

# FTP CALL TOPICS MANUAL HORIZON EUROPE 2023-2024

The complete manual for the Call topics relevant for  
the wood working sector



Version 1.0 – 16/12/2022

Forest-based Sector  
Technology Platform



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## Introduction

Horizon Europe (2021-2027) with its dedicated budget of around €95 billion is the biggest EU Research and Innovation programme ever.

Horizon Europe is structured into three main Pillars. The first pillar focuses on the funding of excellent science through the European Research Council and the Marie Skłodowska-Curie grants programme. It also funds European research infrastructures, like CERN.

Pillar II addresses global challenges and the competitiveness of the European industry. Pillar II is divided into 6 thematic sub-budgets that are called Clusters.

Pillar III focuses on innovation and acts mainly through the European Innovation Council and the European Institute of Technology.

For the stakeholders of the Forest-based sector Technology Platform (FTP), the most relevant funding opportunities are found under Pillar II, Clusters 4, 5 and 6. There are funding opportunities under Pillar I and Pillar III too, but the Calls are not included in this document.

Cluster 4 is called 'Digital, Industry and Space', Cluster 5 is called 'Climate, Energy and Mobility', and Cluster 6 has the rather long title 'Food, Bioeconomy, Natural Resources, Agriculture and Environment'. Each Cluster has a budget for specified topics to be funded, called a Work Programme. They describe hundreds of Call Topics (calls for proposals) for a period of two, or sometimes three years.

There is also something called European Missions, for instance the European Mission on Soil Health. Missions have a separate Work Programme and some topics in this manual relates to this Work Programme.

Another special group of exceptions are the European Partnerships. The reader will see that we refer to some of them, e.g. Built4People Partnership, and Circular Biobased Europe JU (CBE JU) in this document. Some of the Partnerships, e.g. CBE JU, will have their own Work Programmes and are not available yet. Future Calls will have to be published separately.

### **FTPs Call Topic Manual covers the relevant Call Topics of the 2023-2024 Work Programmes for Clusters 4, 5 and 6 and European Missions and Partnerships**

The Horizon Europe budget is distributed by competitive Calls for Proposals. This means that in order to get money from the programme, applicants must submit proposals that will be evaluated and scored by external experts. This is a competition and only the best scoring proposals will be funded under each Call Topic/Call for Proposals.

The proposals, if they are funded, are annexed as part of the contract between the applicants and the European Commission. A proposal could be compared to a business plan of a start-up company. If the proposals are funded or not will depend on how they are ranked in the evaluation by independent experts. The scoring is based on three main criteria; **Excellence** (how ambitious is the proposal, is the idea sound, is the proposal actually covering the scope of the Call, etc), **Impact** (how will the outcomes of the project contribute to the objectives of the Call and relevant EU objectives), and **Quality and efficiency of the implementation** (is the project well planned in terms of budget, are all the reports and deliverables relevant and well described, Are the project milestones relevant and are there contingency plans prepared if the project run into problems). Although all three criteria are scored equally, the Impact criteria is usually considered the most important of the three.

This FTP Call Topic Manual showcases a list of the most relevant call topics for the forest-based sector. Each call topic describes the specific scope and challenge to be addressed by the applicants, as well as the expected impacts to be achieved by the project proposed. The topics selected and compiled in this manual are arranged with the link to the corresponding Research and Innovation Areas [of FTP's Strategic Research and Innovation Agenda for 2030 \(SIRA 2030\)](#).

Proposals can be submitted electronically through the European Commission's [Funding and Tenders Portal](#). The complete list and description of Calls and further guidance to submit a proposal are also published on this Web Portal.

Preparing a proposal takes time and effort. By this version of the FTP Call Topics Manual, we wish to give our members the advantage of an early start.

The texts we have analysed for this document constitute about 2000 pages text and several hundreds of Call Topics. We have identified approximately 100 of those Call Topics as relevant for different stakeholders in the forest-based sector.

**The Call Topics in this Manual will also be made available in the [FTP Research Database](#).**

## Budget for 2023–2024: Call topics relevant for the wood working sector

	Number of Calls	Funding (million EUR)
<b>Cluster 4 – Digital, Industry and Space</b>	<b>1</b>	<b>40</b>
Destination 1 - Climate neutral, circular and digitised production	1	40
<b>Cluster 5 – Climate, Energy and Mobility</b>	<b>15 (2 Indirect)</b>	<b>171</b>
Destination 1 - Climate sciences and responses for the transformation towards climate neutrality	1	10
Destination 3 - Sustainable, secure and competitive energy supply	1	40
Destination 4 - Efficient, sustainable and inclusive energy use	13 (2 indirect)	121
<b>Cluster 6 – Food, Bioeconomy, Natural Resources, Agriculture and Environment</b>	<b>9 (1 Indirect)</b>	<b>77</b>
Destination 3 - Circular economy and bioeconomy sectors	13	45
Destination 4 - Clean environment and zero pollution	1	8
Destination 5 - Land, ocean and water for climate action	1	14
Destination 6 - Resilient, inclusive, healthy and green rural, coastal and urban communities	1 (indirect)	10
<b>Total all Calls</b>	<b>24 Calls (3 indirect)</b>	<b>288 mln EUR</b>
<b>Total (High, Medium, Low)</b>	<b>21 Calls</b>	<b>260 mln EUR</b>

## **How to read this manual: The Call Topic Headers**

For each Call Topic, we provide in the header key information such as the Call publication date, application deadline(s), Call budget, recommended EU funding per project, starting TRL and ending TRL (TRL=Technology Readiness Levels).

Further on, to assist the reader to find their way to the Call Topics of highest relevance to them, we have introduced a few concepts in the header of each Call Topic: FTP Subsector, Relevance, Keywords, “FTP Comment” and “FTP SIRA 2030”.

### **FTP Subsector: F&F, WW, P&P + Biodiversity, Bioenergy, Policy**

This manual makes a basic classification of the forest-based sector into three subsectors: forests and forestry, pulp & paper industries, and woodworking industries.

In many cases, the scope of the Call Topic is relevant to actors in more than one subsector and if the scope covers, chain-of custody, life-cycle analysis, circular economy etc, we have included the whole value-chain, i.e., all three subsectors in this identification.

Forests and Forestry (abbreviated F&F): Sustainable forest management, forest-related sciences, remote sensing technologies, plant breeding and much more.

WoodWorking Industries (abbreviated WW) includes sawmilling, building with wood, wood manufacturing, boards, panel industry, carpentry, wood composite products like CLT, construction, reuse and recycling and much more.

Pulp & Paper Industries (abbreviated P&P): packaging, paper, biocomposites, biochemicals, hygiene and healthcare products, nanocellulose, foams, gels, recycling and reuse and much more.

### **Relevance: High, Medium, Low, Indirect**

High relevance is used when the Call Topic is specifically targeting an area of the forest-based sector, or when it is targeting a broader context but addresses a challenge of very high relevance to the sector.

Medium relevance is used when the Call Topic is relevant but the scope is encompassing for instance agriculture AND forestry, or process industries in general.

Low relevance is used when the topic is either covering a very narrow, special niche of the forest-based sector (e.g. New biocompatible healthcare products), or when the scope is broadly relevant to a much larger group of actors (e.g. a topic on transport and logistics solutions).



Indirect relevance is used when the actors in the forest-based sector should keep an eye of future outcomes, but the Call Topic is unlikely to be addressed by FTP stakeholders. For instance, projects related to standardisation of earth observation data from satellites or studies of climate change effects on biodiversity.

**Keywords** are selected from the Call Topic description.

**FTP Comment:** We share some of our own reflections and recommendations on the call topics which might help when deciding if to prepare an application or not, or when preparing the application.

**FTP SIRA 2030:** Here we identify which of the ten Vision Targets and the related Challenges identified in the FTP Strategic Research and Innovation Agenda 2030 that could be considered addressed by the call topic.

10 Visions Targets and Challenges of SIRA 2030:

1	Sustainable forest management, biodiversity and resilience to climate change
1.A	Capitalizing on the interdependencies between forest management and functional diversity
1.B	Strengthening forest ecosystem resilience and fostering Climate Smart Forestry
1.C	Enhancing the vital role of forests in regional and continental water supply
1.D	Mitigating wildfire risks in forested landscapes
1.E	Improving the partnership with citizens
2	Increased, sustainable wood production and mobilization
2.A	Improving seeds, seedlings and plants to increase productivity and resilience
2.B	Using digital revolution for precision forestry
2.C	Empowering small-scale forest owners
2.D	Harnessing novel technologies and automation in forest operations
2.E	Analysing and foresighting markets and material flows of forest-based products
3	More added value from non-wood ecosystem services
3.A	Improving business opportunities for non-wood forest products
3.B	Enhancing value creation with other ecosystem services
3.C	Providing forest-based benefits for urban and peri-urban societies
3.D	Identifying the benefits of forest expansion as a consequence of land-use change
3.E	Innovation in forest governance to promote forest-based benefits for society
4	Towards a zero-waste, circular society
4.A	Optimizing material recovery through efficient collection, sorting and separation
4.B	Adapting reuse and recycling technologies to complex products
4.C	Defining methods for cost assessment and optimization of recycling
4.D	Boosting the circularity of forest fibres and wood products
5	Efficient use of natural resources
5.A	Reducing energy consumption in biorefineries, including pulp and paper mills
5.B	Optimizing the use of raw materials by exact control of natural variations
5.C	Improving raw material efficiency and production value in wood-based manufacturing
5.D	Improving water balance and process water treatment
6	Diversification of production technologies and logistics

- 6.A Developing industrial symbiosis
- 6.B Creating new biorefinery concepts for the circular and biobased economy
- 6.C Adopting additive manufacturing technologies and new production methods
- 6.D Extracting and producing natural compounds with high added value
- 6.E Improving traceability and chain-of-custody throughout the value chain
- 6.F Integrating autonomous and/or electrified harvesting and transportation systems
- 7 Purposeful, safe jobs and links between rural and urban regions
- 7.A Growing the forest-based sector through creative jobs
- 7.B Creating job opportunities along the value chain through proactive management of small forest ownerships
- 7.C Developing new marketplaces and jobs in response to changing consumer trends
- 7.D Adapting job offers in an era of Artificial Intelligence (AI)
- 7.E Improving operator safety and ergonomics
- 8 Renewable building materials for healthier living
- 8.A Developing new building systems, including modular and pre-fabricated systems
- 8.B Improving wood-based products, including engineered wood and composites
- 8.C Harmonization and standardization research and more intelligent, digital design tools
- 8.D Exploring the experience of living with wood and its health benefits
- 9 New fibre-based products and 80 per cent lower CO2 emissions
- 9.A Providing sustainable, fibre-based, high-value consumer products
- 9.B Developing more sustainable and competitive processes for paper-making and other biobased products
- 9.C Developing building blocks for biobased materials and chemicals in the circular society
- 9.D Adding value through digitalization and functionalization
- 10 Renewable energy for society
- 10.A Developing new, efficient production systems for advanced, clean biofuels and chemicals
- 10.B Enhancing the valorization of forest residues
- 10.C Establishing integrated and holistic energy systems (including energy storage and managing demand fluctuations)
- 10.D Supporting fact-based decision-making on bioenergy-related issues

*DISCLAIMER: Please be aware that only the officially published Work Programme (WP) text, budget and deadlines should be taken as a reference for any proposal preparation. All applicants should consult the Funding and Tenders Portal to find the latest version.*

## Pillar II : Global challenges and European industrial competitiveness Pillar

### Cluster 4: Digital, Industry and Space<sup>1</sup>

#### Destination 1: Climate neutral, circular and digitised production

This destination will directly support the following Key Strategic Orientations, as outlined in the Strategic Plan:

- KSO C, '**Making Europe the first digitally led circular, climate-neutral and sustainable economy** through the transformation of its mobility, energy, construction and production systems.'
- KSO A, '**Promoting an open strategic autonomy by leading the development of key digital, enabling and emerging technologies, sectors and value chains** to accelerate and steer the digital and green transitions through human-centred technologies and innovations.'
- KSO D, '**Creating a more resilient, inclusive and democratic European society**, prepared and responsive to threats and disasters, addressing inequalities and providing high-quality health care, and empowering all citizens to act in the green and digital transitions.'

Proposals for topics under this Destination should set out a credible pathway to the following expected impact of Cluster 4:

**Global leadership in clean, climate-neutral and resilient industrial value chains, circular economy and climate-neutral and human-centric digital systems and infrastructures**, through innovative production and manufacturing processes and their digitisation, new business models, sustainable-by-design advanced materials and technologies enabling the switch to decarbonisation in all major emitting industrial sectors, including green digital technologies.

This Destination will contribute to putting the European Union and Associated Countries on track for achieving climate neutrality of the industrial sector by 2050, while also reducing other polluting emissions, and for speeding up Europe's independence from Russian fossil fuels, in line with the REPowerEU Plan, by means of cleaner, more efficient and more sustainable industrial processes.

<sup>1</sup> [Work Programme published by the European Commission on 6 December 2022](#)

The speed and scale of the twin green and digital transitions has accelerated, and significant opportunities lie ahead to position the European Union and Associated Countries as a technological and industrial leader of this transition, building on their world class R&I capacities and industrial base. Industrial ecosystems will not only need to develop, but also deploy technologies and reshape their goods and services towards a new reality, ensuring that industry can become the accelerator and enabler of the twin green and digital transition. It will also enhance the Union's open strategic autonomy with regard to the underlying technologies.

To achieve these goals, the activities in this Destination are complementary to those in Destination 'Increased Autonomy in Key Strategic Value Chains for Resilient Industry'.

The most relevant policies of the European Commission on this front are:

- The [European Industrial Strategy of March 2020](#), and in particular the [Update of May 2021](#): there is now a renewed momentum in the EU to tackle its strategic dependencies as well as to boost its resilience across key strategic areas. The Covid-19 crisis revealed the importance of improving production response and preparedness of EU industry, in support of its long-term competitiveness.
- The [Digital Decade](#) of March 2021, where the Commission presented a vision, targets and avenues for a successful digital transformation of Europe by 2030.
- The [Circular Economy Action Plan](#) of March 2020 announced initiatives along the entire life cycle of products. It targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented and the resources used are kept in the EU economy for as long as possible.
- The [Fit for 55 Package of July 2021, delivering the EU's 2030 Climate Target on the way to climate neutrality](#), given the process industries' 20% share of global greenhouse gas emissions.
- The [Zero Pollution Action Plan](#) of May 2021 addresses both pollution and waste, where research needs could be tackled and is particularly relevant to advanced materials and the process industries, as well as to the manufacturing industry.

The topics serving the objectives of this destination are structured as follows:

- **Manufacturing Industry**

The implementation of the Green Deal has major repercussions for manufacturing.

Products and related value chains need to be made circular, carbon-neutral and regenerative – in other words, industry has to make positive contributions to the environment and to society, and offer a negative carbon footprint for future products. Manufacturing is expected to be a key driver in this transformation of industry. Current challenges addressed in this work programme include bio-intelligent manufacturing; high-precision and complex-product manufacturing; circularity and remanufacturing; collaborative distributed manufacturing and business models close to the customers, including Manufacturing as a Service, to enable the evolution from the ‘smart factory’ to the ‘smart value network’.

This industrial revolution should not be to the detriment of workers. The lack of appropriate skills in manufacturing is becoming a concern in many sectors, opening the opportunity for the use of breakthrough innovative technologies to make manufacturing jobs more attractive; and more broadly to ensure that manufacturing provides prosperity beyond jobs, while respecting planetary boundaries.

- **A new way to build**, accelerating disruptive change in construction

The construction industry needs to improve its productivity and competitiveness, and upskill its workforce. Its transition pathway depends on greater digitalisation, resilience and resource efficiency across the board. This need has been heightened by recent rising demand following the pandemic, pressure to maintain and repair works and to address hazardous substances.

- **Energy efficient and climate neutral process industries**

From the R&I perspective, climate neutrality by 2050 should be the starting point for any action paving the way to a regenerative industrial transformation. The International Panel on Climate Change (IPCC) report on climate mitigation, released in April 2022,<sup>4</sup> points out that the goal of net-zero GHG emissions for industry is challenging but possible. It will need coordinated action throughout value chains to promote all mitigation options, including energy and materials efficiency, circular material flows, as well as abatement technologies and transformational changes in production processes.

In this context, the process industries' climate neutrality goal is strongly related to the objectives of becoming independent on fossil fuel and fossil fuel imports. To reach these objectives, production processes need to be energy efficient, implying advanced digitisation; renewable energies need to be integrated via electrifications or use of hydrogen; and abatement technologies including CCU for processes that are hard to decarbonise need to be further developed.

This Work Programme refers to the operational objectives of the Processes4Planet partnership, found in the respective Memorandum of Understanding.<sup>5</sup>

- **Circularity and Zero Pollution in process industries**

Energy-intensive industries need to embrace the circular economy and restorative feedback loops, not as an afterthought but as a key pillar of the design of entire value chains. In this context the [Chemicals Strategy](#) for Sustainability, which aims to better protect citizens and the environment whilst boosting the innovation for safe and sustainable chemicals, and its related Strategic Research and innovation agenda are also key. Energy-intensive industries need to commit to engage in Hubs for Circularity and to adopt new collaborative circular business models. There is also a clear space to increase the circularity of industrial wastewater, in symbiosis with urban wastewater, recycling a much higher share of the water, including from the municipal sector to industry and valorising more components in the wastewater.

The **Hubs for Circularity (H4C)** will be a key instrument to advance the research and innovation agenda of European industries towards the Green Deal's objectives. The H4Cs will implement a collection of industrial -urban symbiosis and circularity technologies at scale, which will lead to first-of-a-kind, lighthouse demonstrator plants of (near) commercial size implementing industrial symbiosis and/or urban industrial symbiosis. Starting from existing industry cluster or heavy industrialized urban areas, their aim is to collectively achieve and demonstrate at scale a leap towards circularity and carbon neutrality in the use of resources (feedstock, energy and water) in a profitable way involving all stakeholders (Industry, SMEs, local authorities, educational institutions and civil society). It is a new way to re-imagine the whole value chain in a cross-sectorial and collaborative way exploiting synergies and anchoring in the local ecosystem to optimize the incoming resources including investments. It is about building on creativity, digital tools, AI, and breakthrough technologies for implementing cost-optimal pathways and new value chains for the engineering of a net-zero circular economy.

Projects outcomes will enable achievement of the objectives of Processes4Planet partnership by demonstrating hubs for circularity (H4Cs) concepts<sup>6</sup>, fostering circularity within and beyond process industries and driving the partnership's innovation portfolio towards "First of a kind" demonstrators to de-risk investment for subsequent roll-out. (P4Planet operational objectives 8 and 9).

- **Clean Steel**

Related to the objectives for energy-intensive industries in general, the steel industry will

be enabled to reduce its GHG emissions to the Fit for 55 targets, in particular contributing to fulfilling the new obligations foreseen in the revised ETS Directive to prepare for transition to climate neutrality and to take new pathways towards Circular Economy concepts.

**Business cases and exploitation strategies for industrialisation:** This section applies only to those topics in this Destination, for which proposals should demonstrate the expected impact by including a *business case and exploitation strategy for industrialisation*.

The *business case* should demonstrate the expected impact of the proposal in terms of enhanced market opportunities for the participants and deployment in the EU, in the short to medium term. It should describe the targeted market(s); estimated market size in the EU and globally; user and customer needs; and demonstrate that the solutions will match the market and user needs in a cost-effective manner; and describe the expected market position and competitive advantage.

The *exploitation strategy* should identify obstacles, requirements and necessary actions involved in reaching higher TRLs (Technology Readiness Levels), for example: matching value chains, enhancing product robustness; securing industrial integrators; and user acceptance.

For TRL 7, a credible strategy to achieve future full-scale deployment in the EU is expected, indicating the commitments of the industrial partners after the end of the project.

Where relevant, in the context of **skills**, it is recommended to develop training material to endow workers with the right skillset in order to support the uptake and deployment of new innovative products, services, and processes developed in the different projects. This material should be tested and be scalable, and can potentially be up-scaled through the European Social Fund Plus (ESF+). This will help the European labour force to close the skill gaps in the relevant sectors and occupational groups and improve employment and social levels across the EU and associated countries.

In order to achieve the expected outcomes, for particular topics **international cooperation** is not mandatory but advised with some regions or countries, to get internationally connected and add additional specific expertise and value to the activities.

To achieve wider effects **activities beyond R&I investments** will be needed. Three **co-programmed partnerships** will enhance dissemination, community building and foster spillover effects: **Made in Europe** for the manufacturing industries; and **Processes4Planet** and **Clean Steel** for the energy-intensive industries. Wider activities include the further development of skills and competencies (also via the European Institute of Innovation and Technology, in particular EIT Manufacturing, EIT Digital and EIT Climate-KIC); and the use of financial products under the InvestEU Fund for further



commercialisation of R&I outcomes. For the energy-intensive industries in particular, links with the Innovation Fund are important.

**Synergies:**

For advanced manufacturing in general, synergies are necessary between the Made in Europe Partnership and the Digital Europe Programme, primarily Industrial Data Spaces, Cybersecurity Centres and European Digital Innovation Hubs.

Related to the construction activities, Cluster 5 addresses the energy performance of buildings, under the destination 'Efficient, sustainable and inclusive energy use', as well as the Built4People co-programmed partnership for a 'people-centric sustainable built environment'.

For the energy-intensive industries, there are synergies for energy efficiency and the management of thermal energy in industry in Cluster 5, under 'Industries in energy transition'; and with the Clean Hydrogen partnership.

As some necessary activities of the energy-intensive industries, such as first-of-a-kind plants, involve deployment beyond TRL 7, synergies with other EU programmes are essential in this context, in particular with the Innovation Fund, with the Life Plus Programme, and with the activities of the EIB. International cooperation in process industries will be strengthened through Mission Innovation 2.0 'Net zero Industries'.

**Innovation Actions** — Legal entities established in China are not eligible to participate in Innovation Actions in any capacity. Please refer to the Annex B of the General Annexes of this Work Programme for further details.



## Call – Twin green and digital transition 2023

### A new way to build, accelerating disruptive change in construction

Topic ID and title	<a href="#">HORIZON-CL4-2023-TWIN-TRANSITION-01-37: Hubs for circularity for near zero emissions regions applying industrial symbiosis and cooperative approach to heavy industrialized clusters and surrounding ecosystems (Processes4Planet partnership) (IA)</a>				
Budget	EUR 40 million	Opening date	08 December 2022	Deadline 1	20 April 2023
Budget per project	EUR 15 to 20 million			Deadline 2	/
Type of action	Innovation Actions (IA)				
FTP subsector	WW, P&P				
Keywords	industrial symbiosis, decarbonisation strategies				
FTP comments	By its nature, projects funded under this Call will have many partners from various industry sectors, as well as municipalities and other regional entiies. As such, the participation from P&P sector will always be minor. However, projects could support developing efficient and resource efficient cross-sector cooperations. Tip: If you want to apply to this call, take a moment to acquaint yourself with the Hubs4Circularity strategy proposed by the Processes4Planet Partnership.				
FTP SIRA 2030 Challenges addressed	4D – 5C - 6A – 10C			FTP relevance	Low
				Starting TRL	5
				End TRL	7

#### Expected Outcome:

Projects outcomes will enable achievement of the objectives of Processes4Planet partnership by demonstrating hubs for circularity (H4Cs) concepts, fostering circularity within and beyond process industries and driving the partnership's innovation portfolio towards "First of a kind" demonstrators so as to de-risk investment for subsequent roll-out. (P4Planet operational objectives 8 and 9).

Projects are expected to contribute to the following outcomes:

- Achieve a step change in circular utilization of resources within the process industries reducing the use of virgin resources (materials, energy, and water) by at least 20% of reduction as compared to current state of the art;
- Citizens living in proximity of heavily industrialized clusters will benefit from a healthier environment through industrial symbiosis by lowering emissions through circular and renewable energy sources;
- Use industrial symbiosis and cross-sectorial cooperation to pave the way for achieving the EU Green Deal and "Fit for 55" package objectives: providing recommendations for optimized regional framework conditions by highlighting barriers and suitable innovation-oriented policies.

The targets above are meant to be achieved collectively by the region/area where the demonstration is located, not only by consortium members.

### Scope:

An industrial symbiosis, near commercial scale demonstrator, hub should integrate infrastructures (e.g., industrial waste, by-product and water management infrastructure, fluid flow networks, digital infrastructure), and energy networks and grids (e.g., smart operations scheduling, district heat integration, digital power plant including distributed generation, seasonal storage, biomass, and heat pumps integration). Industries involved should boost: their resource efficiency, heat recovery, integration of e renewable energies, use of hydrogen as an energy carrier, and/or support the implementation of CCU locally or prepare for CCS logistics. The proposed demonstrator should comprehensively show how symbiosis and cross-sectorial cooperation can trigger the green transition by sharing resources and infrastructure investments.

Proposals should address the following aspects:

- Develop systemic solutions leading to a Hub for Circularity (H4C) for near zero emissions as described above;
- (Co-)design and adapt existing processes to integrate new solutions (energy and mass flow coupling, infrastructure, and logistics) and to exploit new synergies between sectors;
- Use digital modelling tools and sensing systems as a basis for dynamic resource management, including information on quantities and characterisation of material, component and product streams in view of full integrated LCA;
- Establish IT infrastructures and tools that provide a secure basis for the integrated management and the preservation of confidentiality of sensitive data, it might not be in the same location as the demonstrator and serve the needs of multiple hubs;
- Deploy one Industrial symbiosis near commercial scale demonstrator using renewables as energy sources, including renewable hydrogen as energy carrier, to achieve at least 30% CO<sub>2</sub> reduction when deployed at full scale at the Hub for Circularity and close environment level. This should balance the overall energy consumption with efficiency gains for the Hub for Circularity of at least 10%, including utilisation through cascading heat recovery, smart grid, and digitalised power plants. Optional: in addition, apply or enlarge the use of CCUS (Carbon Capture Utilization

and Storage) to the existing local industries; the sustainability gains in energy use should be detailed;

- Plan in detail the replication and adaption of the concept, including the simulation and the business case and exploitation strategy of the First of a Kind hubs, in two to three alternative locations in close cooperation with the relevant local actors;
- Consider when applicable the co-development of industrial decarbonization strategies with heat-nets, i.e., based on a socio-economic optimum in the cascading re-use of waste heat and the supply low temperature process heat to the surrounding ecosystem;
- Use established reporting methodologies for the assessment of industrial symbiosis activities and exchanges including Symbiosis Readiness Levels (SRLs) and best practices established by the H4C European Community of Practice (ECoP). In addition, interact with the ECoP for support, best practice and knowledge exchange on technological and non-technological issue;
- Include a plan to extend the hub to additional parties who also should benefit and multiply the local/regional synergies in the co-implementation of the identified innovations and solutions within the next five years;
- Implement a social innovation action involving at least one of the local community actors and, additional actions to facilitate relations and engage with e local community actors e.g., exchanging knowledge with the educational establishments and developing flexible learning resources.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. As a project output a more elaborated exploitation plan should be developed including preliminary plans for scalability, commercialisation, and deployment (feasibility study, business plan and financial model) indicating the possible funding sources to be potentially used (e.g. Innovation Fund, LIFE, InvestEU, ESIF).

Relevant indicators and metrics, with baseline values, should be stated clearly in the proposal. Research must build on existing standards or contribute to standardisation. Interoperability for data sharing should be addressed.

Clustering and cooperation with other selected projects under this cross-cutting topic and other relevant topics in Horizon Europe as well as building on existing projects is strongly encouraged (see also Industrial Symbiosis and Trends Report from March 2020).

This topic aims to support the goals of the smart cities and climate adaptation missions by contributing to a decrease of harmful industrial emissions while favouring renewable energy sources.

This topic implements the co-programmed European partnership Processes4Planet.

## Cluster 5: Climate, Energy and Mobility<sup>2</sup>

### Destination 1: Climate sciences and responses for the transformation towards climate neutrality

Europe has been at the forefront of climate science and should retain its leadership position to support EU policies as well as international efforts for a global uptake of climate action in line with the Paris Agreement and the Sustainable Development Goals (SDGs), including biodiversity objectives. Advancing climate science and further broadening and deepening the knowledge base is essential to inform the societal transition towards a climate neutral and climate resilient society by 2050, as well as towards a more ambitious greenhouse gas reduction target by 2030. It will involve research that furthers our understanding of past, present and expected future changes in climate and its implications on ecosystems and society, closing knowledge gaps, and the development of the tools that support policy coherence and the implementation of effective mitigation and adaptation solutions.

The activities implemented under this section will enable the transition to a climate-neutral and resilient society and economy through improving the knowledge of the Earth system and the ability to predict and project its changes under different natural and socio-economic drivers. This includes a better understanding of society's response and behavioural changes, allowing a better estimation of the impacts of climate change and the design and evaluation of solutions and pathways for climate change mitigation and adaptation and related social transformation.

This Destination contributes directly to the Strategic Plan's **Key Strategic Orientation D** *"Making Europe the first digitally led circular, climate-neutral and sustainable economy through the transformation of its mobility, energy, construction and production systems"* and the **impact area** "Climate change mitigation and adaptation".

In line with the Strategic Plan, the overall **expected impact** of this Destination is to contribute to the *"Transition to a climate-neutral and resilient society and economy enabled through advanced climate science, pathways and responses to climate change (mitigation and adaptation) and behavioural transformations"*, notably through:

- Advancing knowledge and providing solutions in the any of following areas:
  - Earth system science;
  - Pathways to climate neutrality;
  - Climate change adaptation;

<sup>2</sup> [Work Programme published by the European Commission on 6 December 2022](#)

- Climate services;
  - Social science for climate action; and
  - Better understanding of climate-ecosystems interactions.
- Contributing substantially to key international assessments such as those of the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) or the European Environment Agency (e.g. European environment - state and outlook reports, SOER).
  - Strengthening the European Research Area on climate change.
  - Increasing the transparency, robustness, trustworthiness and practical usability of the knowledge base on climate change for use by policy makers, practitioners, other stakeholders and citizens.

Coordination and synergies should be fostered between activities supported under this destination and those under other destinations of cluster 5, as well as with other clusters of Horizon Europe.

In particular, complementarities with cluster 4 and cluster 6 should be taken into account by planning for adequate resources for co-ordination and clustering activities. Following a systemic approach, this destination concentrates on activities related to climate science and modelling, whereas cluster 4 supports activities in the area of low-carbon and circular industry, and cluster 6 contributes to R&I on the implementation of climate change mitigation and adaptation solutions in the areas covered by cluster 6 (notably Intervention Area (IA) 1 on biodiversity and nature-based solutions (NBS), Earth observation, IA 4 on seas, oceans and inland waters...).

Coordination and synergies are also encouraged with the activities funded under the work programmes on the Horizon Europe missions, in particular the Mission “Adaptation to Climate Change”, the Mission “Climate Neutral and Smart Cities” and the Mission “Restore our Ocean and Waters by 2030”. While this destination supports upstream research activities on climate science, the Missions focus on the testing, demonstration and scale up of solutions to address the challenges of climate change and environmental degradation.

Actions should envisage clustering activities with other relevant ongoing and selected projects for cross-projects cooperation, consultations and joint activities on crosscutting issues and share of results, as well as participating in joint meetings and communication events. To this end, proposals should foresee a dedicated work package and/or task and earmark the appropriate resources accordingly.

Synergies are also sought throughout this destination with the work of the European Space Agency (ESA), in order to ensure complementarity and mutual benefit regarding research and innovation actions conducted at the ESA.

## Call – Climate sciences and responses 2023

Topic ID and title	<a href="#">HORIZON-CL5-2023-D1-01-06: Broadening the range of policy options in transition pathway analysis</a>				
Budget	EUR 10 million	Opening date	13 December 2022	Deadline 1	18 April 2023
Budget per project	EUR 5 million			Deadline 2	/
Type of action	Research and Innovation Actions (RIA)				
FTP subsector	F&F, WW, P&P				
Keywords	Paris Agreement, policy biodiversity, energy, circular economy and land use mentioned, economic growth				
FTP comments	This is a topic for research community and policy makers and the scope is huge. However, the forest-based sector is significantly affected by the policy development related to the Paris Agreement and representation of forest-sector competence would be of strategic importance.				
FTP SIRA 2030 Challenges addressed	1E	FTP relevance		Low	
		Starting TRL		/	
		End TRL		/	

### Expected Outcome:

Projects results are expected to contribute to **all of the** following expected outcomes:

- A broader range of policy options that reflect different visions of sustainability and resilience based on alternative economic, technological and societal futures and reflecting different perspectives from economics, (other) social and natural sciences.
- Assessment of long-term feasibility of reconciling economic growth with climate and other environmental objectives and consequences for mitigation pathways.
- More comprehensive understanding of the implications of Paris Agreement-aligned transformation for other (than climate) environmental thresholds and social outcomes, including equity and justice, as a basis for fostering synergies between climate action and other policy goals such as those embedded in the Sustainable Development Agenda.
- Increased diversity of frameworks and scenarios used in climate change mitigation modelling.
- Enhanced assessments of 1) energy and material demands and their links to the macro-economy, 2) behavioural and lifestyle changes, including sufficiency measures and their representation in integrated assessment models and 3) circular economy approaches to decrease the use of energy and materials.
- Development of knowledge to inform future major international scientific assessments such as reports by IPCC and IPBES.



### Scope:

There is an urgent need for a new paradigm that reconciles continued development of human societies with the maintenance of the Earth system in a resilient and stable state. Meeting the ambitious goals of the Paris Agreement while simultaneously respecting other environmental and social constraints would require not only rapid reductions of GHG emissions and other climate forcers, but also decoupling of economic output from material throughput, pollution and biodiversity loss. However, empirical evidence demonstrates a strong relationship between economic growth (expressed in GDP terms) and GHG emissions, energy use, demand for raw materials, land and other natural resources, as well as pollution, with projections indicating that with existing growth trajectories, absolute decoupling on the scale required could prove extremely challenging.

Actions should advance knowledge on the feasibility of the green growth paradigm in the context of transition to climate neutrality, including improved understanding of underlying challenges and opportunities, and by building on the latest scientific evidence. They should explore alternative (to growth-oriented) socio-economic scenarios (such as, but not limited to, degrowth, postgrowth, or “Doughnut” economic models) which could inform the transition to climate neutrality. Research should look well beyond general concepts and explore the practical implications (where possible quantified), benefits, barriers, conditions for delivering strong social outcomes and feasibility of pursuing such alternative options as a viable policy choice within the EU and beyond. In their work, actions should examine the role of emerging/potential trends (such as digitalisation, circularity, structural changes in the economy, relocation of value chains), geopolitical events and shifts in societal values (e.g. COVID related) in shaping future socio-economic development and assess their impacts on the achievement of climate policy objectives. The analysis should also account for the accelerating impacts of climate change and embrace interlinkages with other policy goals, notably biodiversity, resource conservation and human development related. Building on these results, actions should draw conclusions for Nationally Determined Contributions (NDCs) and long-term strategies under the Paris Agreement.

Actions should address some of the following aspects in their research:

- Improve the understanding of the dynamics between economic growth and energy, materials’ use, pollution and land demand. This could include assessing whether shifts within a GDP-based system, such as a greater share of services and recognition of household labour in national statistics, affect the compatibility of economic growth with climate and biodiversity goals.
- Advance knowledge about the role and potential of lifestyle changes and sufficiency-oriented measures in the overall strategies towards climate neutrality and in the

context of other environmental goals, improve their quantification and representation in modelling frameworks and explore the socio-economic, cultural, institutional, infrastructural, regulatory and other conditions for scaling-up.

- Identify and explore the main barriers to adoption of alternatives to growth-based economic models. For example: How plausible is it for policy makers to embrace them? Are there real-world examples? Can a region such as Europe pursue alternative approaches unilaterally?
- Assess the relationship between continued economic growth and societal well-being. Investigate alternative approaches to delivering social progress and evaluate the well-being outcomes of measures to transform societies towards climate-neutrality, taking into account distributional and equity related considerations as well as a broad range of well-being indicators and differences between social groups.
- Investigate how alternative economic approaches could be explained to and accepted by citizens and businesses concerned about both climate and their livelihoods/operating conditions. For example, which concrete day-to-day changes would be required? What are the implications for living standards? How would professions work? What dis-/incentives would firms face to compete, expand and innovate?
- Assess the risks of disruption to energy, food and other key commodity markets based on alternative future transition pathways and development paradigms.
- Explore potential future development paradigms in both high-income and developing economies, taking into account fairness dimension, and evaluate implications for the transition process towards climate neutrality.

The projects are expected to take a truly interdisciplinary approach, leveraging natural, economic and other social sciences to inform policies capable of delivering on multiple environmental, economic and social objectives simultaneously while taking into account constraints related to feasibility and acceptability.

When dealing with models, actions should promote the highest standards of transparency and openness, as much as possible going well beyond model documentation and extending to aspects such as assumptions, code and data that is managed in compliance with the FAIR principles. In particular, beneficiaries are strongly encouraged to publish data and results in open access databases and/or as annexes to publications.

Successful proposals should establish synergies with the projects resulting from the topic [HORIZON-CL5-2021-D1-01-02: Modelling the role of the circular economy for climate change mitigation](#) as well as with the future project resulting from the topic “HORIZONCL5- 2024-D1-

01-06: The role of climate change foresight for primary and secondary raw materials supply” as regards implications for resource demand and the associated GHG emissions.

This topic requires the effective contribution of SSH disciplines (e.g. sociology, economics, behavioural sciences, gender studies, etc.) and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

## Destination 3: Sustainable, secure and competitive energy supply

This Destination includes activities targeting a sustainable, secure and competitive energy supply. In line with the scope of cluster 5, this includes activities in the areas of renewable energy; energy system, grids and storage; as well as Carbon Capture, Utilisation and Storage (CCUS).

The transition of the energy system will rely on reducing the overall energy demand and making the energy supply side climate neutral, in current and future climate conditions. R&I actions will help to make the energy supply side cleaner, more secure, and competitive by boosting cost performance and reliability of a broad portfolio of renewable energy solutions, in line with societal needs and preferences. Furthermore, R&I activities will underpin the modernisation of the energy networks to support energy system integration, including the progressive electrification of demand side sectors (buildings, mobility, industry) and integration of other climate neutral, renewable energy carriers, such as clean hydrogen. Innovative energy storage solutions (including chemical, mechanical, electrical and thermal storage) are a key element of such energy system and R&I actions will advance their technological readiness for industrial-scale and domestic applications. Carbon Capture, Utilisation and Storage (CCUS) is a CO<sub>2</sub> emission abatement option that holds great potential and R&I actions will accelerate the development of CCUS in electricity generation and industry applications.

This destination contributes to the activities of the Strategic Energy Technology Plan (SET Plan) and its implementation working groups.

This Destination contributes to the following Strategic Plan's **Key Strategic Orientations (KSO)**:

- *C: Making Europe the first digitally enabled circular, climate-neutral and sustainable economy through the transformation of its mobility, energy, construction and production systems;*
- *A: Promoting an open strategic autonomy by leading the development of key digital, enabling and emerging technologies, sectors and value chains to accelerate and steer the digital and green transitions through human-centred technologies and innovations;*

It covers the following **impact areas**:

- Industrial leadership in key and emerging technologies that work for people;
- Affordable and clean energy.

The **expected impact**, in line with the Strategic Plan, is to contribute to *“More efficient, clean, sustainable, secure and competitive energy supply through new solutions for smart grids and energy systems based on more performant renewable energy solutions”*, notably through

- i. 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 (more detailed information below).
- 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 new low carbon energy supply. This includes more efficient approaches to managing **smart and cyber-secure energy grids** and optimisation the interaction between producers, consumers, networks, infrastructures and vectors (more detailed information below).
- iii. Accelerating the development of **Carbon Capture, Use and Storage (CCUS)** as a CO<sub>2</sub> emission mitigation option in electricity generation and industry applications (including also conversion of CO<sub>2</sub> to products) (more detailed information below).

### **Global leadership in renewable energy**

Renewable energy technologies encompass renewable electricity, renewable heating and cooling and renewable fuel technologies. They provide major opportunities to replace or substitute carbon from fossil origin in the power, heating/cooling, transportation, agriculture and industry economic sectors. Their large scale and decentralised deployment is expected to create more jobs than the fossil fuel equivalent and, especially, local jobs. Renewable energy technologies are the baseline on which to build a European and global climate-neutral future. A strong global European leadership in renewable energy technologies will pave the way to increase energy security and reliability.

It is imperative to enhance affordability, security, sustainability, and efficiency for more established renewable energy technologies (such as wind energy, photovoltaics, solar thermal, bioenergy or hydropower), and to further diversify the technology portfolio. Furthermore, advanced renewable fuels, including synthetic fuels (which contain also direct solar fuels) and sustainable advanced biofuels, are also needed to provide long-term carbon-neutral solutions for the transport, energy consuming and energy-intensive industrial sectors, in particular for applications where direct electrification is not a technically and cost-efficient option.

In line with the “do not significantly harm” principle for the environment, research and innovation actions for all renewable energy technologies aim to also improve the environmental sustainability of the technologies, delivering products with reduced greenhouse gas emissions and improved environmental performance regarding water use, circularity, pollution, and ecosystems. For biofuels and bioenergy improving the environmental sustainability is associated to the biomass conversion part of the value chain and the quality of the product, while air pollution associated to combustion in engines falls in the scope of other destinations in Cluster 5 and other environmental aspects will be under Cluster 6.

Synergies with activities in cluster 4 are necessary for integrating renewable energy technologies and solutions in energy consuming industries and ensure that renewable energy solutions do not harm the environment. Complementarities with cluster 6 concern mainly biomass-related activities and with EIC low technology readiness level actions.

All renewable energy technologies are addressed as they have all a strong international market potential, and it will be coherent with the EU policy of industrial leadership worldwide.

Regarding the REPowerEU communication, renewable energy technologies are - as described above - a key instrument to diversify EU gas supplies and reduce the EU's dependence on fossil fuels. Most of the topics in this work programme are centred along two of the REPowerEU tracks, with the remainder of the topics fully contributing to decreasing the EU's dependence on fossil fuels:

- **PV, wind energy and heat pumps**, encompassing the most readily available renewable energy technologies to reduce the EU's dependence on fossil fuels. (17 topics)
- **Renewable fuels**, encompassing the most readily available technologies (advanced biofuels) but also the less mature ones (synthetic renewable fuels). Renewable fuels can be used in transport but also in buildings and industry to meet the demand for electricity and heat, therefore displacing fossil fuels. Gaseous renewable fuels are one of the named actions in the REPowerEU communication, as regards increasing the production of bio methane twice above the European Green Deal target in 2030. All forms of renewable fuels, and in particular advanced biofuels, contribute to reduce the EU's dependence, because they are drop-in fuels and direct replacements of fossil fuels, utilizing the existing infrastructure. (8 topics)
- The remainder of the topics also contributes to the objective of **decreasing the EU's dependence on fossil fuels**, with the focus either on specific renewable energy

sectors (bioenergy, geothermal, hydropower, ocean energy and solar thermal) or on cross-technology activities (next generation renewable energy, market measures, international cooperation). (18 topics)

### Main expected impacts

- Availability of disruptive sustainable renewable energy and renewable fuel technologies & systems accelerating the replacement of fossil-based energy technologies to achieve climate neutrality in the energy sector by 2050, considering future climate conditions, and without harming biodiversity, environment and natural resources.
- Reduced cost and improved efficiency of sustainable renewable energy and renewable fuel technologies and their value chains.
- Support de-risking of sustainable renewable energy and fuel technologies with a view to their commercial exploitation to contribute to the 2030 “Fit for 55” targets increasing the share of renewable electricity, heat and fuels in the EU energy consumption (in particular, 40% renewable energy overall, 2.2% advanced biofuels and 2.6% renewable fuels of non-biological origin).
- Better integration of sustainable renewable energy and renewable fuel-based solutions in all economic sectors, including through digital technologies.
- Enhanced security and autonomy of energy supply in the EU, while accelerating the green transition.
- Affordable, secure and sustainable energy solutions to diversify gas supplies in the EU by increasing the level of biomethane.
- Reinforced European scientific basis and European export potential for renewable energy technologies through international collaborations (e.g., the AU-EU Climate Change and Sustainable Energy partnership, the missions and innovation communities of Mission Innovation 2.0).
- Enhanced sustainability of renewable energy and renewable fuels value chains, taking fully into account circular economy, social, economic and environmental aspects in line with the European Green Deal priorities.
- More effective market uptake of sustainable renewable energy and fuel technologies to support their commercialisation and provide inputs to policy making.
- Increased knowledge on the environmental impacts of the different renewable energy technologies along their lifecycle and value chains.

### **Energy systems, grids and storage**

#### Main expected impacts:

- Increased resilience of the energy system, based on improved and/or new technologies and energy vectors, to control the system and maintain system stability under difficult circumstances.
- Increased flexibility and resilience of the energy system to plan and operate different networks for different energy carriers simultaneously in a coordinated manner that will also contribute to climate neutrality of hard-to-electrify sectors.
- Innovative data-driven services for consumers that empower them to engage in the energy transition. Enhanced consumer satisfaction and increased system flexibility thanks to enabling consumers to benefit from new energy services and facilitating their investment and engagement in the energy transition.
- Improved energy storage and energy vector technologies, in particular technologies for long-term storage of electricity and heat.
- Foster the European market for new energy services and business models as well as tested standardised and open interfaces of energy devices through a higher degree of interoperability, increased data availability and easier data exchange.
- More effective and efficient solutions for transporting and seamlessly integrating off-shore energy with new electricity transmission technologies, in particular using superconducting technologies, power electronics and hybrid Alternate Current – Direct Current grid solutions as well as MT HVDC (Multi Terminal High Voltage Direct Current) solutions.
- Based on easy data-sharing, increased flexibility of the energy system to integrate renewables, and better predictability of return on investments in renewable and energy efficiency investments.
- Speeding up of (from early-adoption to upscaling) of new digital technologies in the energy sector for the benefit of the energy transition
- Development of cyber-security and privacy tools and technologies tailor-made for the specific requirements of the energy system.
- Development of technologies and systemic approaches that optimise energy management of IT technologies.

### **Carbon Capture, Utilisation and Storage (CCUS)**

#### Main expected impacts:

#### Carbon capture, utilisation and storage (CCUS)

- Accelerated rollout of infrastructure, in particular for CCUS hubs and clusters.
- Continuing knowledge and best practice sharing activities, in particular on connecting industrial CO<sub>2</sub> sources with potential bankable storage sites and installations using CO<sub>2</sub>, providing greater confidence for decision makers and investors.



- Proven feasibility of integrating CO<sub>2</sub> capture, CO<sub>2</sub> storage and CO<sub>2</sub> use in industrial facilities and to maximize the efforts to close the carbon cycle. Demonstrating these technologies at industrial scale should pave the way for subsequent first-of-a-kind industrial projects.
- Reduced cost of the CCUS value chain, with CO<sub>2</sub> capture being still the most relevant stumbling block for a wider application of CCUS. Develop innovative technology for CO<sub>2</sub> conversion to reduce the need for pre-concentration and/or purification.
- Adequate frameworks for Measurement, Monitoring and Verification (MMV) for storage and use projects, to document safe storage and for public buy-in of the technology.
- Further research in DACCS and BECCS as CO<sub>2</sub> capture technologies in combination with CO<sub>2</sub> storage in order to deliver carbon removals.in view of achieving the net zero targets.
- Assess the environmental impacts and risks, in the short, medium and long term, of CCUS technologies, with respect to the Do No Significant Harm principle, and to inter-generational solidarity.

## Call – Sustainable, secure and competitive energy supply 2023

### Global leadership in renewable energy

Topic ID and title	<a href="#">HORIZON-CL5-2023-D3-01-01: Renewable Energy Valleys to increase energy security while accelerating the green transition in Europe</a>				
Budget	EUR 40 million	Opening date	13 December 2022	Deadline 1	30 March 2023
Budget per project	EUR 20 million			Deadline 2	/
Type of action	Innovation Actions (IA)				
FTP subsector	F&F, WW, P&P				
Keywords	renewable energy (organic waste, agricultural residues, electricity, heat, fuels, regional energy systems), REPowerEU Plan, Digital Twin				
FTP comments	"Renewable energy valleys" and "living labs" are two rather fuzzy concepts that are emphasised in this Call. It might be beneficial to look those concepts up before deciding to apply or participate as a partner in an application. Actors from industry, farmers/foresters, public authorities and the public is likely going to be included in a project.				
FTP SIRA 2030 Challenges addressed	10B, C, D			FTP relevance	Low
				Starting TRL	/
				End TRL	7-8

#### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Contribute to the implementation of the REPowerEU Plan, in particular to i) diversify gas supplies via higher levels of sustainable bio-methane (mainly based on organic waste and agricultural residues) and green hydrogen, and ii) speed up Europe's path to independence from fossil fuels by increasing the share of renewable energy (electricity, heat and fuels) in the European energy consumption.
- Increase the roll-out of local or regional renewable energy system solutions for electricity, heat and fuel needs and contribute to their market up-take in Europe.
- Create new sustainable jobs linked to local or regional renewable energy system value chains and enhance economic growth in local or regional European communities.
- Enhance security and autonomy of local or regional energy supply in EU Member States/Associated countries in current and future climate conditions.
- Increase the readiness, reliability, performance and affordability of local or regional renewable energy system solutions in Europe.

#### Scope:

The EU energy system strongly relies on centralised electricity generation and on fuel imports, with 95% of its oil and 84% of its gas consumption sourced from outside the EU. The REPowerEU Plan proposes a set of actions to reduce the EU's dependence on fossil fuels and diversify its energy supply 'well before 2030'. The three pillars of the plan are to ramp up the production of green energy, diversify our energy supplies, and reduce our demand for fossil gas, coal and oil.

Renewable energy valleys are understood as decentralised renewable energy systems that offer a viable and efficient solution to the challenges mentioned above. For example, local production and consumption, reduced transmission and distribution losses thanks to the reliance on local networks for energy needs, greater operational flexibility and reduced dependence on expensive fuel imports all contribute to a higher energy autonomy, a more secure supply, and lower, more stable overall energy costs, including for individual citizens. In addition, this alleviates a part of the load on the centralised grid and avoids blockages by the capacity of the grid.

Proposals are expected to address the following aspects:

- Creation of a renewable energy valley 'living lab' in local, peri-urban or regional communities that demonstrates in real life conditions the sustainable and cost-effective production and storage of renewable energy from different local renewable energy sources providing multiple renewable energy carriers (e.g., electricity, heat, renewable fuels, bio-methane, biogas, hydrogen), fully covering the local energy needs on an annual basis.
- Consideration of different potentials in terms of geography, climate and natural resources in the concept design.
- Consideration of different end users (e.g. buildings, mobility, industry, industrial parks) of the multiple renewable energy carriers.
- Reduction of energy use and energy losses through the integration of effective and innovative energy-efficient solutions.
- Development and testing of a digital twin of the specific local energy grid for all types of energy carriers (i.e., electricity, heat, fuels including gases) for operational analysis, detailed energy forecasting and local grid management.
- Scenario analysis using the digital twin to constantly improve multiple carrier grid management, planning, data gathering/handling and cyber security.
- Development of cost-effective upscaling and commercialisation approaches of the solutions, linked to robust business models along the value chains, considering

inclusive and affordable access to energy for consumers. This can include collaborative ventures with local stakeholders.

- Regarding the development of the renewable energy technologies value chains, fostering the participation of the local industry and other stakeholders, including citizens, Energy Communities and the Energy Communities Repository<sup>151</sup> as appropriate, therefore generating local jobs, skills, economic growth and benefits for citizens. Where applicable, synergies with other economic sectors than the energy sector may be considered.
- Regarding the local or regional renewable energy system developed, assessment of its stability, robustness, and fitness to the local resources and needs, including understanding consumer behaviour.
- Assessment of costs avoidance from fossil fuels imports in line with REPowerEU to decrease the dependence on such imports.
- Assessment - both at the design phase and during operation - of environmental and socio-economic impacts (positive and negative) for the local community or region, and development of measures to mitigate the negative impacts.

The renewable energy valleys can take diverse configurations, such as peri-urban settings, (agro-) industrial clusters or remote or islanded areas. They can also take the form of either distinct but combined systems or unique poly-generation systems (i.e., in the same infrastructure) to deliver multiple energy carriers from combined renewable energy resources and technologies.

The proposal should indicate how the operation and maintenance of the living lab will be guaranteed after the end of the project.

Technological developments for hydrogen production and storage are addressed in the frame of the Clean Hydrogen European Partnership and are therefore excluded from this call, but proposals may include the integration of such devices in the demonstration.

Proposals are expected to foresee coordination and collaboration with similar EU-funded projects (in particular, those that will be funded under this topic) for policy relevant issues such as regulatory framework, business models and obstacles to innovation.

## Destination 4: Efficient, sustainable and inclusive energy use

This Destination addresses activities targeting the energy demand side, notably a more efficient use of energy as regards buildings and industry. It contributes to the activities of the Strategic Energy Technology Plan (SET Plan) and its implementation working groups.

This Destination contributes to the following Strategic Plan's **Key Strategic Orientations (KSO)**:

- *C: Making Europe the first digitally enabled circular, climate-neutral and sustainable economy through the transformation of its mobility, energy, construction and production systems;*
- *A: Promoting an open strategic autonomy<sup>187</sup> by leading the development of key digital, enabling and emerging technologies, sectors and value chains to accelerate and steer the digital and green transitions through human-centred technologies and innovations.*

It covers the following **impact areas**:

- Industrial leadership in key and emerging technologies that work for people;
- Affordable and clean energy;
- Circular and clean economy.

The **expected impact**, in line with the Strategic Plan, is to contribute to the “*Efficient and sustainable use of energy, accessible for all is ensured through a clean energy system and a just transition*”, notably through

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

This Destination has at its core the ambition to deliver on the research, innovation and technological developments needs to meet EU climate and energy targets, forward-looking policy implementation and long-term carbon neutrality objective. The Destination contributes as well (e.g. through the topics that support digitalisation and smartness of buildings) to the EU digital agenda. Though biodiversity is not in the focus of this Destination, the multiple impacts of the built environment on biodiversity (e.g. in the scope of renovation) should be considered.

The Destination has a strong policy dimension – it is steered by EU policy action in the energy and climate domains, the European Green Deal overarching policy priority, the Renovation Wave Strategy (for buildings topics), the Industrial Strategy, the Industrial Emissions Directive (for industry topics) and the forward-looking policy measures proposed in the Fit for 55 – Delivering European Green Deal package.

In the light of the Versailles Declaration, and acknowledging the need to reduce the energy dependencies of the EU, this Destination will strongly focus on innovations that boost energy efficiency and reduce energy demand in buildings and the industry, thereby contributing to making Europe independent from Russian gas supplies (and other fossil fuel supply from Russia) by the end of the decade in line with the REPowerEU Communication.

### **Highly energy-efficient and climate neutral EU building stock**

The Destination will contribute to putting the EU on track for achieving climate neutrality of its building stock by 2050 and to effectively promoting Europe's independence from Russian gas supplies (and other fossil fuels from Russia) before 2030 by means of a more clean, efficient and sustainable building stock. It will deliver the solutions that can help increase buildings renovation rates, reduce energy consumptions of buildings, improve smart readiness, improve circularity, and improve users' comfort, well-being and health, while keeping housing affordable, in line with the objectives of the Renovation Wave and the revised Energy Performance of Buildings Directive.

This Destination will contribute to 'reducing our energy dependencies' priority of the Versailles declaration across all topics, in particular by improving energy efficiency and the management of energy consumption in buildings, and by delivering more circular approaches to construction and renovation of buildings. The Destination will also contribute to the 'Electrify Europe' track of REPowerEU by delivering innovative solutions for energy efficiency and electrification of homes and buildings, e.g. thanks to heat pumps. These priorities are addressed in a specific flagship topic.

It will contribute to the uptake of digital and smart solutions in buildings and to improved energy flexibility, in line with the Action Plan on the digitalisation of the energy sector. The Destination's innovation will contribute to make the sector fit to support the achievement of higher ambition on energy efficiency under Fit for 55. The Destination's topics contribute significantly to the New European Bauhaus (NEB), integrating the core NEB values of sustainability, inclusion and aesthetics in the built environment (e.g. in relation to cultural heritage and quality of experience), and they are consistent with the EU roadmap and policy initiatives on digitalisation in the construction sector and on sustainability of buildings (e.g.

Level(s)). On climate, one aim will also be to enhance the role of buildings as carbon sinks in the voluntary market for carbon removals, in line with the upcoming Communication on Restoring sustainable carbon cycles and the Proposal for a regulatory framework for carbon removal certification.

The Destination also relies on the Built4People co-programmed partnership's broader action and is complementary to Driving Urban Transitions partnership and to the Mission on Climate Neutral and Smart Cities.

#### Main expected impacts:

- The European buildings and energy sectors are able to effectively support higher EU ambition on energy efficiency, energy independence, and the transition to zero-emission buildings, with a stronger link between innovation in technology and practices, and policy drivers and instruments.
- Building stocks continue to evolve to combine energy efficiency, renewable energy sources, storage, and digital and smart technologies, supporting the transformation of the energy system towards climate neutrality and reducing Europe's energy dependencies.
- Buildings constructed and renovated see their performance enhanced across the board (energy, life-cycle emissions, indoor environment quality), with lower environmental impacts, and rates of holistic renovations continue increasing. Buildings are able to adapt to changing user needs for dynamic and more efficient use of building spaces and they are more resilient to climate change.
- A higher quality, more affordable and inclusive, built environment mitigating climate change and preserving environment, safeguarding cultural heritage, considering sustainability, circularity and aesthetics, while ensuring better living conditions.

#### **Industry**

The Destination will contribute to putting the EU on track for achieving climate neutrality of the industrial sector by 2050, while also reducing other polluting emissions, and for effectively promoting Europe's independence from Russian gas supplies (and other fossil fuels from Russia) before 2030 by means of a more clean, efficient and sustainable industrial processes. It will deliver the solutions that can help a faster transition to renewable and low carbon energy sources for thermal energy generation, and a reduction of the energy consumption through waste heat recovery, storage and upgrade for reuse in other processes. These solutions will contribute to reduce GHG and polluting emissions and reinforce the frontrunner and competitive position of the European industry. They are in line

with the research and innovations areas identified in the Implementation Plan of the action of the Strategic Energy Technology (SET) Plan dedicated to 'energy efficiency in industry'.

The bulk of R&I dedicated to industry is covered in Cluster 4 (Digital, Industry and Space), and in particular by the private public partnership Processes4Planet focussing on process industries. In Cluster 5, this Destination focusses on the management of thermal energy in industry.

Main expected impacts:

- Increasing energy efficiency in industry and reducing industry's energy dependence, Greenhouse Gas (GHG) and air pollutant emissions through recovery, upgrade and/or conversion of industrial excess (waste) heat and through the integration of renewable energy sources into more efficient and flexible systems for the generation of heat and cold for industrial processes.



## Call – Efficient, sustainable and inclusive energy use 2023

### Highly energy-efficient and climate neutral EU building stock

Topic ID and title	<a href="#">HORIZON-CL5-2023-D4-01-01: Innovative cost-efficient solutions for zero-emission buildings</a>				
Budget	EUR 10 million	Opening date	13 December 2022	Deadline 1	20 April 2023
Budget per project	EUR 5 million			Deadline 2	/
Type of action	Innovations Actions (IA)				
FTP subsector	WW				
Keywords	zero emission buildings, construction, indoor air quality, circularity, Energy Performance of Buildings Directive				
FTP comments	This topic is not specifically adapted for the building with wood industries but we believe that this sector and material value-chain has a strong competitive advantage due to the properties of wood. The text mentions for instance construction materials acting as carbon sinks. The topic requires demonstration of at least three real-life construction projects in three different countries and this might be difficult to organise.				
FTP SIRA 2030 Challenges addressed	8	FTP relevance		High	
		Starting TRL		/	
		End TRL		6-8	

#### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Increased number of solutions and approaches for construction of zero-emission buildings.
- Enhanced productivity of construction compared to standard practice.
- Reduced embodied emission and increased carbon storage, enhanced energy performance.
- Improved comfort, Indoor Air Quality and Indoor Environmental Quality.
- Increased awareness on zero-emission construction best practices.
- Enhanced circularity of construction.

#### Scope:

To demonstrate that high-quality and affordable zero-emission buildings, in line with the Proposed Revision of the Energy Performance of Buildings Directive, can be delivered and mainstreamed. With new buildings already required to be nearly-zero energy buildings, the focus is on how to achieve zero or positive energy standards and how to reduce embodied

emissions, also storing CO<sub>2</sub> where possible (using recycled, zero-carbon, or sustainably sourced construction materials acting as carbon sinks).

Proposals are expected to address all of the following:

- Demonstrate innovative construction approaches solutions based on integrated existing solutions into standardised packages for a cost-effective construction of (new) zero-emission buildings, in line with the Energy Performance of Buildings Directive.
- Ensure the approaches demonstrated:
  - Allow to achieve zero or positive energy standards and to reduce embodied emissions, also storing carbon where possible, using recycled, zero-carbon or sustainably sourced carbon-storing construction materials.
  - rely on mature construction products and materials, and technical building systems, seeking to deliver solutions that are ready for application and use.
  - address all components of buildings (envelope, technical building systems, on-site<sup>199</sup> renewable energy – e.g. BIPV – and, where relevant, electric vehicle charging points).
  - are rooted in local and regional value chains for sourcing of buildings components and for involvement and upskilling of local and regional businesses.
  - are tailored for the applicable regulatory framework: EU, national, and (where relevant) regional and local level.
  - have strong potential for replication across Europe, in particular by construction SMEs.
- Demonstrations that include at least three real-life new construction projects, of which one at least should target public buildings.
- Ensure that the demonstrations:
  - Cover at least three countries, with diverse climatic conditions and architectural patterns.
  - Involve local and regional values chains, in particular SMEs, based on participatory approaches to increase innovation acceptability.
  - Lead to clear and, where relevant, quantified and measurable indicators on the results achieved.

- An ambitious EU-wide dissemination roadmap addressing all relevant stakeholders (in particular businesses and authorities) to:
  - promote the zero-emission buildings innovative construction approaches demonstrated.
  - share guidance and recommendations on best practices for zero-emission construction.
  - provide feedback to policy makers at EU, national, and (where relevant) regional and local level.

Topic ID and title	<a href="#">HORIZON-CL5-2023-D4-01-02: Future-proofing historical buildings for the clean energy transition</a>				
Budget	EUR 9 million	Opening date	13 December 2022	Deadline 1	20 April 2023
Budget per project	EUR 4,5 million			Deadline 2	/
Type of action	Research & Innovations Actions (RIA)				
FTP subsector	WW				
Keywords	Buildings energy efficiency, Indoor Environmental Quality, maintenance costs, historical buildings, cultural heritage				
FTP comments	Renovation approaches that improve energy performance and indoor performance and still take into account architectural restrictions is a growing market. This topic represents an opportunity for actors in the woodworking value-chain that aim to address this growing market				
FTP SIRA 2030 Challenges addressed	8			FTP relevance	Medium
				Starting TRL	/
				End TRL	4-5

### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Reduction of energy demand by at least 60%, preserving historical and cultural heritage values.
- Reduction of on-site construction waste.
- Improved lifetime renovation cost effectiveness compared to conventional renovation.
- Improved comfort, Indoor Air Quality and Indoor Environmental Quality.
- Significant reduction in maintenance costs.
- Where possible, increased potential of successful installation of RES and improvement of smart readiness, in a way that respects the specificities of historical buildings.
- Increased effectiveness and potential for replicability of the proposed solutions.

### Scope:

Around a quarter of the existing building stock in Europe was built prior to the middle of the last century. Many such buildings not only reflect the unique character and identity of European cities, but also include essential infrastructure for housing, public buildings etc. A significant number of these have a poor energy performance, continue to use conventional and inefficient fossil fuel-based energy systems and are costly to renovate. Furthermore, changes in building use and higher indoor comfort expectations than in the past are driving

up energy demand, a particular challenge when historical buildings are used or converted for residential, educational, retail, office or other purposes. Many recently developed renovation approaches are not adapted to the specific requirements of historical buildings. The process of future-proofing these buildings for the clean energy transition faces additional challenges compared to newer buildings, as it has to take into account architectural restrictions, as well as the specificities of the materials used in their construction, which does not respond well to renovation techniques used in modern buildings.

Proposals are expected to address all of the following:

- Deliver standardised renovation approaches and solutions for the deep renovation of historical buildings to improve their energy performance, smart readiness, indoor air quality, comfort, and climate resilience, while respecting their architectural and cultural specificities, materials and traditional construction techniques.
- Target building types constructed prior to 1945 that have restrictions regarding changes of their envelope (walls, window, doors, and/or roof). (Buildings of nationally or internationally recognised significant cultural heritage built after this date may also be considered.).
- Standardised renovation approaches and solutions that are directly replicable for other buildings of the same building type, which should represent a share of at least 1% of buildings in the specific country where they are located.
- Solutions that reduce energy demand in a cost-effective way.
- Explore both internal and external insulation solutions, and where possible incorporating adaptable interventions, plug and play technical building systems, and/or renewable energy services.
- Employ both novel and traditional construction materials and techniques, exploring ways to combine, adapt and improve them.
- Improve the comfort of occupants and lower the maintenance costs for building owners.
- Where applicable, involve relevant conservation authorities.
- Validation of the solutions in a relevant environment (real-life or close to real-life) that:
  - Covers at least three different countries, with diverse climatic conditions.
  - Results in clear and, where relevant, quantified and measurable indicators on the effectiveness and the potential for replication of the solutions.

Topic ID and title	<a href="#">HORIZON-CL5-2023-D4-01-03: Interoperable solutions for positive energy districts (PEDs), including a better integration of local renewables and local excess heat sources</a>				
Budget	EUR 8 million	Opening date	13 December 2022	Deadline 1	20 April 2023
Budget per project	EUR 4 million			Deadline 2	/
Type of action	Innovations Actions (IA)				
FTP subsector	WW, P&P				
Keywords	Positive Energy Districts, renewable energy, citizen participation, tools for planning and managing buildings and districts				
FTP comments	This topic might be of interest to the building with wood sector and energy suppliers, like district heating suppliers.				
FTP SIRA 2030 Challenges addressed	8 - 10C	FTP relevance		Indirect	
		Starting TRL		/	
		End TRL		6-8	

### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Increased availability of tools, guides and interoperable solutions for planning, design, development and management of Positive Energy Districts (PEDs).
- Improved integration of energy (e.g. distributed renewable energy generation, waste heat utilisation, storage) and non-energy sectors (e.g. mobility) within PEDs.
- Improved integration of PEDs in energy systems and improved contribution of PEDs to energy grid robustness with regard to dependencies to energy supplies.
- Increased social entrepreneurship and citizen participation and engagement in energy communities.
- Increased participation of consumers and energy communities in the value chain of the energy system.

### Scope:

Recent projects have demonstrated positive energy districts, but there is a need to demonstrate fully interoperable solutions that include improved energy efficiency coupled with a better integration of local renewables and local excess heat sources within the district. In parallel, the interoperability of positive energy districts with the urban and renewable energy system in which they are embedded needs to be enhanced through effective solutions that will allow interaction and integration between buildings, the users and the regional energy, mobility and ICT systems.

Projects are expected to address all of the following:

- Develop solutions (products, tools, etc.) for planning and managing assets (e.g. buildings, energy systems, mobility systems, ICT) in positive energy districts.
- Develop tools and methods for planning and designing PEDs, that support PED developers and managers to optimise the mix of PED solutions depending on the local conditions.
- Develop data exchange platforms (heat & electricity) and technologies to integrate buildings with energy markets (e.g. flexibility market) relying on available standards (e.g. SAREF), allowing buildings to contribute effectively to grid stabilisation at district / city level.
- Develop methodologies and/or planning tools for the optimal integration of distributed renewable generation and excess heat at district (or building) level.
- Develop innovative business models for integration of PEDs in the energy markets including technological, financial and regulatory aspects.
- Deploy and test certification and standardisation frameworks for interoperable solutions in positive energy districts.
- Demonstrate the proposed solutions in at least three PEDs to promote replication, upscaling and mainstreaming.

To ensure interoperability and integration into the grid, projects should make use of operational end-to-end architectures, digital platforms and other data exchange infrastructure for the energy system being developed under ongoing Horizon 2020, Horizon Europe as well as under other EU programs such as the Digital Europe Program, when addressing communication and data exchange between inverters and other components, other appliances and the electricity network.

The selected projects are expected to contribute to relevant BRIDGE initiative, actively participate to its activities and allocate up to 2% of their budgets to that end. Additional contributions to the “Alliance for Internet of Things Innovation” (AIOTI) and other relevant activities (e.g. clusters of digital projects and coordinating actions) might be considered, when relevant.

## Call – Efficient, sustainable and inclusive energy use 2023

### Highly energy-efficient and climate neutral EU building stock

Topic ID and title	<a href="#">HORIZON-CL5-2023-D4-02-01: Innovative uses of lifecycle data for the management of buildings and buildings portfolios (Built4People Partnership)</a>				
Budget	EUR 10 million	Opening date	04 May 2023	Deadline 1	05 September 2023
Budget per project	EUR 5 million			Deadline 2	/
Type of action	Innovations Actions (IA)				
FTP subsector	WW				
Keywords	Building lifecycle, Lifecycle Data, indoor environment quality, energy performance indicators				
FTP comments	The topic is funded under the Built4People Partnership and focuses on improving the collection and monitoring of data from buildings and demonstrating solutions in at least three demo buildings. We foresee that woodworking companies could participate in the project consortium. Observe this funding of this call will be awarded as a lump sum.				
FTP SIRA 2030 Challenges addressed	8	FTP relevance		Low	
		Starting TRL		/	
		End TRL		6-8	

#### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Increase in the availability of key energy and environmental performance indicators from new or improved building management systems that go beyond energy management to life-cycle approach (e.g. environmental performance, circularity, comfort and well-being, indoor environmental quality, accessibility, safety, structural performance, resilience and climate risk vulnerability).
- Improved tools for the planning and management of building assets and portfolios of buildings including energy management, environmental performance, renovation optimisation and investment planning.
- Increased availability and access to lifecycle data of buildings and buildings portfolios and enhanced interoperability and synergies among data sharing platforms.

#### Scope:

European buildings are producing an increasing amount of data on energy and non-energy uses. More and better data can lead to enhanced consumer information, contribute to an effective management of energy grids and support the creation of innovative energy services, new business models and financing schemes for distributed clean energy. Data is also a key enabler for reliable and effective policymaking, e.g. for climate policies. Several



recent projects have focused on developing big data facilities and data analytics tools to monitor the energy performance of buildings based on energy related data. More work is needed to integrate energy data with lifecycle data (e.g. GHG emissions and removals, materials, water, health, comfort, life cycle cost and value, etc.), in order to optimise the performance of buildings and buildings' portfolios across the board and support the decision making of owners/tenants/developers to transform existing and planned physical assets (buildings or buildings' assets, e.g. distributed energy generation, e-mobility recharging infrastructure, micro-grids, building systems).

Proposals are expected to address at least two of the three following points:

- Develop new or upgrade existing building management systems enhanced with data analytics and real-time digital twinning tools. The developed systems should take into account buildings monitoring data (e.g. from embedded sensors/actuators), users' preferences (e.g. related to comfort and well-being, safety, and energy flexibility), and surrounding environmental conditions (e.g. urban density, micro-climate, etc.) in order to optimise operational energy and environmental performance.
- Develop new or upgrade existing decision support tools for the management of building assets and portfolios of buildings. The developed tools should be able to deliver energy (e.g. energy monitoring, renovation optimisation) and non-energy services (investment planning, risk assessment – e.g. risk-related, fault detection, predictive maintenance, surveillance & safety, comfort, occupancy satisfaction). The tools should be co-developed with the potential users (e.g. facility managers, fund managers etc.) and tested in real market conditions.
- Develop new or upgrade existing data sharing platforms including lifecycle data of buildings or buildings portfolios. The platforms should connect relevant market actors (technology providers, developers, aggregators, DSOs, ESCOS) with relevant user groups (consumers, energy communities), policy makers and the financial sector and offer innovative services (e.g. flexibility, prediction, investment planning etc.). The platforms should be co-developed with the participation of the potential user groups and tested in real market conditions linking, where relevant, to digital logbooks and to and other relevant initiatives (e.g. the Smart Readiness Indicator under the Energy Performance of Buildings Directive).

Proposals should contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

Proposals are expected to implement at least three large -scale pilots to demonstrate the chosen system. The pilots should cover a variety of building typologies (residential,

commercial, public etc.) and use cases (energy monitoring, renovation optimisation, investment planning, risk assessment etc.)

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.

<b>Topic ID and title</b>	<a href="#">HORIZON-CL5-2023-D4-02-02: Solutions for the identification of vulnerable buildings and people-centric built environment, and for improving their resilience in disruptive events and altered conditions in a changing climate (Built4People Partnership)</a>				
<b>Budget</b>	EUR 10 million	<b>Opening date</b>	04 May 2023	<b>Deadline 1</b>	05 September 2023
<b>Budget per project</b>	EUR 5 million			<b>Deadline 2</b>	/
<b>Type of action</b>	Innovations Actions (IA)				
<b>FTP subsector</b>	WW				
<b>Keywords</b>	Building improvement, natural disasters				
<b>FTP comments</b>	The topic is funded under the Built4People Partnership and focuses on identification of buildings vulnerable to natural disasters and climate change and offer solutions often found in wood construction. Sensors, data and data analysis will play key roles.				
<b>FTP SIRA 2030 Challenges addressed</b>	8	<b>FTP relevance</b>		Low	
		<b>Starting TRL</b>		/	
		<b>End TRL</b>		6-8	

### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Increased awareness of approaches for the identification and categorisation of the vulnerability of existing and future buildings and infrastructures.
- Increased number of demonstrated innovative solutions to improve safety and resilience of the built environment, to extreme climatic events, and other natural disasters, as well as to altered conditions due to climate change.
- Increased use of relevant data such as weather forecasts or catastrophe warnings by monitoring and management systems in the built environment (e.g. to launch automatic emergency protocols to warn and protect buildings users).
- Improved understanding of new business models allowing to optimise the costs of resilience, taking into account asset management and lifecycle approaches.
- Increased awareness of building occupants and other key stakeholders on the available solutions in case of extreme climatic events, and natural disasters.

### Scope:

Buildings should contribute to an integrated approach for a safe and healthy people-centric built environment at block, district and urban level. The built environment needs to be adapted, designed, and constructed for combating the effects of Global Warming (increased heat island effect, increased cooling demands, water scarcity, etc.) and for providing safety and resilience to adverse climatic events at a larger scale, whilst ensuring their connection and integration with energy, ICT and transport infrastructures.

Proposals are expected to address all of the following:

- Develop approaches and tools for the identification and categorisation of the vulnerability of existing, and future, buildings and built environment, where possible using and/or further developing existing vulnerability assessment methodologies.
- Develop innovative designs, materials and solutions to improve safety (e.g., fire safety) and resilience of the built environment to extreme climatic events (heat waves, floods, category 5 storms, etc.), and which may also be relevant in other natural disasters, such as earthquakes depending on the geographical location of the buildings.
- Ensure, if applicable, that the proposed solutions also improve accessibility for persons with disabilities, improve the local environment, and minimise any negative impacts on biodiversity, e.g. relying on nature-based solutions
- Where appropriate, ensure the proposed approaches and solutions address deep renovation, linking to relevant instruments for awareness and advice of building owners (e.g. renovation passports) in order to gradually adapt buildings to climate change in an adaptation pathways approach.
- Explore the use of relevant data, such as weather forecasts and / or catastrophe warnings, by monitoring and management systems in the built environment (e.g. to launch automatic emergency protocols to warn and protect buildings users).
- Investigate the potential of asset management and life cycle approaches to optimise costs of resilience (e.g. to climate and environmental factors).
- Ensure that the whole value chain from design over construction to end of life is covered.
- Demonstrate the solutions in at least two demonstrators, involving diverse building typologies, at block or district level and including where appropriate the connections to energy, ICT and transport infrastructures, in diverse geographical areas, with various local environmental, social, and economic conditions.
- Contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.

Topic ID and title	<a href="#">HORIZON-CL5-2023-D4-02-03: Demonstrate built-environment decarbonisation pathways through bottom-up technological, social and policy innovation for adaptive integrated sustainable renovation solutions (Built4People Partnership)</a>				
Budget	EUR 12 million	Opening date	04 May 2023	Deadline 1	05 September 2023
Budget per project	EUR 6 million			Deadline 2	/
Type of action	Innovation Actions (IA)				
FTP subsector	WW				
Keywords	Renovation, Circularity, construction value-chain, decarbonisation, wood-based products				
FTP comments	This topic specifically mentions wood-based products and is of high relevance to the woodworking sector. The topic itself might not have that much to do with the core business of the companies in the sector.				
FTP SIRA 2030 Challenges addressed	5C – 8A, C, D			FTP relevance	High
				Starting TRL	/
				End TRL	6-8

### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Increased number of innovative solutions and packages for sustainable construction and renovation.
- Increased number of options for built-environment decarbonisation pathways towards zero-emission buildings considering the whole value chain at local or regional level.
- Increased engagement and participation of the whole value chain in local and regional innovation clusters.
- Reduced time from first demonstration to market of sustainable renovation solutions.
- Increased awareness and improved access at a local or regional level to information on construction products for reuse and circular businesses.
- Creation of new business opportunities with reduced risk for investment in the circular economy.
- Enhanced engagement amongst communities, businesses, local and regional governments, and the extended construction value chain, e.g. materials and equipment, manufacturers, construction companies.

### Scope:

To improve the energy efficiency, circularity and sustainability of the built environment there is a need to develop and apply integrated approaches that demonstrate, in practice, achievable pathways for decarbonisation of the building stock through a whole life carbon approach, including temporary carbon storage in built works (e.g. thanks to wood-based products). This means developing and integrating new design techniques allowing for deconstruction and reuse; new products and components that can be dismantled and reused; and new products and components for construction works that incorporate reused and recycled elements and materials. In addition, there is a need to deploy and test through a value chain approach the enabling conditions that facilitate the integration of the innovations outlined above in planning, design, budgeting, procurement, construction practice, insurance, and related administrative and regulatory processes.

Proposals are expected to address all of the following:

- Demonstrate a value chain approach and pilot decarbonisation pathways in at least two deconstruction/re-use/construction demonstrators and supply chain approaches of market-scale renovations.
- Demonstrate low disruptive and simpler construction and retrofitting processes, which facilitate a life cycle-based approach that fosters alignment with EU Level(s) framework indicators.
- Test the enabling conditions (technological, social, and policy) that can boost innovation and reduce time from research to market of sustainable renovation solutions.
- Establish and operate demonstrative regulatory sandboxes that allow to deploy and test innovation pathways for decarbonisation of buildings at a meaningful scale with the involvement of the whole value chain at local level.
- Where relevant, explore fast tracking of cost-effective standardisation and certification of innovative sustainable renovation solutions.
- Where relevant, investigate non-standard contractual relationships within the design-construction-client project team, including 'as a service' approaches for the built environment.
- Develop solutions that can stimulate the market for reused construction products at a regional level in support of the Renovation Wave and which can contribute to increased rate and depth of renovation in order to reach climate neutrality by 2050, in particular in critical segments of the building stocks such as e.g. public buildings or social housing.

- Develop design solutions that address inclusion and accessibility and leading to documented improvements in comfort and health aspects, whilst reducing emissions from the built environment and enhancing climate change resilience.
- Contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise (including social innovation), in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.



Topic ID and title	<a href="#">HORIZON-CL5-2023-D4-02-04: Fast-tracking and promoting built environment construction and renovation innovation with local value chains (Built4People Partnership)</a>				
Budget	EUR 2 million	Opening date	04 May 2023	Deadline 1	05 September 2022
Budget per project	EUR 2 million			Deadline 2	/
Type of action	Coordination & Support Actions (CSA)				
FTP subsector	WW				
Keywords	Built with local value chains, local community engagement				
FTP comments	The project funded under Built4Planet Partnership and is a complementarity of action with the project funded under the HORIZON-CL5-2021-D4-02-03 topic. The aims should mainly be to enhance engagement amongst communities, businesses, local and regional governments, and the construction industries and associated supply chains and create new business opportunities.				
FTP SIRA 2030 Challenges addressed	8C,D	FTP relevance		High	
		Starting TRL		/	
		End TRL		/	

#### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Expansion and strengthening of the Built4People network of Construction Innovation Clusters.
- Increased awareness and improved access at a local or regional level to research outcomes for sustainable built environment construction and renovation.
- Increased engagement and participation of the whole value chain in local and regional construction innovation clusters.
- Strengthened, long-lasting and multi-disciplinary networking and collaboration on locally rooted, bottom-up innovative holistic solutions for a sustainable built environment.
- Enhanced engagement amongst communities, businesses, local and regional governments, and the construction industries and associated supply chains.
- Establishment and reinforcement of European value chains in sustainable construction and renovation.
- Creation of new business opportunities with reduced risk for investment in innovative built environment construction and renovation.
- Reduced time from research to market of innovative sustainable construction and renovation solutions.

- Increased public and private co-financing of innovation in the field of innovative sustainable built environment.

#### Scope:

For effective fast-tracking and promotion of built environment construction and renovation innovation with local value chains, nascent construction innovation clusters need to link with regional/national innovation hubs and clusters. This will strengthen multi-disciplinary networking and collaboration amongst all actors of local and regional construction ecosystems and reinforce European value chains. A long-term network structure is needed, based on an appropriate business model and governance, to support these clusters and give them capacity to nurture and help deliver public and private investments in sustainable construction and renovation innovation also supporting digitalisation of the value chain.

Proposals are expected to address all of the following:

- Delivery of a long-term network structure for the Built4People construction innovation clusters.
- Support adoption of the enabling conditions (technological, social, and policy) that can boost innovation and reduce time from research to market of sustainable renovation solutions.
- Deliver methods and tools for the reliable assessment of innovation maturity and potential impacts (e.g. potential of replication).
- Monitor growth of Built4People construction innovation clusters and assess their effectiveness for reducing the time from research to market of sustainable renovation solutions.
- Stimulate co-financing of innovation in the field of innovative sustainable built environment.
- Disseminate exemplary practices for fast tracking of cost-effective standardisation and certification of innovative sustainable renovation solutions.
- Prepare the value chain at a local/regional level for uptake of innovative sustainable construction and renovation solutions in support of the Renovation Wave and the increased rate and depth of renovation, also post 2030, in order to reach EU-wide climate neutrality by 2050.
- Stimulate engagement in Built4People innovation clusters of the stakeholders that can lead the transformation of the building stocks at local and regional level (e.g. cooperative and social housing developers).

- Promote design solutions that address inclusion and accessibility and leading to documented improvements in comfort and health aspects, whilst reducing emissions from the built environment and enhancing climate adaptation resilience.
- Ensure the project's dissemination activities include actions that contribute to the activities of the NEB Community, and to sharing information, best practices and results within the NEB Lab.
- Seek to ensure consistency and complementarity of action with the project funded under the HORIZON-CL5-2021-D4-02-03 topic.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise (including social innovation), in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.

<b>Topic ID and title</b>	<a href="#">HORIZON-CL5-2023-D4-02-05: Supporting the creation of an accessible and inclusive built environment (Built4People Partnership)</a>				
<b>Budget</b>	EUR 10 million	<b>Opening date</b>	04 May 2023	<b>Deadline 1</b>	05 September 2023
<b>Budget per project</b>	EUR 5 million			<b>Deadline 2</b>	/
<b>Type of action</b>	Innovations Actions (IA)				
<b>FTP subsector</b>	WW				
<b>Keywords</b>	Inclusive buildings, disability, improved comfort, noise reduction				
<b>FTP comments</b>	The topic probably is out of scope for most actors in the woodworking-chain. However, it focuses on innovative planning and design tools. It presents an opportunity to promote the benefits of building with wood for the comfort and inclusiveness of "fragile people"				
<b>FTP SIRA 2030 Challenges addressed</b>	8C,D	<b>FTP relevance</b>		Indirect	
		<b>Starting TRL</b>		/	
		<b>End TRL</b>		6-8	

### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Improved accessibility of the built environment for persons with disabilities and older persons, following a 'design for all' approach.
- Improved comfort for larger shares of the population.
- Increased uptake of accessible and inclusive active mobility solutions (walking and cycling) in support of healthy and sustainable lifestyles, while catering solutions for persons with reduced mobility.
- Improved sense of inclusiveness and social cohesion in larger shares of the population.
- Availability of a common evaluation and certification framework for accessibility and inclusiveness of the built environment.
- Improved consideration of accessibility and inclusiveness in the transformation of the built environment towards sustainability, climate change mitigation and adaptation, in line with energy and climate ambitions.
- Reduced energy consumption and lifecycle GHG emissions of the facilities of the built environment.

### Scope:

The focus will be on the different facilities of the built environment (buildings, multi-modal hubs, public spaces and other infrastructure for people's use) that are open to the public. Built environment professionals require support to design, plan, build and operate facilities

that are accessible and inclusive. Design concepts should make these facilities accessible for persons with disabilities and fragile people, following an inclusive, 'design for all' approach.

Proposals are expected to address all of the following:

- Develop innovative methods to ensure and facilitate the implementation of accessibility at all stages of design and construction processes, as well as the monitoring and testing of results.
- Demonstrate (and where applicable produce) innovative planning and design tools for new and existing buildings and/or multi-modal hubs and/or public spaces and/or other infrastructure for people's use with the triple aim of:
  - improving comfort (e.g. improving air quality, reducing noise or vibrations);
  - making them accessible and inclusive for persons with disability and/or older persons;
  - transforming the built environment towards sustainability (including social sustainability), climate change mitigation and adaptation, e.g. relying on nature-based solutions.
- Address the adaptability of the built environment over its lifecycle, to ensure flexibility for accessibility adaptations (e.g., in the case of changing needs of people with increasing disabilities and reducing mobility).
- Make the facilities of the built environment under consideration more energy efficient overall, therefore reducing GHG emissions.
- Ensure the involvement of persons with disabilities by means of a participatory approach.
- Consider the possible creation of new job opportunities that are concerned with implementing, monitoring and maintaining accessibility of the facilities of the built environment.
- Demonstrate the solutions in at least two demonstrators.
- Where applicable, investigate solutions aiming at removing barriers, , improving storage of (cargo-)bicycles, improving charging possibilities for electric (cargo-)bicycles in an inclusive way (e.g., considering the specific needs of older persons, multi-generational groups, and persons with disabilities).

- Where applicable, design public spaces to promote soft and active modes of mobility through attractive, safe, and green infrastructure for healthier and environmentally friendly lifestyles, therefore lowering carbon emissions and noise pollution.
- Where applicable, develop solutions to ensure the mobility of person with disabilities (including visually impaired users) inside buildings in an autonomous, ubiquitous, and pervasive way.
- Where new digital tools are used in the built environment (including to address energy efficiency and comfort in buildings), ensure their accessibility for persons with disabilities and older persons.
- Ensure the project's dissemination activities include actions targeted to contributing to the activities of the NEB Community, and to sharing information, best practice and results within the NEB Lab

Infrastructure such as motorways is excluded from the scope.

Participation of / co-creation with relevant societal stakeholders should be part of the action. To this end, this topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise (including social innovation), to produce meaningful and significant effects enhancing the societal impact of the related research activities.

Proposals are expected to contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.

## Call – Efficient, sustainable and inclusive energy 2024

### Highly energy-efficient and climate neutral European building stock

Topic ID and title	<a href="#">HORIZON-CL5-2024-D4-01-01: Low-disruptive renovation processes using integration of prefabricated solutions for energy-efficient buildings</a>				
Budget	EUR 10 million	Opening date	07 December 2023	Deadline 1	18 April 2024
Budget per project	EUR 5 million			Deadline 2	/
Type of action	Innovation Actions (IA)				
FTP subsector	WW				
Keywords	renovation, prefabricated modules, retrofitting				
FTP comments	This topic could be a significant opportunity for producers of prefabricated construction modules for retrofitting and renovation				
FTP SIRA 2030 Challenges addressed	8	FTP relevance		High	
		Starting TRL		/	
		End TRL		6-8	

#### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Reduction of on-site construction activities to 1-2 days per dwelling/building unit.
- Cost reduction of at least 25% compared to conventional renovation processes.
- Significant reduction of dust, noise and waste on the construction site compared to conventional renovation processes.
- Significant reduction in occupant disturbance during the renovation.
- Improved levels of occupancy comfort (e.g. Indoor Air Quality and Indoor Environmental Quality) after renovation.
- Reduction of negative impacts of renovation on biodiversity, considering adaptability as well (e.g. to climate change, different use, evolving societal needs, etc.) and resilience of buildings to disruptive events.

#### Scope:

Low-disruptive renovation processes, using prefabricated modules that are quick and easy to apply can play an important role in increasing the renovation rate of the European building stock. Renovation processes should cover the whole workflow from design to offsite manufacture, installation, compliance checking on site and end strategies for maintenance, operation and end of life.

Proposals are expected to address all of the following:

- Develop streamlined processes for deep energy-efficient renovation to at least NZEB performance levels using prefabricated modules.
- Use relevant available technologies to reduce quality gaps between the off-site manufacturing and on-site deployment of prefabricated modules.
- Develop processes for seamless integration of prefabricated solutions into a variety of existing constructions (e.g. various existing wall materials, presence of balconies and overhangs, existing piping in the way etc.).
- Ensure the processes minimize the disturbance for building owners, tenants and users, through a considerable time reduction of on-site construction activities, reduced impact in terms of the unavailability of the building and its main functionalities, and a minimal impact on occupancy comfort during the renovation process.
- Include at least three demonstrations covering different building categories (residential or tertiary) and various building typologies, such as single or multi-storey, single or multi-use, etc.
- Demonstrate less-disruptive retrofitting processes that are more attractive and more cost-effective for building owners, tenants and users.



## Call – Efficient, sustainable and inclusive energy 2024

### Highly energy-efficient and climate neutral European building stock

Topic ID and title	<a href="#">HORIZON-CL5-2024-D4-02-01: Industrialisation of sustainable and circular deep renovation workflows (Built4People Partnership)</a>				
Budget	EUR 16 million	Opening date	07 May 2024	Deadline 1	05 September 2024
Budget per project	EUR 8 million			Deadline 2	/
Type of action	Innovations Actions (IA)				
FTP subsector	WW				
Keywords	Renovation, indoor comfort, LCA, sustainability, carbon sinks, BIM				
FTP comments	Funded projects should demonstrate innovations in at least three demonstration sites. It requests many of the advantages provided for by build with wood				
FTP SIRA 2030 Challenges addressed	8	FTP relevance		High	
		Starting TRL		/	
		End TRL		6-8	

#### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Streamlining resource-efficient nearly zero-energy performance renovation processes.
- Renovations with reduction of at least 30 % waste, 25% cost, and 30% work time (to 1-2 days per dwelling/building unit), compared to current deep renovation processes.
- Reduced energy performance gap between as-built and as-designed (difference between theoretical and measured performance), and higher construction quality.
- Innovative, tailored business models for deep renovation, generating economies of scale and contributing to an increased rate of renovation.
- Improved comfort, Indoor Air Quality and Indoor Environmental Quality.

#### Scope:

In line with the Renovation Wave and in order to meet long-term climate and energy targets, more action is needed to increase the rate and depth of building renovation. Several recent projects and calls have focused on prefabrication for deep renovation, but more work is needed to develop innovative, seamless workflows from design to off-site prefabrication, to installation, construction on-site, maintenance and future dismantling, reuse and recycling of prefabricated elements, duly considering life cycle performance, sustainability, and the potential to use the buildings as carbon sinks.

Proposals are expected to address all of the following:

- Investigate innovative approaches for industrialised deep circular renovation, covering the whole workflow from design through to off-site prefabrication, installation, construction on-site and strategies for maintenance, operation and end of life.
- Ensure the proposed approaches aim to achieve the highest level of energy performance (at least NZEB level) with a view toward zero-emission buildings, ensuring a high level of indoor environment quality, keeping costs in an attractive range for owners and investors.
- Make use of innovative processes and technologies, including those delivered by previous research, such as design based on circularity principles, prefabricated components, and digital tools that allow to optimise workflows (cost, time, quality, resource use).
- Demonstrate a seamless integration of the proposed approaches with state-of-the-art digital technologies for construction and renovation (Building Information Modelling, Digital Twins, etc.).
- Select processes and technologies that can be easily tailored to give a maximum potential for rapid and broad deployment at European level.
- Investigate innovative business models (e.g. as-a-service models), accounting for potential market and regulatory barriers, in view of mass deployment and Europe-wide impact.
- Apply the proposed workflows to at least three demonstrations to assess the proposed approaches for different buildings typologies representative of the European building stock, ensuring the most adequate coverage of the respective climatic conditions. The demonstrations can be either single buildings or clusters of buildings, and at least one of the demonstrations has to address residential buildings.
- Contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.

Topic ID and title	<a href="#">HORIZON-CL5-2024-D4-02-02: Robotics and other automated solutions for construction, renovation and maintenance in a sustainable built environment (Built4People Partnership)</a>				
Budget	EUR 8 million	Opening date	07 May 2024	Deadline 1	05 September 2024
Budget per project	EUR 4 million			Deadline 2	/
Type of action	Research and Innovation Actions (RIA)				
FTP subsector	WW				
Keywords	Robotics, 3D printing, workers safety				
FTP comments	Funded projects should demonstrate innovations in at least three demonstration sites. It focuses on the construction work environment and lowering the costs of construction.				
FTP SIRA 2030 Challenges addressed	5C - 8A, C	FTP relevance		Medium	
		Starting TRL		/	
		End TRL		4-5	

### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Reduction of construction and renovation time on-site (at least 40% reduction).
- Reduction of errors in construction and renovation works.
- Improved resource efficiency.
- Reduction of construction and renovation costs.
- Reduction of greenhouse gas emissions resulting from, and improved energy efficiency of the works on-site.
- Reduced environmental impact of construction works, including pollution, particulate matter and noise, in the immediate vicinity.
- Reduction of waste generated from the works on-site.

### Scope:

The transformation of the built environment should take place in a way that minimises the environmental impact of the works themselves. With the increasing rollout of highly energy efficient, sustainable buildings and deep renovation, there is a growing need for the development of robotic and automated solutions to support sustainable building construction, renovation and maintenance processes that are less disruptive, cleaner and faster.

Proposals are expected to address all of the following:

- Investigate the use of robotic systems (including those used for 3D printing) and automation for construction and deep renovation, in order to reduce time of construction and renovation works, reduce construction errors, as well as facilitate maintenance, also minimising the impact of the works on the surrounding built environment.
- Explore the potential for lower construction costs through automation and robotics resulting from increased speed, improved resource efficiency and avoidance of errors.
- Develop robotic and automated design and construction techniques that increase energy efficiency and reduce greenhouse gas emissions from construction and renovation works on-site.
- Develop approaches that use digitally assisted design to improve resource efficiency and safety, reduce waste, and reduce construction time.
- Investigate the use of automated technologies for surveying, inspection and monitoring of the site.
- Investigate the use of automated support to augment workers' capability and safety (e.g., lift robots, exoskeletons, automated construction site monitoring, use of augmented and virtual reality).
- Test and validate the prototyped solutions in at least three prototypes to assess the proposed approaches for a variety of buildings typologies representative of the European building stock. These prototypes should be validated in a lab or another relevant environment. The testing and validation are expected to address both new construction and renovation.
- Contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.

Topic ID and title	<a href="#">HORIZON-CL5-2024-D4-02-03: BIM-based processes and digital twins for facilitating and optimising circular energy renovation (Built4People Partnership)</a>				
Budget	EUR 8 million	Opening date	07 May 2024	Deadline 1	05 September 2024
Budget per project	EUR 4 million			Deadline 2	/
Type of action	Innovations Actions (IA)				
FTP subsector	WW				
Keywords	BIM, Building lifecycle, Digital twins				
FTP comments	The topic supports developments of BIM and Digital Twins concepts to support the whole buildings life cycle from design to deconstruction and reuse				
FTP SIRA 2030 Challenges addressed	8A, C	FTP relevance		Medium	
		Starting TRL		/	
		End TRL		6-8	

### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Reduced buildings construction and renovation time and costs.
- Increased buildings material reuse and recycling.
- Improvement of buildings performance (energy, sustainability including whole life-cycle carbon and the potential to store carbon in built works, comfort, health and well-being, and accessibility).
- Enhanced, interoperable and accessible buildings information across the lifecycle.
- Improvement of interoperability with existing Building Information Modelling (BIM) and Digital Twin solutions.
- Broader application of BIM and Digital Twin solutions, in particular within SMEs.

### Scope:

To improve Building Information Modelling and Digital Twinning over the full life cycle of buildings, including construction and renovation of buildings, towards enhanced energy efficiency and sustainability and in compliance with circular economy and resource efficiency principles.

Proposals are expected to address all of the following:

- Develop and integrate solutions based on BIM and Digital Twins to support the whole buildings life cycle from design to deconstruction and reuse, including operation.
- Ensure the solutions developed address all the following aspects:

- Supporting optimal, adaptable and reversible building design for energy efficiency, circularity and sustainability.
- Allowing to track buildings materials and construction products, and supporting cost-effective deconstruction and reuse, recycling and recovery of building materials at end of life.
- Integrating buildings monitoring data (e.g. from sensors and IoT devices) into an interoperable Digital Twin for automated, optimised building performance monitoring and management, and preventive maintenance.
- Enabling buildings data interoperability, quality and integrity across the life cycle, in particular to reliably assess and track building performance over the lifecycle, enabling tailored data access for all life cycle's stakeholders (architects, engineering companies, contractors, building owners, financing institutions, etc.).
- Relying where possible on open BIM standards and linking, where relevant, to digital logbooks and relevant initiatives (e.g. the Smart Readiness Indicator under the Energy Performance of Buildings Directive).
- Easiness of use and cost effectiveness, in particular for SMEs and companies with limited experience in digital solutions, and high potential for replication and commercialisation.
- Apply the solutions delivered on a set (at least two) of real-life residential and non-residential building construction and renovation projects which, taken together, allow to demonstrate the potential of the solutions across all aspects listed in the topic and across the life cycle.
- Ensure that the demonstrations of the solutions delivered:
  - Cover at least two different countries, with diverse climatic conditions.
  - Involve local and regional value chains, in particular SMEs, based on participatory approaches to increase innovation acceptability.
  - Result in clear and, where relevant, quantified and measurable indicators on the improvements due to the use of the solutions, for all aspects listed in the topic and across the life cycle.
- Contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.

Topic ID and title	<a href="#">HORIZON-CL5-2024-D4-02-04: Design for adaptability, re-use and deconstruction of buildings, in line with the principles of circular economy (Built4People Partnership)</a>				
Budget	EUR 8 million	Opening date	07 May 2024	Deadline 1	05 September 2024
Budget per project	EUR 4 million			Deadline 2	/
Type of action	Research & Innovations Actions (RIA)				
FTP subsector	WW				
Keywords	Building recycling, disassembly, reuse				
FTP comments	This call is launched under the Built4People Partnership and funded projects should demonstrate innovations in at least two countries with different climate conditions. It focuses on disassembly and reuse of buildings and all building elements. To increase the reuse of wood in buildings is of high importance				
FTP SIRA 2030 Challenges addressed	8C	FTP relevance		Medium	
		Starting TRL		/	
		End TRL		5-6	

### Expected Outcome:

Project results are expected to contribute to all of the following expected outcomes:

- Improved adaptability of buildings and building units to new uses.
- Increased reuse and recycling of building elements and products.
- Extended service life of buildings.
- Increased awareness on best practices for design for adaptability, reuse and deconstruction.

### Scope:

Based on the integration of innovative tools, products and techniques, to enable construction and renovation that embeds the principle of extending the service life of buildings, and facilitate adaptability to changing user needs (e.g. for optimal use of indoor space or to improve working and living conditions), reuse, and deconstruction, in a life-cycle optimisation and circular economy perspective.

Proposals are expected to address all of the following:

- Validate construction and renovation solutions based on the integration of innovative tools, products, techniques, processes and methods, that facilitate deconstruction and reuse, based on life-cycle approaches across the value chain.
- Ensure the solutions validated:



- Consider the adaptability and reversibility of buildings and building units to changing uses, and to other relevant factors (e.g. evolution of surroundings).
- Improve the ease of reuse of construction elements and products from existing buildings, also facilitating recycling when reuse is not possible.
- Develop building elements and products that can be disassembled and reused, including those made from CO<sub>2</sub>-storing materials such as sustainably sourced long-lived bio-based materials and products and, innovative lower emission materials /aggregates.
- Address all components of buildings, including structural elements, envelopes, interior fixtures and fittings, and technical building systems.
- Are rooted in local and regional value chains, based on participative approaches for social acceptability of innovation, in particular with regard to the workforce's practices and skills.
- Can flexibly adapt to local / regional sourcing of innovative products and materials to increase replication.
- Address climate change mitigation, minimising emissions.
- Allow to minimise any negative impacts of pollution and biodiversity loss from renovation and construction works.
- Validation of the solutions in a relevant environment (real-life or close to real-life) that:
  - Covers residential and non-residential projects, half of which at least should be renovation projects.
  - Covers at least two different countries, with diverse climatic conditions.
  - Involves local and regional values chains, in particular SMEs, based on participatory approaches to increase innovation buy-in from users.
  - Results in clear and, where relevant, quantified and measurable indicators on the improvements due to the use of the solutions.
- Deliver guidance and recommendations for technology providers, regulatory authorities, certification and standardisation bodies, and define and implement ambitious dissemination actions, to promote the approaches demonstrated and support their replication.

- Where relevant, contribute through specific and targeted actions to standardisation and regulatory evolutions that can foster reuse and deconstruction of buildings materials and products.
- Contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

This topic implements the co-programmed European Partnership on 'People-centric sustainable built environment' (Built4People). As such, projects resulting from this topic will be expected to report on results to the European Partnership 'People-centric sustainable built environment' (Built4People) in support of the monitoring of its KPIs.

## Cluster 6 : Food, Bioeconomy, Natural Resources, Agriculture and Environment<sup>3</sup>

### Destination 3: Circular economy and bioeconomy sectors

This destination and its topics target climate-neutrality, zero pollution, fair and just circular and bioeconomy transitions. These cover safe, integrated circular solutions at territorial and sectoral levels, for important material flows and product value chains, such as i) textiles, ii) electronics, iii) chemicals, iv) packaging, v) tourism, vi) plastics and construction, and vii) key bioeconomy sectors such as a) sustainable bio-based systems, b) sustainable forestry, c) small-scale rural bio-based solutions, d) environmental services and e) aquatic (including marine and freshwater) value chains.

The destination supports the European Green Deal, and in particular:

- the new EU Circular Economy Action Plan (CEAP), adopted in March 2020, and the subsequent initiatives along the entire life cycle of products;
- the EU strategy on adaptation to climate change adopted in February 2021;
- the EU zero pollution action plan, adopted in May 2021, with the chemicals strategy for sustainability from October 2020 and the new approach for a sustainable blue economy adopted in May 2021;
- the EU forest strategy for 2030: research and innovation will be key drivers in achieving the ambitious goals of this strategy;
- the EU climate law targeting climate-neutrality by 2050 and AFOLU climate-neutrality by 2035, which supports increased focus on bio-based circular consumption, as part of the Fit for 55 package proposed on 14 July 2021;
- the new European Bauhaus initiative and the renovation wave.

Furthermore, the Horizon Europe work programme for 2023-2024 will play a critical role in implementing the EU strategy for sustainable textiles, which highlights the strategic role Horizon Europe initiatives play in R&I in the textile ecosystem. Textiles are the fourth highest category as regards pressure on the use of primary raw materials and water and fifth for GHG emissions, and are a major source of microplastic pollution in production and use phases. They are also a key material and product stream in the circular economy action plan. Improvements in the circularity of the textile value chains will help reduce GHG emissions and environmental pressure. The framework is established in the strategy for sustainable textiles, The transition pathway is a multistakeholder process, that could support implementation Attention should be paid to ensuring a circular, safe and sustainable design

<sup>3</sup> [Work Programme published by the European Commission on 06 December 2022](#)

and the use of new sustainable biobased materials, as well as to collection, sorting and upcycling. Automated processes and digital solutions should help increase reuse and recycling. The safe-and sustainable-by-design concept aligns circular, safety and bioeconomy approaches with zero pollution. R&I can link various EU policies, namely those related to the green and digital transition, resilience and competitiveness. Under the proposed Ecodesign Sustainable Product Regulation (SPI) the Commission will set out ecodesign requirements on design in order to reduce the environmental footprint of products, striving for products to be kept in circular use for as long as possible.

The wide range of EU initiatives supported by this destination includes:

- the industrial strategy;
- the EU chemicals strategy for sustainability;
- the SME strategy;
- the revised (2018) bioeconomy strategy and its action plan;
- the communication on sustainable carbon cycles;
- the sustainable blue economy approach and its offshoot initiatives;
- the EU biodiversity strategy for 2030;
- the farm to fork strategy;
- the upcoming EU agenda for tourism;
- the plastics strategy and the action plan on critical raw materials.

In addition, this destination will contribute to the transition pathways of energy-intensive industries, textiles, construction and agri-food industrial ecosystems.

Where appropriate, proposals are encouraged to cooperate with the European Commission Knowledge Centre for Bioeconomy, also for the purpose of dissemination and exploitation of results.

### Expected impact

Proposals for topics under this destination should set out a credible pathway to:

- develop the circular economy and bioeconomy sectors;
- ensure natural resources are used and managed in sustainable and circular manner;
- prevent and remove pollution;
- unlock the full potential and benefits of the circular economy and the bioeconomy, with clean secondary raw materials, ensuring competitiveness and guaranteeing healthy soil, air, fresh and marine water for all, through better understanding of planetary boundaries and wide deployment and market uptake of innovative

technologies and other solutions, notably in primary production (forestry) and bio-based systems.

More specifically, the proposed topics should contribute to one or more of the following impacts:

- **Regional, rural, local/urban and consumer-based transitions are accelerated** towards a sustainable, regenerative, inclusive, just and clean circular economy and bioeconomy across all regions of Europe. Special attention should be paid to the most sensitive/vulnerable and greenhouse gas-intensive regions, based on **better knowledge and understanding of science**, and improved capacity to design, implement and monitor policies and instruments for circular and bio-based transitions.
- **European industrial sustainability, competitiveness and resource independence are strengthened** by reducing the use of primary non-renewable raw materials and greenhouse gases emissions and other pollutants, achieving an improved environmental footprint (including on biodiversity), enabling climate-neutrality, zero pollution and higher resource efficiency. This will also be supported by increasing circular and bio-based practices in textiles, plastics, electronics and construction, developing further on industrial symbiosis as well as circularity and sustainability by design, cascading use of biomass and, clean secondary raw materials, along and across value chains.
- **Innovative and sustainable value-chains are developed in the bio-based sectors** replacing fossil-based value chains, increasing circular bio-based systems from sustainably sourced biological resources, and replacing carbon-intensive and fossil-based systems. Such a development will be supported through R&I in **biotechnology** and other enabling technologies, which is a prerequisite and driver of future solutions for a circular economy and the bioeconomy transition. This will involve with inclusive engagement with all stakeholders, including policymakers and will increase access to finance and technical support along whole supply chains for bioeconomy projects.
- **The benefit for consumers and citizens, including those in rural areas, are improved** by establishing circular and bio-based systems based on sustainability, inclusiveness, zero pollution, health and safety. All value chain actors (manufacturers, retailers, service industry, consumers, public administration, including on regional level, primary biomass producers etc.) are involved to a significantly higher degree.
- **Multi-functionality and management of forests in Europe are safeguarded** based on the three pillars of sustainability (economic, environmental and social), in

particular to optimise the contribution of forests and the forest-based sector in mitigating and adapting to climate change.

- **Potential of marine and freshwater biological resources and blue biotechnology is enlarged** to i) deliver greener (climate-neutral and circular) industrial products and processes, ii) help characterise, monitor and sustain the health of aquatic ecosystems for a healthy planet and people, and iii) help in the drafting of proposals for accompanying changes in regulation where necessary.

## Call – Circular economy and bioeconomy sectors 2023

### Enabling a circular economy transition

Topic ID and title	<a href="#">HORIZON-CL6-2023-CIRCBIO-01-7: Symbiosis in the bio-based industrial ecosystems</a>				
Budget	EUR 3 million	Opening date	22 December 2022	Deadline 1	28 March 2023
Budget per project	EUR 1,5 million			Deadline 2	/
Type of action	Coordination & Support Actions (CSA)				
FTP subsector	WW, P&P				
Keywords	Industrial symbiosis, digitalisation, environmental impacts				
FTP comments	The call will support assessment and analysis of how synergies can be developed or strengthened between industrial actors from different value-chains in the bioeconomy. E.g. between personal care products and construction materials				
FTP SIRA 2030 Challenges addressed	5 – 6A	FTP relevance		Low	
		Starting TRL		/	
		End TRL		/	

### Expected Outcome

Successful proposals will enable the bio-based industries in the Union to contribute to the enhancement of European industrial sustainability, competitiveness and resource independence, developing industrial symbiosis and circularity by design and to the development of innovative and sustainable value-chains in the bio-based sectors as a prerequisite and driver of future solutions for a circular economy and the bioeconomy transitions. Projects results will contribute to deliver bio-based solutions with reduced environmental impacts on soil, water and air quality, biodiversity and climate, in line with the EGD objectives, the EU circular economy action plan, the bioeconomy strategy and the implementation of the transition pathway for the EU chemicals industry.

Projects results are expected to contribute to all of the following expected outcomes:

- Innovative processes and industrial symbiosis approaches in the bio-based industrial value chains, enabling local security of supply chains and the maximum valorisation of biological resources while minimizing the use of hazardous substances and waste streams
- Monitoring systems of the industrial symbiosis in the bio-based industrial value chains

### Scope

In the transition towards an effective circularity and zero pollution within the industrial ecosystems in the Union, the production of goods and services must optimize the use of any

resource. Industrial symbiosis is instrumental to this goal, as it is based on the sharing of resources between facilities when wastes or by-products from an industry or industrial process becomes the raw material for another. A well-developed symbiosis across bio-based facilities aims at zero-waste value chains, ensuring more local supply chains, minimizing the use of input material resources, while reducing all the environmental impacts on soil, water and air quality, biodiversity and climate, of all the processes involved. This should also bring an increase in the economic value of final products and a better distribution of economic and social benefits among the stakeholders. Industrial bio-based facilities within the scope of this topic include those producing bio-based materials and products (e.g., paints, coatings, inks and dyes, polymers, construction materials, fibres, personal care products, plasticisers, adhesive, lubricants, platform chemicals, solvents, surfactants, etc.).

To improve the knowledge for the implementation and scaling up of industrial symbiosis in the bio-based industries proposals should:

- Analyse the applicability of existing methods and approaches individuating and assessing technical solutions enabling the symbiosis to specific sectors/facilities within the bio-based industrial ecosystems (but also their symbiosis with non-bio-based industrial assets), including supported by digital innovation and AI, based on existing studies and on the knowledge collected and elaborated under the European Community of Practice (ECoP);
- Improve existing and/or develop new methods to assess the circularity and symbiosis of bio-based industrial ecosystems, taking into considerations specific KPIs developed in the above-mentioned ECoP;
- Assessment and optimize the environmental sustainability of symbiotic processes in terms of (decreased) impacts on soil, water and air quality, biodiversity and climate;
- Evaluate the economic and social benefits of the industrial symbiosis assets in terms of increased economic value of final industrial products, better distribution of economic and social benefits among the stakeholders, improved utilisation of local supply chains, and integration in local (national and regional) strategies supporting circular approaches;
- Individuate high-potential regions/areas, or specific industrial hubs for the demonstration of the developed symbiotic approach. Criteria for the individuation of such sites should focus on process level, symbiosis process implementation, commitment level of the local authorities and communities, regional specificities (business/industrial policy and strategies), additional funding, potential private investors, etc., also taking stock from the EU Hubs for Circularity (H4C) experiences;
- Engage with stakeholders, including local authorities and communities to disseminate the social and economic benefits from innovation in industrial symbiosis,



bio-based industries, universities or other educational institutions to facilitate the training of circular practitioners;

- Develop a targeted reporting system of the effectiveness of the technical solutions, based on ad-hoc monitoring capacity along the bio-based value chains working in symbiosis.

Projects are expected to contribute to the New European Bauhaus (NEB) initiative by interacting with the NEB Community, NEBLab and other relevant actions of the NEB initiative through sharing information, best practice, and, where relevant, results.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects, including under the Circular Bio-based Europe JU and other partnerships of Horizon Europe and beyond.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.

Topic ID and title	<a href="#">HORIZON-CL6-2023-CIRCBIO-01-8: Eco-friendly consumer products – low-toxicity/zero pollution construction bio-based materials</a>				
Budget	EUR 10 million	Opening date	22 December 2022	Deadline 1	28 March 2023
Budget per project	EUR 5 million			Deadline 2	/
Type of action	Innovations Actions (IA)				
FTP subsector	WW				
Keywords	biobased construction materials, life cycle analysis LCA, non-toxic, zero-pollution, circularity				
FTP comments	The scope of the topic targets building with wood and other biobased materials				
FTP SIRA 2030 Challenges addressed	4D – 8B, C, D - 9C	FTP relevance		High	
		Starting TRL		/	
		End TRL		6-8	

### Expected Outcome

A successful proposal will contribute to all Destination ‘Circular economy and bioeconomy sectors’ impacts related to consumers and industry, in particular to development of innovative and sustainable value-chains in the bio-based sectors and of European industrial sustainability, competitiveness and resource independence, including via research on biotechnology and other enabling technologies, as a prerequisite and driver of future solutions for a circular economy and the bioeconomy transitions.

Project results are expected to contribute to all of the following outcomes:

- Higher environmental sustainability, including on the climate targets (primarily reduction of greenhouse gas emissions, and accessorially increase of carbon removals), and zero pollution demonstrated by LCA approaches of bio-based materials and products for construction applications, allowing their intensified sustainable use, under the New European Bauhaus Initiative<sup>251</sup> and the Renovation Wave;
- Demonstrated non-toxic and zero-pollution properties of the construction materials, as well as their recyclability and/or reusability, to respond to the higher societal demand and the objectives of the European Green Deal,
- Increased competitiveness of European industry, including SME sector, and involving various actors of bio-based value chains; while ensuring affordable and sustainable end-products for the consumers and society, including via integration of digital solutions;
- Improved innovation potential in regard to biotechnology, and its potential contribution to the sustainable, circular bio-based materials and biochemicals, with safe, environmentally-friendly and functionally performing applications; Improved societal innovation and creativity, with inclusive engagement of all societal actors, especially professional bodies, policy-makers, designers, architects, consumers and

end-users, for the bio-based construction product segments. This is expected to contribute, e.g., by developing recommendations or guidelines, or public engagement/dialogue, to the policy-feedback on innovative construction materials, and to resolving related regulatory bottlenecks.

### Scope

Bio-based construction materials offer major opportunities to contribute to the climate-neutral and zero-pollution objectives of the European Green Deal, replacing fossil-based alternatives, and so, reducing the environmental footprint, while offering economic benefits to the actors involved. However, care needs to be taken to ensure sustainability of sourcing and production process, while guaranteeing safety and positive user experience. This calls for high level of innovation and creativity, ensuring full inclusiveness of participation for all actors.

Proposals will focus on:

- Identification and upscaling of bio-based materials suitable for the construction sector, understood as bio-based feedstocks, e.g., agro-forestry 253 residues, fibres, recycled organic materials, industrial by-products etc, obtained especially by higher circularity of available biomass, under the cascading use of biomass principle. However, the selected materials can also be found in other bio-based resources that, due to their specific genetic / physiological / biochemical backgrounds have functional properties, which can be further improved or upgraded by fermentation, biomanufacturing, or biotechnology approaches. Also, the hybrid integration of living organisms into traditional or bio-based construction materials (e.g., plants, algae, fungi) might be considered, if leading to higher quality and improved environmental impact. The range of final construction materials is broad and may cover composites, insulation materials, interior or exterior elements, adhesives, etc., depending on the construction value chain selected.
- Innovating in terms of bio-based production improvements (e.g., additive bio-based manufacturing, nature-based solutions, or composite materials with added functionalities), leading to new construction-oriented consumer applications. This effort should benefit from innovation developed both from the technical angle, but also from social innovation and from inclusive participation of all actors, including development of recommendations for pre-normative or/and regulatory actions, related to new (recyclable/reusable) bio-based construction materials, as appropriate.
- The safety and user experience aspects should be duly considered and included in the developed solutions.

- Communication and dissemination will form an essential part of the projects, especially as related to the sustainability, 'reconnection with nature' and inclusiveness aspects.
- Proposals should include a dedicated task, appropriate resources and a plan on how they will collaborate with other projects funded under this topic and other relevant topics.
- International cooperation is encouraged to benefit from exchange of best practices, while taking care of European (industrial) competitiveness.
- SSH aspects should be considered and covered, as well as the contribution from digital solutions.

Topic ID and title	<a href="#">HORIZON-CL6-2023-CIRCBIO-01-9: Business models that balance the share of power and profit in the bioeconomy</a>				
Budget	EUR 8 million	Opening date	22 December 2022	Deadline 1	28 March 2023
Budget per project	EUR 4 million			Deadline 2	/
Type of action	Research & Innovation Actions (RIA)				
FTP subsector	F&F, WW, P&P – Value Chain				
Keywords	green jobs, business models, biorefineries, cooperatives, marginal lands, R&I priorities				
FTP comments	This call topic is for the whole value chain and the forest-based sector is included.				
FTP SIRA 2030 Challenges addressed	2E - 3E - 5 – 6A, B – 7 – 9A, B – 10B			FTP relevance	Low
				Starting TRL	/
				End TRL	/

### Expected Outcome

This topic is supporting the Bioeconomy Strategy and the Common Agriculture Policy (CAP) by promoting diverse forms of cooperation among primary producers to create value-added bio-based products in fair value chains via advanced biorefineries.

Project results are expected to contribute to all of the following outcomes:

- Revitalisation and resilience of rural economies by creating new green jobs and investments.
- Development and validation of replicable, scalable production and business models for the operation of biorefineries that offer economic opportunities in rural areas and contribute to a fair distribution of benefits in bio-based value chains.
- Enhanced joint investment in R&D and demonstration plants.
- Linking of underutilised feedstock types with available technologies and market information, improved logistics and quality standards.
- Identification of factors for success and policy recommendations in view of robust contracts and agreements, training and capacity building, shared business plans, marketing strategies for bio-based products as well as financial and legal aspects.
- Climate-neutral land sector by 2035 and climate-neutral economy by 2050.
- Diversification and enhancement of agricultural incomes (organic and conventional farming).
- Enhanced cooperation between primary producers and other key actors along the value chain in the bio-based economy.

## Scope

The circular use of waste, by-products and residues from agriculture, forestry, and the agri-food industry can lead to the creation of new economic opportunities in rural areas. However, primary producers are often not fully integrated in bio-based value chains, and thus, benefits are not sufficiently distributed among value chain actors.

This topic addresses diverse forms of cooperation among primary producers and suitable business models to create high-value bio-based products in vertically integrated value chains via advanced biorefineries.

Proposals will:

- Examine the potential of contractual agreements or fully developed shareholder/ownership concepts (e.g., cooperatives) to create sustainable and competitive innovations in the bio-based economy through the conversion of by-products, residues and wastes from agriculture and forestry.
- Develop and promote business models for different primary production sectors in the EU that build on existing rural infrastructures, support the economies of scale, and contribute to a fair distribution of costs, benefits, and risks amongst the economic operators.
- Contribute to a better understanding of sustainable and fair biobased supply chains, synergetic points along and across agricultural, forestry and industrial value chains as well as industrial symbiosis opportunities.
- Explore existing investment options, including non-traditional sources (e.g., cross sectoral collaborations, etc.) and identify barriers and enablers for sustainable long-term operations.
- Contribute to restoring carbon content in soil, increasing nutrients, revitalising marginal lands and ensuring food security.
- Consider further socio-economic factors, influencing farmers' behavior and develop indicators to assess the economic, environmental and social impacts for farmers, foresters and rural areas through increased cooperation.
- Connect with a wide range of stakeholders (farmers, foresters, industry, processors, advisors, clusters, etc.) and develop together a portfolio of research and innovation priorities that can be implemented in Horizon Europe and relevant European partnerships such as the Circular Biobased Europe.

- Promote bioeconomy-related interventions in the new CAP and provide advice and technical guidance for Member States.

Proposals shall apply the concept of the 'multi-actor approach' and ensure adequate involvement of the farming sector, SME's and other actors active in rural areas.

Proposals may involve financial support to third parties e.g. to primary producers, academic researchers, start-ups, SMEs, and other multidisciplinary actors, to, for instance, develop, test or validate developed applications. Consortia need to define the selection process of organisations, for which financial support may be granted. Maximum 20% of the EU funding can be allocated to this purpose.

Cooperation with other selected projects under this topic is strongly encouraged.

## Call – Circular economy and bioeconomy sectors 2024

### Enabling a circular economy transition

Topic ID and title	<a href="#">HORIZON-CL6-2024-CIRCBIO-01-3: Innovative circular solutions for furniture</a>				
Budget	EUR 10 million	Opening date	17 October 2023	Deadline 1	22 February 2024
Budget per project	EUR 5 million			Deadline 2	/
Type of action	Innovation Action (IA)				
FTP subsector	WW				
Keywords	furniture, digitalisation, circularity, waste management, recycling, industrial symbiosis, reuse				
FTP comments	The problem this topic address is: 80% to 90% of the EU furniture waste in MSW is incinerated or sent to landfill, with ~10% recycled. To increase circularity a successful project is expected to develop unorthodox solutions, e.g: AI, robotics, industrial symbiosis and circular design. Wood furniture producers and their value-chain, could surely contribute successfully to the objectives.				
FTP SIRA 2030 Challenges addressed	4	FTP relevance		Medium	
		Starting TRL		/	
		End TRL		6-8	

### Expected Outcome

A successful proposal will contribute to the following Destination impacts: i) enhance European industrial sustainability, competitiveness and resource independence, and ii) improve on consumer and citizen benefits.

Proposal results are expected to contribute to all of the following outcomes:

- Increased deployment and demonstrated benefits of advanced digital solutions (e.g., through AI, robotics, IoT, blockchain) in circular businesses including waste management and recycling
- Emergence of new value chains using upcycled, recycled and/or biobased resources, e.g. through industrial symbiosis, with particular attention to SMEs
- Increased recycling rates and upcycling to new higher-value products
- Increased uptake of recycled and/or renewable material
- Increased deployment and market uptake of circular design, including design for easy maintenance, repair, remanufacturing and recycling
- Increased reuse and refurbishment rates and diffusion of new circular business practices, in particular in the uptake of repair, reuse and refurbishment



- Increased resource efficiency along and across value chains, causing a measurable reduction in GHG emissions, release of microplastics, other environmental pollution, and in the use of hazardous substances, and an increase of carbon removals.

### Scope

Predominantly consisting of SMEs, the EU furniture industry employs around one million European workers and manufactures approximately a quarter of the world's furniture, representing a EUR 84 billion market equating to an EU28 consumption of ~10.5 million tons of furniture per annum. Despite a notable degree of knowledge and awareness of CE principles, analyses conducted in the framework of luxury furniture show that the involvement of furniture companies in CE practices, in particular those concerning reuse and recycle actions, is still marginal, and very limited use of process and product certifications has been noted.<sup>179</sup> According to the findings of an EU-funded project<sup>180</sup>, furniture waste in the EU accounts for more than 4% of the total municipal solid waste stream. Waste arising from commercial sources is assumed to contribute 18% of total furniture waste generation across the sector. Total annual EU furniture waste equates to 10.78 million tonnes. According to European Federation of Furniture Manufacturers statistics, 80% to 90% of the EU furniture waste in MSW is incinerated or sent to landfill, with ~10% recycled. Reuse activity in the sector is considered low. Where reuse does occur, it is mostly through commercial second-hand shops, social enterprise companies or charities.

Six key cycles can be highlighted to make furniture more circular. All proposals should target several of these cycles:

- Maintain – using preventative maintenance to maximise product lifetime, e.g., a chair remains a chair;
- Repair – corrective maintenance, e.g., a chair remains a chair;
- Reuse – redistributing products through a change in ownership, e.g., a chair remains a chair;
- Refurbish – remanufacturing the product to optimize lifetime, e.g., by resizing a desk or changing the appearance of a chair through re-upholstering to extend 'fashion' service life, or resizing desks;
- Repurpose – change functionality of the product, e.g., a desk becomes a table;
- Recycle – recovering the value of components and materials for feedstock as secondary materials in new products.

Key strategies to achieve the circularity transition are circular design including the smart use of biobased materials, a shift from products to services, extended product life through design, safe and circular material choices, increased material efficiency, and modular design. It is evident that circularity concepts must be anchored in the design phase of products and

aim at the user. All proposals should therefore address to some extent circular design strategies.

Projects should demonstrate and deploy at large scale innovative solutions and designs for increased quality, non-toxicity and durability of secondary and renewable materials and increased share of secondary and renewable materials in new products. Projects should demonstrate increased recovery, recycling and upcycling rates and a higher uptake of secondary materials for high value applications. Projects should also demonstrate circular business practices, in particular in the uptake of repair and reuse, remanufacture, product-service-systems, and in the full lifetime of products or services. To achieve this, targeted market size, economic feasibility, cost efficiency and social acceptance need to be addressed. To break down the barriers for this transition, it is important that proposals involve and address the different perspectives of all relevant actors, e.g., manufacturers, retailers, consumers and civil society organisations (CSOs). Proposals should consider the use of digital solutions (including technologies such as AI, robotics, IoT and blockchain) and demonstrate their benefits for increased circularity. They should also help produce harmonised and robust methods to assess the amount of recycled content in sectoral products, which is key for a future review of green claims through authorities and consumer organisations. Environmental, social and economic impacts should be assessed from a lifecycle perspective as product, organisation and consumption environmental footprints, using the respective methods developed by the European Commission (Product Environmental Footprint, PEF, should be used for the assessment of the environmental impacts) and through costing methods and a dynamic LCA; relevant data should be fed into the European Platform on Life Cycle Assessment, following the specific Environmental Footprint data and format requirements. The functional performance of technologies and secondary materials can be assessed through the EU Environmental Technology Verification (ETV) scheme. Considering the microplastics and microfiber pollution and hazardous substances that are present in the targeted waste streams, their removal from the materials used for the products in concern as well as from the recovered material is crucial, in addition to applying less-polluting production and consumption procedures. Decontamination levels need to be properly addressed and accumulation prevented. Proposals should fully incorporate the Safe and Sustainable by Design (SSbD) approach. All results should be validated using quantitative indicators and targets wherever possible.

Proposals should also envisage policy recommendations for increased warranty and cascading use. They should also provide for the development of training material to endow workers in this occupational group with the right skillset in order to deploy the new technologies developed. Proposals should consider the development of learning resources for the current and future generations of employees, with the possibility to integrate them

in existing curricula and modules for undergraduate level and lifelong learning programmes. The projects should provide contributions to relevant standards or best practices.

Social innovation is recommended when the solution is at the socio-technical interface and requires social change, new social practices, social ownership or market uptake.

To the extent that proposed solutions will address the role of the consumer, proposals should seek to contribute to the goals and cooperate with the services of the European Commission's Circular Cities and Regions Initiative (CCRI). Joint activities with CCRI projects are encouraged.

The targeted TRL at the end of the projects is 6 to 8.

## Innovating for sustainable bio-based systems, biotechnology and the bioeconomy

Topic ID and title	<a href="#">HORIZON-CL6-2024-CIRCBIO-01-6: Digital information systems for bio-based products</a>				
Budget	EUR 6 million	Opening date	17 October 2023	Deadline 1	22 February 2024
Budget per project	EUR 3 million			Deadline 2	/
Type of action	Research and Innovations Actions (RIA)				
FTP subsector	WW, P&P				
Keywords	digitalisation, CBE JU, EU Digital strategy, Circular Economy, Bioeconomy				
FTP comments	The scope of the topic is to digitalise the biobased value chains (through AI tools, digital chain-of-custody solutions, etc) for better circularity. It targets the bioeconomy as a whole. Participation of relevant stakeholders of the complex forest-based value-chain, is important but. This role is likely suitable for a technical/research Institute. The topic is part of the Circular Biobased Europe JU programme.				
FTP SIRA 2030 Challenges addressed	2E – 6E – 8C – 9D	FTP relevance		Medium	
		Starting TRL		/	
		End TRL		5	

### Expected Outcome

Successful proposals will support the bio-based industries and the enablers of the digital transition in the Union to contribute to the development of innovative and sustainable value-chains in the bio-based sectors. Projects' results will contribute to deliver bio-based solutions with reduced environmental impacts on soil, water and air quality, biodiversity and climate, in line with the EGD objectives, the EU circular economy action plan and its sustainable product initiative and the proposal for the Ecodesign for sustainable Products Regulation as well as the EU data strategy.

Projects results are expected to contribute to the following expected outcome:

- Mobilising the potential of digitalisation of bio-based sectors enabling efficient, sustainable and climate neutral production processes and transparent information.

### Scope

An effective circular economy needs improved information of material flows used in all economic sectors. Information and data on products and services are key factors to improve their production's sustainability and to meet the performance demands and needs of customers. Sharing data in an accessible and simple way, according to FAIR principles, to enable easy processing, can provide information back to the society, facilitating the inclusiveness of economic activities. Digital technologies can track and report the journeys of products, components and materials and make the resulting data securely access.

The Circular Economy Action Plan's Sustainable Product Initiative, the EU Digital strategy's Circular Electronics Initiative and the EU Data strategy provide guidelines to build data and system architectures aiming at improving products sustainability, resources efficiency and circularity, among other goals.

To exploit the potential of digitalisation for the objectives of the EU circular economy in the bio-based sectors, proposal should:

- Design solutions for the digitalisation of information from bio-based products and their value chains, e.g., AI-based, such as digital passports, tagging and watermarks, etc. and enable their use;
- Specialize the information from bio-based products on impacts on climate , based on estimates of carbon emissions and carbon removals, environmental impacts on soil, water and air quality and biodiversity, end-of-life options, safety control, technical performances, predictive maintenance, and programmed integrity/biodegradation, among other data;
- Design the information from bio-based products to improve the societal readiness adaptation in terms of acceptability, and uptake of innovations by society. The information should be easily accessible by customers and consumers and to support them in making responsible and informed choices;
- Support the harmonisation and interoperability of the digital information formats;
- Enable bio-based industries to participate in the European Dataspace for Smart Circular Applications;
- Design the interfaces between the digital information from bio-based products and other applications of digital technologies ensuring interoperability in the Union.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects, including under the Circular Bio-based Europe JU.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities. Moreover, the link between digitalisation and the resilience of economies to disruptions, such as the one suffered from COVID-19 crisis, should be part of the societal impacts assessment.

## Call – Circular economy and bioeconomy sectors 2024 two-stage

### Innovating for sustainable bio-based systems, biotechnology and the bioeconomy

Topic ID and title	<a href="#">HORIZON-CL6-2024-CIRCBIO-02-5-two-stage: Circular design of bio-based processes and products</a>				
Budget	EUR 8 million	Opening date	17 October 2023	Deadline 1	22 February 2024
Budget per project	EUR 4 million			Deadline 2	17 September 2024
Type of action	Research & Innovation Actions (RIA)				
FTP subsector	WW, P&P				
Keywords	circularity, biobased processes and products, reuse, recycling, environmental impacts				
FTP comments	The bio-based processes and products within the scope of this topic do not include food, feed, biofuels, bioenergy and cultural and recreation sectors. The aim is to improve circularity of biobased products. As such it could be very relevant for several actors in the forest-based sector. The topic is part of the Circular Biobased Europe JU programme.				
FTP SIRA 2030 Challenges addressed	4	FTP relevance		Medium	
		Starting TRL		/	
		End TRL		5	

#### Expected Outcome

Successful proposals will enable the bio-based industries in the Union, including SMEs, to contribute to the enhancement of European industrial sustainability, competitiveness and resource independence and to the deployment of innovative and sustainable value-chains in the bio-based sectors as a prerequisite and driver of future solutions for a circular economy and the bioeconomy transitions. Projects results will contribute to deliver bio-based solutions with reduced environmental impacts on soil, water and air quality, biodiversity and climate, in line with the EGD objectives, the EU circular economy and the EU zero pollution action plans, the bioeconomy strategy and the communication on sustainable carbon cycles.

Projects results are expected to contribute to all of the following expected outcomes:

- Circular design of bio-based processes and products: increasing resources and energy efficiency of bio-based technologies, decreasing their environmental impacts on soil, water and air quality, biodiversity and climate, improving durability and suitability of bio-based products to be safely re-used and re-manufactured, allowing for high-quality recycling, increasing the safe recycled content in new products;
- Product information systems enabling the circularity, safety and environmental sustainability of the bio-based manufacturing sectors and of the use of products at consumers' level.

## Scope

The bio-based processes and products within the scope of this topic do not include food, feed, biofuels, bioenergy and cultural and recreation sectors. The establishment of safe, resilient, competitive and equitable production and consumption systems with reduced environmental impacts on soil, water and air quality, biodiversity and climate, is part of the objectives of the EU circular economy.

To improve the capacity of the industrial bio-based sectors within the scope of the topic, especially the manufacturing sectors, to contributing to that objective, proposals should:

- Develop optimized design of bio-based processes and bio-based products to improve their circularity, taking into account the opportunity to re-use recycled materials in the local market. This could be achieved through increasing resources and energy efficiency of processes, improving high-quality recycling technologies, increasing the durability of products and their suitability to be safely re-used and re-manufactured, improved products end-of-life options, increasing the safe recycled content in new products, etc.;
- Assess the safety, environmental sustainability and climate neutrality of circular biobased processes and products along their value chains, including of the biological feedstock from land and sea used in the production processes. The environmental impacts of processes and products on soil, water and air quality, biodiversity and climate should be based on existing and validated assessment methods, also developed and improved in past and ongoing R&I projects<sup>206</sup>. In particular, the climate neutrality should be assessed based both on the reduction of greenhouse gas emissions and on the increase of carbon removals and should include an assessment of the energy efficiency improvement;
- Include the assessment of economic and social aspects of the improved production and consumption bio-based systems in terms of increased economic value along the whole value chains, circular patterns of products involving consumers, i.e., durability, reuse, repair, remanufacturing and recycling patterns, improved economic value of recycled materials, job opportunities, etc.;
- Develop product information systems demonstrating the safe and sustainable use of biological resources and the resource efficiency along value chains, from the production to the extended circular product lifetimes and appropriate disposal. Transparent information should aim at improving the societal acceptance of bio-based innovation and at supporting consumers and customers in making responsible and informed choices.

In order to achieve the expected outcomes, and in line with the EU strategy for international cooperation in research and innovation, international cooperation is encouraged. Projects are expected to contribute to the New European Bauhaus (NEB) initiative by interacting with the NEB Community, NEBLab and other relevant actions of the NEB initiative through sharing information, best practice, and, where relevant, results.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects<sup>207</sup>, including under the Circular Bio-based Europe JU, the Processes 4 Planet partnership and other European partnerships of Horizon Europe.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.



## Destination 4: Clean environment and zero pollution

Anthropogenic pollution undermines the integrity of Earth's ecosystems and severely affects natural resources essential for human life. Keeping our planet clean and our ecosystems healthy will not only help addressing the climate crisis but also help regenerate biodiversity, ensure the sustainability of primary production activities and safeguard the well-being of humankind. In line with the objectives of the European Green Deal and related initiatives targeting environmental challenges, particularly the EU zero pollution action plan, the 2030 climate target plan, and other relevant EU legislation, this destination seeks to halt and prevent pollution by focusing on:

- removing pollution from fresh and marine waters, soils, air, including from nitrogen and phosphorus emissions;
- substituting harmful chemicals;
- improving the environmental sustainability and circularity of bio-based systems;
- reducing environmental impacts of and pollution in food systems.

Synergies with other clusters (notably 1 for health issues and 5 for air pollution from urban sources), relevant destinations, missions (particularly 'A Soil Deal for Europe' and 'Restore our Ocean and Waters by 2030') and partnerships will be exploited.

Topics under the heading ***Halting pollution of air, soil and water*** aim to identify and demonstrate approaches to combat diffuse emissions of pollutants from land and other sources. In this context, keeping nitrogen (N) and phosphorus (P) cycles in balance is a major challenge. N and P flows from anthropogenic sources, mostly from excessive or inefficient input of fertilisers (manure, sewage sludge, etc.) in agriculture and from waste water treatments, currently exceed planetary boundaries. Their leaching and run-off negatively affect soil biodiversity, pH, organic matter concentration and carbon sequestration capacity, and cause the eutrophication of water bodies while ammonia and nitrous oxide emissions affect air quality and climate. As all environmental compartments are concerned, a systemic approach is needed to limit N/P emissions from different sources, and to bring N/P flows back within safe ecological boundaries, e.g. by improving the way fertilising products in agriculture are managed while taking into account regional conditions. Actions will include showcasing best practices to recover nutrients from secondary raw materials in order to produce alternative fertilisers and demonstrating pathways for regions to keep their N/P flows within ecological boundaries.

Topics under ***Protecting drinking water and managing urban water pollution*** seek to develop and demonstrate a comprehensive framework bringing together new innovative solutions and approaches to ensure drinking water is of a good quality, address urban water

pollution and harmonise different policies and management approaches. Actions should explore solutions to increase the resilience of urban waste water systems, reducing the carbon footprint and emissions, improve resource efficiency and energy recovery, and limit risks from contaminants of emerging concern. An integrated strategy to harmonise and update monitoring with prioritisation for comprehensive control of urban water cycles should be developed by harnessing the potential of digital solutions.

Topics under ***Addressing pollution in seas and ocean*** strive to fill knowledge gaps about risks and impacts of pollution from contaminants of emerging concern in the marine environment (in particular pharmaceuticals and endocrine disruptors) including in the context of the changing marine environment due to changes in the climate system. They will further develop and test solutions for the integrated assessment and monitoring of the circulation and impacts of contaminants of emerging concern in the marine environment, in order to help implement EU policies and legislation, e.g. the Water Framework Directive and Marine Strategy Framework Directive. Actions should also explore the role of pollution in intensifying impacts related to climate change, including in the Arctic, resulting in solutions and strategies to help ecosystems and human communities adapt as regards the changes in the Arctic.

Topics under ***Increasing the environmental sustainability and circularity of bio-based processes and products*** look at developing bio-based solutions for environmental monitoring and remediation as well as the concept of integrating sustainability and circularity into bio-based systems. This concept also includes bio-based chemicals, additives and materials solutions contributing to carbon removal objectives, the chemicals strategy for sustainability (CSS strategy) and the development of safe- and -sustainable-by-design materials and products.

Furthermore, topics under the heading ***Reducing the environmental impact and pollution of food systems*** focus on increasing our knowledge of the soil, water and air pollution stemming from different food production and supply practices and providing opportunities to reduce environmental and climate impacts of food systems. This also includes preventing and reducing plastic pollution stemming from plastic food packaging.

#### Expected impact

Proposals for topics under this destination should set out a credible pathway that helps to halt and eliminate pollution to guarantee clean and healthy soils, air, fresh and marine water for all and ensure that natural resources are used and managed in a sustainable and circular manner. To reach this objective, it will be vital to advance the knowledge of pollution sources

and pathways to enable preventive measures to be rolled out, improve sustainability and circularity, apply planetary boundaries in practice and introduce effective remediation methods. To this end, the following is required:

- move towards achieving clean, unpolluted surface water and groundwater bodies in the EU and Associated Countries by increasing understanding of diffuse and point sources of **water pollution in a global and climate change context**, enabling novel solutions to avoid degradation and restore water bodies, aquatic ecosystems and soil functionality,
- and further improve the quality and management of water for safe human and ecological use, while strengthening the EU's and Associated Countries' positions and roles in the global water scene;
- balance **N/P flows within safe ecological boundaries** at regional and local level, helping restore ecosystems;
- move towards achieving **clean, unpolluted oceans and seas**, including in the Arctic, by means of successful scientific, technological, behavioural, socio-economic, governance and green-blue transitions;
- **strengthen circular bio-based systems** to operate within planetary boundaries, replacing fossil-based systems and their carbon footprint, mitigating climate change, and restoring biodiversity and protecting air, water and soil quality along the supply chain of biological feedstocks and industrial value chains within the EU and Associated Countries and across borders;
- **substitute harmful chemicals** for safer and more sustainable alternatives, notably by boosting innovative biotechnology and other sustainable technologies to create zero-pollution bio-based solutions;
- **reduce the environmental impact of food systems**, e.g. by increasing knowledge of the environmental and climate impacts stemming from the food systems and reducing pollution from plastic food packaging.

## Call – Clean environment and zero pollution 2023

### Increasing environmental performances and sustainability of bio-based processes and products

Topic ID and title	<a href="#">HORIZON-CL6-2023-ZEROPOLLUTION-01-4: Environmental sustainability and circularity criteria for industrial bio-based systems</a>				
Budget	EUR 8 million	Opening date	22 December 2022	Deadline 1	28 March 2023
Budget per project	EUR 4 million			Deadline 2	/
Type of action	Research & Innovations Actions (RIA)				
FTP subsector	F&F, WW, P&P				
Keywords	biobased industrial systems, environmental impacts, circularity, life cycle analysis LCA				
FTP comments	This topic is very ambitious and expect projects to deliver sustainability criteria for the bioeconomy, inventory of TRL levels for relevant technologies and processes, etc. The result of funded projects should be used for future preparations of research funding programmes in the area of the circular bioeconomy (note: biofuels and bioenergy is excluded). As such, it is critical for the forest-based sector that relevant knowledge is represented in the proposals. It is most likely that this competence and willingness to apply is found in the academia or research institutes.				
FTP SIRA 2030 Challenges addressed	2E – 4D – 5C – 9B			FTP relevance	High
				Starting TRL	/
				End TRL	5

#### Expected Outcome

Successful proposals will support bio-based industries, traders and researchers and innovators, to assess and trace the environmental impacts and circularity of industrial bio-based systems in order to enable responsible production and to steer innovation in the industrial bio-based systems in the EU. Project outcomes will contribute to enhancing circular bio-based systems to operate according to planetary boundaries, replacing fossil-based systems and their carbon footprint, mitigating climate change, restoring biodiversity and protecting air, water and soil quality along supply chain of biological feedstock and industrial value chains, in line with the 2030 Climate Target Plan, the EU zero pollution action plan and the communication on sustainable carbon cycles.

Projects results are expected to contribute to the following expected outcome:

- Standardisation of methods assessing the environmental impacts on soil, water and air quality, biodiversity and climate, and the circularity along the value chains of bio-based products for international trade at EU and global scale.
- Methods to assess the environmental sustainability and the circularity of low TRL biobased technologies
- Orientations for research and innovation programmes in the bio-based sectors

## Scope

The environmental sustainability and circularity assessment of industrial bio-based systems is instrumental to guarantee and monitor that they are developed in a way they can contribute to the just green transition of the EU economy away from a linear fossil-based system. On one hand, the method for such assessment, applied to high TRL bio-based solutions, would represent an instrument for policy makers and for investors, to support the deployment of and to leverage investments in the best performing bio-based sectors. On the other hand, the assessment of the environmental sustainability and circularity of low TRL, cutting-edge bio-based technologies is important to understand the potential of emerging technologies to contribute to the just green transition, also compared to the more mature technologies. Such knowledge would have an impact on the programming of R&I support initiatives, to save resources and move faster towards the scaling-up of the most promising bio-based technologies, including focussing on the potential environmental hotspots of the emerging technologies.

The assessment of the environmental sustainability and circularity should benefit to the greatest extent possible from existing methodologies and indicators, which can be adapted if needed. Methods and indicators should use the available environmental observations efficiently.

To deliver on the expected outcome, proposals should:

- Identify the range of high TRL industrial bio-based systems in the Union to be analysed in the project. Industrial bio-based systems within the scope of this topic do not include food, feed, biofuels, bioenergy and cultural and recreation sectors;
- Improve existing and/or develop new methods to assess environmental impacts of the selected industrial bio-based systems on climate, biodiversity, land use and water resources as priorities, but also on soil, water and air quality. Assessments should consider the life cycle perspective. The impact on climate should include the both the greenhouse gas emissions and the carbon removal potential of bio-based systems. The analysis should include trade-offs, for example between direct and indirect land use and land use change impacts and the carbon storage and substitution effect of bio-based products and provide an overall assessment of the environmental sustainability of the systems within the scope;
- Improve existing and/or develop new metrics of circularity of industrial bio-based systems based on the application of the cascading approach of biomass use, the resources efficiency, and effectiveness on a life-cycle perspective (i.e. durability, reuse, repair, remanufacturing and recycling patterns of bio-based products), other circular aspects;

- Analyse trade-offs and synergies with economic and social objectives (including geographical distribution aspects, urbanization pressures, etc.) and with competing and adjacent economy sectors in the bioeconomy (e.g. food and feed, biofuels and bioenergy) as well as with the fossil-based industrial systems;
- Collect and analyse the (range of) best available industrial bio-based systems within the Union in terms of environmental and circular performances, to build a set of benchmarks or references with best performances for similar industrial systems;
- Include the environmental sustainability and circularity of bio-based products, as assessed through the methods developed under the project, in existing certification scheme at EU and global scale, to enable international trade of certified sustainable biobased products;
- Consult stakeholders on the applicability of proposed certification schemes, also to improve the societal readiness adaptation in terms of acceptability and uptake of innovations by society;
- Develop and disseminate guidelines for targeted stakeholders on the assessment methods and the enhanced certification schemes developed in the project; Perform a preliminary analysis and improvement of the methods for the assessment of environmental sustainability and circularity performances of bio-based supply and value chains adapted to very low TRL bio-based technologies through: i) a review of the “prospective” LCA approaches and applications to bio-based and fossil-based technologies, with a focus on the environmental sustainability and circularity assessment approaches and tools. This task would lead to improve understanding and classifying the main challenges of prospective LCAs, e.g., comparability of results, input data availability, uncertainties/robustness, etc.; ii) the adaptation of the “prospective” LCA approaches to very low TRL bio-based technologies, including via modelling approach; iii) modelling the tests to validate the developed methods on a range of low TRL technologies and processes, including in relevant environments for future R&I projects; iv) including the analysis of potential synergies and trade-offs with economic and social objectives;
- Develop and disseminate guidelines to targeted stakeholders on the assessment of environmental sustainability and circularity performances of bio-based supply and value chains adapted to very low TRL bio-based technologies.

Consortia of applicants should involve LCA experts and researchers in the bio-based technologies, bio-based industries, trade bodies, consumers’ organisations and any relevant stakeholder along the value chain of industrial bio-based systems.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects, including under the Circular Bio-based Europe JU and other partnerships of Horizon Europe.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

## Destination 5: Land, ocean and water for climate action

Reducing greenhouse gas (GHG) emissions and increasing carbon sinks in primary production and natural systems as well as in harvested wood products and other carbon storage products are key components of the European Green Deal<sup>345</sup>. Achieving sustainable ocean, water and land management, and using natural resources efficiently to help mitigate climate change implies finding the right balance between productivity, climate, biodiversity and environmental goals in the agriculture and forestry sectors, with a long-term perspective. R&I activities will support **solutions for climate and environmentally friendly practices** to reduce emissions of major greenhouse gases, other pollutants and the environmental impact of ocean and land use changes and agricultural activities. R&I will rely on the application of digital technologies where relevant.

The **EU climate law** states that to reach 2030 and 2050 climate targets and to restore biodiversity, the EU needs to immediately and decisively restore and increase its natural carbon sinks. In 2021, the Commission proposed to amend **Regulation (EU) 2018/841 for land use, forestry, and agriculture** by setting an increased EU target for net removals of 310 MtCO<sub>2</sub>eq by 2030 and allocating targets for each Member State. The proposal also includes the aim to reach climate-neutrality in the entire land sector by 2035, namely that carbon removals should balance the greenhouse gas emissions from land use, livestock and fertiliser use. At the end of 2021, the Commission published a **communication on sustainable carbon cycles**, including **carbon farming** and **certification of carbon removals**. R&I, new technologies and business models are expected to unlock the full potential of land use, land-use change and forestry (LULUCF) activities in the mitigation of climate change.

Carbon farming will be implemented in line with the communication on sustainable carbon cycles and related documentation. R&I activities under this destination, and in the work programme of the mission 'A Soil Deal for Europe' will **help coordinate** the research community and key stakeholders in **developing, testing and demonstrating carbon farming practices and in certifying carbon removals**. Results of funded activities will help in managing land and forests and in delivering of multiple services provided by agricultural land and forests, such as: i) the provision of goods and long-term carbon storage in harvested wood products, ii) protection of soils, water and biodiversity; and iii) mitigation of and adaptation to climate change.

Specific attention will be given to paludiculture, complementing the activities of Cluster 5 in the 2021/2022 work programme. R&I activities will help increase soil organic carbon, protect carbon-rich soils (e.g. grasslands and peatlands), restore peatlands and wetlands, and improve advisory services for land managers. Together with the work programme for the



mission 'A Soil Deal for Europe', R&I activities will aim to reduce the financial burden resulting from the costs of management practices in carbon farming and the uncertainty about revenue possibilities. In the livestock sector, R&I on manure management will help **implement the EU methane strategy**. R&I activities will also boost the contribution made by a forest **as a natural and man-made carbon sink** and maintain multiple ecosystem services (e.g., water replenishment, soil protection), as proposed in the **Fit for 55** package with the revised LULUCF Regulation and the new **EU forest strategy**.

Strengthening the **nexus between the ocean and climate change** is a priority for the EU. There is growing political awareness of the importance of ocean and polar regions as integral parts of the Earth's climate system and of the need to ensure the integrity and resilience of these vulnerable ecosystems in the context of climate change. The main outcomes expected are an improved understanding of the ocean's role in the Earth's climate system, resulting in the closing of the research gaps on ocean essential climate variables and improved ocean models for seasonal to decadal forecasting at local and regional scales. This in turn will support decision-making aimed at preserving the integrity of the ocean and aquatic ecosystems and the polar Regions, through a better understanding of the drivers of change and of emerging threats, including tipping points. The ocean is also a large storage system for the global reservoirs of climate-regulating factors, particularly carbon. R&I will advance knowledge innovations to develop ocean-based solutions/mitigation options, helping to close the emissions gap and stop ocean acidification and prevent the consequent biodiversity losses.

The following blue carbon ecosystem developments could be envisaged:

- more knowledge about identifying regions at risk;
- exploring, preserving, restoring or even creating new natural habitats, and providing solutions to strengthen resilience and protection of EU coastal areas against climate change;
- more knowledge and data on blue carbon quantification;
- consider nature-based solutions for carbon farming, e.g. on coastal wetlands, as well as seaweed and mollusc aquaculture.

Biodiversity protection plays an important role in all approaches for mitigation in ecosystems and Nature-based Solutions (NBS) are highly important in this context, providing further environmental, social and economic benefits. Building on the political momentum gained at COP25 where the ocean was identified as a priority, and on the latest developments at COP26, science on the climate and the ocean nexus developed under the Horizon Europe programme will contribute to and inform the dialogue under the United Nations Framework Convention on Climate Change (**UNFCCC**) on the ocean and climate change.

Other major contributions include: i) providing new scientific knowledge on polar regions for the **EU Arctic policy**; ii) supporting the new policy initiative on **sustainable blue economy** and its offshoot initiatives as well as implementing the **Marine Strategy and Water Framework Directives**; and iii) helping to achieve the **clean planet for all's** aim of neutralising all major threats to the health of the planetary ecosystem.

In line with the **climate adaptation strategy**, climate action also calls for ecosystems, primary production, food systems and the bioeconomy to adapt to climate change. Climate change is exacerbating existing risks to livelihoods, biodiversity, human and ecosystem health, infrastructure and food systems. Human activities relying on the availability and use of clean water are particularly affected by variable and extreme weather events, which may also lead to desertification. Agriculture and forestry in the EU are vulnerable to climate change. Specifically, there is growing evidence about the effects of climate change and extreme weather events, which need to be mitigated, on agricultural production, crop yields, and also on the forest sector.

In the area of forestry, R&I will improve knowledge on the interactions and interdependencies between biodiversity and climate change, and identify win-win management strategies, also addressing trade-offs in a sustainable manner. Marine and coastal areas are also threatened by the rise in sea level, saline water intrusion, biodiversity loss, ocean acidification, extreme events and a shrinking cryosphere. R&I will, therefore, be critical to stepping up adaptation and building resilience in agriculture, forestry, and activities in marine and coastal areas. They will aim to deliver on the urgent need to step up the adaptation of primary production, notably by providing farmers and other actors in bioeconomy value chains with better-adapted crop varieties and animal breeds with lower impacts on the related ecosystems.

R&I efforts are critical to avoiding, reducing and reversing desertification. They are also critical to delivering sustainable nature-based solutions that will also i) increase carbon sequestration, natural water retention, biodiversity conservation and restoration, ii) strengthen coastal protection, iii) reduce the risks of algal blooms and iv) offer ecotourism opportunities. Water adaptation strategies and approaches will be developed and tested. In this context, the innovation potential for a wide range of alternative water solutions (rainwater harvesting, storm water collection, water reuse and reclamation, brackish and sea water desalination, aquifer recharge, etc.) to be used for avoiding possible negative environmental impacts will be assessed and the European partnership for ensuring water security for the planet will be further supported. Potential trade-offs, and measures to mitigate and avoid them, will be assessed to ensure environmental sustainability and to keep the objectives of improving soil fertility, increasing carbon storage in soils and biomass to

support benefitting agricultural productivity and food security and reduce biodiversity loss. R&I will also aim at providing a better understanding of how institutions and behaviour shape vulnerability and offer opportunities for adaptation.

Expected outcomes include, by means of international cooperation, collaborative research on joint adaptation, mitigation and biodiversity reporting and monitoring of land contributing to the overall areas targeted in Cluster 6.

### Expected impacts

Proposals for topics under this destination should set out credible pathways that contribute to **climate action on land - including forestland, grassland, cropland and wetland - as well as on oceans and water** and more specifically to one or several of the following impacts:

- better understanding and strengthening of the mitigation potential of ecosystems and sectors based on the sustainable management of natural resources;
- advancement of science and technology to support the **adaptation and resilience of natural and managed ecosystems**, on land, in the ocean, in water and soil systems as well as economic sectors in the context of the changing climate, including interaction with drivers of biodiversity change and zero pollution;
- efficient monitoring, assessment, modelling and data-driven decision-making support systems and projections related to **climate change impacts, mitigation and adaptation potential** in order to derive solutions for tackling existing and emerging threats and support decision-making in climate change mitigation and adaptation policies at European and global levels, including through the use of AI and other digital solutions;
- increased **climate change mitigation in the primary sectors**, including by means of reducing their GHG emissions and other pollutants, maintaining **natural and man-made carbon sinks** and increasing uptake and storage of carbon in ecosystems, taking into account trade-offs with regard to ecosystems;
- improved **capacity to climate change** of the ocean, sea, water and soil systems and related sectors to adapt to climate change, including by means of unlocking the potential of nature-based solutions;
- **sustainable management of scarce resources**, in particular soils and water, therefore mitigating climate related risks, especially desertification and erosion, thanks to informed decision-makers and stakeholders and the integration of adaptation measures in relevant EU policies.

## Call – Land, ocean and water for climate action 2024

Topic ID and title	<a href="#">HORIZON-CL6-2024-CLIMATE-01-5: Climate-smart use of wood in the construction sector to support the New European Bauhaus</a>				
Budget	EUR 14 million	Opening date	17 October 2023	Deadline 1	22 February 2024
Budget per project	EUR 7 million			Deadline 2	/
Type of action	Research and Innovation Actions (RIA)				
FTP subsector	WW				
Keywords	wood in construction, New European Bauhaus, hardwood, damage wood, circularity, Internet of Things IoT, AI, robotics, healthy living, reuse, recycling, renovation, deconstructivity, multi-story wood buildings				
FTP comments	This topic is highly relevant to the woodworking industries and mentions for instance: "Pathways for an efficient conversion of solid biomass into forms of long-term carbon storage". It will support the New European Bauhaus initiative.				
FTP SIRA 2030 Challenges addressed	8	FTP relevance		High	
		Starting TRL		/	
		End TRL		/	

### Expected Outcome

This topic will support the New European Bauhaus initiative and the implementation of the new EU forest strategy by making the construction sector more renewable and circular especially for existing buildings, which includes the use of currently underused timber such as hardwoods, salvage wood and post-consumer wood for traditional and newly emerging innovative woody biomass-based applications, while including circularity as part of a broader system and design loop.

Projects results are expected to contribute to all of the following outcomes:

- Enhanced contribution of the forest-based sector with respect to climate change mitigation and adaptation, a toxic-free environment and rural development objectives.
- Pathways for an efficient conversion of solid biomass into forms of long-term carbon storage.
- Enhanced contribution of the forest-based sector to decarbonisation strategies for buildings, both in terms of operational emissions, embodied emissions, and carbon removals, in relation to the Energy Performance of Buildings Directive, the Renovation Wave Strategy, the Construction Products Regulation and other EU policies on buildings.
- A robust and transparent methodology to quantify the climate benefits of wood construction products and other building materials, reflecting the most advanced

dynamic life-cycle analyses and in view of contributing to the carbon farming initiative and carbon removal certification.

- Increased resource efficiency and minimisation of environmental footprint.
- Better knowledge about the quantitative limits of global wood supply and the limits of wood as a resource.

### Scope

Wood materials remain considerably under-utilised in the construction sector despite their durability and appreciation by end users. At the same time, there is a need for making the construction sector more renewable and circular, which includes the use of currently underused timber such as hardwoods, damage wood and post-consumer wood, while including circularity as part of a broader system and design loop. This requires new raw material sources, technologies, and designs for wood components, specified products and for wooden buildings. Buildings need also to be adapted to climate change, including as regards summer and winter thermic performance.

Proposals will:

- Analyse the potential market and new technologies (such as the use of AI, IoT sensors or robotics) as well as processes for the utilisation of hardwoods, low quality, damage, and post-consumer wood in the construction sector, including for the refurbishment of buildings.
- Explore the potential of zero-waste concepts by developing solutions for each source type to turn into viable products as elements and as whole buildings in the wood construction sector.
- Design wood building blueprints based on these products and other underutilised biobased materials, taking into account the reuse, adaptability and healthy living environment (e.g. avoidance of hazardous substances) into the design.
- Study and integrate human health and wellbeing aspects, as well as the cultural traditions of local crafts and design languages, as integral elements of the built space.
- Analyse and propose systems to overcome technical, logistical, legal, business, political, economic, knowledge and social barriers, challenges and opportunities and derive integrated policy recommendations and business strategies for enlarging the wood construction sector in Europe.
- Include the reuse, recycling, renovation and deconstructivity into product and building design concepts.
- Develop robust, transparent and cost-effective methodologies to quantify the carbon removal benefits of key wood construction products and other building materials.

- Develop roadmaps to mainstreaming multi-story wood buildings in Europe, which are the main market segment in living and commercial/office spaces in cities.
- Engage with relevant stakeholder in co-creation processes (e.g., the New European Bauhaus Community of Partners, policy, architects, business, insurance, investment, society, public and private sector).
- Link with other selected proposals and the NEB Lab and establish an open-access wood construction observatory in Europe, to monitor and update progress, statistics, good practice guidelines and solutions on wood construction.
- Address policy frameworks and standards that are still hindering innovation and further market development, as well international production norms and standards for assessing the ecological effects, climate adaptation and climate footprint of buildings which do not account for all benefits of wood.

The project must implement the multi-actor approach and ensure an adequate involvement of the primary production sector and the wider forest-based value chain

This topic should involve the effective contribution of SSH disciplines and capitalise on previous research results (e.g., BASAJAUN, Build-in-Wood, etc.), as well as the results of the LIFE Strategic Projects from the LIFE Circular Economy and LIFE Quality and Climate Action Sub-programmes.

Proposals are encouraged to/should consider social innovation when the solutions is at the socio-technical interface and requires social change, new social practices, social ownership or market uptake.

Proposals may involve financial support to third parties e.g. to primary producers, academic researchers, start-ups, SMEs, and other multidisciplinary actors, to, for instance, develop, test or validate developed applications. Consortia need to define the selection process of organisations, for which financial support may be granted. Maximum 20% of the EU funding can be allocated to this purpose.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.

## Destination 6: Resilient, inclusive, healthy and green rural, coastal and urban communities

Places and people matter when it comes achieving of a more sustainable Europe. The Sustainable Development Goals and the ecological and digital transitions brought forward by the European Green Deal with its farm to fork and biodiversity strategies, zero pollution action plan, common fisheries policy (CFP), along with the recent pandemic, bring challenges and opportunities that vary for different places and people. Rural (including mountains and sparsely populated areas) and coastal areas, play a key role in protecting, managing, and using natural resources. The provision of both private and public goods from these areas depends on the resilience and attractiveness of communities there and the capacity of people living and working there to enjoy an adequate level of well-being, which should be guaranteed by, e.g. the access to good quality services. The COVID-19 pandemic has highlighted deficiencies in digital infrastructures and economic opportunities that hamper resilience. It also highlighted the importance of high-quality and biodiverse green and blue spaces for the health and well-being of local communities, in primis, but also for that of visitors of these areas.

Innovation is a key enabler of the long-term vision for the EU's rural areas (LTVRA) that aims to overcome the challenges outlined above and make rural areas stronger, connected, resilient and prosperous by 2040. Urban communities generally offer better access to many services but are also more vulnerable to supply-chain disruptions, as shown during the COVID-19 pandemic. Furthermore, they have a key role to play in fostering sustainable production and consumption as major demand drivers. The New European Bauhaus initiative offers possibilities to redesign living spaces to improve sustainability, inclusiveness, and aesthetics, setting out a path to a more resilient, inclusive, healthy and green (built) environment. In all communities, social, cultural and behavioural drivers play an important role in either enabling or slowing down transitions. Knowledge and innovative solutions need to be developed to strengthen every community's resilience and capacity to contribute to and benefit from the upcoming transitions in an economy that works for all territories and ensures a fair and just transition leaving no one behind.

Under this destination, transdisciplinary R&I with a strong social, behavioural and humanities sciences dimension (SSH), which pay and attention to gender aspects, will enable a sustainable, balanced, equitable and inclusive development and management of rural, coastal and urban areas in three different ways.

Firstly, it will aim to **increase our understanding** of the different ways of climate, environmental, socio-economic and demographic changes affect rural, coastal and urban



areas in order to identify ways to turn these changes into equal, and, when needed equitable, opportunities for people wherever they live. This would strengthen territorial cohesion and enable a just transition. Secondly, it will **explore innovative ways to tailor policy responses** to the place-based challenges and needs identified at various levels of governance. Thirdly, it will **support bottom-up community-led innovation** to empower communities to develop, test and upscale solutions that answer global challenges in locally adapted ways. Achieving policy goals require providing people with more equitable access to the knowledge and skills needed to make informed choices and ensure they are actively engaged in the conservation. It also requires natural resources to be managed in a sustainable and circular manner, from production or service provision to consumption, in the spirit of the EU competence framework for sustainability. Rural, coastal and urban communities need improved labour conditions, quality of life and long-term socio-economic prospects in the context of major transitions and rising threats to climate, resources and health. This is particularly the case for women, young people older people, people with disabilities, people in vulnerable situations (e.g. income falling below the poverty line, or at risk of poverty), migrants, ethnic minorities and indigenous people and those hit the hardest by the COVID-19 pandemic. Their capacity to drive community-led innovations and their resilience must be increased across the diverse European territories including remote and peripheral places such as mountains, forests, archipelagos, sparsely populated areas, as well as the Arctic. The necessary changes will be facilitated and resilient, smart, and climate friendly production and lifestyles will be supported through mobilising the forces of i) digital transformation, ii) upgraded innovation ecosystems, iii) cultural and natural heritage, iv) nature-based solutions, more sustainable and regenerative tourism as well as social and policy innovation will facilitate necessary changes and support resilient, smart, and climate friendly production and lifestyles.

This destination will in particular:

- Address the spatial and socio-economic or behavioural drivers of the **European Green Deal** (including farm to fork, biodiversity and sustainable and smart mobility strategies), especially its just transition component.
- It will make a key contribution to the **flagship initiative 'R&I for rural communities'** and to the four areas of work under the **long-term vision for the EU's rural areas**: making areas stronger, connected, resilient, prosperous. It will in particular help achieve to climate targets by putting the focus on the climate-neutrality of rural communities that have specific needs and are often neglected by climate action.



- It will complement the **New European Bauhaus (NEB) initiative** that connects the European Green Deal to our living and public spaces; The NEB aims to achieve deep transformation of these spaces, closely involving the public, and integrating the core NEB values of sustainability, inclusion and aesthetics. It will make a key contribution to improving **social inclusion** in Europe in line with the principles of the **European pillar for social rights**, the **EU social economy action plan** and contributing to the **strategy for the rights of persons with disabilities for 2021-2030**.
- It will contribute to the: i) implementation of the **new joint communication on the Arctic** (adopted on 13 October 2021), ii) the fourth Arctic Science Ministerial Joint Statement<sup>384</sup> and iii) to the All- Atlantic Ocean Research Alliance.
- It will contribute to the: i) implementation of the **competence framework for sustainability** prepared by the Commission<sup>385</sup> and the Council Recommendation on education for environmental sustainability for learners of all ages and at all levels of education (part of the EU biodiversity strategy for 2030).
- It will help implement the **EU agenda for tourism** (expected in late 2022).
- It will contribute and link to the **just, green and digital transitions** called for by the European Green Deal, the European industrial strategy, the circular economy action plan and the updated bioeconomy strategy, by exploiting the potential of digital technologies (e.g., using local digital twins for participatory urban planning and evidence-based policy-making).

The following outcomes are expected.

- Policy makers and the public will have a better citizens understanding of **social inclusion challenges**, the circumstances of **people in vulnerable situations in rural and coastal areas** and how to strengthen **social resilience**, including in relation to ecosystem services, biodiversity and natural heritage for coastal areas.
- Policy makers will have a better understanding of the **behavioural and structural drivers of people's lifestyle choices and people's perceptions of rural life** in the aftermath of COVID-19 and of the long-term trends and opportunities for rural areas.
- A **sustainable post-COVID recovery will be enabled in urban, rural and coastal communities** through biodiversity-friendly actions, and valorisation of natural and cultural heritage for sustainable recovery, professional, collective and personal attitudes.

- There will be an improvement **connections, strategies and governance arrangements that enable synergistic development of rural, coastal and urban areas** and more integrated territorial policies and interventions in a growing number of localities and across several sectors.
- **Rural, urban and coastal actors will be engaged in a just and green transition. They will be** equipped with strategies and innovations to contribute to the EU's climate-neutrality by 2050 and benefit from a climate-neutral economy.
- Prosperity will increase thanks to the deployment of business models that are fit for the future and greater job opportunities will be provided for rural and coastal people, particularly in relation to territorial and marine economies and critical resources (soil, water, biodiversity). This is in line with the objectives of the EU Missions 'A Soil Deal for Europe', 'Restore our Ocean and Waters', and 'Adaptation to climate change'.
- More **innovative and integrated policy framework will be upgraded and developed**, capitalising on international knowledge exchange, including indigenous, traditional and local knowledge<sup>387</sup> and cultural heritage in a bottom-up approach.
- Knowledge on the costs and benefits of **urban farming** and improved policy frameworks will be strengthened to maximise its benefits for European society at large across all dimensions of sustainability.
- More **diverse and systemic approaches and innovative solutions** (digital, nature-based, social and community-led) will be developed **with and for local communities** and there is an increase in the number of local actors with improved capacity to sustain these innovative processes and take up these solutions.
- Connections between food provision and multi-functional nature-based solutions for the benefit and well-being of people will be increased. Resilience (climate adaptation mechanisms) will also increase through the combination of the vision of the **New European Bauhaus initiative** to '*call on all Europeans to imagine and build together a sustainable and inclusive future that is beautiful for our eyes, minds, and souls*' with a sustainable food systems approach and make use of Novel sources of inspiration will be put to best use.
- **Understanding, support and engagement will increase** among young people, professionals, authorities, decision makers and the public **for all dimensions of sustainability**.

- Local, coastal and policy communities will use coastal and nature-based heritage, culture and ecosystem services as a basis for potentially year-round diversified sustainable eco-tourism activities.
- A framework will be developed to measure communities' well-being beyond economic indicators (e.g. social, environmental) and use both to create collaborative community management models, including for sustainable and/or regenerative tourism.

### Expected impact

Proposals for topics under this destination should set out a credible pathway to achieving **resilient, inclusive, just, healthy and green rural, coastal and urban communities** and more specifically one or several of the following expected impacts:

- **Rural, coastal and urban areas are developed in a sustainable, balanced, equitable and inclusive manner** thanks to a better understanding of the i) environmental, socio-economic, behavioural, cultural, architectural and demographic structures, ii) needs and drivers of change and their interconnections, and iii) how digital, nature-based, social and community-led innovations are deployed.
- **Rural, coastal and urban communities are empowered to i) act for change**, ii) be better prepared to achieve climate-neutrality and adapt to climate change, and iii) use the digital and green transitions to increase resilience and provide positive long-term prospects.
- **Rural communities are equipped with upgraded innovation ecosystems and innovative and smarter circular solutions** that i) increase access to services and job opportunities, including for women, young people in vulnerable situations, ii) increase their attractiveness and iii) reduce the feeling of being left behind, even in remote locations like mountains and outermost regions.
- **Sustainable development of coastal areas**, including coastal protection and resilience, is enhanced, reaping the benefits of social, digital and community-led innovations, to deliver nature-based and scientifically validated solutions to current coastal socio-economic and environmental threats.
- **Urban and peri-urban communities** – including people in vulnerable situations – can access, afford and choose healthy, nutritious and environmental-friendly food.

Communities in natural and coastal areas can offer sustainable, quality, environmentally and socially friendly tourism, recreational and leisure activities.

## Call – Resilient, inclusive, healthy and green rural, coastal and urban communities 2024 two stage

Topic ID and title	<a href="#">HORIZON-CL6-2024-COMMUNITIES-02-1-two-stage: Innovating for climate-neutral rural communities by 2050</a>				
Budget	EUR 10 million	Opening date	17 October 2023	Deadline 1	22 February 2024
Budget per project	EUR 5 million			Deadline 2	17 September 2024
Type of action	Innovation Actions (IA)				
FTP subsector	F&F, WW, P&P				
Keywords	innovation, rural communities, fire prevention, biodiversity, circularity				
FTP comments	This topic has indirect relevance on the rural forest-based economy, job creation and sustainability.				
FTP SIRA 2030 Challenges addressed	7B	FTP relevance		Indirect	
		Starting TRL		/	
		End TRL		/	

### Expected Outcome

The successful proposal will contribute to fostering a sustainable, balanced, equitable and inclusive development of rural areas, supporting the implementation of the long-term vision for the EU's rural areas and its objectives (in particular contributing to stronger and resilient rural areas) and to its flagship initiative “Research and innovation for rural communities”, the European Green Deal, in particular the climate pact, the fit for 55 package, the forest and biodiversity strategies, and the new soil strategy as well as the territorial agenda 2030, the common agricultural policy (CAP) and the REPowerEU Plan. In addition, proposals will complement the EU Mission Climate-Neutral and Smart Cities, covering sparsely populated areas, and contribute to the objectives of the EU Mission ‘A Soil Deal for Europe’.

Project results are expected to contribute to all of following expected outcomes:

- rural communities are empowered and engaged in the green transition and equipped with strategies and innovative solutions to contribute to EU's climate-neutrality objectives (by 2035 and 2050) and benefit from a climate-neutral economy;
- rural communities take advantage of data, interoperable platforms and digital technologies available to help them meet climate-neutrality objectives, such as dashboards, data visualisation techniques, modelling, digital twins of entire rural communities and tools contributing to spatial planning;
- policy makers are better informed about policy and regulatory frameworks, conditions and processes that are likely to encourage rural areas' climate-neutrality while sustaining an adequate social welfare and well-being and avoiding negative social, economic and environmental externalities;

- a stronger rural innovation ecosystem is in place bringing together public and private players and making rural areas an attractive place for innovators to work and live.

### Scope

The EU aims to be climate-neutral by 2050 – an economy with net-zero greenhouse gas emissions. This objective is in line with the EU's commitment to global climate action under the Paris Agreement and it is reflected in the European Green Deal objectives. Considering that approximately one third of EU citizens live in rural areas, which represent 83% of the EU territory, it is key to empower rural communities to transit towards sustainability by fostering innovation in key areas such as environment and sustainable management of resources (air, soil, water), energy, transport, agriculture, industry, bioeconomy, and finance and ensure that no one is left behind.

Projects funded under this topic are expected to:

- design, prototype and test concrete innovations (technical, social, organisational) supporting climate-neutrality, zero pollution and biodiversity enhancement in rural communities, possibly including initiatives such as nature-based solutions (NBS), circularity and bioeconomy, bio-based solutions, community-energy systems, climate neutral mobility, fire-prevention, etc. Innovations should be co-created with rural stakeholders to respond to their needs and tested for their feasibility for the territorial development opportunities or drawbacks that they bring;
- include training and capacity building for local administrations and rural stakeholders in order to create and maintain a rural innovation ecosystem and enable them to make use or benefit from the successful innovation developed and from existing funding opportunities for the green and digital transitions;
- boost networking and enhance peer-to-peer learning between communities and capitalise on lessons learnt making them available as recommendations for policy makers at various levels (European, national, regional and local);

Proposals are encouraged to fully exploit and build complementarities with the ongoing work regarding the establishment of the European Open Science Cloud and interact with relevant projects developing metadata standards and added-value tools to ensure interoperability within and across fields of study.

This topic should involve the effective contribution of social sciences and humanities (SSH), (e.g., for expertise in behavioural change, etc.) and must implement the multi-actor approach by involving relevant stakeholders from an early stage (e.g. rural communities representatives, small-medium enterprises -SMEs, etc., end-users, local authorities, etc.).

Proposals should cover various biogeographical regions with a balanced coverage reflecting the various pedo-climatic zones in Europe in a representative way.

Proposals are expected to build on the preliminary results of the Horizon Europe projects GRANULAR and RUSTIK, in particular its framework and indicators on climate-neutrality of rural communities.

Proposals should also create synergies and coordinate activities with the other project funded under this topic and should allocate appropriate budget for this task. Proposals are also encouraged to build synergies with relevant projects that will be financed under this call.

## Destination 7: Innovative governance, environmental observations and digital solutions in support of the Green Deal

Taking advantage of the use, uptake, and deployment of environmental observations as well as digital and data-based green solutions, assessed through the European Green Deal's 'do no harm' principle, is key for innovative governance models and for designing, implementing and monitoring science-based policy. To maximise impacts of R&I on the ground and spark behavioural and socio-economic change, the knowledge and innovation produced throughout the whole cluster should be widely disseminated to and exchanged between the key stakeholders and end users. In particular, the Agricultural Knowledge and Innovation Systems (AKIS) need to be strengthened in line with the 2023-2027 CAP to accelerate the required transformative changes.

### Innovating with governance models and supporting policies

Transformative changes such as those required within the European Green Deal are dynamic processes that require appropriate governance. At the same time, to ensure coordination and for collaborative and informed decision-making, governance requires multiple channels and networks that provide readily available and robust data and information from different sources.

R&I activities under this destination aim to both: experiment with new ways to govern the transition process and strengthen the governance, in particular by ensuring i) appropriate and inclusive engagement with stakeholders, e.g. civil society and regional and local actors, ii) environmental observations coverage, and iii) that information and knowledge is made available and accessible. R&I for governance to support the European Green Deal should provide insights into the opportunities to overcome potential institutional barriers such as lock-ins, path dependency, political and cultural inertia, power imbalances and the ways to strengthen the effectiveness and efficiency of regulatory pathways. It should also help create synergies and linkages between different policy instruments and funding opportunities.

Innovative governance supporting the European Green Deal objectives needs to recognise, cope with and promote resilience and inclusiveness in the face of on-going shocks and disruptions across Europe and the world, whether these be climatic, ecological, economic, social, geopolitical or related to agricultural inputs and resources, food, health, bio-based sectors or the wider bioeconomy. The creation of networks with the public (citizen engagement) and researchers, including also through digital technologies, can step up transformation and enhance resilience in different areas, such as food. Critical risk assessment and reduction strategies need to be incorporated, including the diversification



of infrastructures, resources and knowledge through more self-sufficiency and autonomy. Innovative governance will: i) support social innovation in the bioeconomy and bio-based systems (e.g. revitalisation of local communities with innovative bio-based business models and social innovation, or with co-creation and trust-building measures for biotechnology and bio-based innovation systems); ii) assess existing and emerging trade-offs of land and biomass; and iii) strengthen the national bioeconomy networks in countries taking part in the Central-Eastern European Initiative for Knowledge-Based Agriculture, Aquaculture and Forestry in the Bioeconomy (BIOEAST Initiative).

The new **partnership 'Agriculture of Data'** will help improve the sustainability performance of agricultural production and strengthen policy monitoring and evaluation capacities through using the full potential of Earth and environmental observation and data technologies. It will address public and private sector interests in a synergetic way. This will be done through responsible R&I delivering data-based green solutions and through establishing governance structures which allow for systemic approaches to capitalising and using data. The **partnership for a 'Climate-neutral, sustainable and productive Blue Economy'** will enable a just and inclusive transition to a climate-neutral, sustainable and productive blue economy providing for a healthy ocean, people's wellbeing, and a blue economy that is in harmony with nature and whose benefits are distributed fairly.

### **Deploying and adding value to environmental observations**

Data and information obtained through environmental observation is of great value when assessing the state of the planet and is crucial to supporting the European Green Deal and the climate and ecological transitions. Integrating this information from different sources (space-based, airborne including drones, in-situ and citizens observations) with other relevant data and knowledge while ensuring (better) accessible, interoperable or deployable information, provides the information necessary for shaping the direction of policy development in the broad context of Cluster 6A strong link to Copernicus, the European Earth observation and monitoring part of the EU Space programme (in Cluster 4 - Digital, Industry and Space) and the European Space Agency's (ESA) Earth observation programme, as well as support to the Group on Earth Observation (GEO), its European regional initiative (EuroGEO), the Global Earth Observation System of Systems (GEOSS) and the European Commission initiative *DestinationEarth*, is foreseen for topics on environmental observations under this destination. R&I activities relevant to the ocean, seas and coastal waters will complement and support the UN Decade of Ocean Science for Sustainable Development and the UN Decade on Ecosystem Restoration, the G7 Future of the Seas and Oceans Initiative, the European Global Ocean Observing System (EOOS) and the GOOS 2030 strategy.

## **Digital and data technologies as key enablers**

Digital and data-based innovation, in complementarity with activities supported by Cluster 4 and the Digital Europe Programme, should bring benefits for citizens, businesses, researchers, the environment, society at large and policymakers. The potential of the ongoing digital transformation, and its wider impacts – both positive and negative – need to be better understood and monitored in view of future policy design and implementation, governance, and solution development. The potential for digital and data technologies, including AI-, IoT-, and augmented reality-based solutions, to increase the sustainability and resilience of production and consumption systems, as well as industry and services, in sectors covered by this Cluster will be exploited. This destination will contribute to the development, support and take up of innovative digital and data-based solutions to support communities, economic sectors relevant for this cluster and society at large to achieve sustainability objectives. The focus is on overall sustainable solutions tailored to the needs of end-users and/or the systems. More specifically, R&I activities will contribute to economic circularity by promoting reuse of materials and waste reduction, adding value to existing knowledge and increasing cost-effectiveness, safety and trustworthiness of innovative environmentally-friendly technologies in and across primary production sectors, food systems, bio-based sectors, bioeconomy, and sectors related to the oceans and biodiversity.

It will also increase attention given to precision and collaborative technologies and contribute to the human-centric twin green and digital transitions. This is a key policy objective that is also supported by the cross-cutting objective pursued by the CAP, the EU digital strategy, the European industrial strategy, the circular economy action plan, the SME strategy and the European data strategy.

## **Strengthening agricultural knowledge and innovation systems (AKIS)**

Knowledge and advice to all actors relevant to this cluster are key to improving sustainability. For instance, primary producers have a particular need for impartial and tailored advice on sustainable management choices. Agriculture Knowledge and Innovation Systems (AKIS, which are at the heart of the 2023-2027 CAP's cross-cutting objective, go beyond agriculture, farming and rural activities and cover environment, climate, biodiversity, landscape, bioeconomy, consumers and citizens, i.e. all food and bio-based systems including value chains up to the consumer. R&I actions under this destination will support effective AKIS as a key driver to bridge the gap between science and practice and to enhance co-creation. This will speed up innovation and the take-up of results needed to achieve the European Green Deal objectives and targets.

This includes promoting interactive innovation and co-ownership of results by users as well as strengthening synergies with other EU funds, especially the CAP, boosting the multi-actor approach and setting up structural networking within national/regional/local AKIS. In addition, social innovation also has the potential to achieve the objectives set in this destination, as it strengthens the resilience of communities, increases the relevance, acceptance and uptake of innovation, and helps bring about lasting changes in social practices, therefore acting as a system changer.

Where appropriate, proposals are encouraged to cooperate with the European Commission Knowledge Centre on Earth Observation (KCEO), in order to e.g. disseminate and exploit results.

### Expected impact

Proposals for topics under this destination should set out a credible pathway contributing to innovative governance and sound decision-making on policies for the green transition and more specifically to one or more of the following impacts:

- innovative governance models enabling sustainability and resilience notably to achieve better informed decision-making processes, societal engagement and innovation;
- areas related to the European Green Deal benefit from further deployment and exploitation of environmental observation data, products and “green” solutions;
- a strengthened Global Earth Observation System of Systems (GEOSS);
- sustainability performance and competitiveness in the areas covered by Cluster 6 are improved through further deployment of digital and data technologies as key enablers;
- stakeholders and end users including primary producers and consumers are better informed and engaged thanks to effective platforms such as AKIS;
- strengthened EU and international science-policy interfaces to achieve the Sustainable Development Goals.

When considering their impact, proposals also need to assess their compliance with the “Do No Significant Harm” principle according to which the project’s R&I activities should not support or carry out activities that cause a significant harm to any of the six environmental objectives of the EU Taxonomy Regulation.

Topics under this destination will have impacts in the following areas:

- “Climate change mitigation and adaptation”;

- “Clean and healthy air, water and soil”;
- “Enhancing ecosystems and biodiversity on land and in water”;
- “Sustainable food systems from farm to fork on land and sea”;
- “High quality digital services for all”;
- “A Competitive and secure data-economy”.

Social innovation is recommended when the solution is at the socio-technical interface and requires social change, new social practices, social ownership or market uptake. In this cluster, it is envisaged that topics will be coordinated with European Space Agency (ESA) actions so that ESA space data and science can be proactively integrated into the relevant research actions of the WP.

## Call – Innovative governance, environmental observations and digital solutions in support of the Green Deal 2021

### Innovating with governance models and supporting policies

Topic ID and title	<a href="#">HORIZON-CL6-2023-GOVERNANCE-01-5: Revitalisation of European local (rural / peri-urban) communities with innovative bio-based business models and social innovation</a>				
Budget	EUR 5 million	Opening date	22 December 2022	Deadline 1	23 March 2023
Budget per project	EUR 5 million			Deadline 2	/
Type of action	Research and Innovations Actions (RIA)				
FTP subsector	F&F, WW, P&P (Value Chain)				
Keywords	business models, local/regional scales				
FTP comments	This topic has indirect relevance on the rural forest-based economy, job creation and sustainability.				
FTP SIRA 2030 Challenges addressed	3A, B, E	FTP relevance		Indirect	
		Starting TRL		/	
		End TRL		/	

#### Expected Outcome:

Successful proposals will contribute to the expected impacts of Destination ‘Innovative governance, environmental observations and digital solutions in support of the Green Deal, and the European policies it supports, by supporting the establishment of the innovative governance models notably to achieve better-informed decision-making processes, social engagement and innovation. Furthermore, it will contribute to strengthened EU and international science-policy interfaces to achieve the Sustainable Development Goals.

Proposal results are expected to contribute to all following expected outcomes:

- Higher impact of bio-based innovation to accelerate the transition from a linear fossil-based economy, which leads to overuse and depletion of natural resources, into a resource-efficient and circular bio-based systems operating within safe planetary boundaries.
- Improved and informed public awareness, governance and especially social innovation contributing to reduced resource consumption and increased innovation capacity of all actors, in respect to circular bio-based sectors, reduced risk of leaving anyone behind, particularly in the areas and communities in need of revitalization (focus on rural and peri-urban areas).

- Higher level of innovation at local scale and inclusive engagement of all actors (especially focusing on the 'social enterprise' model relevant for vulnerable populations).

Scope:

- Proposals will benefit from social creativity and economic opportunities at local/regional scale unleashed for bio-based systems, taking care of their high environmental performances, in terms of local bio-based feedstock, resources, processes, skills, materials and products. Impacts and trade-offs, such as lower carbon footprint and environmental impacts of the whole value chains shall be part of the assessment of the bio-based systems.
- Communication and dissemination activities need to take into account the inclusive nature of engagement of local actors (e.g., use of languages, mutual learning process, trust building measures), to achieve exchange of best practice at European level, and connection to appropriate local governance structure.
- Integration of regional, local, or macro-regional policy makers is considered essential, as is the involvement of civil society (NGOs, consumer organisations, etc). This should include the assessment of robustness of existing governance schemes, to allow replication across Europe (taking into account the issues such as the income generation for all stakeholders, labour conditions, environmental indicators, social engagement, innovation parameters etc).
- The development of novel bio-based models shall involve economic actors, primarily SMEs, but also rural entrepreneurial structures (e.g., cooperatives, professional associations). Digital solutions to connect and inform all stakeholders, including consumers, shall be given due consideration.
- Projects should build on past or parallel activities, e.g., Horizon 2020 projects Power4Bio, BE-Rural or the projects funded under the call HORIZON-CL6-2021-GOVERNANCE-01-09: Revitalisation of European local communities with innovative bio-based business models and social innovation, as well as the past/on-going projects under the Bio-based Industries Joint Undertaking (BBI JU), seeking synergies and links with upcoming activities of the Circular Bio-based Europe Partnership, as well as Horizon Europe calls.
- In order to avoid the risk of duplication of efforts and to limit the focus to rural and periurban actions, the present topic excludes blue (marine and maritime) bio-based activities from its scope.
- International cooperation should be considered, aiming at exchange of best practice.
- Social innovation is recommended when the solution is at the socio-technical interface and requires social change, new social practices, social ownership or market uptake

- Proposal should explore intersectionality approaches and consider aspects like gender, ethnicity, migrant or refugee status, social class, sexual orientation and disability to ensure inclusion of marginalised groups in citizen engagement and the development of tools and guidelines.
- This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

Topic ID and title	<a href="#">HORIZON-CL6-2023-GOVERNANCE-01-7: Integrated assessment of land use and biomass demands to contribute to a sustainable healthy and fair bioeconomy</a>				
Budget	EUR 4 million	Opening date	22 December 2022	Deadline 1	23 March 2023
Budget per project	EUR 4 million			Deadline 2	/
Type of action	Research and Innovation Actions (RIA)				
FTP subsector	F&F, WW, P&P (Value Chain)				
Keywords	biomass, land use, policy, ecosystem services, biomass availability				
FTP comments	This topic will support policy developments related to land-use and biomass availability. As such it is of strategic importance to the forest-based sector and stakeholders should get involved.				
FTP SIRA 2030 Challenges addressed	2E - 3D, E	FTP relevance		High	
		Starting TRL		/	
		End TRL		/	

### Expected Outcome:

In line with the European Green Deal priorities, the EU's climate ambition for 2030 and 2050 and the bioeconomy strategy vision of an economic system that acts within environmental and social boundaries, the successful proposal will aim to develop or improve land use models and tools, enabling sustainability assessments to support better-informed policy- and decision-making processes, particularly on a national and regional level. European Green Deal related policy domains will benefit from further deployment and exploitation of this Environmental Observation data.

Project results are expected to contribute to all of the following expected outcomes:

- Better understanding, methods and tools for determining the potential and limits of land and biomass to contribute to the climate, biodiversity, environmental, as well as social and economic objectives of the European Green Deal.
- Enhanced knowledge on the policy pathways for maximising the climate benefit of bioeconomy solutions within ecological boundaries and improved decision-making for ensuring policy coherence on the national and regional level.

### Scope:

- Improve understanding of direct and indirect implications of current and future regional, national or EU policies and targets on land and biomass use, including an assessment of existing and emerging trade-offs, using and improving existing databases with high resolution data.
- Develop methodologies as well as tools for national and regional policy- and decisionmakers to carry out integrated bioeconomy land and biomass use assessments. The assessments will integrate existing and future EU, national and



regional climate, environmental and food policies with projections on industrial biomass demand, and assess their implications on land and biomass use, taking into account trade-offs and synergies.

- Using the methodologies, quantify and project the land and biomass use and its climate mitigation potential, including the substitution effect of bio-based products and land impacts of diets, in at least four case study regions covering different socio-economic situations and climate/ecological zones in the EU and associated countries. The data should also cover, but not be excluded to, land use intensity and management types and their respective areas as well as biomass stocks and flows.
- Take into account as far as possible biophysical, legal and socioeconomic constraints determining possible land use and biomass potentials.
- Seek to understand and identify factors determining land management practices and enabling nature-based solutions that maximise the co-production of ecosystem services, biodiversity restoration and preservation, and net primary production.
- Seek to understand and identify optimum/sustainable land-dependent and land independent food supply for healthy, safe and sustainable diets.

The proposals must use the multi-actor approach by involving a wide diversity of bioeconomy actors and conducting trans-disciplinary research.

Where relevant, activities should build and expand on the results of past and ongoing research projects. The project requires an active collaboration with the JRC on the development of the necessary methods and approaches for the activities described in the scope of the topic.