



# HORIZON EUROPE



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## THE EU RESEARCH & INNOVATION PROGRAMME

2021 – 2027

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RTD.- Unit « Clean Energy Transition »

Information Session - Destination 3 Cluster 5

19/10/2021



# 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

Fusion

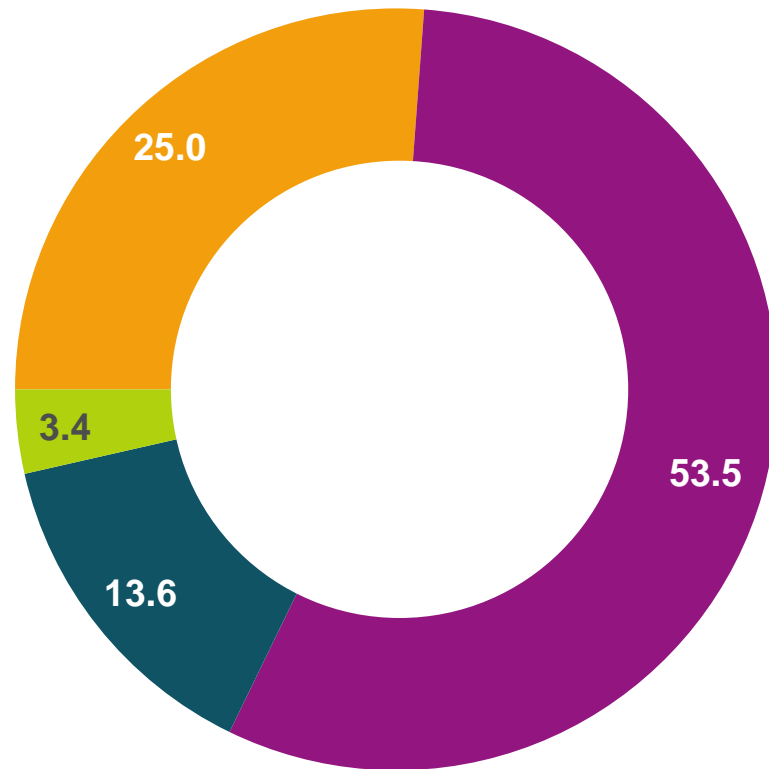
Fission

Joint Research Center

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

# Horizon Europe Budget: €95.5 billion (2021-2027)

(including €5.4 billion from NGEU – Next Generation Europe – programme of EU for Recovery from COVID-19 crisis)

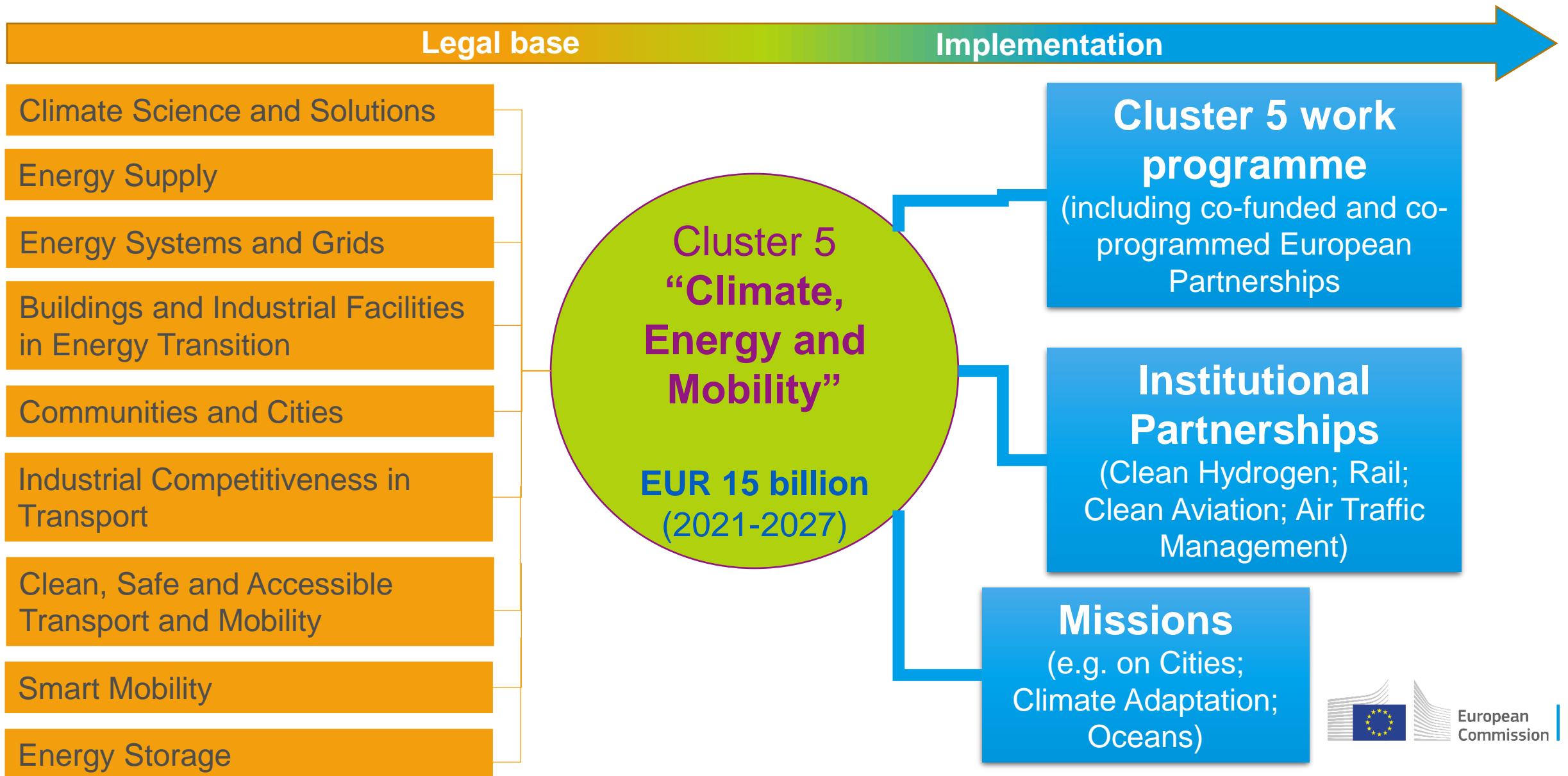


## Political agreement December 2020

*€ billion in current prices*

- Excellent Science
- Global challenges and European ind. comp.
- Innovative Europe
- Widening Part and ERA

# Cluster 5 - overview



# Cluster 5 Partnerships

## Institutional Partnerships

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

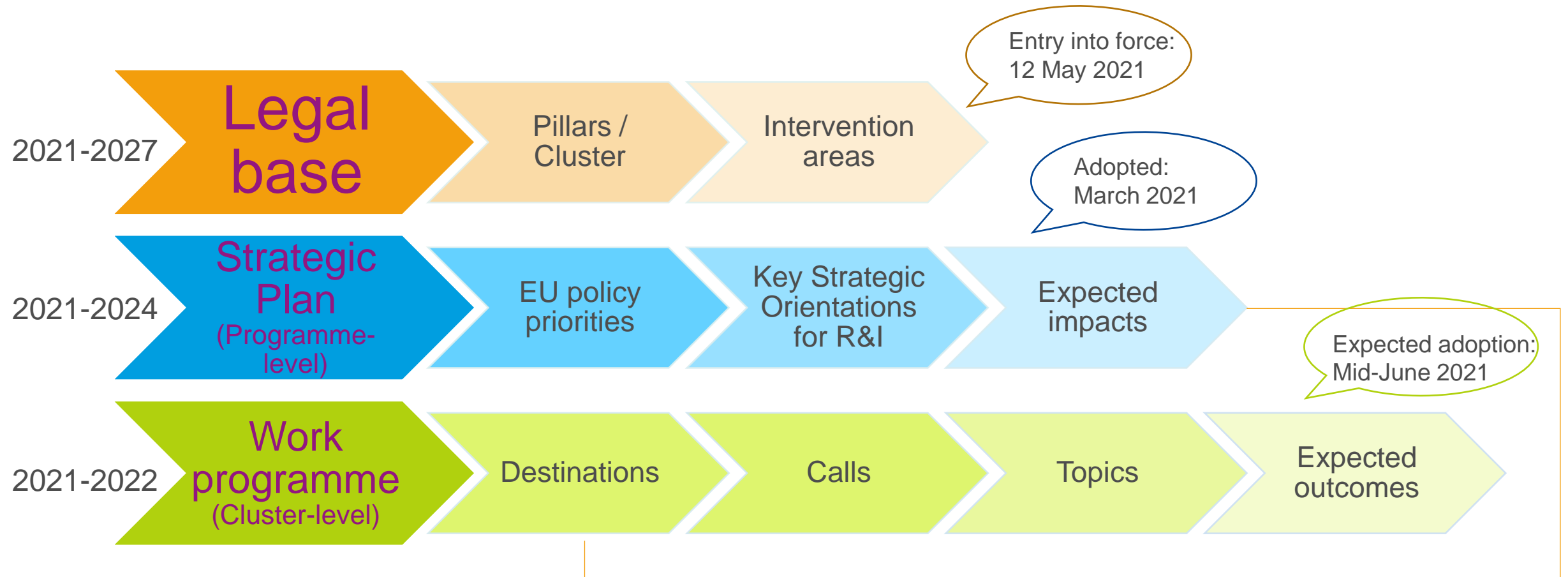
## Co-funded Partnerships

- 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)

# 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
- Zero Pollution Action Plan

### 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

Open strategic autonomy by leading the development of **key digital, enabling and emerging technologies, sectors and value chains**

**Restoring Europe's ecosystems and biodiversity, and managing sustainably natural resources**

**Strategic Plan**

**Making Europe the first digitally enabled circular, climate-neutral and sustainable economy**

**Creating a more resilient, inclusive and democratic European society**

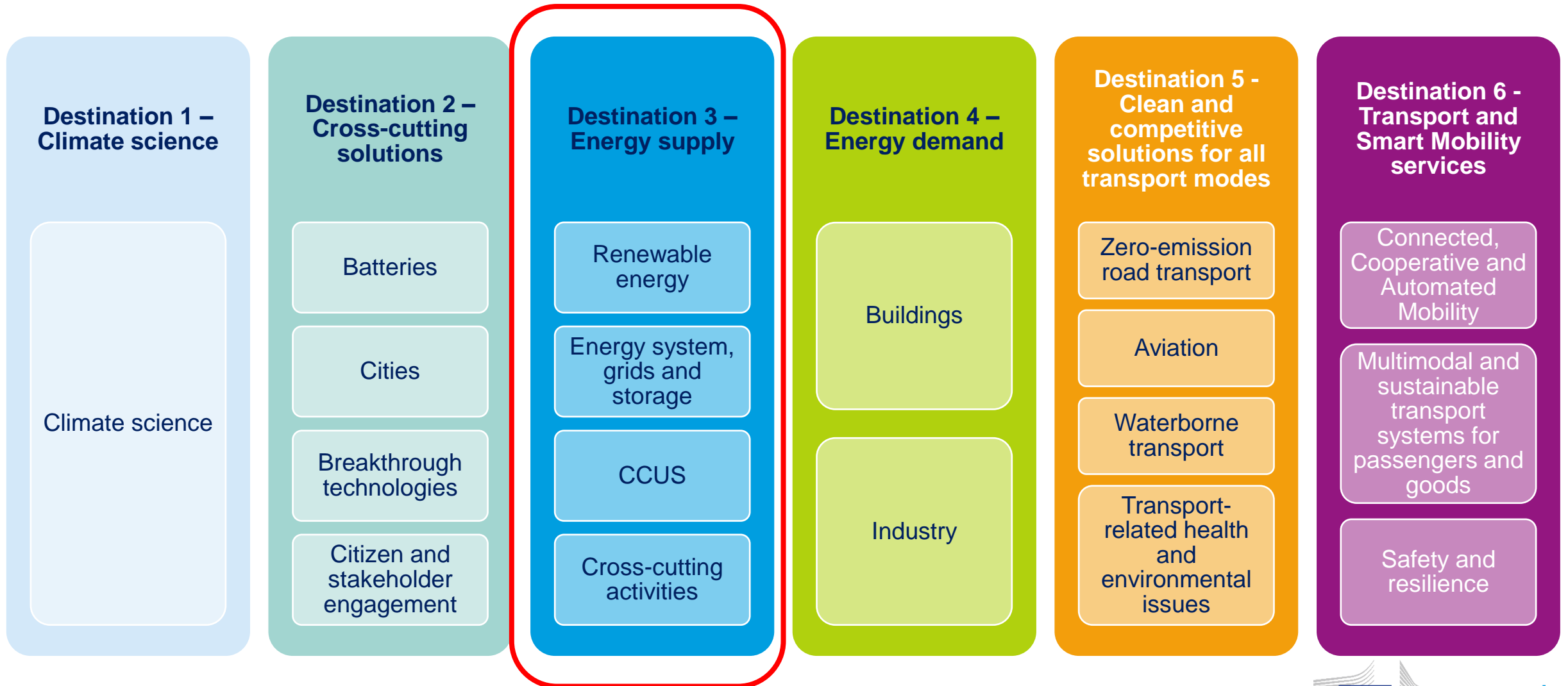
More efficient, clean, sustainable, secure and competitive **energy supply** through new solutions for smart grids and energy systems based on more performant renewable energy solutions

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

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



# Cluster 5 Work programme - overview



# Cluster 5 – Impact expected from the topics

## Renewable energy (1/2)

- Availability of disruptive renewable energy and renewable fuel technologies and systems in 2050 in order to accelerate the replacement of fossil-based energy technologies.
- Reduced cost and improved efficiency of renewable energy and renewable fuel technologies and their value chains.
- De-risking of renewable energy and fuel technologies with a view to their commercial exploitation and net zero greenhouse gas emissions by 2050.
- Better integration of renewable energy and renewable fuel-based solutions in energy consuming sectors.

# Cluster 5 – Impact expected from the topics

## Renewable energy (2/2)

- Reinforced European scientific basis and European export potential for renewable energy technologies through international collaboration (notably with Africa in renewable energy technologies and renewable fuels and enhanced collaboration with Mission Innovation countries).
- Enhanced sustainability of renewable energy and renewable fuels value chains, taking fully into account social, economic and environmental aspects in line with the European Green Deal priorities.
- More effective market uptake of renewable energy and fuel technologies.

# Cluster 5 – Impact expected from the topics

## Energy system, grids and storage (1/3)

- Increased resilience of the energy system based on improved and/or new technologies to control the system and maintain system stability under difficult circumstances.
- Increased flexibility and resilience of the energy system, based on technologies and tools to plan and operate different networks for different energy carriers simultaneously in a coordinated manner that will also contribute to climate neutrality of hard-to-electrify sectors.

# Cluster 5 – Impact expected from the topics

## Energy system, grids and storage (2/3)

- Enhance consumer satisfaction and increased system flexibility thanks to enabling consumers to benefit from data-driven energy services and facilitating their investment and engagement in the energy transition, through self-consumption, demand response or joint investments in renewables (either individually or through energy communities or micro-grids).
- Improved energy storage technologies, in particular heat storage but also others such as electrochemical, chemical, mechanical and electrical.

# Cluster 5 – Impact expected from the topics Energy system, grids and storage (3/3)

- Foster the European market for new energy services and business models as well as tested standardised and open interfaces of energy devices through a higher degree of interoperability, increased data availability and easier data exchange among energy companies as well as companies using energy system data.
- More effective and efficient solutions for transporting off-shore energy thanks to new electricity transmission technologies, in particular using superconducting technologies, power electronics and hybrid Alternate Current – Direct Current grid solutions as well as MT HVDC (Multi Terminal High Voltage Direct Current) solutions.

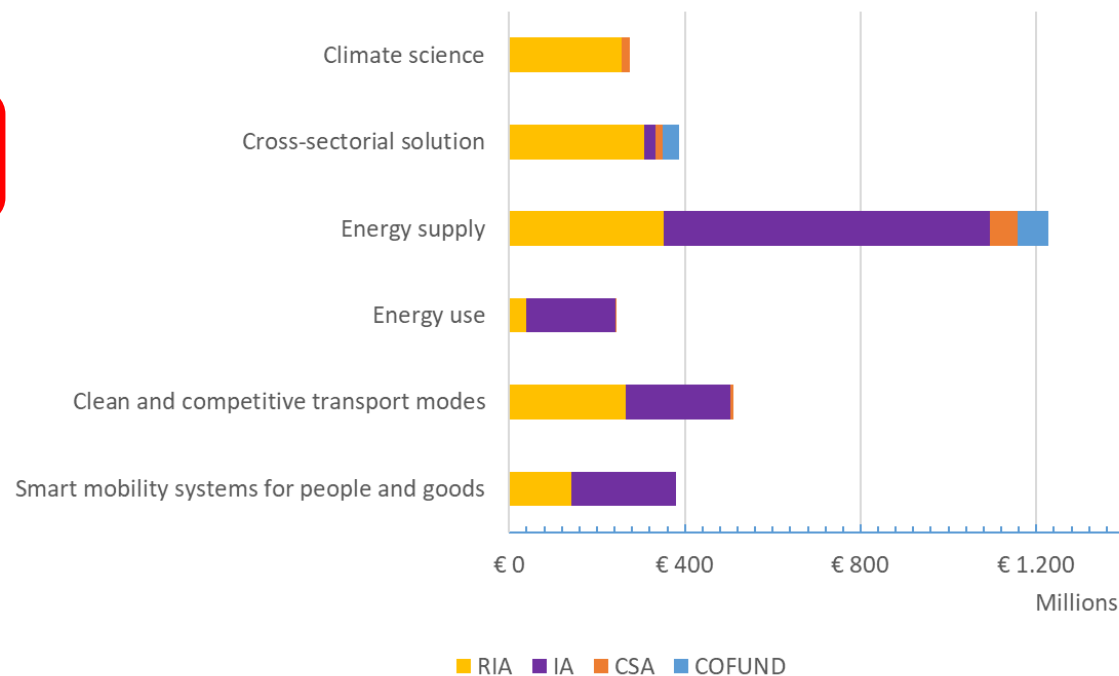
# Cluster 5 – Impact expected from the topics CCUS

- Accelerated rollout of infrastructure for CCUS hubs and clusters.
- Updated authoritative body of knowledge on connecting industrial CO<sub>2</sub> sources with potential 'bankable storage sites, providing greater confidence for decision makers and investors.
- Proven feasibility of integrating CO<sub>2</sub> capture, CO<sub>2</sub> storage and CO<sub>2</sub> use in industrial facilities. Demonstrating these technologies at industrial scale shall pave the way for subsequent first-of-a-kind industrial projects.
- Reduced cost of the CCUS value chain, with CO<sub>2</sub> capture being still the most relevant stumbling block for a wider application of CCUS.
- Adequate frameworks for Measurement, Monitoring and Verification (MMV) for storage projects, to document safe storage and for public acceptance of the technology.

# Cluster 5 Work programme - overview

	Budget (Mio €)	Share of total	Number of topics	Share of total
Climate science	274.0	9%	17	9%
Cross-sectorial solution	387.5	13%	25	13%
<b>Energy supply</b>	<b>1226.3</b>	<b>40%</b>	<b>67</b>	<b>36%</b>
Energy use	244.0	8%	18	10%
Clean and competitive transport modes	511.0	17%	31	17%
Smart mobility systems for people and goods	380.0	13%	28	15%
<b>TOTAL</b>	<b>3022.8</b>		<b>186</b>	

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





# 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

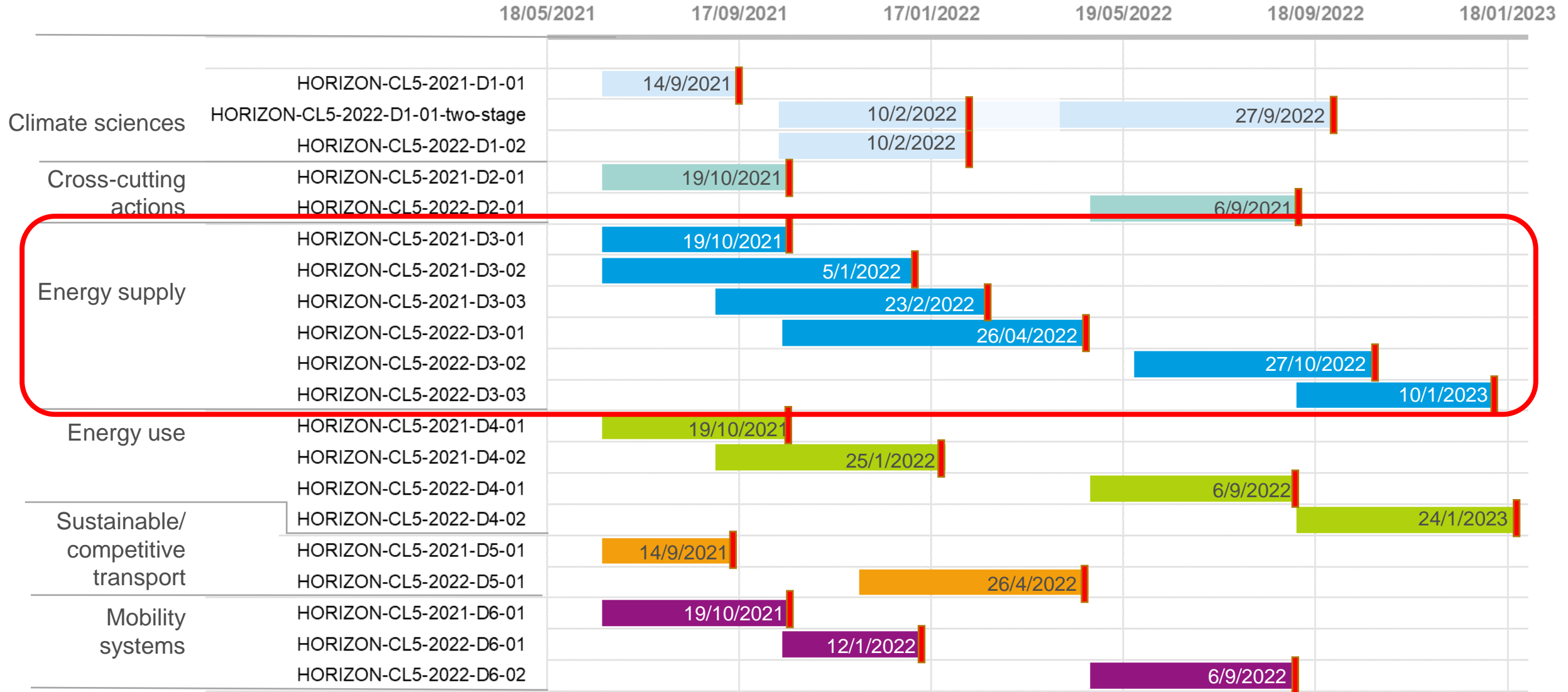
- **Accelerating** the development of Carbon Capture, Use and Storage (CCUS) as a CO<sub>2</sub> emission mitigation option in **electricity generation** and **industry applications** (including also conversion of CO<sub>2</sub> to products)
- **2 topics in 2021** (32 M€)
- **1 topic in 2022** (58 M€)
- **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)



# Cluster 5 call structure



# Opening: 24 Juin 2021 / Deadline(s): 05 Jan 2022

Topics	Type d'action	Budgets (EUR million)	Contribution EU attendue par projet (EUR million)	Nombre de projets attendus
		2021		
HORIZON-CL5-2021-D3-02-01 Demonstration of wave energy devices to increase experience in real sea condition	IA	15.00 <sup>1</sup>	Environ 15.00	1
HORIZON-CL5-2021-D3-02-02 Sustainability and educational aspects for renewable energy and renewable fuel technologies	CSA	10.00	Environ 2.50	4
HORIZON-CL5-2021-D3-02-03 Market Uptake Measures of renewable energy systems	CSA	10.00	Environ 2.00	5
HORIZON-CL5-2021-D3-02-04 Novel tandem, high efficiency Photovoltaic technologies targeting low cost production with earth abundant materials	RIA	20.00	Environ 5.00	4
HORIZON-CL5-2021-D3-02-05 Energy Sector Integration: Integrating and combining energy systems to a cost-optimised and flexible energy system of systems	IA	30.00 <sup>2</sup>	9.00 to 10.00	3
HORIZON-CL5-2021-D3-02-06 Increasing energy system flexibility based on sector-integration services to consumers (that benefits system management by DSOs and TSOs)	IA	25.00 <sup>3</sup>	Environ 8.00	3
HORIZON-CL5-2021-D3-02-07 Reliability and resilience of the grid: Measures for vulnerabilities, failures, risks and privacy	IA	15.00 <sup>4</sup>	7.00 to 8.00	2

<sup>1</sup> Of which EUR 7.50 million from the 'NGEU' Fund Source.  
<sup>2</sup> Of which EUR 15.00 million from the 'NGEU' Fund Source.  
<sup>3</sup> Of which EUR 12.50 million from the 'NGEU' Fund Source.  
<sup>4</sup> Of which EUR 7.50 million from the 'NGEU' Fund Source.

HORIZON-CL5-2021-D3-02-08 Electricity system reliability and resilience by design: High-Voltage, Direct Current (HVDC)-based systems and solutions	RIA	15.00	7.00 to 8.00	2
HORIZON-CL5-2021-D3-02-09 Demonstration of superconducting systems and slopes	IA	15.00 <sup>5</sup>	Environ 15.00	1
HORIZON-CL5-2021-D3-02-10 Demonstration of advanced Power Electronics for application in the energy sector	IA	10.00 <sup>6</sup>	Environ 5.00	2
HORIZON-CL5-2021-D3-02-11 Reinforcing digitalisation related know how of local energy ecosystems	CSA	4.00	Environ 4.00	1
HORIZON-CL5-2021-D3-02-12 Integration of CCUS in hubs and clusters, including knowledge sharing activities	CSA	2.00	Environ 2.00	1
HORIZON-CL5-2021-D3-02-13 Cost reduction of CO2 capture (new or improved technologies)	RIA	30.00	10.00 to 15.00	2
HORIZON-CL5-2021-D3-02-14 Support to the activities of the European Geological Services	CSA	20.00	Environ 20.00	1
HORIZON-CL5-2021-D3-02-15 Support to the activities of the ETIPs and technology areas of the SET Plan	CSA	9.80	Environ 1.00	10
Budget indicatif		230.80		

<sup>5</sup> Of which EUR 7.50 million from the 'NGEU' Fund Source.  
<sup>6</sup> Of which EUR 5.00 million from the 'NGEU' Fund Source.

# Important websites

## **Cluster 5 - Work programme 2021-2022 – Information Days (5-6/074/2021)**

<https://www.horizon-europe-infodays2021.eu/event/cluster-5-climate-energy-mobility>

## **Funding & Tender Portal**

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/programmes/horizon>

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# Thank you!

## # HorizonEU

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



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