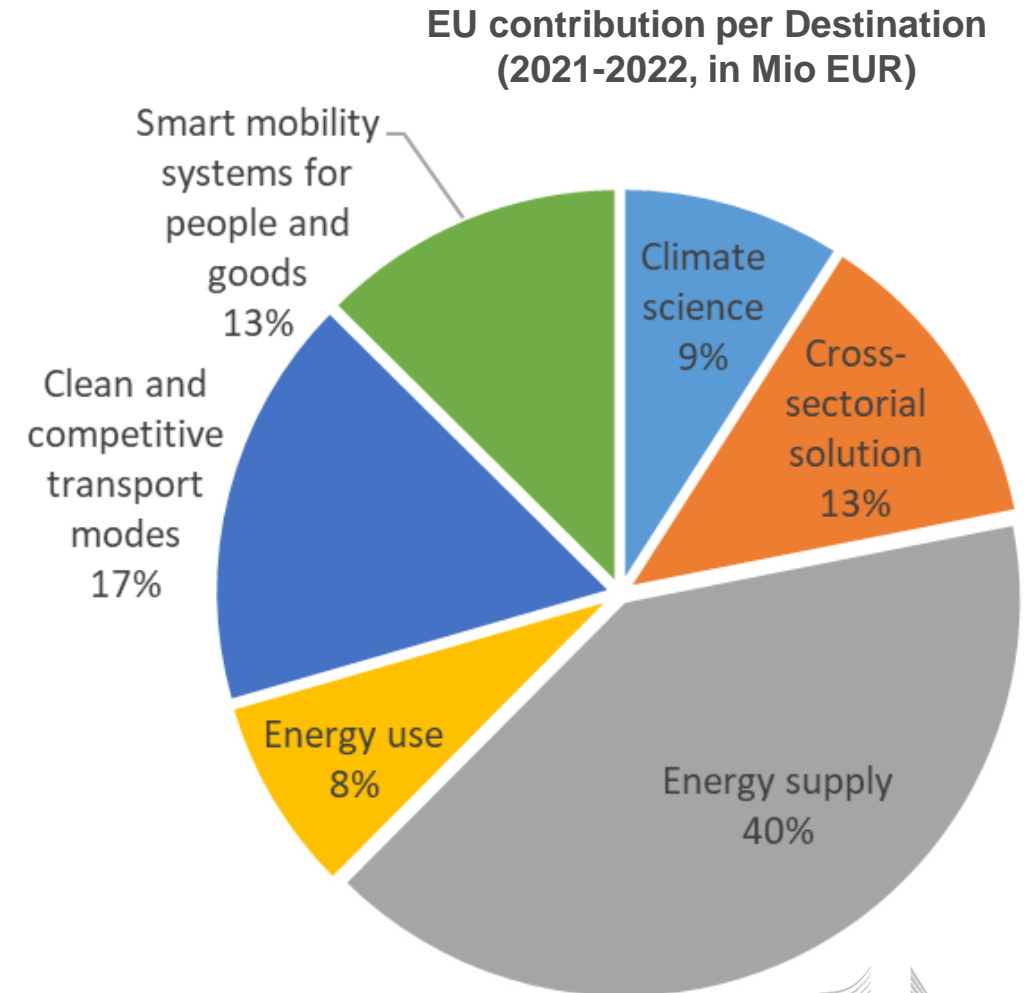


# Cluster 5 – budgetary overview 2021-2022



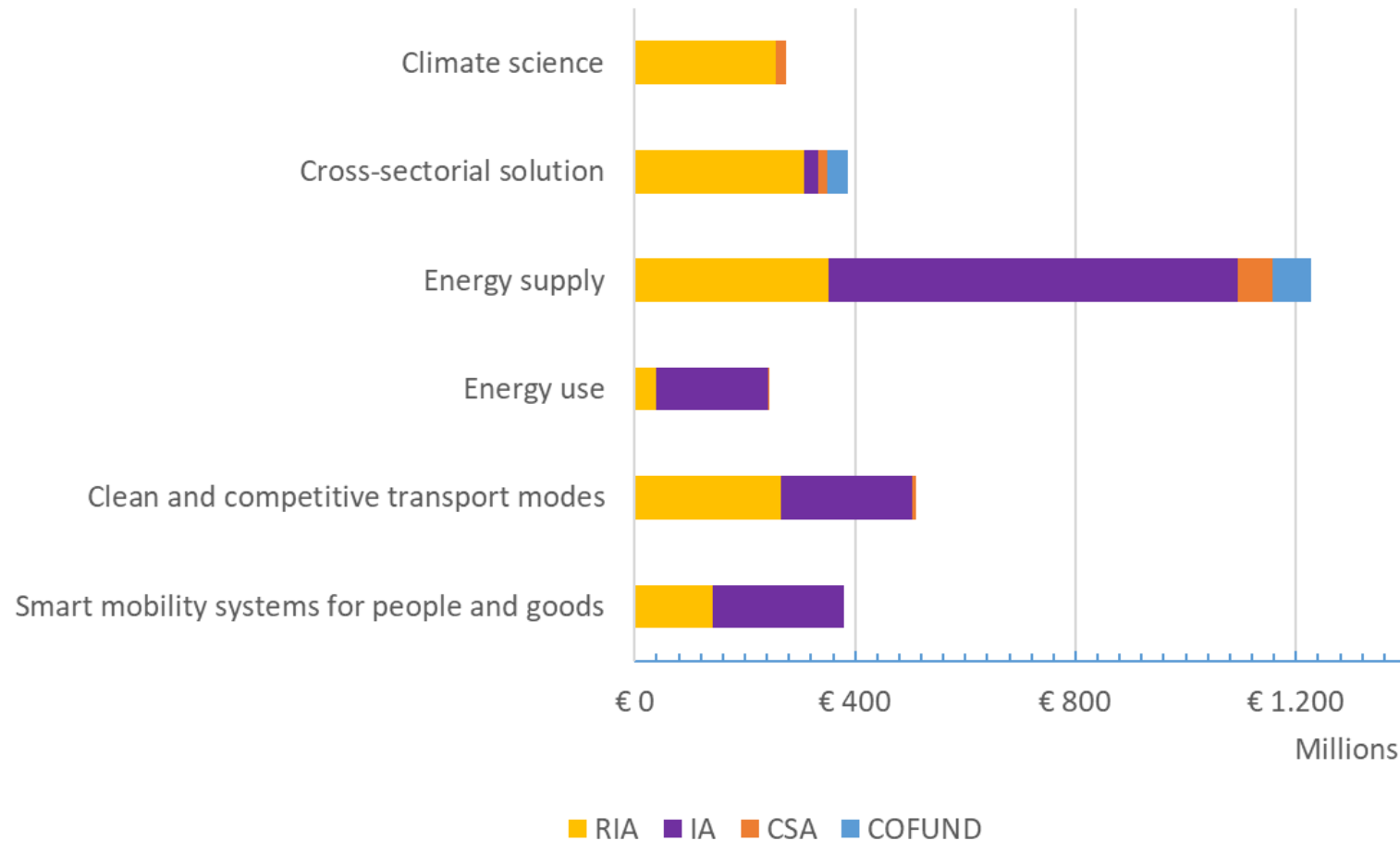
# Cluster 5 Work programme - overview

	Budget (Mio €)	Share of total	Number of topics	Share of total
Climate science	274	9%	17	9%
Cross-sectorial solution	387.5	13%	25	13%
Energy supply	1226.3	40%	67	36%
Energy use	244	8%	18	10%
Clean and competitive transport modes	511	17%	31	17%
Smart mobility systems for people and goods	380	13%	28	15%
<b>TOTAL</b>	<b>3022.8</b>		<b>186</b>	



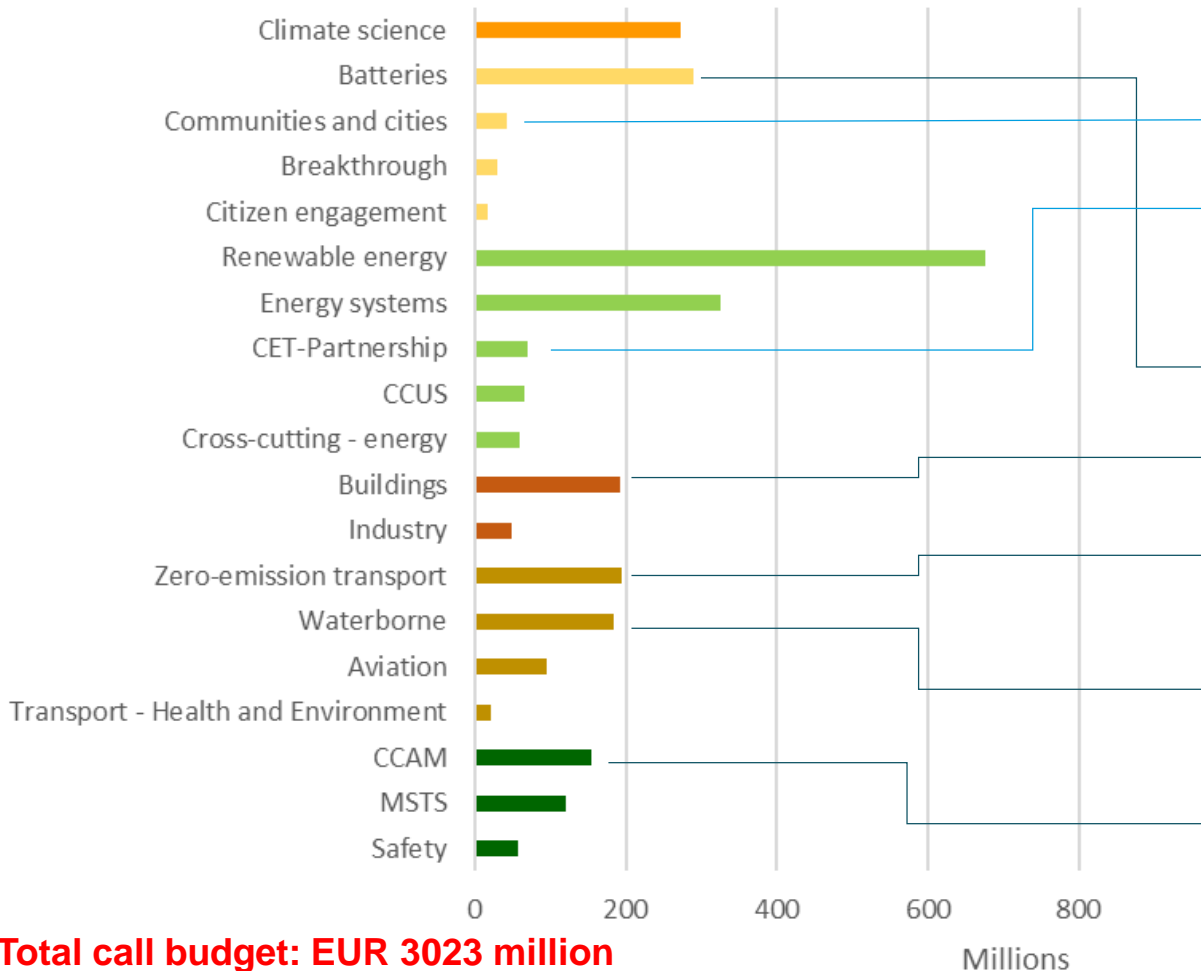
# Cluster 5 Work programme - overview

EU contribution per Destination and type of action (2021-2022, in Mio EUR)



# Cluster 5 Work programme - budgets

EU contribution per thematic area  
(2021-2022, in Mio EUR)



58 out 186 topics (31% of all) implement European Partnerships (2021-2022)

## Co-funded Partnerships:

- **Driving Urban Transition:** 1 topic (37 M€ for 2021-2022)
- **Clean Energy Transition:** 1 topic (70 M€ for 2021-2022)

## Co-programmed Partnerships:

- **Batteries:** 17 topics (EUR 293 million)
- **Built4People:** 8 topics (EUR 124 million)
- **Towards Zero-Emission Road Transport:** 8 topics (EUR 199 million)
- **Zero-Emission Waterborne Transport:** 12 topics (EUR 167.5 million)
- **Connected, Cooperative and Automated Mobility:** 11 topics (EUR 162 million)

# Destination - 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 2021-2022

- Earth system science, analysis of pathways leading to carbon neutrality, adaptation and climate services, social sciences to tackle climate change, climate eco-system interactions

## Implementation

- 1 call in 2021 – 9 topics (total budget: 136 M€)
- 2 calls in 2022 – 8 topics (total budget: 138 M€)

# Destination - Cross-sectoral solutions for the climate transition

## Batteries



- Supporting creation of a **competitive, circular, and sustainable European battery manufacturing value chain**
- Improvement of **technological performance** to increase application user attractiveness
- **1 call in 2021** (7 topics, 160 M€); **1 call in 2022** (10 topics, 133 M€)
- **Issues:** Raw material processing, advanced materials, manufacturing processes, battery systems, recycling technologies, coordination activities
- Implementing **Batteries** co-programmed **Partnership**

## Communities and cities



- Increased **efficiency** of Europe's cities' and communities' **energy, resource use and mobility patterns** and cities' and communities' overall **sustainability**, thereby improving their **climate-resilience** and **attractiveness** to businesses and citizens in a holistic fashion.
- Implemented also through co-funded Partnership **Driving Urban Transition**
- **2 topics** in 2021-2022 (42 M€)
- Bulk of topics to be included in **WP update**, once Implementation Plan of cities mission is ready

## Breakthrough technologies

- Nurturing the development of emerging technologies with **high potential** to enable **zero-greenhouse gas** and **negative emissions** in energy and transport.
- **4 topics in 2021** (35 M€)
- **Issues:** Methane cracking, non-CO2 greenhouse gases removal, direct atmospheric carbon capture and conversion, bottom-up

## Citizen and stakeholder engagement

- Facilitating the transformation to a climate neutral society through more effectively **engaging and empowering citizens** to participate in the transition, from planning to decision-making and implementation
- **4 topics in 2021** (17.5 M€)
- Issues: just transition, SSH platform, Transition Super Labs, NCP-network

# Destination - 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
- **20 topics in 2021** (335 M€)
- **24 topics in 2022** (368 M€)
- **Issues:** 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
- **10 topics in 2021** (152 M€)
- **7 topics in 2022** (181 M€)
- **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<sub>2</sub> emission mitigation option in **electricity generation** and **industry applications** (including also conversion of CO<sub>2</sub> to products)
- **2 topics in 2021** (32 M€)
- **1 topic in 2022** (58 M€)
- **Issues:** CCUS hubs, application in industry, CO<sub>2</sub> capture

## Cross-cutting

- Geological services (2021; CSA; 20 M€)
- Stakeholder support (2021; CSA; 9.8 M€)
- Clean Energy Transition co-funded Partnership (2021-2027; 210 M€ in total)



# Destination - 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**
- **6 topics in 2021** (74 M€)
- **10 topics in 2022** (140 M€)
- **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
- **2 topics in 2021** (30 M€)
- **Issues:** heat upgrade technologies, industrial excess (waste) Heat-to-Power conversion





# Destination - 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
- **4 topics in 2021** (94 M€)
- **4 topics in 2022** (105 M€)
- **Issues:** regional medium freight haulage, power electronics, optimised smart EV charging, sustainable circularity, heavy duty vehicles, busses
- Implementing **co-programmed Partnership** “Towards zero emission road transport” (2ZERO)

## Aviation

- Accelerating the **reduction of all aviation impacts and emissions** (CO<sub>2</sub> and non-CO<sub>2</sub>, 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
- **2 topics in 2021** (54 M€)
- **3 topics in 2022** (45 M€)
- **Issues:** long-term research, silent and ultra-low local air pollution aircraft, 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
- **8 topics in 2021** (93 M€)
- **6 topics in 2022** (96 M€)
- **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
- **2 topics in 2021** (15 M€)
- **1 topic in 2022** (7 M€)
- **Issues:** retrofit solutions for tailpipe and brake polluting emissions, noise and particle emissions, smog prevention

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

## Connected, cooperative and automated mobility

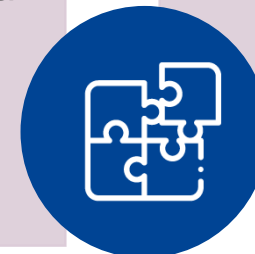
- Accelerating the implementation of innovative connected, cooperative and automated mobility (CCAM) technologies and systems for **passengers and goods**
- **6 topics in 2021** (74 M€)
- **5 topics in 2022** (88 M€)
- **Issues:** on-board perception and decision-making technologies, safety validation, 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

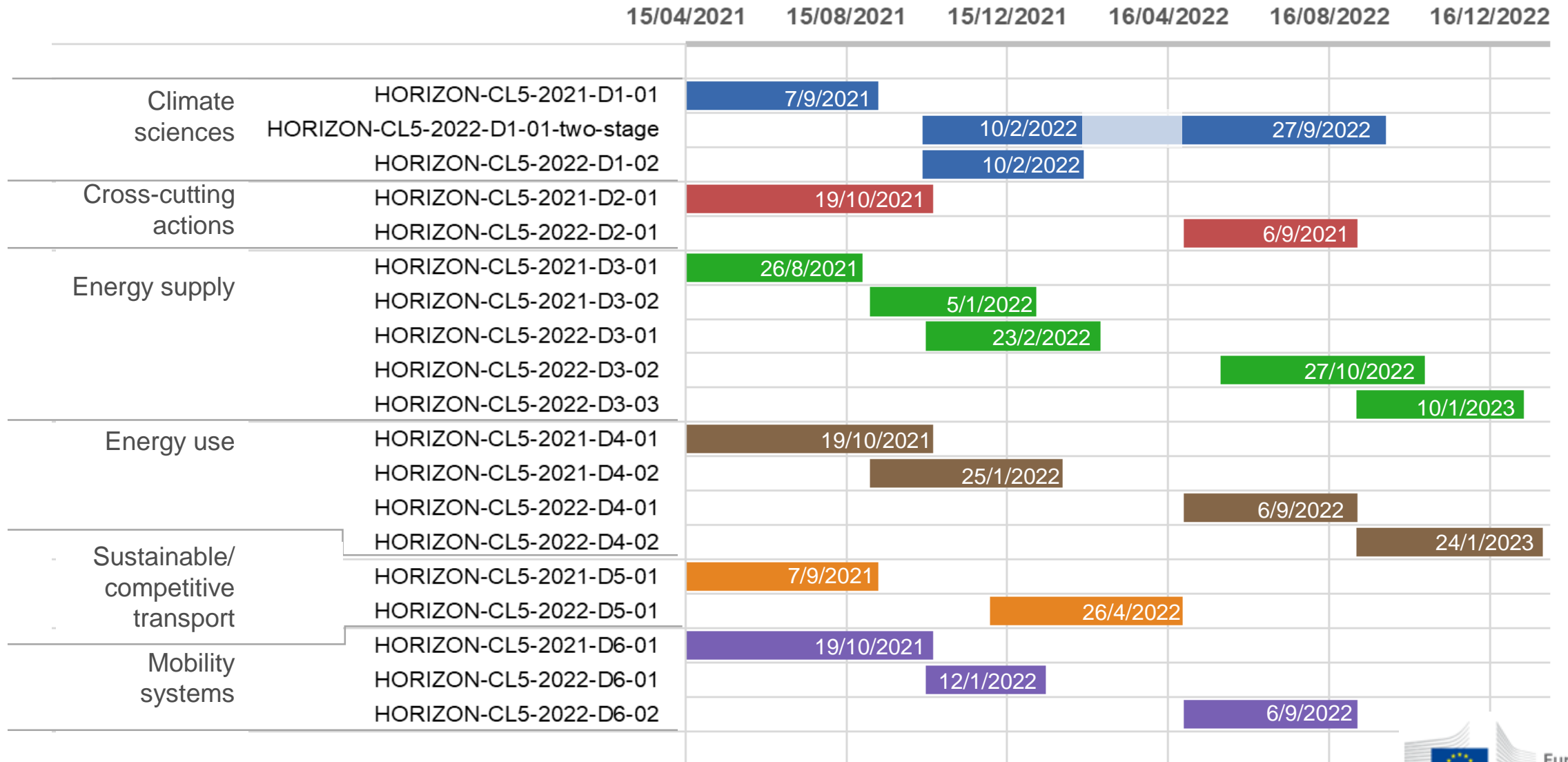
- Further developing a **multimodal transport system** through sustainable and smart long-haul and urban freight transport and **logistics**, upgraded and resilient physical and digital **infrastructures** for smarter vehicles and operations, for optimised system-wide network efficiency
- **3 topics in 2021** (53 M€)
- **7 topics in 2022** (91 M€)
- **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

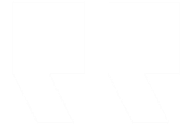
## Safety and resilience

- 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
- **4 topics in 2021** (40 M€)
- **3 topics in 2022** (34 M€)
- **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



# Cluster 5 call structure





# 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.