#HorizonEU

THE EU RESEARCH & INNOVATION PROGRAMME

2021 – 2027

PIERO DE BONIS
COMMISSIONE EUROPEA

Info day nazionali sui temi ed i bandi 2023 del Programma Quadro per la ricerca e l'innovazione – Cluster 5

26 gennaio 2023

Research and Innovation

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
- EU Missions

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 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€

European Commission

CLUSTER 5 - CLIMATE, ENERGY AND MOBILITY

Work Programme 2023-2024

European Commission

WP 2023-2024: EU policy objectives

European Green Deal	• Great majority of topics contribute to Green Deal objectives and initiatives in energy and transport/mobility
Developing an economy that works for people	• Many topics address industrial competitiveness, training and skills, business models and standardisation
Europe fit for the digital age	• Half of all topics foster IT- (and data-) driven solutions
Stronger Europe in the world	• Many topics call for international cooperation, e.g. in the context of Mission Innovation or EU-Africa cooperation
New push for European democracy	• Focus on citizen engagement and mainstreaming of social sciences and humanities (SSH) across many topics

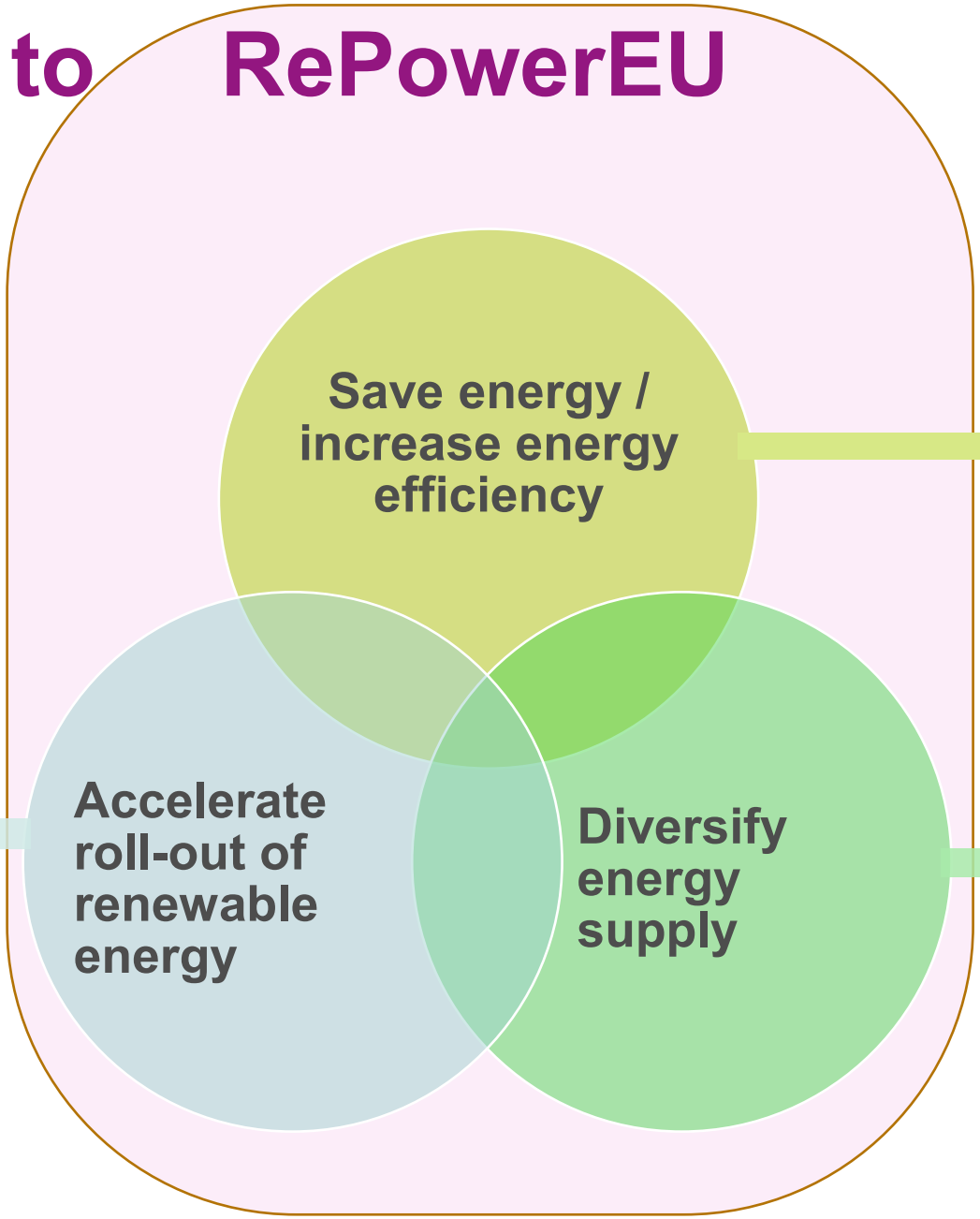
New European Bauhaus

European Commission

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

- Maturing hydrogen-based solutions

Destination 3, 5

European Commission

EU Hydrogen 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

EU Solar Strategy

Covers the following areas:

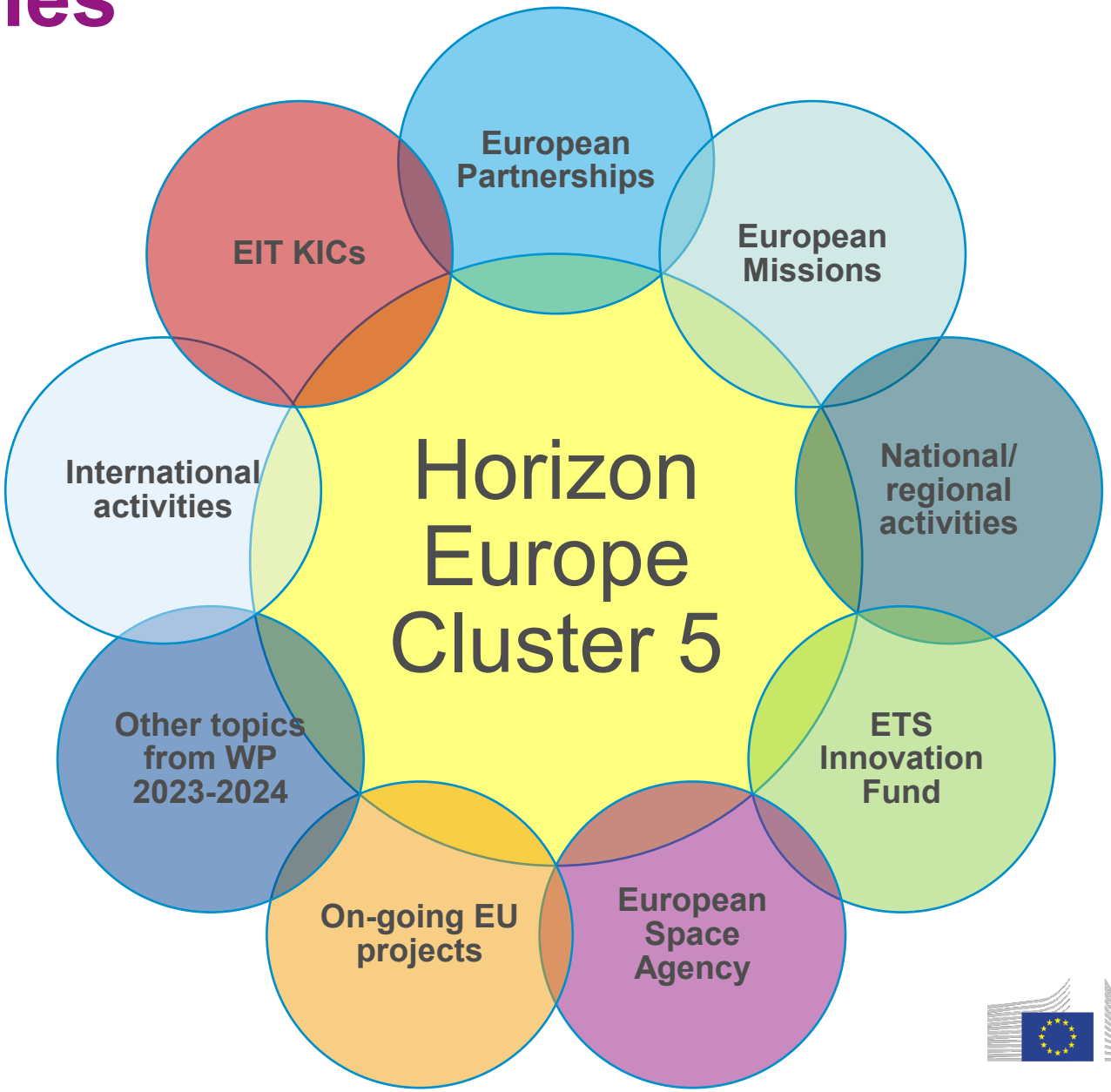
- Concentrated Solar Power (CSP)
- Photovoltaics (PV)
- Solar Heat & Power

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

European Commission

Fostering synergies

Around **25% of all topics** with a total budget of some **730 M€** (~30% of the total budget) refer explicitly to “synergies”



European Commission

Contribution to the European Research Area (ERA)

An ERA for a Green Energy Transformation

SET-Plan

- Energy WP topics in line with SET-Plan priorities and targets
- Clean Energy Transition co-funded Partnership leverages additional national activities

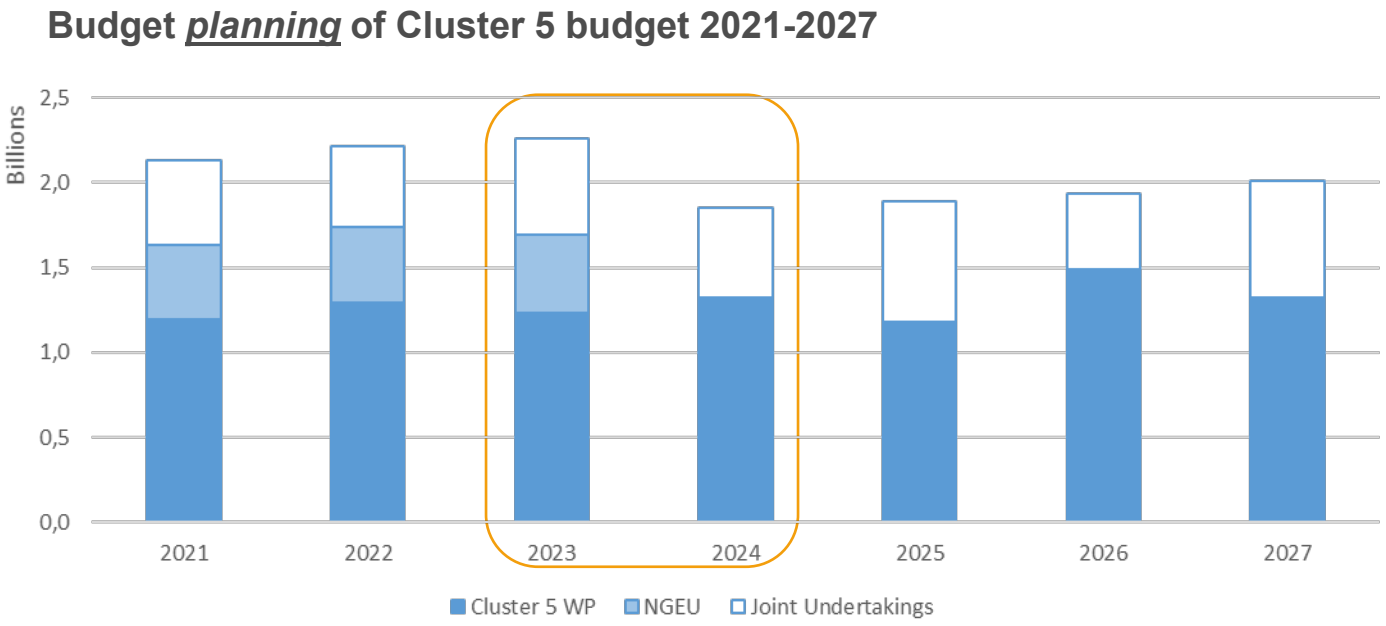
Green Hydrogen pilot

- 17 topics address hydrogen (in addition to JU's activities)
- All cluster 5 projects dealing with hydrogen must report to data collection platform (managed by JU)

Education, training and skills

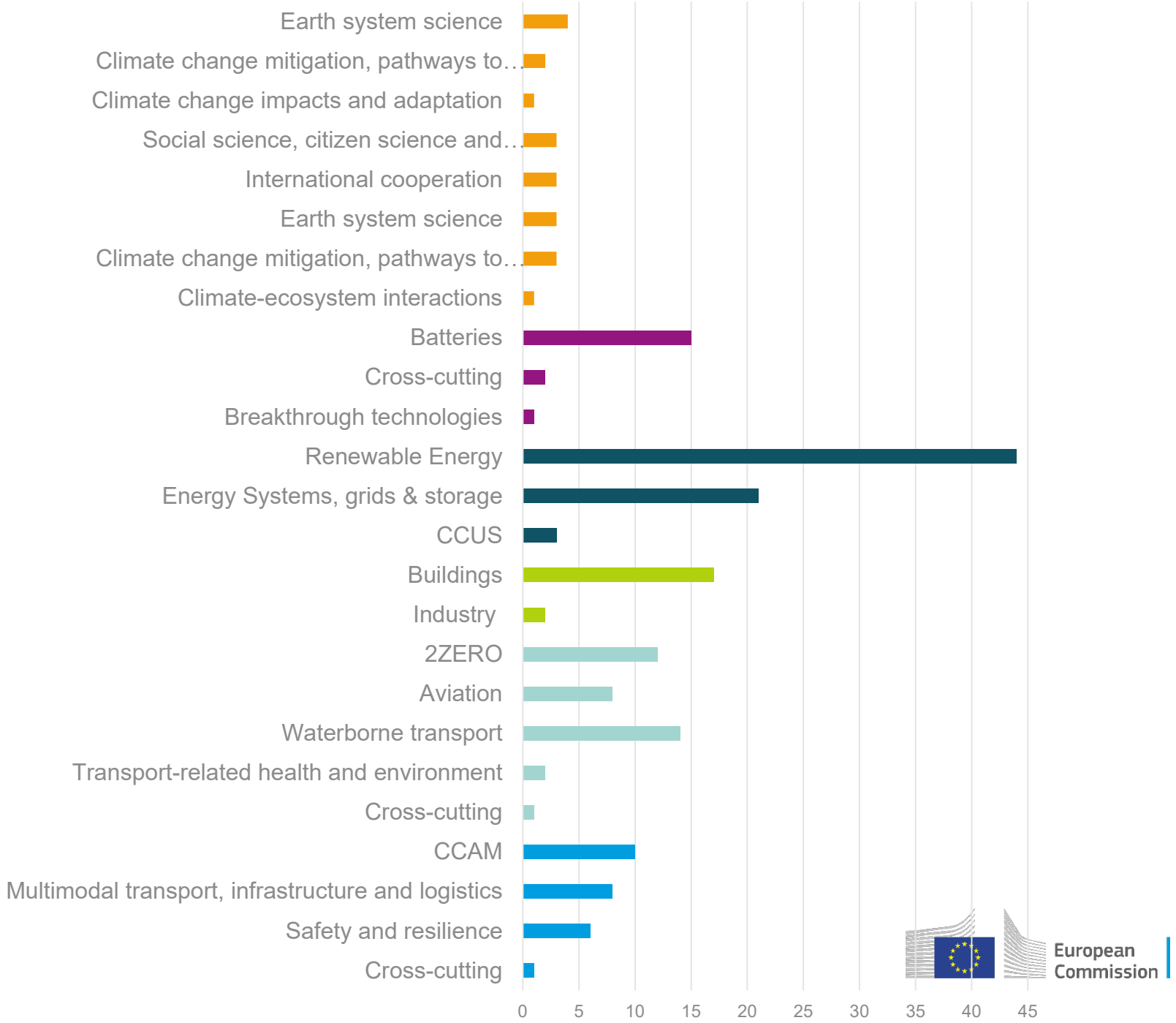
- 14 topics address education, training and skills for key sectors of the green transition

Main figures



European Commission

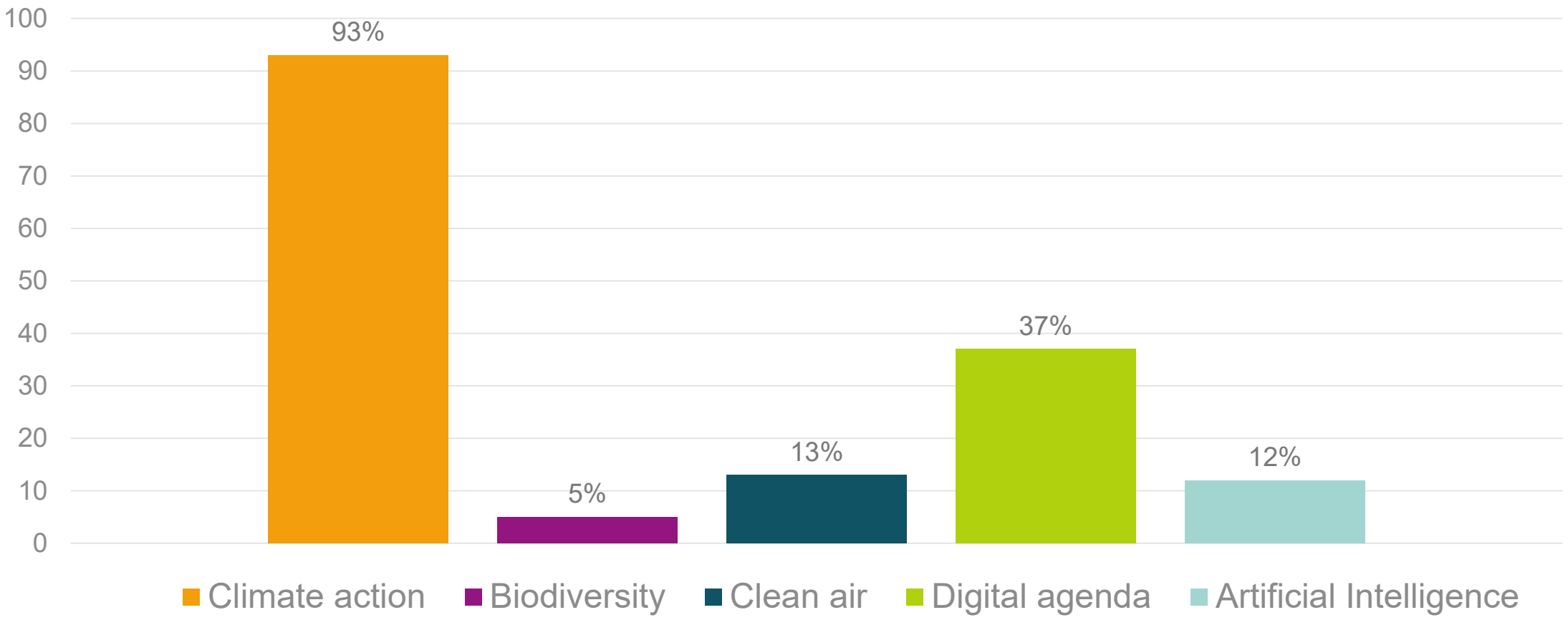
Number of topics per area



European Commission

Cross-cutting priorities

Budget for cross-cutting policy priorities (share of total call budget)



European Commission

Cluster 5 work programme – Overview

Destination 1 – Climate science

- Climate science

Destination 2 – Cross-cutting solutions

- Batteries *[Batt4EU partnership]*
- Other cross cutting issues

Destination 3 – Energy supply

- Renewable energy
- Energy system, grids and storage
- CCUS

Destination 4 – Energy demand

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

Destination 5 – 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

European Commission

CLUSTER 5 WORK PROGRAMME 2023-2024

Thematic areas

European Commission

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€)

European Commission

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€)

European Commission

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€)

European Commission

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

All topics contribute to the co-programmed Partnership **BAtt4EU**

Implementation

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

European Commission

Destination 2 – Cross-cutting actions

This area includes the co-funded partnership **Driving Urban Transition**

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€)

European Commission

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

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

Implementation

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

European Commission

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

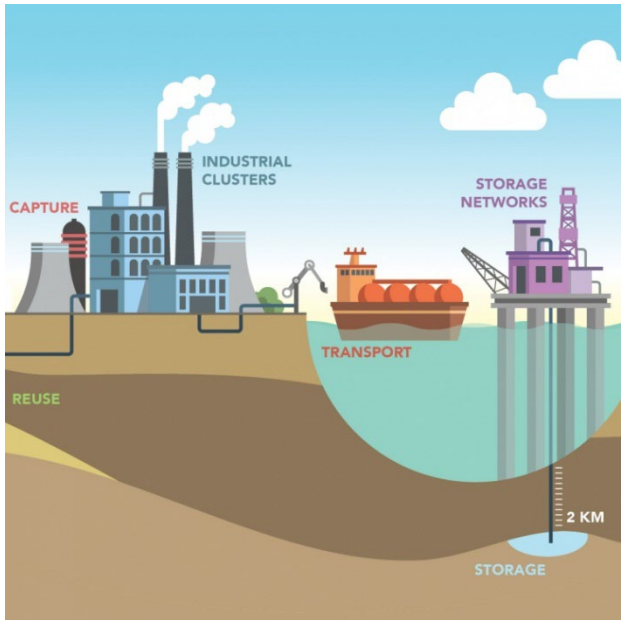
- 2 calls in 2023 – 14 topics (total budget: 193 M€)

European Commission

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€)

European Commission

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

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

Implementation

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

European Commission

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€)

European Commission

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 software

Topics contribute to the co-programmed partnership **2ZERO**

Implementation

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

European Commission

Destination 5 – Aviation

Objectives

- 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 covered in topics 2023-2024

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

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

Implementation

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

European Commission

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

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

Implementation

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

European Commission

Destination 5 – Transport-related health and environement

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€)

European Commission

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

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

Implementation

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

European Commission

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

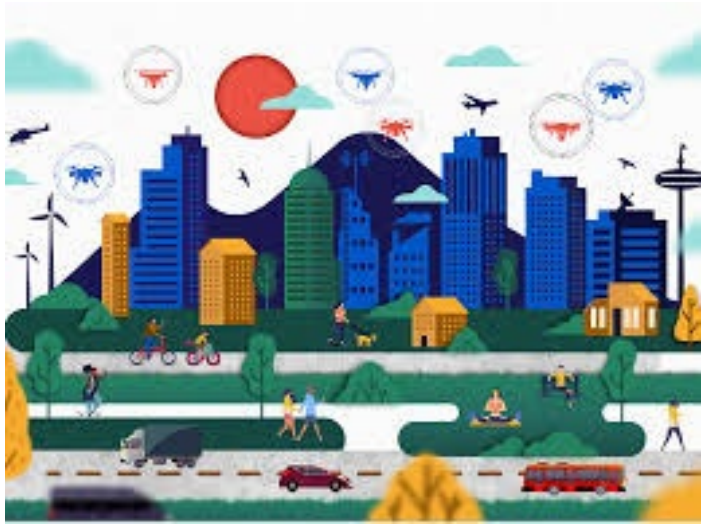
- 1 call in 2023 – 4 topics (total budget: 31 M€)

European Commission

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€)

European Commission

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