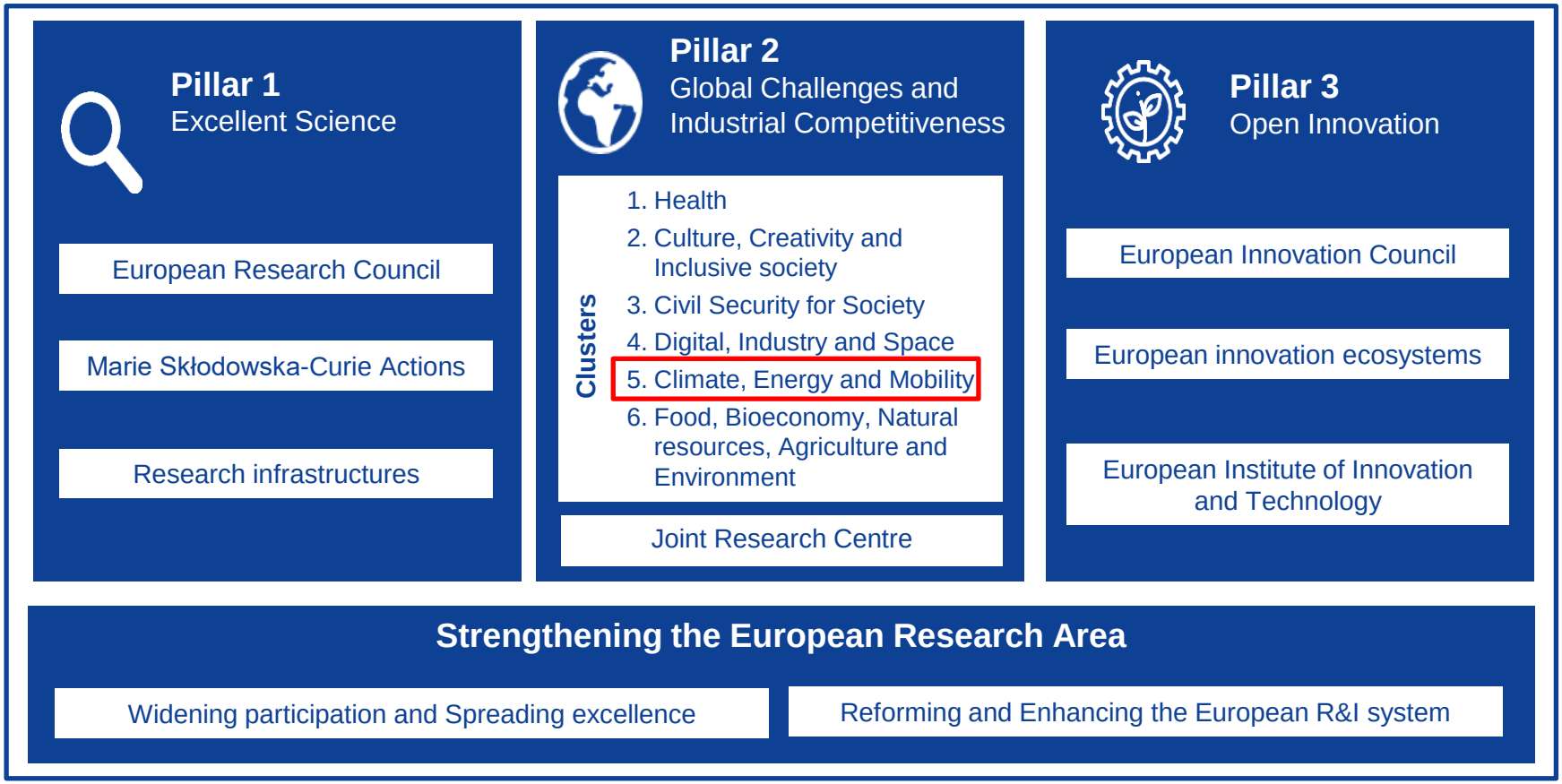
Energía en Horizonte Europa
Calls 2021-2022

Comité Coordinación Plataformas Tecnológicas Energía, 26 mayo 2021
Cristina Garrido, Dirección de Programas Europeos y Cooperación Territorial
CDTI

Advertencia

- Información según versión Programa de Trabajo de 21 mayo
- Para preparar propuestas se debe utilizar la versión final del Programa de Trabajo que publicará la Comisión Europea en el Funding and Tenders Portal

Horizon Europe (2021-2027) Estructura



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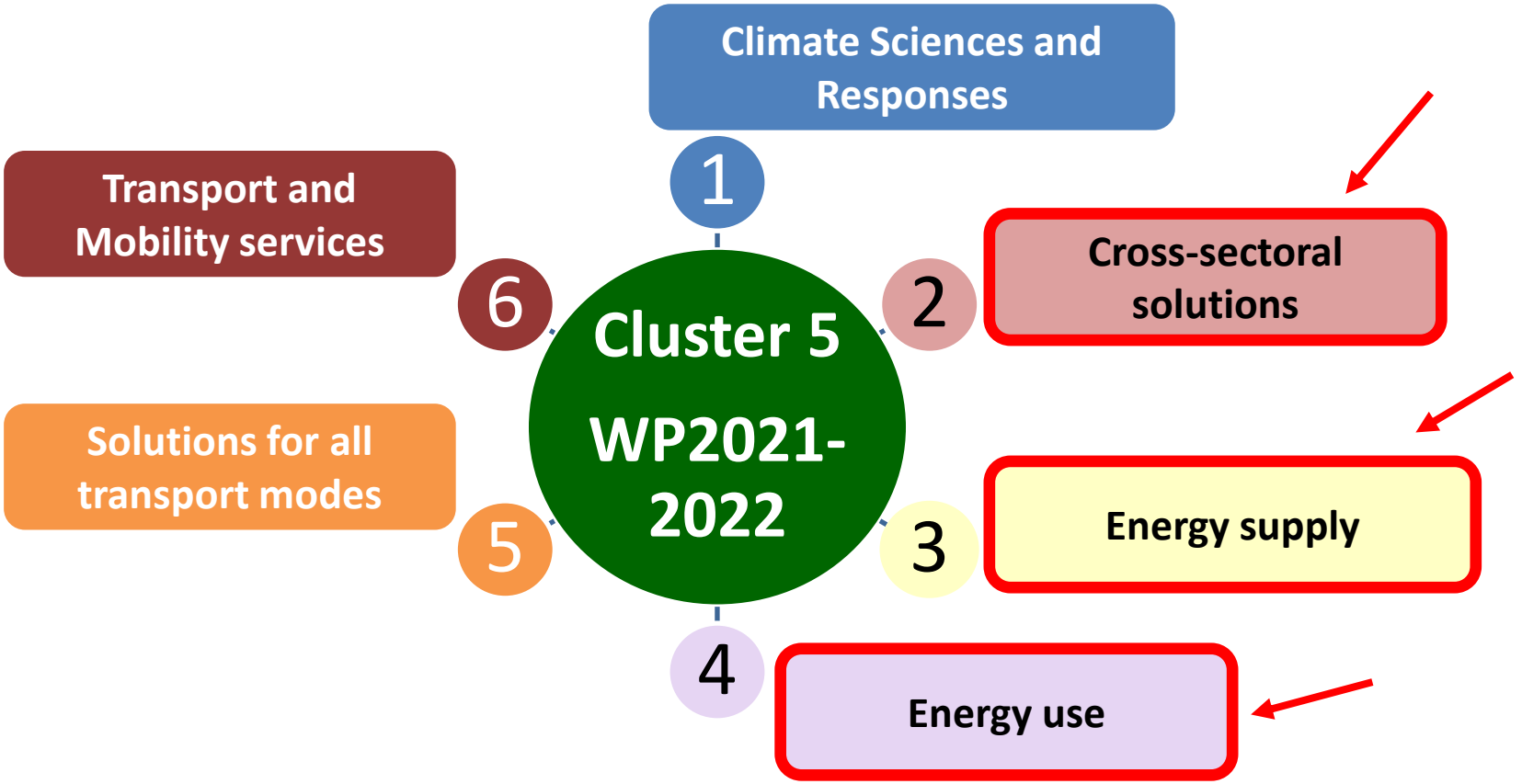
Cluster 5 – Destinations



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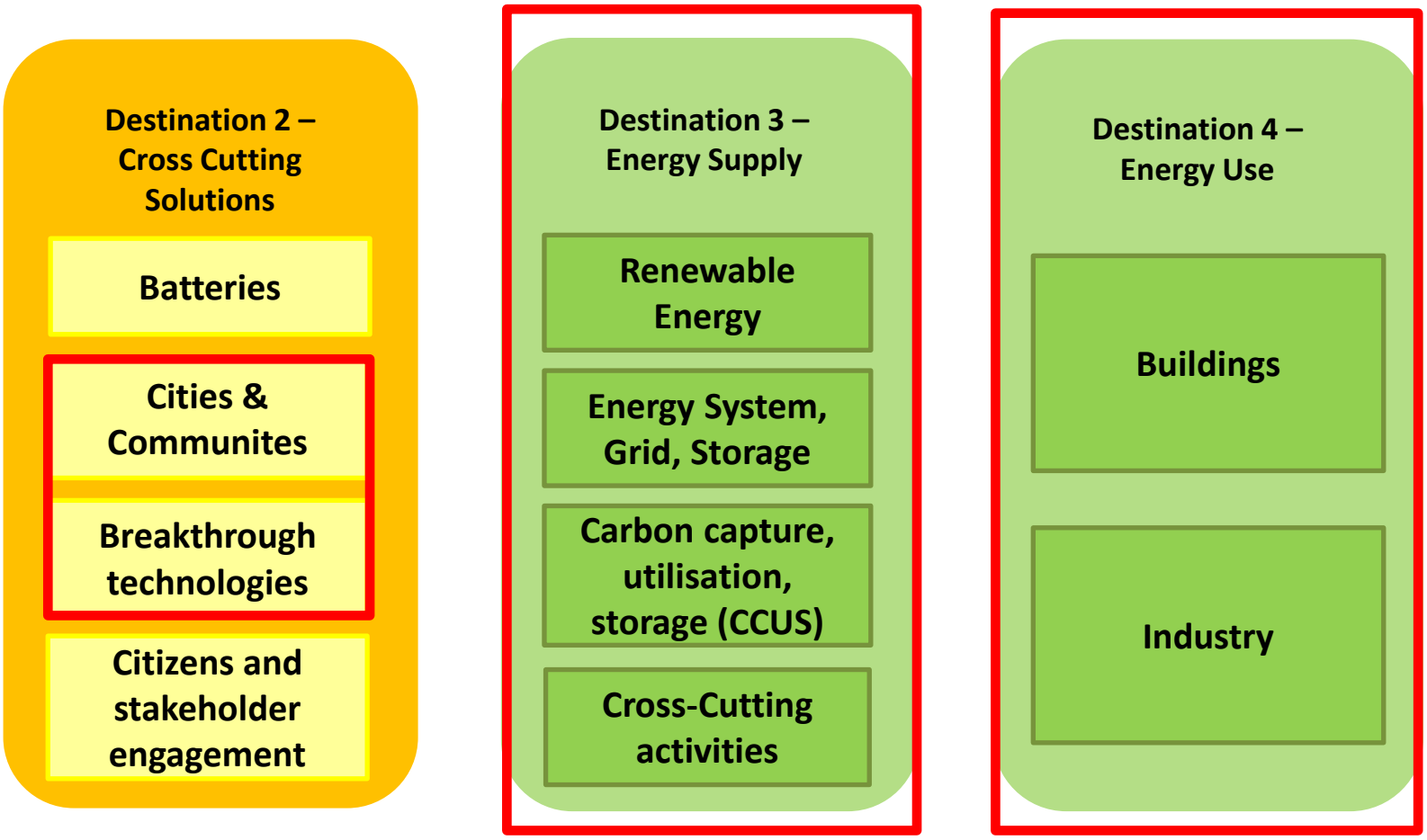
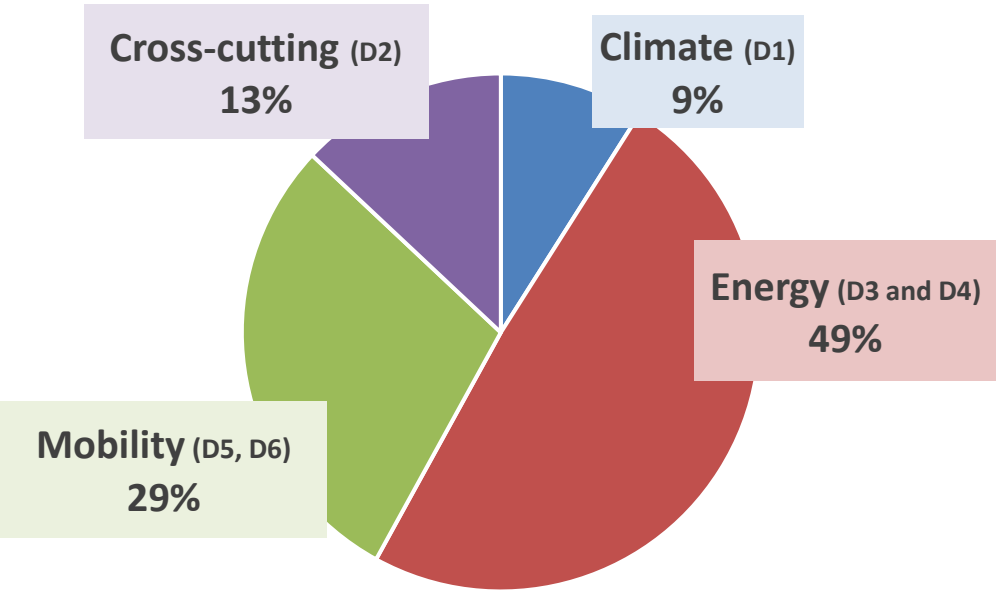
Cluster 5: Climate, Energy, Mobility

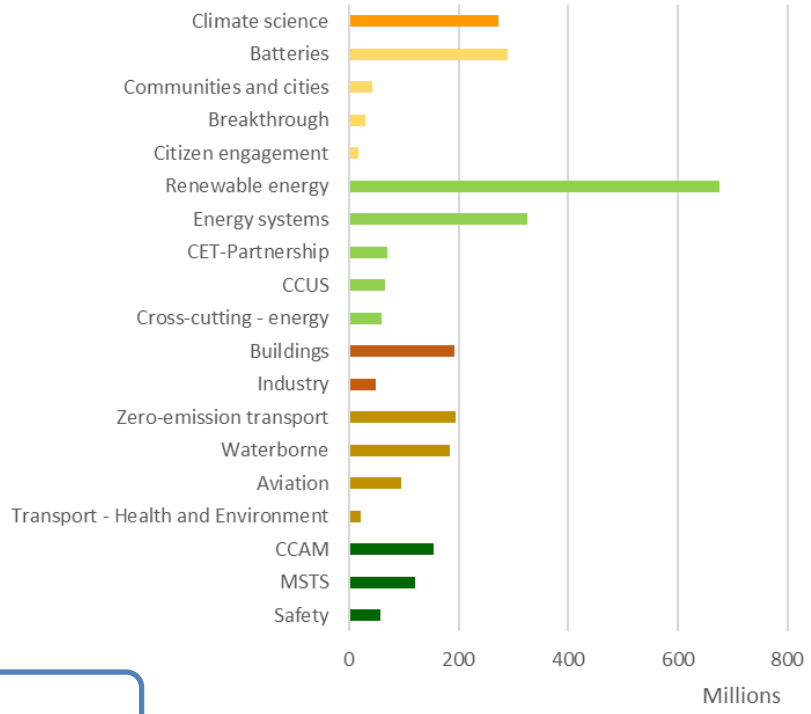


Cluster 5 - Budget allocation

Budget allocation per Destination (2021 and 2022)



Budget allocation per thematic heading (2021 and 2022)



Budget 2021-2022: **3000 M€**

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Horizon Europe – Partnerships D2, D3 y D4

Institutional Partnerships	Co-programmed Partnerships	Co-funded Partnerships
• **Clean Hydrogen Europe (CHE)**	• **Built4People** | People-centric sustainable built environment • **Batteries** | For stationary applications and e-mobility	• **Driving urban transitions** to a sustainable future **(DUT)** • **Clean Energy Transition (CET)**
Separate calls **Multi Annual Work Programme (MAWP)** **Annual Work Programme (AWP)**	**Calls in WorkProgramme of Cluster 5** *** Built4People: Destination 4** *** Batteries: Destination 2**	**Separate Calls**

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Partenariado “Clean Hydrogen Europe”

Antecedentes y Presupuestos:

FP7 (2008-2013) **=> 470 M€ from EC**

Horizon 2020 (2014-2020) **=> 665 M€ from EC**

Horizon Europe (2021-2027) => 1.000 M€ from EC pendiente de aprobación

Documentos de trabajo:

SRIA – Strategic Research and Innovation Agenda

MAWP – Programa de Trabajo Multianual – **en proceso de elaboración**

AWP – Programa de Trabajo Anual

Partenariado "Clean Hydrogen Europe" – Multiannual WorkProgramme (MAWP) draft

PILLAR I: Renewable H2 Production

- Electrolysis
- Other routes of H2 production

PILLAR II: H2 Distribution and Storage

- Large-scale Storage
- Develop H2 infrastructure (HRS)
- H2 in the Natural Gas Grid
- Liquid H2 Carriers
- Improving existing H2 Transport Means
- Compression, Purification and Metering Solutions

PILLAR III and IV: H2 End uses

- Transport Applications: Fuel Cell Sytem, H2 storage tank, Heavy-duty vehicles, Waterborne, Rail and Aviation
- Clean Heat and Power: Stationary fuel cells; Turbines, boiler and burners

Horizontal Activities

- Cross-Cutting Issues: PNR, safety, education, LCSA, awareness
- H2 Valleys
- Hydrogen Supply Chains

A tener en cuenta ……

- **IMPORTANTE** formar parte del Grupo Industrial o Grupo de Investigación:

  "Hydrogen Europe" – Representa a la Industria hydrogeneurope.eu

  "Hydrogen Europe Research" – Representa a los Grupos de Investigación

  Principal ventaja:

  - Participar en la elaboración de los Programas de Trabajo anuales (AWP), siguiendo la planificación estratégica elaborada en el MAWP

- **Convocatorias Anuales** (excepción este año 2021-2022)

- En principio **mismas condiciones de participación que en Horizon Europe**, pero las convocatorias pueden incluir criterios de elegibilidad adicionales

Co-fund “Driving Urban Transitions” (DUT)

Partnership Concept

https://jpi-urbaneurope.eu/app/uploads/2019/02/SRIA2.0.pdf

Positive Energy Districts and Neighbourhoods
transforming the urban energy system

Downsizing District Doughnuts
an integrated approach for urban greening and circularity transitions

The 15 Minutes Cities
rethinking the urban mobility system and space

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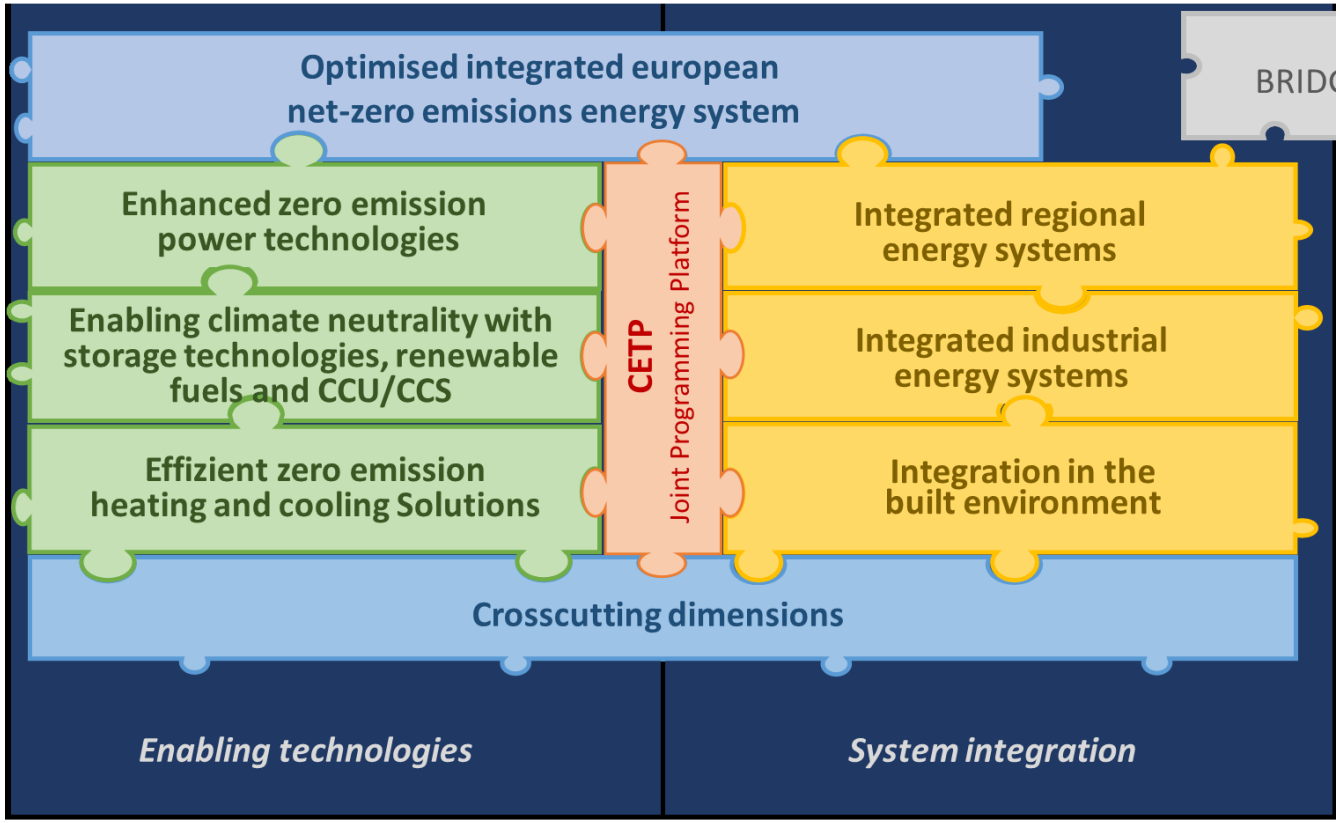
Co-fund “Clean Energy Transition” (CET)

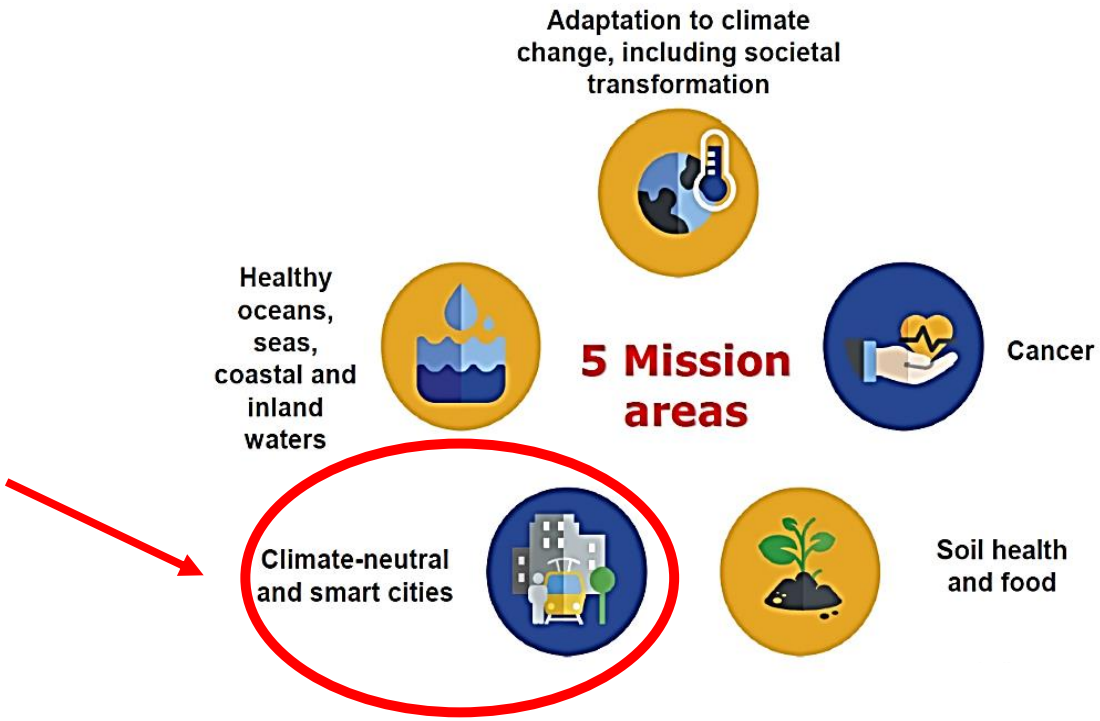
Challenges



Misiones en Horizonte Europa

Cartera de acciones multidisciplinares, de plazo determinado, con meta audaz e inspiradora y de éxito cuantificable, que tiene un impacto en la sociedad y la ciudadanía.

Cinco áreas de misiones



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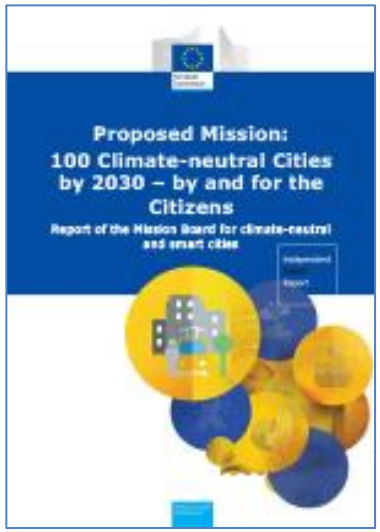
100 Climate-neutral cities by 2030 by and for the citizens



Report of the Mission Board

- Process formalised in a **Climate City Contract**
- **Co-design and co-implementation with citizens**, as users, producers, consumers and owners
- **Removal of barriers** to participatory governance
- Help for cities to design an **investment strategy** and access to funding
- Cross-sectoral and **systemic transformation**, encompassing transport, energy, built environment, digitalisation, etc
- Strong **business case** for transforming how products are designed, produced, used and recycled

WorkProgramme of R&D activities – under preparation

Convocatorias “Energía” (2021-2022)

90 topics
≈1.550 M€

Destination 2	Communities and Cities	• xx topics – total budget: xx M€
	Breakthrough Technologies	• 4 topics – total budget: 35 M€
Destination 3	Renewable energy	• 44 topics – budget: 703.5 M€
	Energy system, grids and storage	• 17 topics – budget: 333 M€
	Carbon capture, utilisation and storage (CCUS)	• 3 topics – total budget: 90 M€
Destination 4	Buildings	• 14 topics – total budget: 196 M€
	Industry	• 4 topics – total budget: 48 M€

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Calendario de convocatorias (2021-2022)

¡Atención! Chequear fechas finales

Destination	Call	Opening	Deadline
Destination 2	HORIZON-CL5-2021-D2-01	24 June 2021	**19 October 2021**
	HORIZON-CL5-2022-D2-01	28 April 2022	6 September 2022
Destination 3	HORIZON-CL5-2021-D3-01	24 June 2021	**19 October 2021**
	HORIZON-CL5-2021-D3-02	24 June 2021	**5 January 2022**
	HORIZON-CL5-2021-D3-03	2 September 2021	**23 February 2022**
	HORIZON-CL5-2022-D3-01	14 October 2021	**26 April 2022**
	HORIZON-CL5-2022-D3-02	26 May 2022	27 October 2022
	HORIZON-CL5-2022-D3-03	6 September 2022	10 January 2023
Destination 4	HORIZON-CL5-2021-D4-01	24 June 2021	**19 October 2021**
	HORIZON-CL5-2021-D4-02	2 September 2021	**25 January 2022**
	HORIZON-CL5-2022-D4-01	28 April 2022	6 September 2022
	HORIZON-CL5-2022-D4-02	6 September 2022	24 January 2023

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Calendario de convocatorias (2021-2022)

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Call	Area	Nº of topics	Opening date	Deadline
HORIZON-CL5-2021-D2-01	Breakthrough Tecnologies	4	24 June 2021	19 October 2021
HORIZON-CL5-2021-D3-02	Renewable	4	24 June 2021	5 January 2022
HORIZON-CL5-2021-D3-03	Renewable	16	2 September 2021	23 February 2022
HORIZON-CL5-2022-D3-01	Renewable	7	14 October 2021	26 April 2022
HORIZON-CL5-2022-D3-02	Renewable	8	26 May 2022	27 October 2022
HORIZON-CL5-2022-D3-03	Renewable	9	6 September 2022	10 January 2023
HORIZON-CL5-2021-D3-01	Energy systems, grids and storage	3	24 June 2021	19 October 2021
HORIZON-CL5-2021-D3-02	Energy systems, grids and storage	7	24 June 2021	5 January 2022
HORIZON-CL5-2022-D3-01	Energy systems, grids and storage	7	14 October 2021	26 April 2022
HORIZON-CL5-2021-D3-01	Carbon capture, utilisation and storage (CCUS)	2	24 June 2021	5 January 2022
HORIZON-CL5-2022-D3-01	Carbon capture, utilisation and storage (CCUS)	1	14 October 2021	26 April 2022
HORIZON-CL5-2021-D4-01	Buildings	3	24 June 2021	19 October 2021
HORIZON-CL5-2021-D4-02	Buildings	3	2 September 2021	25 January 2022
HORIZON-CL5-2022-D4-01	Buildings	3	28 April 2022	6 September 2022
HORIZON-CL5-2022-D4-02	Buildings	5	6 September 2022	24 January 2023
HORIZON-CL5-2021-D4-01	Industry	2	24 June 2021	19 October 2021
HORIZON-CL5-2022-D4-01	Industry	2	28 April 2022	6 September 2022

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Calendario convocatorias (I)

¡Atención!
Chequear fechas finales

Call	Destination/Nº Topics/Areas	Opening date	Deadline to apply
HORIZON-CL5-2021-D2-01 HORIZON-CL5-2021-D4-01	• **Destination 2** **7** BAT, **4** Breakthrough, **3** Citizen Engagement • **Destination 4** **3** Buildings, **2** Industry	24 June 2021	19 Oct. 2021
HORIZON-CL5-2021-D3-01	• **Destination 3** **3** Energy Systems, grids and storage	24 June 2021	19 Oct. 2021
HORIZON-CL5-2021-D3-02	• **Destination 3** **4** Renewable, **7** Energy Systems, grids and storage, **2** CCUS, **2** Cross-cutting	24 June 2021	5 Jan. 2022
HORIZON-CL5-2021-D4-02	• **Destination 4** **3** Buildings	2 Sept. 2021	25 Jan. 2022
HORIZON-CL5-2021-D3-03	• **Destination 3** **16** Renewable	2 Sept. 2021	23 Feb. 2022
HORIZON-CL5-2022-D3-01	• **Destination 3** **7** Renewable, **7** Energy system, grids and storage, **1** CCUS	14 Oct. 2021	26 Apr. 2022

Calendario convocatorias (y II)

Call	Destination/Nº Topics/Areas	Opening date	Deadline to apply
HORIZON-CL5-2022-D2-01 HORIZON-CL5-2022-D4-01	• **Destination 2** **10** BAT, **1** Communities and Cities • **Destination 4** **3** Buildings, **2** Industry	28 April 2022	6 Sept. 2022
HORIZON-CL5-2022-D3-02	• **Destination 3** **8** Renewable	26 May 2022	27 Oct. 2022
HORIZON-CL5-2022-D3-03	• **Destination 3** **9** Renewable	6 Sept. 2022	10 Jan. 2023
HORIZON-CL5-2022-D4-02	• **Destination 4** **5** Buildings	6 Sept. 2022	24 Jan. 2023

¡Atención!

Chequear fechas finales

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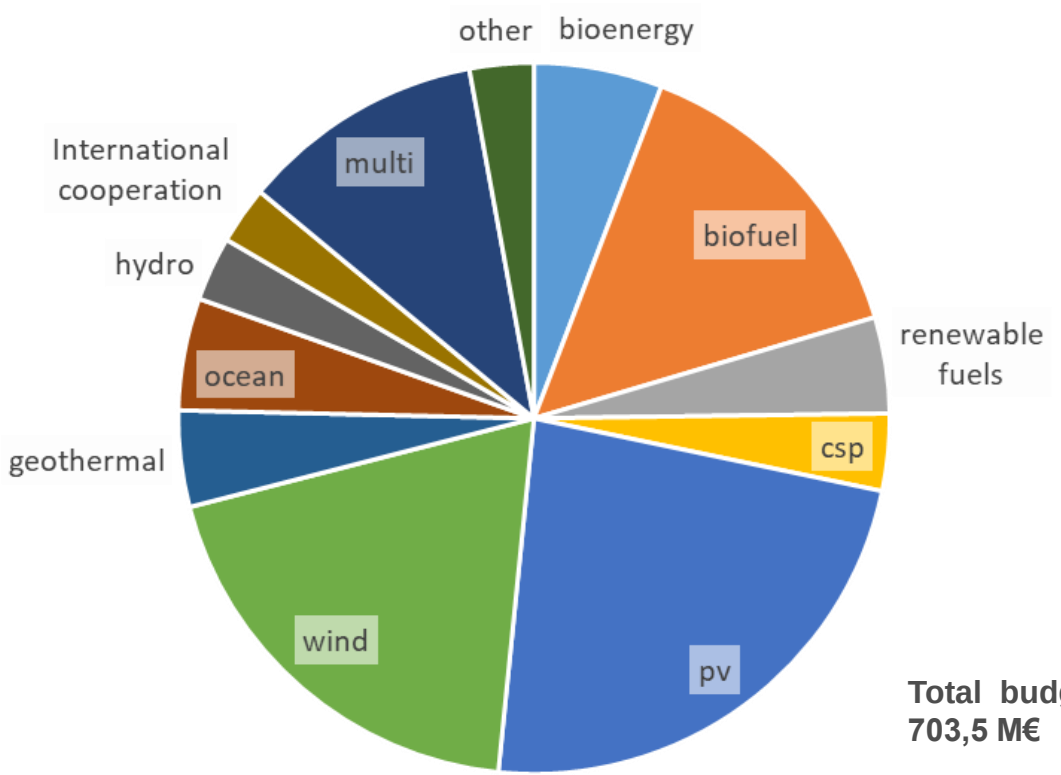
Destination 3
Todos los topics

Destination 3
Renewables

Budget allocation– Renewables

Budget allocation within renewable energy, per technology (2021 and 2022)



Total budget: 703,5 M€

Destination 3 – Renewables (I)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Ocean	HORIZON-CL5-2021-D3-02-01	Demonstration of wave energy devices to increase experience in real sea condition	IA	Around 15.00	15.000.000,00	1
	HORIZON-CL5-2021-D3-03-10	Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices	RIA	Around 3.50	10.000.000,00	3
	HORIZON-CL5-2022-D3-01-07	Demonstration of innovative rotor, blades and control systems for tidal energy devices	IA	Around 10.00	10.000.000,00	1
Educational	HORIZON-CL5-2021-D3-02-02	Sustainability and educational aspects for renewable energy and fuel technologies	CSA	Around 2.50	10.000.000,00	4
Market uptake	HORIZON-CL5-2021-D3-02-03	Market Uptake Measures of renewable energy systems	CSA	Around 2.00	10.000.000,00	5
África-UE	HORIZON-CL5-2021-D3-03-01	AU-EU Water Energy Food Nexus	RIA	Around 2.50	5.000.000,00	2
	HORIZON-CL5-2022-D3-02-02	AU-EU Energy System Modelling	RIA	Around 2.50	5.000.000,00	2
Next generation	HORIZON-CL5-2021-D3-03-02	Next generation of renewable energy technologies	RIA	Around 3.00	33.000.000,00	10

Destination 3 – Renewables (II)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Renewable fuels/Bioenergy/ Synthetic fuels	HORIZON-CL5-2021-D3-03-03	Hybrid catalytic conversion of renewable energy to carbon-neutral fuels	RIA	Around 3.3	10.000.000,00	3
	HORIZON-CL5-2021-D3-03-09	Carbon-negative sustainable biofuel production	RIA	Around 5.00	15.000.000,00	3
	HORIZON-CL5-2021-D3-03-14	Demonstration of large-scale CHP technologies for a shift to the use of biogenic residues and wastes	IA	Around 10.00	10.000.000,00	1
	HORIZON-CL5-2021-D3-03-16	Innovative biomethane production as an energy carrier and a fuel	IA	Around 10.00	20.000.000,00	2
	HORIZON-CL5-2022-D3-01-01	Demonstration of cost-effective advanced biofuel technologies utilizing existing industrial plants	IA	Around 10.00	20.000.000,00	2
	HORIZON-CL5-2022-D3-02-05	Renewable energy carriers from variable renewable electricity surplus and carbon emissions from energy consuming sectors	IA	Around 10.00	20.000.000,00	2
	HORIZON-CL5-2022-D3-02-08	Demonstration of complete value chains for advanced biofuel and non-biological renewable fuel production	IA	Around 10.00	20.000.000,00	2
	HORIZON-CL5-2022-D3-03-02	Best international practice for scaling up sustainable biofuels	RIA	Around 3.00	9.000.000,00	3
	HORIZON-CL5-2022-D3-03-06	Efficient and low-emission technologies for industrial use of combustion and gasification systems from low-value biogenic residues and wastes	RIA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D3-03-07	Development of algal and renewable fuels of non-biological origin	RIA	Around 5.00	15.000.000,00	3

Destination 3 – Renewables (III)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Wind	HORIZON-CL5-2021-D3-03-04	Physics and aerodynamics of atmospheric flow of wind for power production	RIA	Around 6.00	18.000.000,00	3
	HORIZON-CL5-2021-D3-03-05	Wind energy in the natural and social environment	RIA	Around 3.00	10.000.000,00	3
	HORIZON-CL5-2021-D3-03-12	Innovation on floating wind energy deployment optimized for deep waters and different sea basins (Mediterranean Sea, Black Sea, Baltic Sea, North-east Atlantic Ocean)	IA	Around 16.00	50.000.000,00	3
	HORIZON-CL5-2022-D3-01-02	Demonstration of innovative materials, supply cycles, recycling technologies to increase the overall circularity of wind energy technology and to reduce the primary use of critical raw materials	IA	Around 13.00	40.000.000,00	3
	HORIZON-CL5-2022-D3-03-04	Integrated wind farm control	RIA	Around 6.00	18.000.000,00	3
Photovoltaics	HORIZON-CL5-2021-D3-02-04	Novel tandem, high efficiency Photovoltaic technologies targeting low cost production with earth abundant materials	RIA	Around 5.00	20.000.000,00	4
	HORIZON-CL5-2021-D3-03-07	Stable high performance Perovskite Photovoltaics	RIA	Around 5.00	15.000.000,00	3
	HORIZON-CL5-2021-D3-03-10	Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices	RIA	Around 3.50	10.000.000,00	3
	HORIZON-CL5-2021-D3-03-13	Demonstration pilot lines for alternative and innovative PV technologies (Novel c-Si tandem, thin film tandem, bifacial, CPV, etc.)	IA	Around 15.00	45.000.000,00	3
	HORIZON-CL5-2022-D3-01-03	Advanced manufacturing of Integrated PV	IA	Around 16.00	32.000.000,00	2
	HORIZON-CL5-2022-D3-01-06	Novel Agro-Photovoltaic systems	IA	Around 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D3-03-05	Novel Thin Film (TF) technologies targeting high efficiencies	RIA	Around 5.00	20.000.000,00	4
	HORIZON-CL5-2022-D3-03-09	Recycling end of life PV module	IA	6.00 to 7.00	20.000.000,00	3

Destination 3 – Renewables (IV)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Combined Heating and Power	HORIZON-CL5-2021-D3-03-08	Cost-effective micro-CHP and hybrid heating systems	RIA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2021-D3-03-14	Demonstration of large-scale CHP technologies for a shift to the use of biogenic residues and wastes	IA	Around 10.00	10.000.000,00	1
Hydropower	HORIZON-CL5-2021-D3-03-11	Development of hydropower equipment for hidden hydropower	RIA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D3-03-08	Development of digital solutions for existing hydropower operation and maintenance	RIA	3.00 to 4.50	9.000.000,00	3
Geothermal	HORIZON-CL5-2021-D3-03-15	Solutions for more sustainable geothermal energy	RIA	Around 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D3-01-04	Demonstrate the use of high temperature geothermal reservoirs to provide energy storage for the energy system	IA	Around 20.00	20.000.000,00	1
Concentrated Solar Power	HORIZON-CL5-2021-D3-03-06	Novel approaches to concentrated solar power (CSP)	RIA	Around 3.00	9.000.000,00	3
	HORIZON-CL5-2022-D3-03-01	Innovative components and/or sub-systems for CSP plants and/or concentrating solar thermal installations	IA	Around 5.50	16.500.000,00	3

Destination 3 – Renewables (y V)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Off-grid systems	HORIZON-CL5-2022-D3-01-05	Demonstration of innovative plug-and play solutions for system management and renewables storage in off-grid applications	IA	Around 10.00	10.000.000,00	1
Digital	HORIZON-CL5-2022-D3-02-01	Digital solutions for defining synergies in international renewable energy value chains	RIA	Around 3	9.000.000,00	3
Renewable Heating and Cooling	HORIZON-CL5-2022-D3-02-03	Innovative renewable energy carrier production for heating from renewable energies	IA	Around 10.00	10.000.000,00	1
Solar Fuel Technologies	HORIZON-CL5-2022-D3-02-04	Technological interfaces between solar fuel technologies and other renewables	RIA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D3-03-03	Efficient and circular artificial photosynthesis	RIA	3.00 to 5.00	10.000.000,00	2
RES for industry	HORIZON-CL5-2022-D3-02-06	Direct renewable energy integration into process energy demands of the chemical industry	RIA	3.00 to 5.00	10.000.000,00	2
RES in agro sector	HORIZON-CL5-2022-D3-02-07	Renewable energy incorporation in agriculture and forestry	IA	Around 7.5	15.000.000,00	2

Destination 3
Energy systems, grids and storage

Destination 3 – Energy system, grids and storage (I)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Energy Sector Integration	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	9.00 to 10.00	30.000.000,00	3
Flexibility management	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	Around 8.00	25.000.000,00	2
Electricity system reliability and resilience	HORIZON-CL5-2021-D3-02-07	Reliability and resilience of the grid: Measures for vulnerabilities, failures, risks and privacy	IA	7.00 to 8.00	15.000.000,00	2
	HORIZON-CL5-2021-D3-02-08	Electricity system reliability and resilience by design: High-Voltage, Direct Current (HVDC)-based systems and solutions	RIA	7.00 to 8.00	15.000.000,00	2
Transmission of energy	HORIZON-CL5-2021-D3-01-02	Laying down the basis for the demonstration of a Real Time Dem	CSA	Around 1.00	1000000	1
	HORIZON-CL5-2021-D3-02-09	Demonstration of superconducting systems and elpipes	IA	Around 15.00	15000000	1
	HORIZON-CL5-2021-D3-02-10	Demonstration of advanced Power Electronics for application in	IA	Around 5.00	10000000	2
	HORIZON-CL5-2022-D3-01-09	Real Time Demonstrator of Multi-Vendor Multi-Terminal VSC-HVDC with Grid Forming Capability (in support of the offshore strategy)	IA	Around 55.00	55.000.000,00	1

Destination 3-Energy system, grids and storage (y II)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Green digitalisation of the energy system - interoperability and data	HORIZON-CL5-2021-D3-01-01	Establish the grounds for a common European energy data space	IA	Around 8.00	32.000.000,00	4
	HORIZON-CL5-2021-D3-01-03	Interoperability community	CSA	Around 5.00	5.000.000,00	1
	HORIZON-CL5-2021-D3-02-11	Reinforcing digitalisation related know how of local energy ecosystems	CSA	Around 4.00	4.000.000,00	1
	HORIZON-CL5-2022-D3-01-12	Replicable solutions for a cross sector compliant energy ecosystem	IA	8.00 to 9.00	35.000.000,00	4
Energy system planning and operation	HORIZON-CL5-2022-D3-01-08	Supporting the action of consumers in the energy market and guide them to act as prosumers, communities and other active forms of active participation in the energy activities	IA	5.00 to 6.00	18.000.000,00	3
	HORIZON-CL5-2022-D3-01-13	Energy system modelling, optimisation and planning tools	RIA	Around 6.00	6.000.000,00	1
Storage development and integration	HORIZON-CL5-2022-D3-01-10	Interoperable solutions for flexibility services using distributed energy storage	IA	2.00 to 3.00	7.000.000,00	3
	HORIZON-CL5-2022-D3-01-11	Demonstration of innovative forms of storage and their successful operation and integration into innovative energy systems and grid architectures	IA	8.00 to 9.00	25.000.000,00	3
	HORIZON-CL5-2022-D3-01-14	Thermal energy storage solutions	IA	7.00 to 8.00	30.000.000,00	4

Destination 4
Todos los topics

Destination 4
Buildings

Destination 4 – Buildings (I)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Building Energy Efficiency **(BEE)**	HORIZON-CL5-2021-D4-01-01	Advanced energy performance assessment and certification	IA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2021-D4-01-02	Industrialisation of deep renovation workflows for energy-efficient buildings	IA	5.00 to 8.00	16.000.000,00	2
	HORIZON-CL5-2021-D4-01-03	Advanced data-driven monitoring of building stock energy performance	IA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D4-01-01	Demand response in energy-efficient residential buildings	IA	4.00 to 6.00	12.000.000,00	2
	HORIZON-CL5-2022-D4-01-02	Renewable-intensive, energy positive homes	IA	4.00 to 6.00	12.000.000,00	2
	HORIZON-CL5-2022-D4-01-03	Smarter buildings for better energy performance	IA	4.00 to 6.00	12.000.000,00	2

Destination 4 – Buildings (y II)

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Built4People **(B4P)**	HORIZON-CL5-2021-D4-02-01	Demonstrating integrated technology solutions for buildings with performance guarantees (Built4People)	IA	5.00 to 7.50	15.000.000,00	2
	HORIZON-CL5-2021-D4-02-02	Cost-effective, sustainable multi-functional and/or prefabricated holistic renovation packages, integrating RES and including re-used and recycled materials (Built4People)	IA	9.00 to 11.00	22.000.000,00	2
	HORIZON-CL5-2021-D4-02-03	Strengthening European coordination and exchange for innovation uptake towards sustainability, quality, circularity and social inclusion in the built environment as a contribution to the new European Bauhaus (Built4People)	CSA	Around 1.00	1.000.000,00	1
	HORIZON-CL5-2022-D4-02-01	Designs, materials and solutions to improve resilience, preparedness & responsiveness of the built environment for climate adaptation (Built4People)	IA	5.00 to 7.50	15.000.000,00	2
	HORIZON-CL5-2022-D4-02-02	Solutions for the sustainable, resilient, inclusive and accessible regeneration of neighbourhoods enabling low carbon footprint lifestyles and businesses (Built4People)	IA	5.00 to 7.50	15.000.000,00	2
	HORIZON-CL5-2022-D4-02-03	Sustainable and resource-efficient solutions for an open, accessible, inclusive, resilient and low-emission cultural heritage: prevention, monitoring, management, maintenance, and renovation (Built4People)	RIA	4.00 to 5.00	20.000.000,00	4
	HORIZON-CL5-2022-D4-02-04	Smart-grid ready and smart-network ready buildings, acting as active utility nodes (Built4People)	IA	6.00 to 9.00	18.000.000,00	2
	HORIZON-CL5-2022-D4-02-05	More sustainable buildings with reduced embodied energy / carbon, high life-cycle performance and reduced life-cycle costs (Built4People)	IA	6.00 to 9.50	18.000.000,00	2

Buildings and Construction en otros Clusters

Oportunidades inmediatas 2021 WPs

Cluster	Topic Tittle	Budget for the Topic (millon EUR)
4	HORIZON-CL4-2021-TWIN-TRANSITION-01-10: Digital permits and compliance checks for buildings and infrastructure (IA)	15
4	HORIZON-CL4-2021-TWIN-TRANSITION-01-11: Automated tools for the valorisation of construction waste (RIA)	21
4	HORIZON-CL4-2021-TWIN-TRANSITION-01-12: New breakthrough technologies for technological sovereignty in construction (IA)	24

Oportunidades 2022 WPs

Cluster	Topic Tittle	Budget for the Topic (millon EUR)
4	HORIZON-CL4-2022-TWIN-TRANSITION-01-09: Demonstrate the use of Digital Logbook for buildings (IA)	9
6	HORIZON-CL6-2022-CIRCBIO-02-01-two-stage: Integrated solutions for circularity in buildings and the construction sector	21

Destination 4
Industry

Destination 4 – Industry

Area	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Industry	HORIZON-CL5-2021-D4-01-04	Full-scale demonstration of heat upgrade technologies with supply temperature in the range 90 - 160°C	IA	Around 8.00	16.000.000,00	2
	HORIZON-CL5-2021-D4-01-05	Industrial excess (waste) Heat-to-Power conversion based on organic Rankine cycles	IA	10.00 to 14.00	14.000.000,00	1
	HORIZON-CL5-2022-D4-01-04	Development and pilot demonstration of heat upgrade technologies with supply temperature in the range 150-250°C	RIA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D4-01-05	Development of high temperature thermal storage for industrial applications	RIA	3.00 to 4.00	8.000.000,00	2

Destination 2
Convocatorias 2021

Destination 2 – Expected Impact

To contribute to the

Clean and sustainable transition of the energy and transport sectors towards climate neutrality

through:

a. **[Batteries]**

b. Increased efficiency of Europe's **cities' and communities'** energy, resource use and mobility patterns and overall sustainability, thereby improving their climate-resilience and attractiveness to businesses and citizens in a holistic fashion. This also includes improved air and water quality, resilience of energy supply, intelligent mobility services and logistics, liveability and accessibility of cities, public health, comfortable, affordable zero emissions housing as well as the exploitation of relevant technologies and knowledge

c. **[Citizens engagement]**

d. Nurturing the development of **emerging technologies** with high potential to enable zero-greenhouse gas and negative emissions in energy and transport

D2 – Communities and Cities

D2– Communities and Cities – Expected Impacts

To be included once the preparatory phase of the Missions has been concluded

D2 – Breakthrough technologies

D2 – Breakthrough technologies Expected Impacts

The main expected impacts to be generated by topics are:

- Emergence of anticipated 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 EU economy

Breakthrough technologies

4 topics

Area	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Breakthrough technologies	HORIZON-CL5-2021-D2-01-08	Emerging technologies for a climate neutral Europe	RIA	Around 2.50	20.000.000,00	8
	HORIZON-CL5-2021-D2-01-09	Methane cracking to usable hydrogen and carbon	RIA	2.00 to 3.00	15.000.000,00	2
	HORIZON-CL5-2021-D2-01-10	Technologies for non-CO2 greenhouse gases removal	RIA	2.00 to 3.00		2
	HORIZON-CL5-2021-D2-01-11	Direct atmospheric carbon capture and conversion	RIA	2.00 to 3.00		2

Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D2-01-08

Emerging technologies for a climate neutral Europe

RIA

2,5 M€/project

Total budget 20 M€

TRL 4 end of the project

High risk/high return technologies for a transition to a net greenhouse gas neutral EU economy by 2050

Knowledge and scientific proofs of the technological feasibility of the concept

The proposal should establish the technological feasibility of the proposed concept. Address one of the following areas:

- Decarbonised, efficient, effective, and safe transport
- Fuel cells
- Efficient energy generators
- Energy distribution
- Energy storage
- Negative GHG emissions

The following areas should not be covered:

- Material research
- Renewable energy technologies and renewable hydrogen production are addressed under *HORIZON-CL5-2021-D3-02-02: Next generation of renewable energy technologies*
- Batteries

Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D2-01-09

Methane cracking to usable hydrogen and carbon

RIA

2-3 M€/project

Total budget 15 M€

TRL 5 end of the project

Replacement of unabated use of natural gas by hydrogen

Reduction of emissions by hard to decarbonize sectors

Production of economically usable by-product solid carbon (in tires, batteries, etc)

Use of available fossil and renewable methane to economically generate hydrogen without any release of CO_2 or other GHGs (as in current processes)

- Deliver high performance hydrogen production from methane by directly splitting the molecule in its components (hydrogen and solid carbon)
- Deliver a minimum of 50% efficiency (i.e. energy from hydrogen recovery vs energy from original methane)
- Demonstrate the potential to achieve mass production and a competitive hydrogen cost with respect to current methane based, CO_2 releasing hydrogen production methods including carbon capture and storage
- Due consideration to the economic potential of the carbon particles delivered which could have a valuable end-use (e.g. synthetic graphite or carbon black)

Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D2-01-10

Technologies for non-CO2 greenhouse gases removal

RIA

2-3 M€/project

Total budget 15 M€

Investigate techno-economic aspects of technologies and physical properties of emissions striving to match both into market-ready solutions

Present global potential for emission reductions, cost figures and versatility and economic viability of use

Development of technologies for removing non-CO2 greenhouse gases CH4, N2O and fluorinated gases

- Focus on technological concepts at low TRLs (TRL3 or lower)
- Technologies are expected to contribute to the capture, concentration, use and/or disposal of emissions, either from or at natural sources (if more concentrated) or in the atmosphere
- Methane emission from the supply chain of fossil fuels are excluded (addressed through emission avoidance)
- Other emissions with a methane concentration higher than 1% are also excluded, economic interests should drive their mitigation
- CO2 may be considered only if any synergy can be found with processing it in combination with other greenhouse gas(es) which should be the prime focus

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Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D2-01-11

Direct atmospheric carbon capture and conversion

RIA

2-3 M€/project

Total budget 15 M€

TRL 4-5 end of the project

Creating the carbon sinks required to balance out residual emissions in 2050 and/or

Using carbon captured from the air as a raw material to replace other fossil raw materials

Establish this concept as a viable technology to fight climate change

- Increase knowledge of existing/develop new oxygen-tolerant catalysts for photo/electro-reductive conversion of carbonates/carbamates; or
- Develop thermal chemical conversion technologies; or
- Develop photo(electro) chemical conversion technologies

Technological concepts should:

- Combine capture and conversion in a single step, eliminating the need to regenerate absorbents or adsorbents and/or
- Be able to enable decentralized production of chemicals and fuels using solar energy devices

Destination 3
Convocatorias 2021

Destination 3 – Expected Impact

To contribute to

More efficient, clean, sustainable, secure and competitive energy supply

through:

i. Fostering 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

ii. Ensuring cost-effective uninterrupted and affordable supply of energy to households and industries in a scenario of high penetration of variable renewables and other low carbon energy supply. This includes more efficient approaches to managing **smart and cyber-secure energy grids** and optimization the interaction between producers, consumers, networks, infrastructures and vectors

iii. 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)

D3 - Renewables

D3 – Renewable technologies Expected Impacts

The main expected impacts to be generated by topics are:

a. Disruptive renewable energy and renewable fuel technologies and systems will be available in 2050 in order to accelerate the replacement of fossil-based energy technologies

b. Reduced cost and improved efficiency of renewable energy and renewable fuel technologies and their value chains

c. De-risking of renewable energy and fuel technologies with a view to their commercial exploitation and net zero greenhouse gas emissions by 2050

d. Better integration in energy consuming sectors

e. Reinforced scientific basis and export potential for renewable energy technologies through international collaboration (notably with Africa and enhanced collaboration with Mission Innovation countries)

f. Enhanced sustainability of value chains, taking fully into account social, economic and environmental aspects

g. More effective market uptake

Ocean Energy

1 topic

Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
HORIZON-CL5-2021-D3-02-01	Demonstration of wave energy devices to increase experience in real sea condition	IA	Around 15.00	15.000.000,00	1
HORIZON-CL5-2021-D3-03-10	Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices	RIA	Around 3.50	10.000.000,00	3
HORIZON-CL5-2022-D3-01-07	Demonstration of innovative rotor, blades and control systems for tidal energy devices	IA	Around 10.00	10.000.000,00	1

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-01

Demonstration of wave energy devices to increase experience in real sea condition

IA

15 M€/project

Total budget 15 M€

Clearly justify estimated LCOE at project start and end

Demonstrate how the project will get a financial close for the whole action

- Demonstrate wave energy devices in real sea conditions for long periods, providing learnings regarding performance, reliability, maintainability, survivability and environmental impact
- On-shore testing (to reduce risks) of key subsystems prior to any at-sea deployment of complete devices. Finalise dry testing in the 1st year
- Industrial design and manufacturing processes, circularity of (critical) raw materials, scalability, installation methods, transport, operation, maintenance, supply chains
- Projects requested to demonstrate the technologies at sea while respecting existing environmental regulatory framework

The project has to include a clear go/no go moment ahead of entering the deployment phase

Photovoltaics

1 topic

Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
HORIZON-CL5-2021-D3-02-04	Novel tandem, high efficiency Photovoltaic technologies targeting low cost production with earth abundant materials	RIA	Around 5.00	20.000.000,00	4
HORIZON-CL5-2021-D3-03-07	Stable high performance Perovskite Photovoltaics	RIA	Around 5.00	15.000.000,00	3
HORIZON-CL5-2021-D3-03-10	Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices	RIA	Around 3.50	10.000.000,00	3
HORIZON-CL5-2021-D3-03-13	Demonstration pilot lines for alternative and innovative PV technologies (Novel c-Si tandem, thin film tandem, bifacial, CPV, etc.)	IA	Around 15.00	45.000.000,00	3
HORIZON-CL5-2022-D3-01-03	Advanced manufacturing of Integrated PV	IA	Around 16.00	32.000.000,00	2
HORIZON-CL5-2022-D3-01-06	Novel Agro-Photovoltaic systems	IA	Around 5.00	10.000.000,00	2
HORIZON-CL5-2022-D3-03-05	Novel Thin Film (TF) technologies targeting high efficiencies	RIA	Around 5.00	20.000.000,00	4
HORIZON-CL5-2022-D3-03-09	Recycling end of life PV module	IA	6.00 to 7.00	20.000.000,00	3

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-04

Novel tandem, high efficiency Photovoltaic technologies targeting low-cost production with earth abundant materials

RIA

5 M€/project

Total budget 20 M€

TRL 5 end of the project

Increase the potential of tandem technologies with earth abundant materials for mass production at low manufacturing cost

Minimise the impact of PV on landscape and environment by increasing its energy yield/m2

Tandem-junction cell architectures present a path towards higher module efficiencies over single-junction designs because of the ability to absorb more efficiently the different wavelengths of the solar spectrum

Develop tandem cells and modules that will reach efficiencies > 30%, offer the same lifetime and degradation rate as standard crystalline panels at only marginally higher cost

- Develop novel concepts based on earth abundant materials
- Perform device/module real-life (under actual outdoor operating conditions) characterization for reliability and energy yield assessment
- Perform a life cycle analysis to bring evidence of the lower environmental impact, better resource efficiency than current commercial PV technologies

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- Educational – 1 topic
- Market uptake – 1 topic

Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
HORIZON-CL5-2021-D3-02-02	Sustainability and educational aspects for renewable energy and fuel technologies	CSA	Around 2.50	10.000.000,00	4
HORIZON-CL5-2021-D3-02-03	Market Uptake Measures of renewable energy systems	CSA	Around 2.00	10.000.000,00	5

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-02

Sustainability and educational aspects for renewable energy and renewable fuel technologies

CSA

2,5 M€/project

Total budget 10 M€

Development of training and reskilling efforts in the renewable energy and fuel technology sectors

Engage with stakeholders at different levels (policymakers, regulators, innovators, industry, trade associations, universities and local communities)

Promote circularity concepts

Sustainability is meant in environmental, social and economic terms. Address all the following aspects:

- Coordinate the stakeholder community and propose concrete actions to promote and accelerate the development of sustainable solutions for renewable energy and fuel technologies
- Set up and initiate a structured programme to promote a multi-disciplinary approach on teaching and engaging with the sustainability of all forms of renewable energy. Actively engage with European universities
- Develop and run an industry-academia programme focused on hands-on training

Effective contribution of Social Sciences and Humanities disciplines and the involvement of SSH experts

Deadline: 5 Jan. 2022

CSA

2 M€/project

Total budget 10 M€

Wider uptake of renewable energy systems in the energy, industrial and residential sectors

Increase societal acceptance of renewable energy facilities

HORIZON-CL5-2021-D3-02-03

Market Uptake measures of renewable energy systems

Develop solutions for the entire renewable energy market or focusing on a specific energy sector, such as electricity, heating, cooling or renewable fuels.

Aspects that can be addressed:

- Specific geographical issues, such as urban or peri-urban areas
- Acceptance of RES technologies due to cultural heritage particularities
- Self-consumption issues
- International collaboration and promising solutions in new markets
- Can address a local challenge but need to have wide potential for reapplication
- The consortia have to involve and/or engage relevant stakeholders (e.g., businesses, public authorities, civil society organisations) and market actors committed to adopting/implementing the results
- Assess legal, institutional and political frameworks as a barrier or an enabler

D3 - Energy systems, grids and storage

D3 – Energy systems, grids and storage Expected Impacts

The main expected impacts to be generated by topics are:

a. Increased resilience of the energy system based on improved and/or new **technologies to control the system and maintain system stability** under difficult circumstances

b. Increased flexibility and resilience of the energy system, based on **technologies and tools to plan and operate different networks for different energy carriers** simultaneously on a coordinated manner that will also contribute to climate neutrality of hard-to-electrify sectors

c. 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)

d. Improved **energy storage technologies**, in particular heat storage but also others such as electrochemical, chemical, mechanical and electrical

e. Foster the EU market for **new energy services and business models** as well as tested standardized and open interfaces for 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

f. More effective and efficient solution for transporting off-shore energy thanks to **new electricity transmission technologies**, in particular using superconducting technologies, power electronics and hybrid AC-DC grid solutions as well as Multi Terminal High Voltage Direct Current solutions

- Energy sector integration – 1 topic
- Flexibility management – 1 topic

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Energy Sector Integration	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	9.00 to 10.00	30.000.000,00	3
Flexibility management	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	Around 8.00	25.000.000,00	2

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-05

Energy sector integration: integrating and combining energy systems to a cost-optimized and flexible energy system of systems

IA

9-10 M€/project

Total budget 30 M€

TRL 6-8 end of the project

Sector integration in different geographic, climate and economic conditions

Improved planning of integration of power, heat, gas, industry with a production site(s) of renewable energy

Sector coupling testing in large demonstration projects

Evaluate the impacts on OPEX, CAPEX

Develop 2 or 3 pilots that demonstrate solutions for energy system integration, based on integrated management of various networks and infrastructures:

- Electricity and gas networks
- District heating and cooling
- Long term energy storage systems (e.g. Hydrogen, power-to-X, thermal storage, hydro-storage)
- Mobility systems (e.g. e-mobility infrastructure)
- Energy-intensive industry and/or industrial clusters or sites

Projects should develop innovative tools for:

- Environmental impact and social acceptance
- System planning toolboxes to determine the optimal sizing, location and distribution of energy storage systems
- Ageing models' definition for several storage technologies

Deadline: 5 Jan. 2022

IA
8 M€/project
Total budget 25 M€
TRL 7-8 end of the project

New business models for market parties based on energy services and revenue streams for consumers

Enable market parties to provide flexibility services to network operators and the wholesale market

Enable TSOs and DSOs to develop markets for flexibility

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)

Test and develop further already demonstrated solutions for data-driven **energy services for consumers**, in cooperation with various actors (such as prosumers, aggregators, TSOs, DSOs, owners of assets that can provide flexibility like batteries, heating/cooling systems, charging point operators, gas systems)

- Replicate them in as many different geographies as possible, with different system needs, consumer needs, economic conditions or different climates
- Integrate energy services with other services for citizens and/or consumers (e.g. health, safety, mobility)

Electricity system reliability and resilience

2 topics

Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
HORIZON-CL5-2021-D3-02-07	Reliability and resilience of the grid: Measures for vulnerabilities, failures, risks and privacy	IA	7.00 to 8.00	15.000.000,00	2
HORIZON-CL5-2021-D3-02-08	Electricity system reliability and resilience by design: High-Voltage, Direct Current (HVDC)-based systems and solutions	RIA	7.00 to 8.00	15.000.000,00	2

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-07

Reliability and resilience of the grid: measures for vulnerabilities, failures, risks and privacy

IA

7-8 M€/project

Total budget 15 M€

TRL 5-6 end of the project

Increased energy system reliability and resilience following disturbances such as faults, cyberattacks, terrorism or similar at all levels (infrastructure, hardware, software, organizational, etc)

Include all of the following 4 points:

- Demonstration of measures to minimize TSO and DSO risks, vulnerabilities of priority strategies and measures against nature and man-made hazards, terrorism, climate-related extreme events, weather, migration, etc for:
  - Substation systems security and design
  - HV, MV, LV grid infrastructures
  - Automatic control of decentralized flexibility solutions
  - Events resulting in cascading failures, their mitigation and prevention
- Application of advanced information technologies (e.g. probabilistic safety assessment, quantitative risk analysis) in system development, operation and asset management
- Application of digital technologies for ensuring operational data quality and demand patterns recognition
- Development of shared knowledge basis, not only for components but for entire system and energy system technologies

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-08

Electricity system reliability and resilience by design: High-Voltage, Direct Current (HVDC)-based systems and solutions

RIA

7-8 M€/project

Total budget 15 M€

TRL 5-6 end of the project

HVDC interconnections as a firewall blocking the spread of disturbances

Buried HVDC cables reduce the visual impact and improves the social acceptance compared to the classical AC overhead lines

Development of large HVDC based transmission grid infrastructures capable of integrating the future large amount of renewable energy. Demonstrate the reliability and resilience through HVDC interconnections integrated in the AC grid. Address at least two of the following topics:

- Grid architecture concepts using HVDC (e.g. multi terminal, hub operation, etc)
- Real-time monitoring of the system stability and vulnerability
- Impact on the overall transmission system reliability with the HVDC link
- Technical-economic benefits of the HVDC interconnection with the firewall funct.
- Simulation, real time demonstration of the avoidance of cascading effects
- Simulation, real time demonstration of the use of HVDC-connected RES
- Impact on system reliability of an increasing number of HVDC links
- Use of HVAC fault location and monitoring systems for cables in HVDC
- Novel pre-fault monitoring systems for the evaluation of status of HVDC cables
- New dielectric materials for the insulation of HVDC cables and accessories
- Highly reliable design and manufacturing of HVDC cables and accessories

Transmission of energy

4 topics

Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
HORIZON-CL5-2021-D3-01-02	Laying down the basis for the demonstration of a Real Time Dem	CSA	Around 1.00	1000000	1
HORIZON-CL5-2021-D3-02-09	Demonstration of superconducting systems and elpipes	IA	Around 15.00	15000000	1
HORIZON-CL5-2021-D3-02-10	Demonstration of advanced Power Electronics for application in	IA	Around 5.00	10000000	2
HORIZON-CL5-2022-D3-01-09	Real Time Demonstrator of Multi-Vendor Multi-Terminal VSC-HVDC with Grid Forming Capability (in support of the offshore strategy)	IA	Around 55.00	55.000.000,00	1

Deadline: 19 Oct. 2021

CSA

1 M€/project

Total budget 1 M€

De-risk the technology to enable the installation in Europe of the first Multi-Vendor Multi-Terminal HVDC system with Grid forming capability

Advanced grid management capabilities and the deployment of the offshore grid

HORIZON-CL5-2021-D3-01-02

Laying down the basis for the demonstration of a Real Time Demonstrator of Multi-Vendor Multi-Terminal HVDC with Grid forming capability: Coordination Action

Preparatory tasks among all stakeholders (HVDC systems manufacturers, TSOs, wind turbine manufacturers and windfarm developers). Focus on offshore grid application. Detailed planning for the full-scale industrial demonstrator

- Coordination and organization of a platform involving all stakeholders
- Compatibility of modelling tools towards interoperability
- Model sharing between TSOs: legal framework
- Roles and responsibilities on interoperability issues

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-09

Demonstration of superconducting systems and elpipes

IA

15 M€/project

Total budget 15 M€

TRL 8 end of the project

Test and validate the transmission of bulk power not achievable with current cable technologies

Use of different superconductor technologies with different cooling medium, power rating and lengths

Superconducting Transmission Lines (SCTL) main advantages are higher transmission efficiency and ability to use lower operating voltages.

Elpipes (polymer-insulated underground HVDC conductors) to transfer massive capacities in identified corridors.

- Demonstration of up to +- 100 kV, up to 1 GW power, superconducting system up to 5 km onshore
- Demonstration of +- 100 kV, up to 1 GW power, superconducting system up to 100 km offshore
- Demonstration of a SCTL based on MgB2 LH2 cooled, for DC with a length up to 1 km and above onshore
- Cable design and simulation of kA range defaults, loss calculation
- Technical-economic benefits of the SCTL compared with traditional
- Investigate the feasibility and applicability of elpipes with technical economic analysis, use cases, etc

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-10

Demonstration of advance Power Electronics for application in the energy sector

IA

5 M€/project

Total budget 10 M€

TRL 5-6 end of the project

WBG semiconductors enable higher power density, operation voltages, temperatures and frequencies while reducing heat dissipation

Reduced size of components and equipment for offshore/onshore applications

Reduced cost of WBG semiconductors

Produce, test and validate wide bandgap-based (WBG) semiconductors such as Silicon Carbide (SiC) for converter station application

- Production of SiC based semiconductors for HVDC-MVDC converter applications
- Converter board design and production (soldering of components, HW/SW testing, etc)
- Simulation and analysis of the impact of the actual passive components used in WBG components circuitry in the mentioned conditions
- Analysis of the impact of fast transients from power electronics on other electrical components
- Series modules assembly for converter application
- Simulation and real time testing and validation of the converter with WBG-based switching semiconductor
- Technical-economic assessment of the benefits of WBG-based compared to Silicon-based switching semiconductor of converters

Deadline: 26 April 2022

HORIZON-CL5-2022-D3-01-09

Real time demonstrator of Multi-Vendor Multi-Terminal VSC-HVDC with grid forming capability (in support of the offshore strategy)

IA
55 M€/project
Total budget 55 M€
TRL 6-7 end of the project

New way of framing the energy system architecture and topology

Pave the way to the exploitation of the offshore RES and grid

Involvement of all stakeholders (HVDC system manufacturers, TSOs, wind turbine manufacturers, offshore wind farm developers)

HVDC system will guarantee at least the following capabilities or better:

- Independent and full control over the active and reactive power
- Provide support to weak AC systems
- Power flow reversal without the need of reversing the voltage polarities
- Excellent response to AC faults
- Black start capabilities

These include, but are not limited to:

- Requirements for multi-vendor converter capabilities in all connection points
- Evaluation of technological challenges of placing MT-HVDC systems at subsea
- Demonstrator connected to the AC grid with at least 3 terminals
- Address grid codes and standardisation for all European operators
- Regulatory framework analysis
- etc

Green digitalisation of the energy system, interoperability and data

4 topics

Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
HORIZON-CL5-2021-D3-01-01	Establish the grounds for a common European energy data space	IA	Around 8.00	32.000.000,00	4
HORIZON-CL5-2021-D3-01-03	Interoperability community	CSA	Around 5.00	5.000.000,00	1
HORIZON-CL5-2021-D3-02-11	Reinforcing digitalisation related know how of local energy ecosystems	CSA	Around 4.00	4.000.000,00	1
HORIZON-CL5-2022-D3-01-12	Replicable solutions for a cross sector compliant energy ecosystem	IA	8.00 to 9.00	35.000.000,00	4

Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D3-01-01

Establish the grounds for a common European energy data space

IA
8 M€/project
Total budget 32 M€
TRL 5-7 end of the project

Enable new market roles, market participants and energy communities

Enable new digital solutions and services supporting the energy transition

Participation of consumers on data sharing for energy services

Develop, validate, demonstrate an Energy Data Space that enables access to and use of energy data, with the following features:

- Interfaces for the exchange of information and interoperable open standards
- Connect and make accessible as much data as possible covering the full energy value chain
- Support the ability to accommodate Digital Twins at different levels of the grid
- Create a marketplace for data-driven energy services that are attractive for consumers and operators
- Protection of personal data, cybersecurity and data rights (e.g. right for a fair remuneration) are to be considered

Effective contribution of Social Sciences and Humanities disciplines and the involvement of SSH experts

Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D3-01-03
Interoperablity community

CSA
5 M€/project
Total budget 5 M€

Increased interoperability of energy services, data and platforms, both at the function and business layers of the Smart Grid Architecture Model

Support and disseminate a common framework for testing interoperability across running projects. Harmonise interoperability testing procedures

- Support a community of practice that keeps track and maintains an expertise around changes in requirements, emerging use cases and regulatory condition
- Development of IT/ICT, evolution of standards
- Create a repository of best practices and use cases
- Develop an Interoperability Maturity Model
- Establish a cross-fertilization of existing regional testing infrastructures, explore best practice of local sand-boxing
- The networks should agree on a common testing methodology and a common test reporting methodology

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-11

Reinforcing digitalization related know how of local energy ecosystems

CSA
4 M€/project
Total budget 4 M€

Increased autonomy of local ecosystems to participate in the decentralization of energy systems

Cover the gap on knowledge around digitalization of energy services

Create an upskilling and reskilling training program on the digitalization of energy and covering needs of local ecosystems centred on DSOs, city operators, connected active consumers (energy communities or potential new entrants) and local/regional authorities

- Contribute to capacity building of energy community members
- Establish a cluster organization at local level for energy relevant digital technologies such as Artificial Intelligence, Internet of Things, cybersecurity, big data, edge computing, data communication or blockchain
- Extensive training in all Member States/Associated Countries

Effective contribution of Social Sciences and Humanities disciplines and the involvement of SSH experts

Deadline: 26 April 2022

HORIZON-CL5-2022-D3-01-12

Replicable solutions for a cross sector compliant energy ecosystem

IA
8-9 M€/project
Total budget 35M€
TRL 6-7 end of the project

Catalogue of services of appliances tailor-made for specific consumer groups

Increase participation of energy consumers in demand side flexibility markets

Promote the adoption and usage of connected interoperable **energy smart home appliances** (including EV charging and home storage) in order to accelerate the deployment of demand-side flexibility services, reduce the entry barriers and facilitate replication

- Identify a set of open standards for minimum interoperability to enable energy smart appliances and solutions to participate in demand side flexibility
- Solutions initially developed in a pilot in one country will have to be tested in real life in at least two other countries, with different energy constraints
- Open to all stakeholders: utilities, ESCO/aggregators, appliances manufacturers, energy cooperatives, retailers owing buildings (heating/cooling) in many cities, office buildings with EV chargers, water treatment plants, schools, etc
- Support the proliferation of energy services markets, easily tailored to the type or need of users
- Solutions expected to adapt digital technologies to the specificities and requirements of the energy system (AI, Big Data, IoT….)

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D3 - Carbon capture, utilisation and storage (CCUS)

D3 – Carbon capture, utilisation and storage Expected Impacts

The main expected impacts to be generated by topics are:

a. Accelerating rollout of infrastructure for CCUS hubs and clusters

b. Updated authoritative body of knowledge on connecting industrial CO2 sources with potential bankable storage sites, providing greater confidence for decision makers and investors

c. Proven feasibility of integrating CO2 capture, storage and use in industrial facilities. Demonstrating these technologies at industrial scale shall pave the way for subsequent first-of-a-kind industrial projects

d. Reduced costs of the CCUS value chain, with CO2 capture being still the most relevant stumbling block for a wider application of CCUS

e. Adequate frameworks for Measurement, Monitoring and Verification (MMV) for storage projects, to document safe storage and for public acceptance of the technology

Carbon capture, utilisation and storage

3 topics

Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
HORIZON-CL5-2021-D3-02-12	Integration of CCUS in hubs and clusters, including knowledge sharing activities	CSA	Around 2.00	2.000.000,00	1
HORIZON-CL5-2021-D3-02-13	Cost reduction of CO2 capture (new or improved technologies)	RIA	10.00 to 15.00	30.000.000,00	2
HORIZON-CL5-2022-D3-01-15	Decarbonising industry with CCUS	IA	Around 29.00	58.000.000,00	2

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-12

Integration of CCUS in hubs and clusters, including knowledge sharing activities

CSA
2 M€/project
Total budget 2 M€

Enable the roll-out of a CCUS infrastructure consisting of capture points and clusters, intermediate hubs, CO2 conversion facilities, safe and cost-effective CO2 transport and storage

Comprehensive information on the integration of CCUS in high emission industrial hubs and clusters shall facilitate the development of operational sites

- Elaboration of detailed plans for the integration of CCUS in hubs and clusters linked to CO2 storage sites via hubs, pipeline networks and shipping routes
- Identification of transport corridors
- Developing local business models for delivery of CO2 capture, transport, utilization and/or storage
- Industrial clusters may include for example power generation, cement and steel factories, chemical plants, refineries, waste-to-energy plants and hydrogen production facilities
- Assessment of cost-effective (bankable) storage capacity
- Sites for onshore or offshore storage

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-13

Cost reduction of CO2 capture (new or improved technologies)

RIA

10 M€/project

Total budget 30 M€

TRL 6 end of the project

Assessment of the societal readiness

Identify and involve end users and societal stakeholders (civil society organisations, non-governmental org. and local associations)

Commercial deployment of CCUS requires a significant reduction of the energy intensity of the CO2 capture process for power plants and other energy-intensive industries, and a substantial decrease of the cost of capture

- Pilot demonstration of advanced CO2 capture technologies with high potential for increasing capture rates and efficiency
- Test operating conditions, prove the reliability and cost-effectiveness
- Evaluate the cost, technical requirements and operational and safety impacts on the industrial facility and associated transport and storage infrastructure
- State targets and KPIs for the energy penalty reduction, the capture rate and the capital and operating costs of the capture process
- Environmental impact in view of future scaling up

Deadline: 26 April 2022

HORIZON-CL5-2022-D3-01-15

Decarbonising industry with CCUS

IA

29 M€/project

Total budget 58 M€

TRL 7-8 end of the project

Successful, safe and economic demonstration of CCUS from relevant industrial sources for subsequent first-of-a-kind industrial projects

Areas with a sufficient concentration of CO2 emitting industries are prime sites for hub and cluster developments and expected to generate the highest impact

CCUS promising technology to reduce CO2 emissions in industries that generate CO2 as part of their production processes (steel, iron, cement, oil refining, gas processing, hydrogen and biofuel production and waste-to-energy plants)

- Demonstrate the integrated chain of CO2 capture technologies in industrial facilities with the perspective of geological storage and/or use
- Detailed plan on how to use the results, i.e., subsequent transport, utilization and/or underground storage of the captured CO2
- Address technical (e.g., integration of capture plant with industrial processes), safety (e.g., during transportation and storage), financial (e.g., cost of capture and integration) and strategic (business models, industrial clusters) aspects
- Operational, environmental, technical and economic KPIs
- End users and stakeholders (civil society/local associations, NGOs) involved in deliberative activities to address their concerns and needs

D3 - Cross-cutting issues

Cross-cutting issues

2 topics

Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
HORIZON-CL5-2021-D3-02-14	Support to the activities of the European Geological Services	CSA	Around 20.00	20.000.000,00	1
HORIZON-CL5-2021-D3-02-15	Support to the activities of the ETIPs and technology areas of the SET-Plan	CSA	Around 1.00	9.800.000,00	10

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-14

Support to the activities of the European Geological Services

CSA

20 M€/project

Total budget 20 M€

A body of knowledge with geoscientific information

Filling currently existing gaps in data and information

Create a network of National Geological Survey organisations

Need for uniform appraisal of subsurface capacities for CO2 sequestration and temporary storage of energy carriers (hydrogen, heat/cold)

- Re-evaluation of EU resources in primary raw materials and mining waste
- Developing a database with FAIR and harmonized data on mineral resources and reserves
- Developing an EU International Centre of Excellence on Sustainable Resource Management
- Building and maintaining a European geothermal resources database
- Deploying and maintaining a European storage atlas for CO2 and sustainable energy carriers like hydrogen and compressed air
- Monitoring and evaluation of groundwater dynamics and groundwater quality

Deadline: 5 Jan. 2022

HORIZON-CL5-2021-D3-02-15

Support to the activities of the ETIPs and technology areas of the SET-Plan

CSAs

Around 1 M€/project
Total budget 9,8 M€

Engagement of stakeholders

More interconnected activities, in terms of contents and implementation mechanisms

Links with national authorities

ETIPs are the European Technology and Innovation Platforms. SET-Plan is the Strategic Energy Technology Plan, organized in Implementation Working Groups (IWGs)

- Support ETIPs and/or IWGs and/or stakeholders fora, policy priorities
- ETIPs, IWGs and stakeholders' fora should ensure the participation of companies, research and civil society, universities and associations
- Develop and implement outreach approaches and societal engagement
- Effective contribution of Social Sciences and Humanities disciplines
- Proposals should address one of the following sectors: carbon capture storage and use, geothermal systems, hydropower, ocean energy, photovoltaics, renewable fuels & bioenergy, concentrated solar thermal energy (CSP&STE), renewable heating and cooling, wind energy, energy efficiency in industry, energy efficiency in buildings

Destination 4
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Destination 4 – Expected Impact

To contribute to

Efficient and sustainable use of energy, accessible for all

through:

a. 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

b. Increased energy efficiency in **industry** and reducing industry's Greenhouse Gas and air pollutant emissions through recovery, upgrade and/or conversion of industrial excess (waste) heat and through electrification of heat generation

D4 – Buildings (BEE)

D3 – Buildings Expected Impacts

Topics targeting **energy efficiency in buildings** to achieve the impacts:

- More energy efficient building stocks supported by an accurate understanding of buildings performance and of related evolutions
- Building stocks that effectively combine energy efficiency, renewable energy sources and digital and smart technologies

Topics contributing to the **Built4People Partnership** to achieve the impacts:

- Higher buildings' performance with lower environmental impacts through increased rates of holistic renovations
- Higher quality, more affordable built environment preserving climate, environment and cultural heritage and ensuring better living conditions

Building Energy Efficiency

3 topics

Subarea	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Building Energy Efficiency **(BEE)**	HORIZON-CL5-2021-D4-01-01	Advanced energy performance assessment and certification	IA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2021-D4-01-02	Industrialisation of deep renovation workflows for energy-efficient buildings	IA	5.00 to 8.00	16.000.000,00	2
	HORIZON-CL5-2021-D4-01-03	Advanced data-driven monitoring of building stock energy performance	IA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D4-01-01	Demand response in energy-efficient residential buildings	IA	4.00 to 6.00	12.000.000,00	2
	HORIZON-CL5-2022-D4-01-02	Renewable-intensive, energy positive homes	IA	4.00 to 6.00	12.000.000,00	2
	HORIZON-CL5-2022-D4-01-03	Smarter buildings for better energy performance	IA	4.00 to 6.00	12.000.000,00	2

Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D4-01-01

Advanced energy performance assessment and certification

IA

3-5 M€/project

Total budget 10 M€

TRL 6-7 end of the project

Improved and automated monitoring of energy performance of buildings

More reliable understanding of energy and environmental performance in early stage of the building life cycle, across countries

The proposal should:

- Develop more reliable, cost-effective and highly replicable energy performance calculation methods, addressing aspects like well-being, indoor air quality and comfort, acoustics, water consumption
- Demonstrate how data from smart sensors can be included in assessments in a dynamic way
- Ensure the proposed solutions build on the results of previous projects on building performance and allow for synergies with other instruments (Smart Readiness Indicators, …)
- Include a clear business case and exploitation strategy, as well as demonstration activities (at least 3 demo use cases) of adequate scale

Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D4-01-02

Industrialisation of deep renovation workflows for energy-efficient buildings

IA
5-8 M€/project
Total budget 16 M€
TRL 8 end of the project

Improvement in productivity of construction and renovation processes: 30% waste reduction, 30%-50% reduction of work time, 25% costs reduction

Upskilled workforce and enhanced safety

Tailored business models generating economies of scale for renovation

The proposal should:

- Industrialised deep renovation, covering the whole workflow from design to offsite manufacture, installation, maintenance, operation and end of life
- Integration with digital technologies (Building Information Modelling, digital twins, etc)
- Use of robotic systems and automation
- Application at neighbourhood and district level, optimizing use shared resources (heating and cooling, renewable energy, energy storage)
- Lead at least 3 large-scale demonstrations for a variety of buildings types representative of the European building stock

Deadline: 19 Oct. 2021

IA
3-5 M€/project
Total budget 10 M€
TRL 8 end of the project

More robust, improved monitoring of performance (energy and other aspects) of buildings

Better informed planning of building infrastructure (e.g., renovation roadmaps, heating and cooling, district heating, mobility infrastructures, parking facilities)

Better informed investment decision-making for designing future buildings

HORIZON-CL5-2021-D4-01-03

Advanced data-driven monitoring of building stock energy performance

The proposals should:

- Enhance the collection and quality of energy and related data (heating, ventilation and air-conditioning, indoor environment quality, lighting, other appliances) through various sources (manufacturers' data, Building Information Modelling and digital twin models, sensors)
- Build on interoperability and cloud-based solutions
- Develop new or enhance existing open source data analytics dashboards and prediction tools
- Demonstrate real use cases with business potential (e.g., smart energy services) valorising high quality building performance data e.g., to accurately monitor energy consumption and production across different fuels

D4 - Industry

D4 – Industry Expected Impacts

Topics focus on thermal energy management in industry

The bulk of R&I activities related to industry is supported under Cluster 4 “Digital, Industry and Space”

Industry

2 topics

Area	Topic	Topic title	Type of action	Indicative project budget	Total Budget	Expected number of grants
Industry	HORIZON-CL5-2021-D4-01-04	Full-scale demonstration of heat upgrade technologies with supply temperature in the range 90 - 160°C	IA	Around 8.00	16.000.000,00	2
	HORIZON-CL5-2021-D4-01-05	Industrial excess (waste) Heat-to-Power conversion based on organic Rankine cycles	IA	10.00 to 14.00	14.000.000,00	1
	HORIZON-CL5-2022-D4-01-04	Development and pilot demonstration of heat upgrade technologies with supply temperature in the range 150-250°C	RIA	3.00 to 5.00	10.000.000,00	2
	HORIZON-CL5-2022-D4-01-05	Development of high temperature thermal storage for industrial applications	RIA	3.00 to 4.00	8.000.000,00	2

Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D4-01-04

Full scale demonstration of heat upgrade technologies with supply temperature in the range 90-160ºC

IA

8 M€/project

Total budget 16 M€

TRL 7-8 end of the project

Demonstration at full scale (0.5-10 MWth) of industrial heat upgrade systems to supply industrial processes with useful heat in the temperature range of 90-160 ºC, extracted from renewable sources (e.g., solar thermal), ambient heat or industrial excess (waste) heat

Demonstration of business models and contractual arrangements

To satisfy the need for low temperature heat in the relevant industrial sectors by upgrading lower temperature heat flows.

All development areas need to be covered:

- Identify the target industrial processes which would benefit from this technology, as excess (waste) heat sources and as users (heat sinks)
- Integration and long-term full-scale demonstration of the system in an industrial application in at least one industrial sector
- Technical and economical life cycle assessment of heat upgrade systems adapted for at least 4 industrial sectors
- Assess the potential impact in CO2 emissions reduction and energy savings

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Deadline: 19 Oct. 2021

HORIZON-CL5-2021-D4-01-05

Industrial excess (waste) Heat-to-Power conversion based on organic Rankine cycles

IA

10-14 M€/project

Total budget 14 M€

TRL 6-7 end of the project

Better use of process excess/waste heat represents a significant source of energy savings for industry

Conversion of excess heat back to electricity mitigates the increase of electricity consumption due to industrial electrification and reduces the load on the power grids

Integrate an industrial excess heat-to-power system based on Organic Rankine cycle (ORC) and demonstrate the system operation in industrial environment at an output level of at least 2 MW.

All development areas need to be covered:

- Optimisation of thermal cycles and mixtures of fluids or additives for different temperature levels of recovered heat
- Development/improvement of materials and components: heat exchangers, turbomachinery, waste heat recovery unit, power generator and electronics
- Integration and demonstration of the system in an industrial environment
- Technical and economical life cycle assessment of heat-to-power systems adapted for at least 4 energy intensive industrial sectors
- Evaluation of the potential impact in terms of primary energy savings in industry (heat recovery) and in the power generation sector

Información de interés

- **Webinars de la Comisión Europea**
  - How to prepare a successful proposal in Horizon Europe (24 Marzo 2021)
  - A successful proposal for Horizon Europe: Scientific-technical excellence is key, but don't forget the other aspects (21 Abril 2021)
  - The Funding & tenders Portal for beginners (27 Mayo 2021)
  - Dissemination, Communication and Exploitation (9 Junio 2021)

- **InfoDay Nacional Clúster 5 (12 Mayo 2021)**
  https://eventos.cdti.es/ES/JornadaHorizonteEuropaCluster5

- **InfoDay Comisión Clúster 5 (5-6 Julio ?????)**

- **Otros eventos => CCAAs, Plataformas Tecnológicas, ….**

Conclusiones

- Cluster 5 Energía => Destination 3, Destination 4 y parte Destination 2
- WP Cluster 5 + WP JTI CHE + Co-funds + WP Cities Mission
  Draft WP Cluster 5
- Publicación versión final WP Cluster 5 prevista en Junio

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