



Horizont Europa – Ziele der Europäischen Forschungsförderung im Bereich Wasserkraft

INTERALPINE ENERGIE- & UMWELTTAGE MALS 2022

27.10.2022

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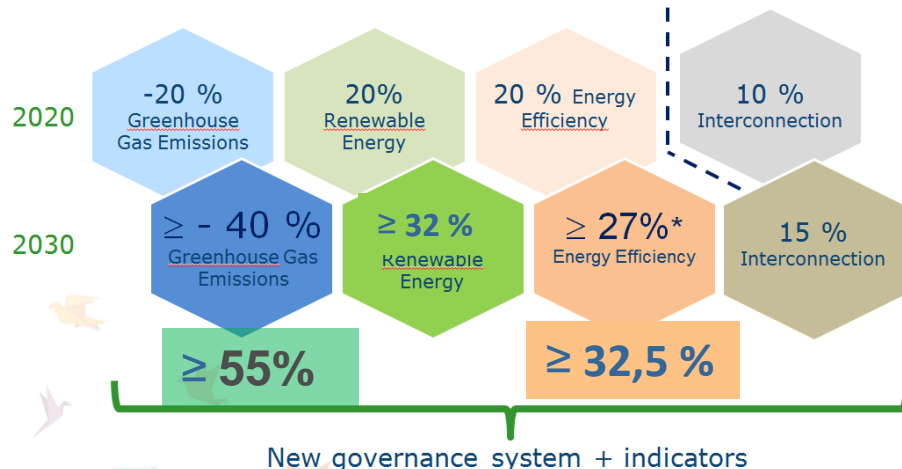
Policy Framework

"European Green Deal"



"Clean Energy for all Europeans"

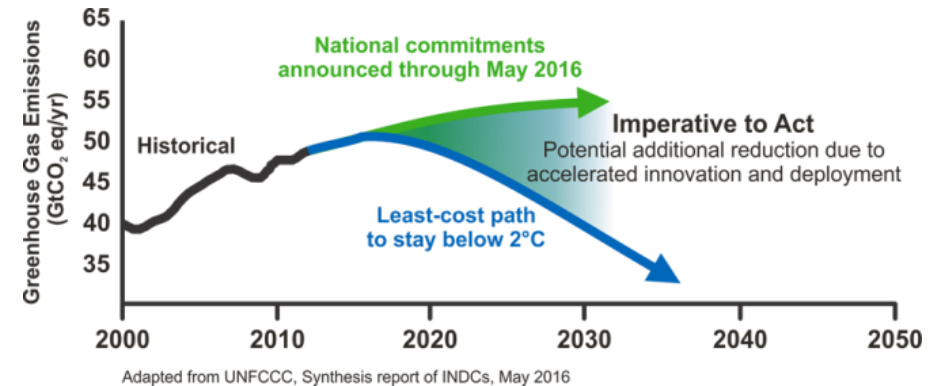
Agreed headline targets



Paris Agreement

Holding global average temperature to **well below 2°C** and limit its increase to **1.5°C**

Accelerating, encouraging and enabling **innovation** is crucial...



Other EU policy priorities

- Digital Single Market
- Jobs, Growth and Investments
- EU as a strong global actor
- Sustainable Development
- ...

Was ist der europäische Grüne Deal?

Dezember 2019

#EUGreenDeal

Der europäische Grüne Deal soll zur Verbesserung des **Wohlergehens der Bürgerinnen und Bürger** beitragen. Die Schaffung eines klimaneutralen Europas und der Schutz unseres natürlichen Lebensraums werden sich positiv auf die Menschen, den Planeten und die Wirtschaft auswirken. Niemand wird zurückgelassen.

Die EU wird



bis 2050 die Klimaneutralität erreicht haben



durch die Eindämmung der Umweltverschmutzung das menschliche Leben und die Tier- und Pflanzenwelt schützen



Unternehmen dabei unterstützen, im Bereich saubere Produkte und Technologien weltweit führend zu werden

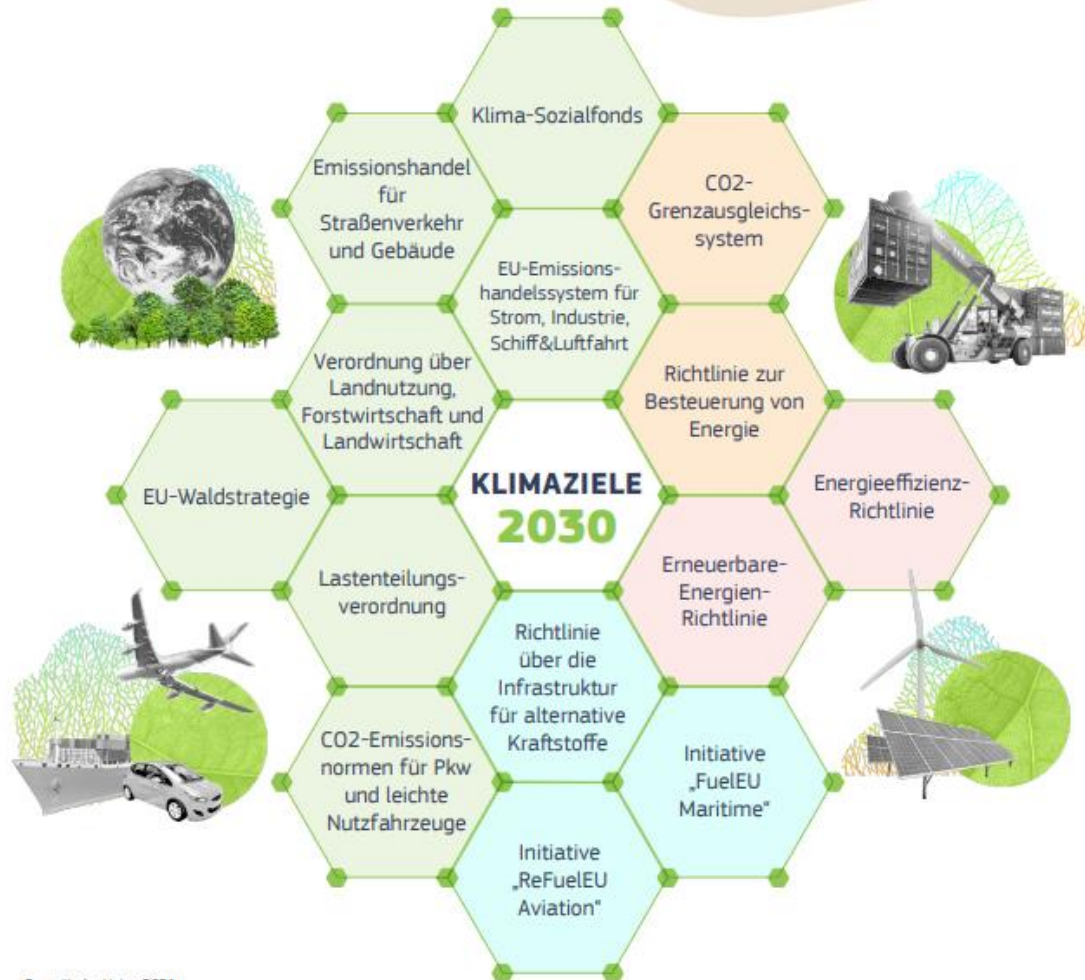


einen gerechten und inklusiven Übergang gewährleisten

UMSETZUNG DES EEUROPÄISCHEN GRÜNEN DEALS

DAS ENTSCHEIDENDE JAHRZEHNT

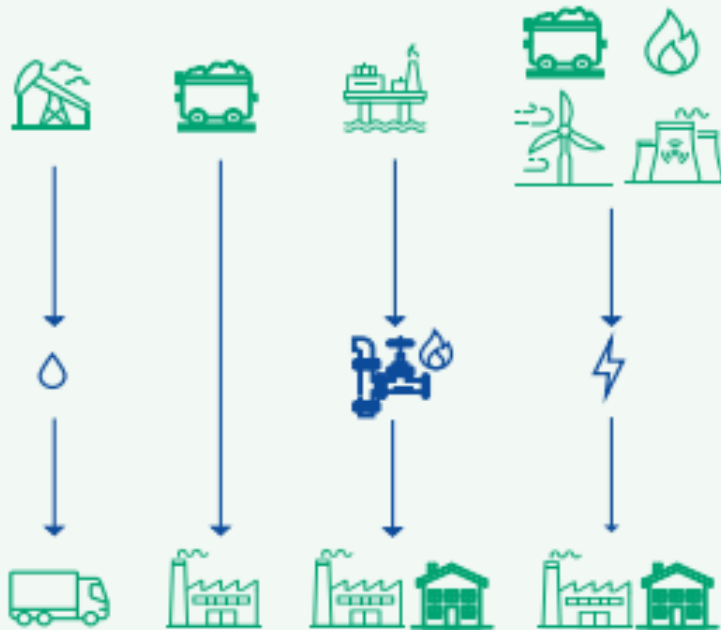
Wie im Klimagesetz der EU vereinbart, wird die EU ihre **Netto-Treibhausgasemissionen bis 2030 um mindestens 55 % senken** gegenüber dem Stand von 1990. Am 14. Juli 2021 hat die Kommission Vorschläge präsentiert, um diese Ziele zu verwirklichen und den europäischen Grünen Deal Realität werden zu lassen.



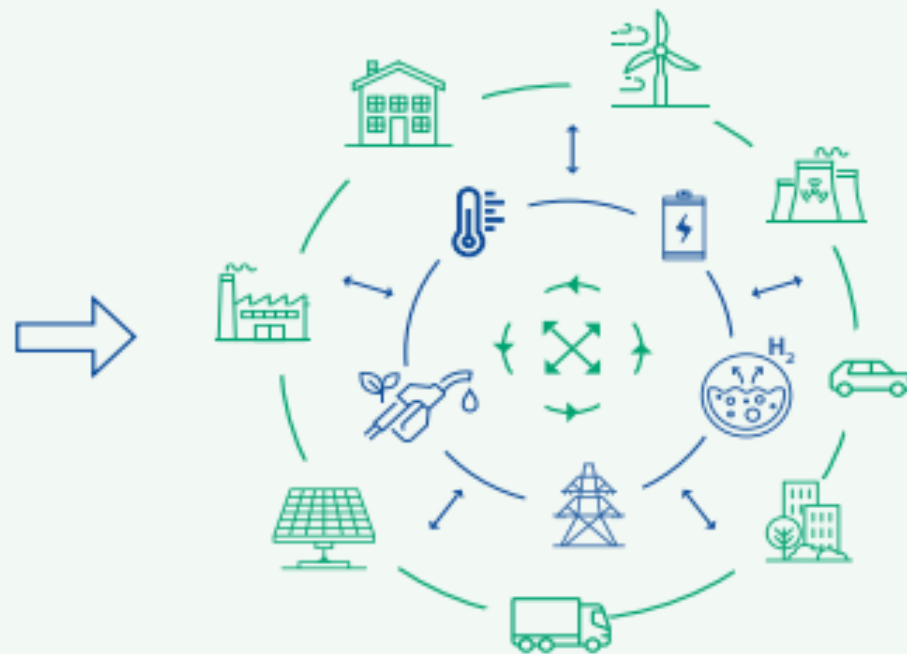
- Fit for 55 Package
- REPowerEU

EU Strategie für ein integriertes Energiesystem

Das Energiesystem heute: lineare und verlustreiche Energieflüsse in nur eine Richtung



Künftiges integriertes Energiesystem der EU: Energieflüsse zwischen Verbrauchern und Erzeugern, weniger Vergeudung von Ressourcen und Geld



REPOWEREU TO CUT OUR DEPENDENCE ON RUSSIAN GAS



More rooftop solar panels, heat pumps and energy savings to reduce our dependence on fossil fuels, making our homes and buildings more energy efficient.



Decarbonising Industry by accelerating the switch to electrification and renewable hydrogen and enhancing our low-carbon manufacturing capabilities.



A Hydrogen Accelerator to develop infrastructure, storage facilities and ports, and replace demand for Russian gas with additional 10 mt of imported renewable hydrogen from diverse sources and additional 5 mt of domestic renewable hydrogen.



Speeding up renewables permitting to minimise the time for roll-out of renewable projects and grid infrastructure improvements.



Doubling the EU ambition for biomethane to produce 35 bcm per year by 2030, in particular from agricultural waste and residues.



Diversifying gas supplies and working with international partners to move away from Russian gas, and investing in the necessary infrastructure.



EU SUSTAINABILITY POLICIES



- Long-term strategy to reach carbon neutrality by 2050
- EU Environmental Action Plan



European
Commission



Guidance on The requirements for hydropower in relation to EU Nature legislation

TABLE OF CONTENTS

Purpose of the document	5
1. Overview of EU Policy and Legislative framework	7
1.1 The Birds and Habitats Directives	7
1.2 The Water Framework Directive (WFD)	10
1.3 Coordination between the WFD and the Nature Directives	11
1.4 The Floods Directive	13
1.5 The SEA and EIA Directives	14
1.6 The relationship between SEA,EIA and Article 6	15

[hydro_final_june_2018_en.pdf \(europa.eu\)](#)

EU Taxonomy

A UNIFIED EU GREEN CLASSIFICATION SYSTEM - 'TAXONOMY'

to determine if an economic activity is environmentally sustainable based on harmonised EU criteria. The European Parliament adopted its report in March 2019. In June 2019, the Technical Expert Group on Sustainable Finance published the first classification system – or taxonomy – for environmentally-sustainable economic activities. This aims to provide guidance for policy makers, industry and investors on how best to support and invest in economic activities that contribute to achieving a climate neutral economy.

To qualify as green, an investment would need to contribute to at least one of these **six objectives**:



CLIMATE CHANGE
MITIGATION



CLIMATE CHANGE
ADAPTATION



SUSTAINABLE USE OF WATER AND
MARINE RESOURCES



CIRCULAR
ECONOMY



POLLUTION
PREVENTION



HEALTHY
ECOSYSTEM

The Strategic Energy Technology Plan (SET Plan) - *coordinating research and innovation across Europe*



Overall objective: Accelerating the development and deployment of low-carbon technologies through cooperation among EU countries, companies, research institutions, and the EU itself, based on common priorities, targets and actions.

Priority Actions:

- 1&2. Improving performance and reducing cost of renewable energy
3. Smart solutions for consumers
4. Smart Resilience and Secure Energy System
5. Energy Efficiency in Buildings
6. Energy Efficiency in Industry
7. Batteries and e-Mobility
8. Renewable Fuels and Bioenergy
9. Carbon Capture Utilisation and Storage
10. Nuclear Safety

Defining priorities

- SET-Plan Communication 2015

Setting targets

- Declaration of Intent

Implementation Plans (IP)

- Temporary Working Groups

Execution of IPs

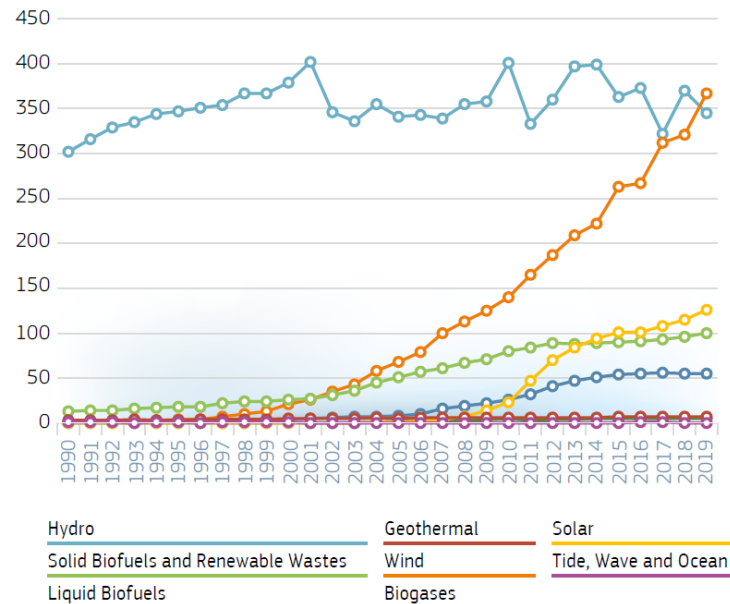
Hydropower:
2013 Technology Map of the SET-Plan
2014 Towards an Integrated Roadmap



Hydropower in Europe

- Limited potential if only focused on power production but high potential in energy system services

EU27_2020 – BY FUEL – GROSS ELECTRICITY GENERATION, BY FUEL: RENEWABLES – 1990-2019 (TWh)

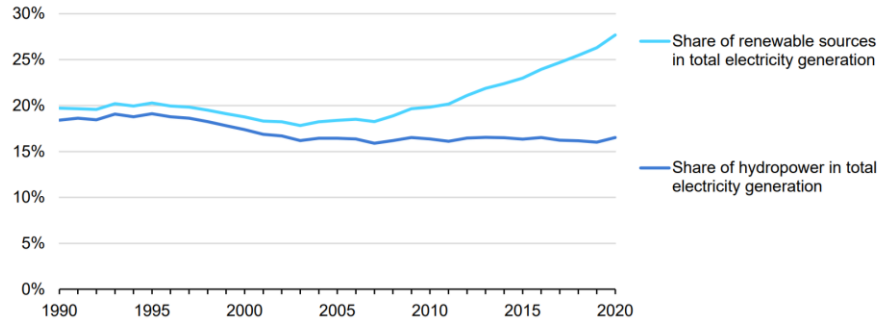


Source: Eurostat April 2021

- Strong technology base
- Challenges and opportunities
 - Refurbishment
 - Flexible operation / grid balancing
 - Sustainability, e.g. water/river connectivity

Global Hydropower Developments

Figure 3.20 Shares of hydropower and total renewable sources in global electricity generation, 1990-2020

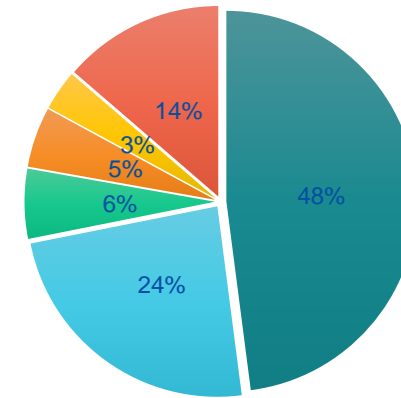


IEA. All rights reserved.

Sources: Based on IEA (2020a), World Energy Statistics and Balances 2020 (database); IEA (2021c), Global Energy Review 2021.

Source: IEA Hydropower Special Market Report 2021

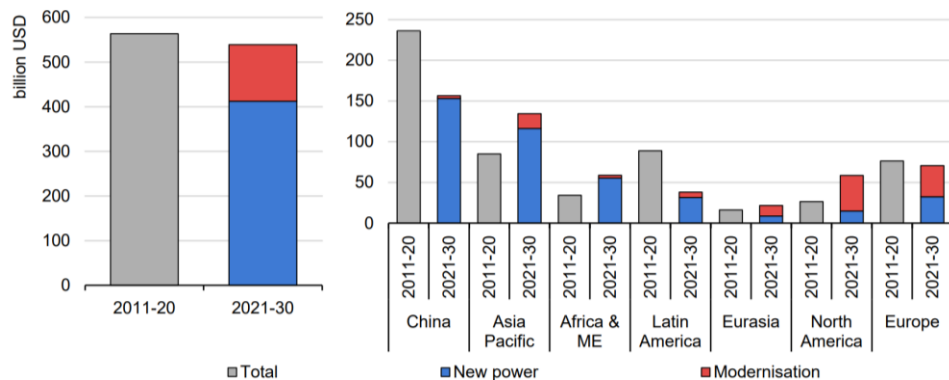
Global Exports in 2019 (878 M EUR)



■ EU ■ China ■ India ■ Brazil ■ USA ■ Other

Source: International Trade Center (ITC). Trade statistics for international business development 2020, in SWD(2020) 953 final.

Figure 3.17 Hydropower capacity investment globally (left) and by region (right), 2011-2020 and 2021-2030



IEA. All rights reserved.

Notes: ME = Middle East.

Source: IEA Hydropower Special Market Report 2021

Research articles on hydropower 01/2016 – 08/2020



Source: ISI Web of Knowledge (jcr.clarivate.com), in SWD(2020) 953 final.

NOT LEGALLY BINDING

Hydropower: Global cooperation



THE INTERNATIONAL ENERGY AGENCY TECHNOLOGY
COLLABORATION PROGRAMME ON HYDROPOWER

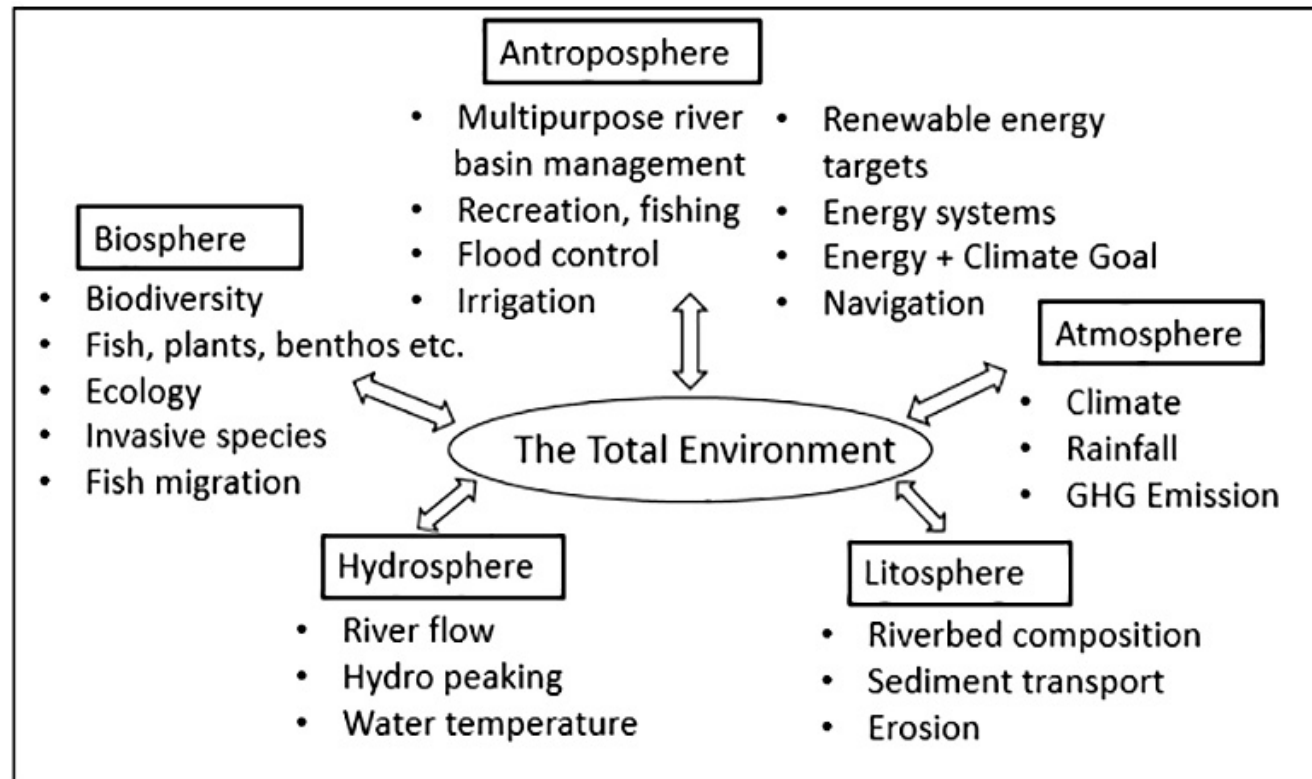
IEA Hydropower



Joint DG RTD/IEA Hydropower TCP workshop (2017)

Hydropower and Fish – Research and Innovation in the context of the European Policy Framework

Interfaces of Hydropower and Fish to the different Spheres of the Total Environment



Schleker and Fjeldstad, 2019

Hydropower in Horizon 2020 SC3

RIA:

FIThydro Fishfriendly Innovative Technologies for Hydropower

HydroFlex Increasing the value of Hydropower through increased Flexibility

AFC4Hydro Active Flow Control system FOR improving HYDRaulic turbine performances at off-design Operation

ALPHEUS Augmenting grid stability through Low-head Pumped Hydro Energy Utilization & Storage

IA:

XFLEX HYDRO Hydropower Extending Power System Flexibility

Hydro4U Hydropower For You - Sustainable small-scale hydropower in Central Asia

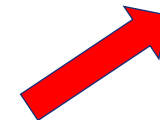
CSA:

HYDROPOWER-EUROPE LC-SC3-CC-4-2018 - Support to sectorial fora

HYPOSO Hydropower solutions for developing and emerging countries

From other parts of H2020:

AMBER, SHYDRO-ALP, DAFNE, KEEPFISH, Hykinetics, HYPOS...



from ~10 Mio. € (FP7)
to ~40 Mio. € (H2020)



HORIZON EUROPE

THE EU
RESEARCH &
INNOVATION
PROGRAMME 2021 – 27



This presentation is based on the political agreement of 11 December 2020 on the Horizon Europe. Information on some parts is pending revision.

19 March 2021

Our Vision

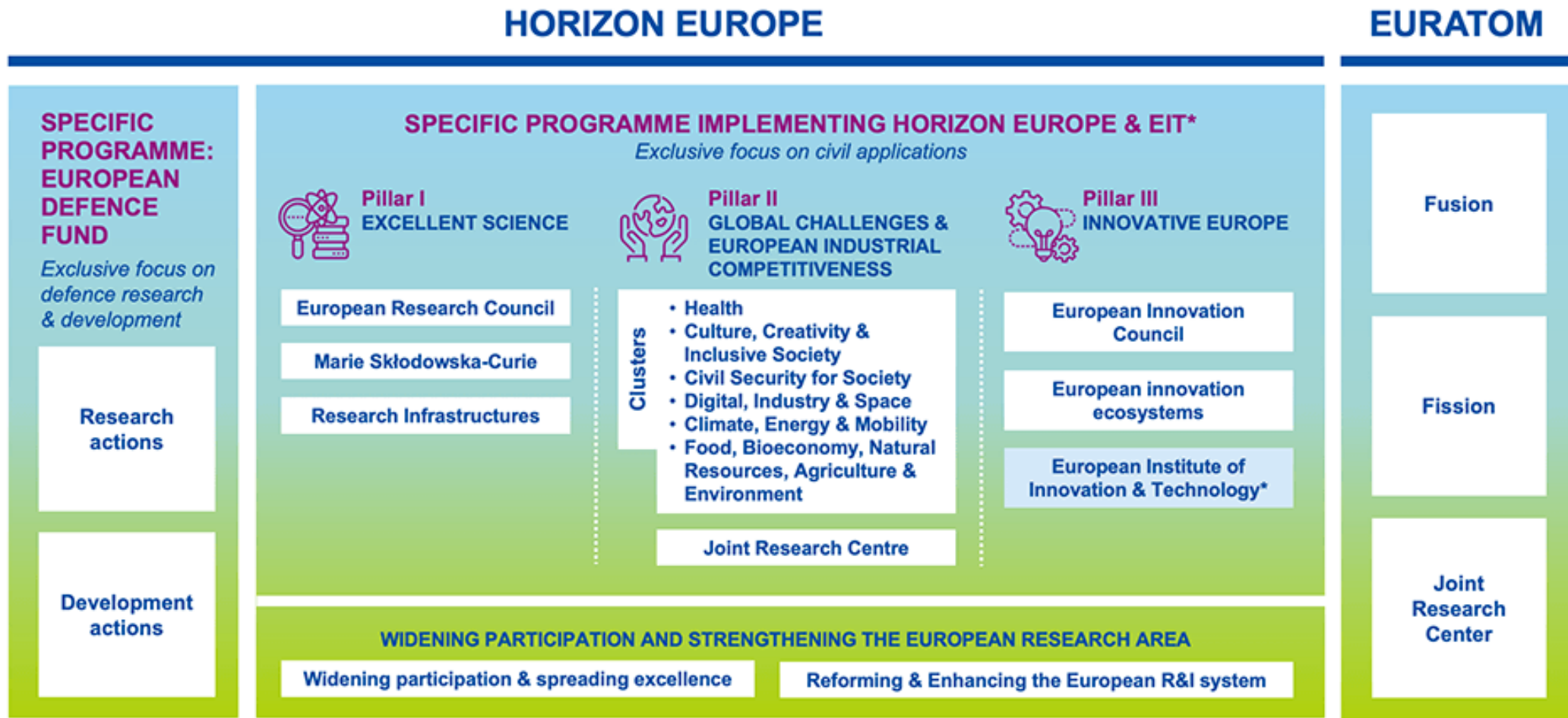
The EU's key funding programme for research and innovation:

- Tackles climate change
- Helps to achieve the UN's Sustainable Development Goals
- Boosts the EU's competitiveness and growth
- Facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges
- Supports the creation and better diffusion of excellent knowledge and technologies
- Creates jobs, fully engages the EU's talent pool, boosts economic growth, promotes industrial competitiveness and optimises investment impact within a strengthened European Research Area.



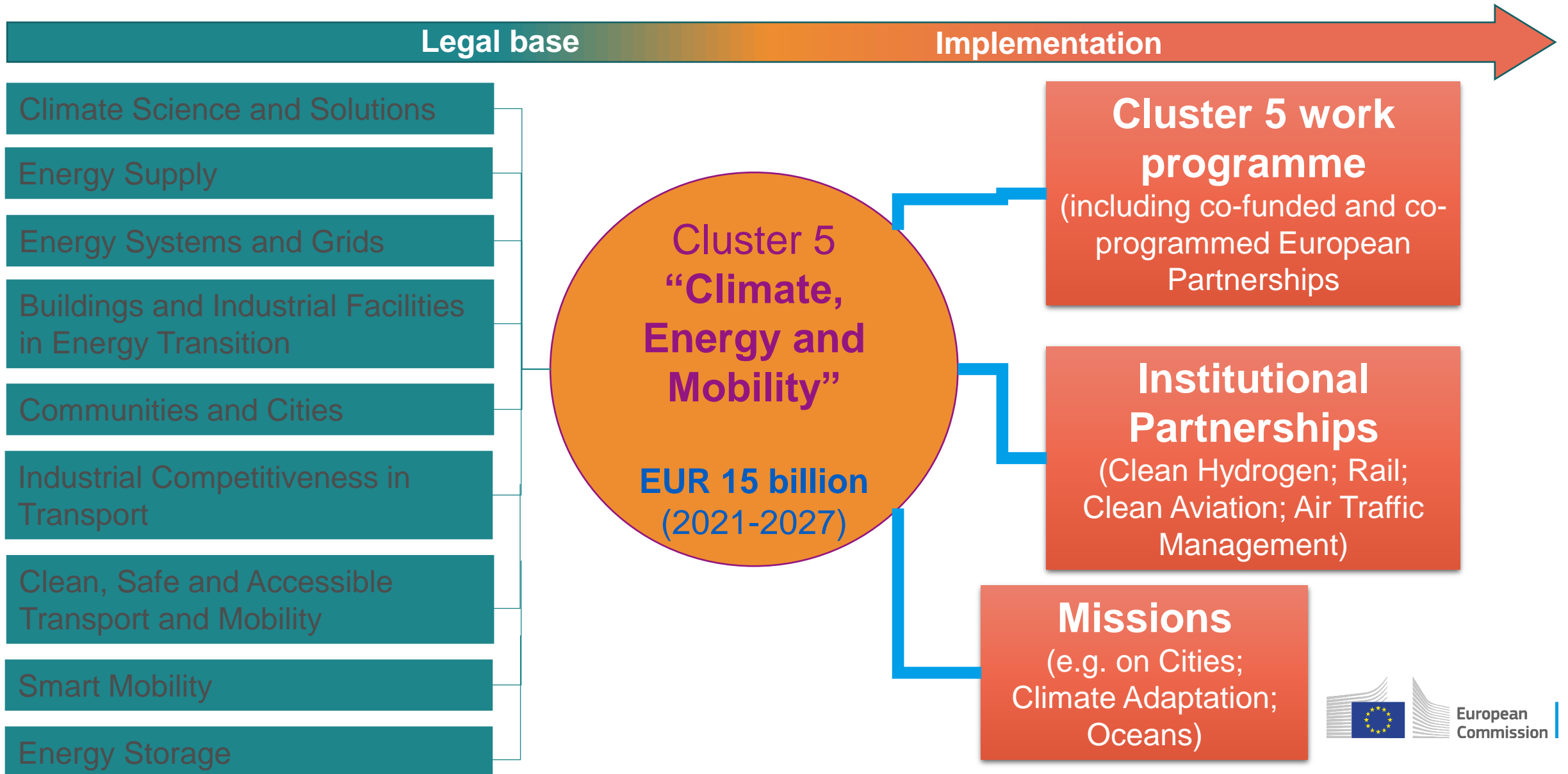
Credits: <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Horizon Europe: investing in R&I to shape our future

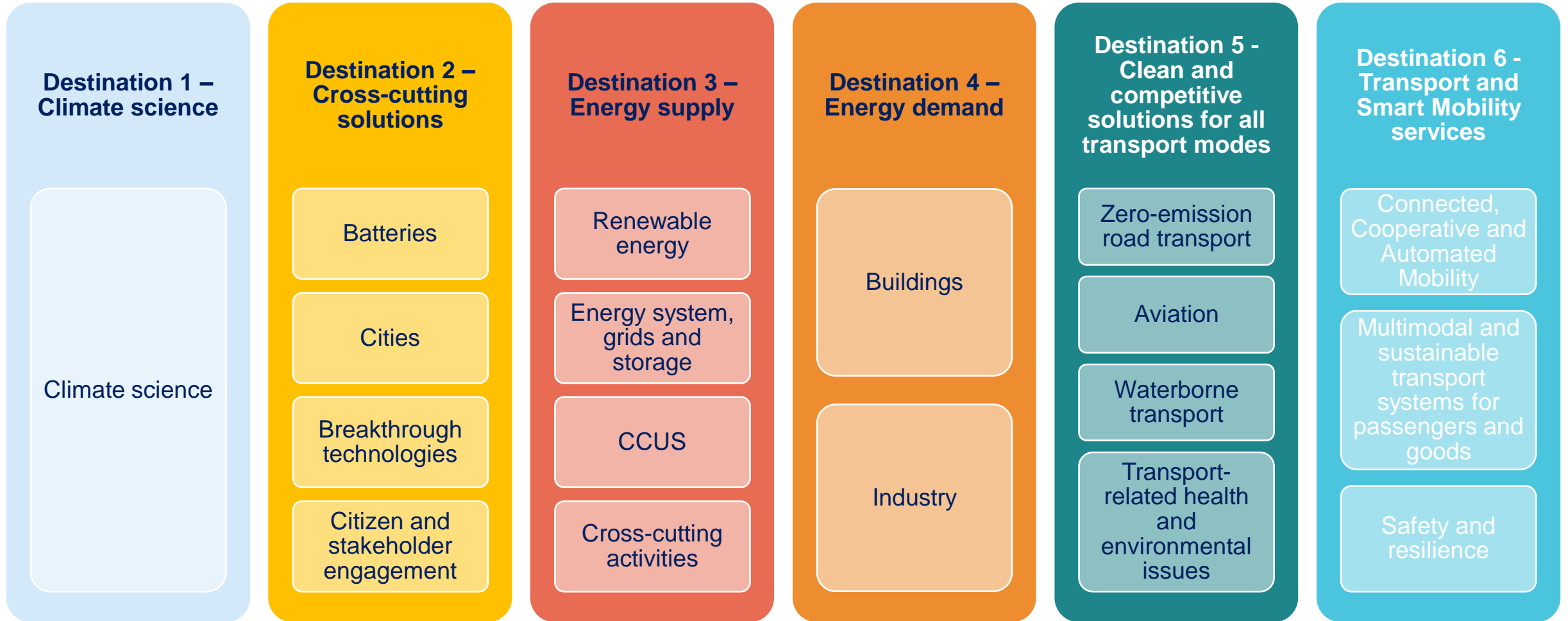


* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

Cluster 5 - overview



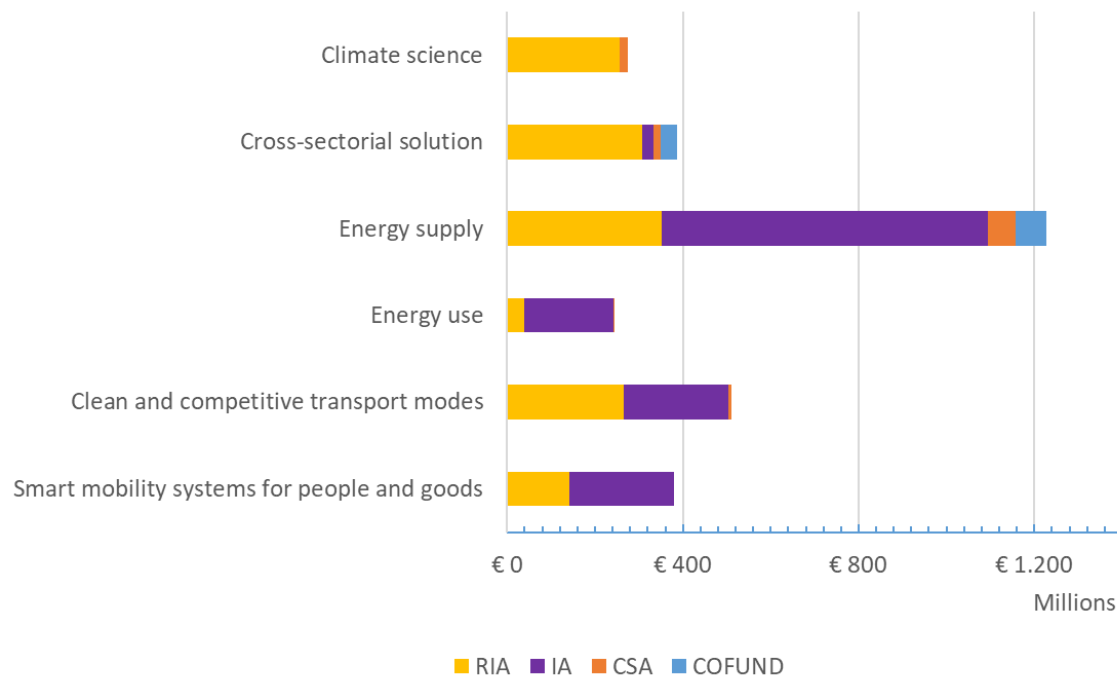
Cluster 5 Work programme - overview



Cluster 5 Work programme 2021-22 - 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%
Energy supply	1226.3	40%	67	36%
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%
TOTAL	3022.8		186	

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



Destination 3 – Renewable energy

Objectives

- 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 covered in topics 2021-2022

- Solar energy, wind energy, biofuels, geothermal energy, hydro energy, CHP, energy carriers
- Disruptive technologies, cost reduction, improved efficiency, de-risking, integration, export potential, sustainability, market uptake

Implementation

- **2021: 20 topics** (total budget: 335 M€)
- **2022: 24 topics** (total budget: 368 M€)



Destination 3 – Energy systems, grids and storage

Objectives

- 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 covered in topics 2021-2022

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

Implementation

- **2021: 10 topics** (total budget: 152 M€)
- **2022: 7 topics** (total budget: 181 M€)



Cluster 5 WP

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 CO₂ emission mitigation option in **electricity generation** and **industry applications** (including also conversion of CO₂ to products)
- **2 topics in 2021** (32 M€)
- **1 topic in 2022** (58 M€)
- **Issues:** CCUS hubs, application in industry, CO₂ 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)



Hydropower – themes

- Hydropower equipment for hidden hydropower
- Digital solutions for existing hydropower operation and maintenance

Other:

- Digital solutions addressing synergies in international renewable energy value chains
- Energy system modelling and tools
- Innovative forms of storage and their successful operation and integration into innovative energy systems and grid architectures
- Innovative plug-and play solutions for system management and renewables storage in off-grid applications

HORIZON-CL5-2021-D3-03-11

Development of hydropower equipment for hidden hydropower



Scope

Development of hydropower equipment for hidden and therefore unrealised hydropower by developing novel technologies which allow for increased techno-economic feasible and sustainable hydropower production in non-hydropower hydraulic systems with low head and/or small reservoir or water body size and/or impaired water quality (e.g. saltwater), that may also involve prosumer solutions.

H-HOPE: Hidden Hydro Oscillating Power for Europe

HORIZON-CL5-2022-D3-03-08

Development of digital solutions for existing hydropower operation and maintenance



Scope

Development of novel sensor technologies and digital solutions for digitization of existing hydropower plants and improving their sustainable operation by addressing one or more of the following: weather and flow forecast, biodiversity monitoring, predictive modelling and artificial intelligence for the analysis of sensor data for decision-making in operation and maintenance. Acknowledging eventual confidentiality of operational data, to ensure wide uptake and reliability, actions should promote the highest standards of transparency and openness of the digital solutions, extending to aspects such as assumptions, architecture, code and data.

HORIZON-CL5-2022-D3-03-08

Development of digital solutions for existing hydropower operation and maintenance



Expected outcome:

- Advance the European scientific basis, technology base, technology leadership in the area of hydropower in the context of digital transition and energy markets while creating evidence for policy making;
- Increase the technology competitiveness of the existing hydropower fleet in changing European power markets by increasing hydropower flexibility and decision-making in modern power markets;
- Facilitate market penetration of renewables and getting closer to the European Green Deal and climate and energy targets for 2030 by increasing the flexibility, sustainability and predictability of existing hydropower;
- Improve environmental and socio-economic sustainability of the existing hydropower fleet.

HORIZON-CL5-2022-D3-03-08

Development of digital solutions for existing hydropower operation and maintenance



Specific conditions:

- Expected EU contribution per project: **between EUR 3.00 and 4.50 million**
- Total indicative budget: EUR 9.00 million
- Type of Action: **Research and Innovation Actions**
- Technology Readiness Level: Activities are expected **to achieve TRL 5** by the end of the project – see General Annex B.



Deadline:

Opening: 06 Sep 2022

Deadline: 10 Jan 2023

Hydropower in Cluster 5 WP 23/24

... in preparation

Vielen Dank für Ihre
Aufmerksamkeit!