Destination 2: Increased Autonomy in Key Strategic Value Chains for Resilient Industry

This destination will directly support the following Key Strategic Orientations (KSOs), as outlined in the Strategic Plan[76]:

- 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'

- 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 contributing to the following expected impact of Cluster 4:

- **Industrial leadership and increased autonomy in key strategic value chains with security of supply in raw materials,** achieved through breakthrough technologies in areas of industrial alliances, dynamic industrial innovation ecosystems and advanced solutions for substitution, resource and energy efficiency, effective reuse and recycling and clean primary production of raw materials, including critical raw materials, and leadership in the circular economy.

The COVID-19 crisis, the war against Ukraine and other crises have shown that global competitiveness and resilience are two sides of the same coin. Resilience is about more than the ability to withstand and cope with shocks; it is an opportunity to undergo transitions in a sustainable and fair way. As the European Union and Associated Countries gear up to becoming a climate-neutral, circular and competitive economy by 2050, resilience will require paying attention to new vulnerabilities as entire sectors undergo deep transformations while creating opportunities for Europe's industry to develop its own markets, products and services which boost competitiveness.

Research and innovation will be fundamental to spur industrial leadership, enhanced sustainability and resilience. It will support the modernisation of traditional industrial models while developing novel technologies, business models and processes. This should enhance the

[76] Whilst Cluster 4 addresses KSOs A, C and D, KSO B is becoming increasingly important, given the role of the industry highlighted in the zero-pollution action plan.

flexibility of the EU's industrial base, and increase its resilience by reducing EU dependencies on third countries for critical raw materials and technologies.

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 Industrial Strategy Update and the accompanying Staff Working Document on strategic dependencies, showed that 99 products in the most sensitive ecosystems included materials on the list of critical raw materials.

- 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 resources used are kept in the EU economy for as long as possible.

- The Chemicals Strategy for Sustainability of October 2020 strategy aims to better protect citizens and the environment whilst boosting the innovation for safe and sustainable chemicals. It calls for actions in the frame of research and innovation to develop a Safe and Sustainable by Design (SSdB) framework and criteria and a Strategic Research and Innovation Agenda addressing research and innovation needs raised in the Strategy and beyond.

- The Zero Pollution Action Plan of May 2021 set's out the objective that by 2050 air, water and soil pollution shall be reduced to levels no longer considered harmful to health and natural ecosystems, that respect the boundaries of the planet. The action plan aims to strengthen the EU green, digital and economic leadership, whilst creating a healthier, socially fairer Europe and planet. It provides a compass to mainstream pollution prevention in all relevant EU policies, to step up implementation of the relevant EU legislation and to identify possible gaps.

- The Materials 2030 Roadmap, presented by a large group of stakeholders, will enable the green and digital transition, anchoring on good design principles, combined with synergies between advanced materials, circularity, digital and industrial technologies. It calls for the evolution of materials research by uniting digital and material capacities and competences, combining technology push with market pull and united actions at Member States level, to benefit from Europe's strength.

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

- **Raw Materials for EU open strategic autonomy and successful transition to a climate-neutral and circular economy**

Since the Work Programme 2021-22 was drafted, strategic dependencies have increased in importance, given their prominence in accelerating and delivering the green and digital transformation of the EU's key industrial ecosystems, as well as the objective of supporting a more resilient European industry. The transition of the European industrial ecosystems is dependent on the supply of raw materials (both from primary and secondary sources) as many digital and green technologies rely on this supply. The focus in this Work Programme is on Diversifying the international supply chains of critical raw materials; and on Developing internal capacity for primary and secondary raw materials production.

- **Safe and Sustainable by Design (SSbD) chemicals and materials**

Safe and Sustainable by Design (SSbD) is an approach to the design, development and use of chemicals and materials that focuses on providing a function (or service), while reducing harmful impacts to human health and the environment. The Commission published a framework and criteria for Safe and Sustainable chemicals and materials in 2022. Projects across Horizon Europe developing new chemicals or materials are expected to adhere to the framework as of this Work Programme.

Under Horizon 2020 a series of research projects were funded aimed to define and implement a Safe-by-Design concept for nanomaterials. This generated a knowledge base that serves as the foundation for the SSbD concept, which is now a key feature of the Chemical Strategy for Sustainability. The new SSbD concept covers chemicals and materials, including advanced materials and therefore nanomaterials.

The focus on this work programme is on extending the portfolio of methods and models applicable in the SSbD framework as well as on the actual application of the framework to develop SSbD alternatives to substances of concern. Projects resulting from the SSbD topics are expected to contribute to extending the available scientific knowledge base for regulations and policy making.

- **Strategic Innovation Markets driven by Advanced Materials**

Materials, in particular advanced materials, are not only the backbone and source of prosperity of the European society. They will also play a decisive and enabling role in the twin green and digital transition. The Materials2030 Roadmap highlighted that innovation markets are the industrial perspective presenting the "market pull" to address societal needs and challenges under a long-term perspective. The focus in this Work Programme is on a systemic approach to develop the next generation solution-oriented advanced materials, which

will offer faster, scalable and efficient responses to the societal and technological challenges, that are relevant and can be considered as opportunities for Europe's society, economy and environment today and over the next three decades. The competition for critical raw materials (CRMs) Europe's open strategic autonomy at risk in key technologies of the twin green and digital transition. Advanced materials may mitigate these risks by replacing or substituting CRMs.

Moreover, this Work Programme addresses data exchange and interoperability in materials modelling and characterisation across value chains, to support the green and digital transformation of European industry.

- **Improving the resilience of EU businesses, especially SMEs and Startups**

EU companies, in particular SMEs, need to have capabilities to respond in an agile and effective way to supply disruption, but also to be better equipped for dealing with such shocks in the future.

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. Wider activities include the further development of skills and competencies (also via the European Institute of Innovation and Technology, in particular EIT Raw Materials, EIT Climate-KIC and EIT Digital); and the use of financial products under the InvestEU Fund for further commercialisation of R&I outcomes.

Synergies:

For **raw materials**, there are synergies with energy-intensive industries and in particular the circularity part; and with strategic innovation markets driven by advanced materials. A further synergy is with Cluster 5: Renewable energies and energy storage.

Safe and Sustainable by Design presents synergies with

Cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture' in areas Bio-based Innovation Systems in the EU Bioeconomy and Circular Systems;

Cluster 5 'Climate, Energy and Mobility' in view of areas on lightweight materials;

Cluster 1 'Health', Destination 'Living and working in a health-promoting environment: research on impact of chemicals on human health'; and

Horizon Europe Partnership on the Assessment of Risks from Chemicals (PARC): on exposure and hazard activities as well as the SSbD toolbox and case studies.

Strategic Innovation Markets driven by Advanced Materials presents synergies with the energy-intensive and manufacturing industries, in view of both the circularity approaches and low-carbon technologies; and with

Cluster 1 'Health', in view of areas on bio-based materials;

Cluster 5 'Climate, Energy and Mobility' in view of areas on lightweight materials;

Cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture' in view of areas on agrochemicals.

While focusing *exclusively* on civilian applications, there may be synergies with actions conducted under the European Defence Fund (EDF) or its precursor programmes (Preparatory Action on Defence Research and European Defence Industry Development Programme), notably in the field of advanced sensing and advanced materials.

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.

The following call(s) in this work programme contribute to this destination:

Call	Budgets (EUR million)	Deadline(s)

	2023	2024	
HORIZON-CL4-2023-RESILIENCE-01-TWO-STAGE	124.00		07 Mar 2023 (First Stage) 05 Oct 2023 (Second Stage)
HORIZON-CL4-2023-RESILIENCE-01	213.00		20 Apr 2023
HORIZON-CL4-2024-RESILIENCE-01-TWO-STAGE		62.00	07 Feb 2024 (First Stage) 24 Sep 2024 (Second Stage)
HORIZON-CL4-2024-RESILIENCE-01		160.20	07 Feb 2024
Overall indicative budget	337.00	222.20	

Call - RESILIENT VALUE CHAINS 2023 TWO STAGE

HORIZON-CL4-2023-RESILIENCE-01-TWO-STAGE

Conditions for the Call

Indicative budget(s)[77]

Topics	Type of Action	Budgets (EUR million)	Expected EU contribution per project (EUR million)[78]	Indicative number of projects expected to be funded
		2023		
Opening: 08 Dec 2022 Deadline(s): 07 Mar 2023 (First Stage), 05 Oct 2023 (Second Stage)				
HORIZON-CL4-2023-RESILIENCE-01-32	IA	31.00	6.00 to 8.00	4
HORIZON-CL4-2023-RESILIENCE-01-33	RIA	31.00	6.00 to 8.00	4
HORIZON-CL4-2023-RESILIENCE-01-34	RIA	31.00	6.00 to 8.00	4
HORIZON-CL4-2023-RESILIENCE-01-37	RIA	31.00	6.00 to 8.00	4
Overall indicative budget		124.00		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General Annex B.
Financial and operational capacity and exclusion	The criteria are described in General Annex C.

[77] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

[78] Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

Award criteria	The criteria are described in General Annex D.
Documents	The documents are described in General Annex E.
Procedure	The procedure is described in General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Strategic innovation markets driven by advanced materials

Proposals are invited against the following topic(s):

HORIZON-CL4-2023-RESILIENCE-01-32: Bioinspired and biomimetic materials for sustainable textiles (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 6.00 and 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 31.00 million.
Type of Action	Innovation Actions
Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms, logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Technology Readiness Level	Activities are expected to start at TRL 4 and achieve TRL 6-7 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.

Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: This topic refers to the innovation market[79] for *Sustainable Textiles* and will support citizens and their needs. Europe's textile sector, its technology providers and research community are world leading. The most technologically advanced textile products are being manufactured in Europe and new manufacturing value chains such as technical textiles, in the 1990's and early 2000's are developed in Europe first.

Several materials specifications and related innovations needs will support this topic such as renewable and recyclable materials, alternative active ingredients, design for circularity.

Projects are expected to contribute to the following outcomes:

- The innovation market of sustainable textiles requires the use of a new generation of renewable and recyclable materials designed with properties that are inspired by nature.
- Bioinspired and biomimetic advanced materials that do not require or limit the need to use chemical additives or coatings will have a positive impact on the environment, the climate, and the circularity of textile materials, in view of the Safe and Sustainable by Design Framework.
- Smart functions or functionalities of textiles will address future consumer needs.
- Low-cost, low-resource, and low environment-impact high performance durable fibres and textiles from renewable sources will serve for technical end markets.
- Develop effective circularity enabling technologies for technical textiles, non-woven and fibre-reinforced composites, e.g. biopolymer or natural fibre based high performance fibres.
- Use of hazardous chemical processing shall be reduced and reserved for crucial technical functionalities of textiles.
- Designed circularity for renewables and recyclable materials supporting the sustainable use of textiles, reducing the CO_2-footprint of the textiles industry.

Scope: Proposals **should address at least three of the following activities**:

- Bio-inspired and biomimetic polymers for use as smart textile materials will provide improved functionalities, e.g. for outdoor use.
- The molecular functionalities of natural polymers, and their macromolecular structures and properties, provide inspiration for designing different classes of high-performance

79 http://ec.europa.eu/info/sites/default/files/research_and_innovation/research_by_area/documents/advanced-materials-2030-manifesto.pdf

polymeric materials that aim to reproduce specific functions of natural polymers, such as adaptability, self-healing, adhesiveness, surface super-hydrophobicity, chiral recognition, and bioactivity.

- Biodegradability and recyclability of polymers will be a factor, so the consideration of natural polymers, such as polysaccharides, proteins, lignin-based polymers and composites could be a pathway. This is expected to translate into lower GHG-emissions in the textiles value chain, as well as reducing landfill waste volumes.
- Projects must prove scalability of biomimetic materials for the manufacturing process of smart fabrics and sustainable textiles.
- To enable a fast development of new advanced materials, digital tools such as modelling, simulation and characterisation techniques (including those provided by analytical infrastructures) are under the scope, assisted by advanced methods, e.g. physics-based methods, machine learning or artificial intelligence.

Dovetailing with digital technology, e.g. sensors, is encouraged.

Materials and products should be developed under Safe and Sustainable by Design framework[80] taking into account circularity aspects, and with prognostic and product health management to ensure product and system reliability.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination.

Projects should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms.

HORIZON-CL4-2023-RESILIENCE-01-33: Smart sensors for the Electronic Appliances market (RIA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 6.00 and 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 31.00 million.
Type of Action	Research and Innovation Actions

[80] See documents defining the SSbD framework on: http://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms, logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to start at TRL 3-4 and achieve TRL 5-6 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [81].
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: This topic refers to the innovation market for *electronics appliances*, in support of citizens and their various needs (be it in health care, home &personal care, food or textiles). Several materials specifications and related innovations needs will support this topic such as renewable and recyclable materials, alternative active ingredients and design for circularity. The topic should address several key policies of the European Union such as the

[81] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

Circular Economy Action Plan, the Zero Pollution Action Plan, the EU Chemicals Strategy, the EU Strategy for sustainable textiles.

Sensors are a key technology for electronic appliances serving our society. From manufacturing, improving living conditions, and reducing consumption of energy and precious natural resources, even detecting threats, all rely on the availability of high-quality localized information.

Smart systems and ubiquitous connectivity create opportunities for new applications in smart living, environmental protection, and supply chains. These applications will be made possible through improved sensing technologies, which capture the relevant information. Core properties to enable a wide adoption are miniature size, low power consumption, resilience to varying ambient conditions, low cost, and compatibility with mass production.

To avoid misuse of the captured personal data (e.g. medical), novel concepts of identification of the data originator/provider and data possession are needed. This could include biometric identification mechanisms as well as other fast and secure identification mechanisms, which is GDPR conform and with protected authorisation mechanisms.

The desired information is often chemical or biochemical. Miniaturization of established analytical methods and development of new materials compatible with established production processes require an integrated multidisciplinary approach.

Projects are expected to contribute to the following outcomes:

- The Innovation market for Electronics Appliances is very broad and fast developing with a range to monitor human and environmental factors, which require to develop materials for a new generation of fast and smart sensors devices.
- Smart sensor technology can support self-monitoring in fitness and well-being, decentral personal health monitoring, environmental monitoring, as well as cooling and thermal distribution and supply chain management.
- Sensor devices must be small, and durable to deploy at various locations and withstand the ambient conditions of the targeted application.
- Advanced materials are needed to allow the capturing of chemical and bio-chemical signals with extended lifetime or extreme low cost for disposable sensors.
- Smart concepts and tools for evolving data analysis that embed a deep understanding of the sensor properties enable new business models for distributed, connected sensors.

Scope: Proposals **should address at least four of the following activities**:

- Biosensors and chemical sensors can be applied to detect and monitor analytes or pathogens in the environment, in healthcare settings, and in food industries in an efficient and timely manner. Fast scanning and sensor-based devices that can be

deployed at a large scale could augment or replace traditional methods of measurement and quality control.

- Advanced biological or biomimetic sensing elements for the measurement of biomarkers allow for new compact analytical devices or be integrated in personal devices such as smart phones, smart watches, and body sensors.

- New sensor materials with properties such as stretchability, self-healing and self-cleaning for the use in wearable electronics and smart textiles enable next-generation devices for the health and sports sector.

- To enable a fast development of new advanced materials, digital tools such as modelling, simulation and characterisation techniques (including those provided by analytical infrastructures) are under the scope, assisted by advanced methods, e.g. physics-based methods, machine learning or artificial intelligence.

- Connected smart sensors allow for new data analysis concepts. Algorithms may be adapted throughout the lifetime of the deployed devices, improving their functionality through data-fusion with additional data sources, adaptation to new requirements or enabling of big-data scenarios.

- Digitalisation technologies for PoC (Point-of-Care), PoN (Point-of-Need), home, and in-vivo/in-vitro diagnostics (e.g. sensors, sensor-arrays, sustainable system integration incl. microfluidics; machine learning approaches).

Materials and products should be developed under Safe and Sustainable by Design framework[82] taking into account circularity aspects.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination.

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, to produce meaningful and significant effects enhancing the societal impact of the related research activities. An early involvement of end users could be essential.

Projects should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms.

HORIZON-CL4-2023-RESILIENCE-01-34: Advanced (nano and bio-based) materials for sustainable agriculture (RIA)

Specific conditions

[82] See documents defining the SSbD framework on: http://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 6.00 and 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 31.00 million.
Type of Action	Research and Innovation Actions
Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms, logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Technology Readiness Level	Activities are expected to start at TRL 3-4 and achieve TRL 5-6 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects are expected to contribute to the following outcomes:

- Producers of agrochemicals will provide alternative chemicals and/or bio-based materials following the safe and sustainable by design framework to farmers and comply with relevant agri-food market authorisations.
- Advanced (nano)materials and/or bio-based materials will provide farmers with alternative tools to reduce the use of pesticides and fertilizers, thereby reducing the environmental footprint of these agrochemicals.
- Support to the EU climate ambitions[83] by contributing to reversing biodiversity loss and to more sustainable food production as well as the objectives of the Zero Pollution Action plan and the Chemicals Strategy for Sustainability and where relevant the Farm to Fork Strategy.

[83] http://ec.europa.eu/clima/eu-action/european-green-deal/2030-climate-target-plan_en

- Support to the goals of the Mission 'A Soil Deal for Europe[84], i.e., such as reducing soil pollution and use of hazardous substances.

- Support the EU goals of the Ocean and Waters mission,[85] i.e., prevent and eliminate pollution by reducing use of fertilizers and chemical pesticides by 50%.

Scope: This topic refers to the innovation market[86] for sustainable agriculture. The next generation of fertilisers, biocides and plant protection products for agriculture should need to be based on new delivery systems made from advanced (nano)materials (nanosubstances and nanoformulations of conventional substances) or and/or bio-based materials, to enable target-specific, precise and slow release of the product, reduction of load of active substances, ease of application, reduced risk for non-target organisms and operator exposure, reduced wash-off, reduced costs for farmers, etc.

Proposals **should address at least four of the following activities, the second bullet point being compulsory**:

- Develop advanced (nano)material-based delivery systems and/or bio-based materials for agriculture. The new agrochemicals should exhibit less GHGs emissions, improved efficiency, improved toxicity and ecotoxicity profile and biodegradability to overcome the problems of traditional agrochemicals (e.g., pest resistance, bioaccumulation in non-target fauna or flora, soil, groundwater, as well as bioaccumulation and bioconcentration in the food chain due to release to the environment).

- Each proposal should identify and address one or more (nano)active substances or delivery systems for (nano)formulations and/or bio-based materials (including biopolymers and biodegradable polymers) for which they will provide a sound risk and safety assessment including toxicity evaluation for non-target organisms, and humans and environment, and sustainability assessment along their entire life-cycle, including a holistic assessment of the short-, medium- and long-term impact (environmental, economic, social) of all substances/materials of the proposed solution. The safety and sustainability assessment should be done according to the Safe and Sustainable by Design framework.[87] This activity needs to be addressed by all proposals.

- Undertake a proof of concept of the efficiency of the selected delivery systems in real-life case studies. The justification for the selection of materials for new agrochemicals as

84 http://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/soil-health-and-food_en

85 http://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/healthy-oceans-seas-coastal-and-inland-waters_en

86 http://ec.europa.eu/info/sites/default/files/research_and_innovation/research_by_area/documents/advanced-materials-2030-manifesto.pdf

87 See documents defining the SSbD framework on: http://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

well as case studies (e.g., type of crop for agrochemicals testing, etc.) should include environmental and socio-economic aspects.

- The proposals should build on existing standards for production and risk assessment, when available and relevant, and should consider the requirements laid down in the specific guidance for risk assessment of the selected delivery systems (e.g., the EFSA Guidance on risk assessment of nanomaterials to be applied in the food and feed chain[88] or the EFSA guidance on specific protection goal and ecosystem services [89] for environmental assessment and sustainability).

- Data produced during the development of new agrochemicals should be FAIR[90] and the FAIRness should also be demonstrated and shared through available platforms (e.g., IPCHEM[91], e-NanoMapper[92], etc.).

- Proposals should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes, clusters (e.g., EU Nanosafety Cluster[93]) and platforms, in particular with the European Platform on Life Cycle Assessment (EPLCA)[94].

This topic requires the effective contribution of Social Sciences and Humanities (SSH) disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise in particular in social and economic assessments, to produce meaningful and significant effects enhancing the societal impact of the related research activities. An early involvement of end users could be essential.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. Proposals should seek links with and capitalise on the results of relevant past and ongoing EU funded research projects, including the ones under Cluster 6 'Food, Bioeconomy, Natural Resources and Environment'. Namely, the proposals are expected to have synergies with the topic HORIZON-CL6-2023-FARM2FORK-01-7: Innovations in plant protection: alternatives to reduce the use of pesticides focusing on candidates for substitution.

HORIZON-CL4-2023-RESILIENCE-01-37: Advanced materials for magnets in applications for the New Energies Market (RIA)

Specific conditions

88 EFSA Guidance on risk assessment of nanomaterials including Appendices D.2 for pesticides, D.5 for nanocarriers and D.6 for fertilisers; http://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2021.6768
89 http://www.efsa.europa.eu/en/efsajournal/pub/4499
90 http://www.go-fair.org/fair-principles/
91 http://ipchem.jrc.ec.europa.eu/
92 http://www.enanomapper.net/
93 http://www.nanosafetycluster.eu/
94 http://eplca.jrc.ec.europa.eu/

Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 6.00 and 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 31.00 million.
Type of Action	Research and Innovation Actions
Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms, logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Technology Readiness Level	Activities are expected to start at TRL 3-4 and achieve TRL 5-6 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects are expected to contribute to the following outcomes:

This topic refers to the innovation markets for *New Energy* and for *Sustainable Transportation*. Several materials specifications and related innovation needs will support this topic such as renewable energy and efficiency, renewable and recyclable materials, sustainable additives and catalysts, advanced surfaces, design for circularity The topic should address several key policies of the European Union such as Circular Economy Action Plan, Zero Pollution Action Plan, A New Industrial Strategy for Europe also in view of critical and strategic raw materials for energy storage and conversion.

In order to deliver the EU's 2030 climate targets under the ‘Fit For 55’ delivering EU's 2030 climate targets, Europe will need an increasing number of advanced systems for energy transformation for wind turbines and electric drive trains. For this, European industry needs high performance magnets using advanced materials solutions for the new energy innovation market, which shall contain in future lesser amounts of rare-earth metals, in view of the geostrategic dependency on critical raw materials, including rare-earth metals.

Projects are expected to contribute to the following outcomes:

- Europe's industry will benefit from advanced materials for magnets that are either free from rare-earth metals, or use to a significant extent a substitute and reduce the share of rare-earth metals magnets (compared to the state of art). This will alleviate the dependency and possible supply risks and strengthen Europe's open strategic autonomy and competitiveness.

- Europe used 16 kt of rare earths in 2020, and most of them were used to manufacture permanent magnets (NdFeB). This market is still increasing due to the massive electrification of the energy industries. If new magnet composition is successfully developed by 2030 (Nd1Fe12 phases, NdFeMo, high entropy alloys) this permanent magnet could be widely applied, also in offshore wind energy and in industry.

- The new advanced materials for high-performance magnets must be available at an industrial scale and shall have improved energy-efficiency and performance, whilst at the same time will be easier to recycle with longer and enhanced life cycle.

- This is in particular necessary to keep up with the political ambitions of the European Green Deal matching the increasing demand for energy harvesting and storage with the ambition to reduce emissions.

Scope: Proposals **should address at least four of the following activities**:

- The deployment of permanent-magnets in the energy (e.g. wind-turbine engines for power generation) is of major importance for reaching the green deal ambitions. To achieve this whilst reducing Europe's dependency on Critical Raw Materials, the rare-earth metals for magnets shall be replaced or reduced with inexpensive and non-critical materials.

- Designing new rare-earth-free permanent magnetic materials (PMM) to replace high performing but critically restrained rare-earth-based PMM could be based for example on new Mn-Bi alloys, other material compositions could also be proposed. As an alternative strategy, composite magnetic materials could be developed. Rare earth-free magnets for turbines with good efficiency levels were already developed and could be further adopted. Projects must demonstrate 50% enhanced magnetic performance (energy products above 55 kJ/m^3) with respect to commercial ferrites.

- Alternatively, the redesigning of rare-earth magnets such as NdFeB magnets should provide for advanced materials where rare-earth metals such as Nd are (partially) replaced. These doped perovskite manganite oxide nanostructures should have the potential to achieve similar or improved magnetic properties such compared to as NdFeB magnets.

- Advanced material models and simulation tools to extend the usage range of the current critical materials and shorten the development and certification cycle of new materials and processes.

- Life-cycle assessment and techno-economic assessment (LCA/TEA) will analyse the economic relevance of the new advanced materials for magnets. This will also address aspects of circularity, and end-of-life aspects. Strategies for the recycling of the new advanced materials will support the whole design process.

- Delivering a scaling will increase the production to an industrial level for advanced materials for magnets that are rare-earth metal free or where rare-earth metals are substituted.

To enable a fast development of new advanced materials, digital tools such as modelling, simulation and characterisation techniques (including those provided by analytical infrastructures) are under the scope, assisted by advanced methods e.g. physics-based methods, machine learning or artificial intelligence.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination.

Projects should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms.

An early involvement of SSH research and of end users appears essential.

Additionally, a strategy for skills development should be presented.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded research projects, including the ones under Cluster 5 “Climate, Energy, Mobility”.

Call - RESILIENT VALUE CHAINS 2023

HORIZON-CL4-2023-RESILIENCE-01

Conditions for the Call

Indicative budget(s)[95]

Topics	Type of Action	Budgets (EUR million)	Expected EU contribution per project	Indicative number of

[95] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

		2023	(EUR million)[96]	projects expected to be funded
Opening: 08 Dec 2022 Deadline(s): 20 Apr 2023				
HORIZON-CL4-2023-RESILIENCE-01-02	RIA	25.00 [97]	Around 5.00	5
HORIZON-CL4-2023-RESILIENCE-01-03	IA	22.00	Around 7.30	3
HORIZON-CL4-2023-RESILIENCE-01-05	IA	28.00 [98]	Around 7.00	4
HORIZON-CL4-2023-RESILIENCE-01-06	IA	20.00 [99]	Around 6.70	3
HORIZON-CL4-2023-RESILIENCE-01-07	CSA	3.00	Around 3.00	1
HORIZON-CL4-2023-RESILIENCE-01-09	IA	20.00 [100]	Around 6.70	3
HORIZON-CL4-2023-RESILIENCE-01-21	RIA	29.00 [101]	6.00 to 8.00	4
HORIZON-CL4-2023-RESILIENCE-01-22	RIA	15.00 [102]	3.00 to 4.00	4
HORIZON-CL4-2023-RESILIENCE-01-23	RIA	29.00 [103]	6.00 to 7.00	4
HORIZON-CL4-2023-RESILIENCE-01-39	CSA	2.00	Around 2.00	1
HORIZON-CL4-2023-RESILIENCE-01-42	CSA	10.00 [104]	2.00 to 3.00	4
HORIZON-CL4-2023-RESILIENCE-01-44	IA	10.00 [105]	Around 5.00	2
Overall indicative budget		213.00		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General

96 Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
97 Of which EUR 5.00 million from the 'NGEU' Fund Source.
98 Of which EUR 11.00 million from the 'NGEU' Fund Source.
99 Of which EUR 8.00 million from the 'NGEU' Fund Source.
100 Of which EUR 8.00 million from the 'NGEU' Fund Source.
101 Of which EUR 4.90 million from the 'NGEU' Fund Source.
102 Of which EUR 3.50 million from the 'NGEU' Fund Source.
103 Of which EUR 5.55 million from the 'NGEU' Fund Source.
104 Of which EUR 4.00 million from the 'NGEU' Fund Source.
105 Of which EUR 4.00 million from the 'NGEU' Fund Source.

	Annex B.
Financial and operational capacity and exclusion	The criteria are described in General Annex C.
Award criteria	The criteria are described in General Annex D.
Documents	The documents are described in General Annex E.
Procedure	The procedure is described in General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Raw Materials for EU open strategic autonomy and successful transition to a climate-neutral and circular economy

Proposals are invited against the following topic(s):

HORIZON-CL4-2023-RESILIENCE-01-02: Innovative technologies for sustainable and decarbonised extraction (RIA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 25.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: To increase EU resilience in raw materials supply chains and thus reduce the serious risk to the Union's strategic assets, economic and societal interests, autonomy and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal

	entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. *"*African Union member states" includes countries whose membership has been temporarily suspended.*
Technology Readiness Level	Activities are expected to achieve TRL 3-5 by the end of the project – see General Annex B.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [106].

Expected Outcome: A secure supply of sustainable raw materials is crucial for the green and digital transition. Environmentally friendly, safe, intelligent and resource efficient extraction technologies and methods for both open pit and underground mining need to be developed and implemented.

Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials in particular critical raw materials[107] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

[106] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

[107] https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en

- Develop innovative technologies for extraction of raw materials in the European Union.
- Increase the domestic EU sourcing of raw materials.
- Improve responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance[108].
- Show the potential to reduce substantially the Green House Gases (GHGs) emissions intensity of extraction per ton of the material (metal, metal content, concentrate, mineral) sold on to the downstream value chain, thus contributing to EU climate neutrality objectives.
- Promote the utilisation of UNFC (United Nations Framework Classification for Resources) and UNRMS (United Nations Resource Management System) in the raw materials sector.
- Accelerate development of EU domestic raw materials exploration projects integrating innovative technologies.

Scope: Actions should develop new sustainable concepts and technological solutions, including alternative approaches, for mining of complex or difficult to access mineral deposits, including mining wastes and abandoned mining sites, particularly addressing the challenges of accessibility, industrial viability, safety and environmental impacts, including water use and GHG intensity of extraction.

Actions should be driven by industry and raw materials users. The actions should duly justify the relevance of all targeted minerals and metals. Priority are the EU critical raw materials. Sea mining is excluded from this topic.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

HORIZON-CL4-2023-RESILIENCE-01-03: Technologies for processing and refining of critical raw materials (IA)

Specific conditions

[108] https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1

Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 7.30 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 22.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: To increase EU resilience in raw materials supply chains and thus reduce the serious risk to the Union's strategic assets, economic and societal interests, autonomy and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. *"*African Union member states" includes countries whose membership has been temporarily suspended.*
Technology Readiness Level	Activities are expected to start at TRL 6 and achieve TRL 7 by the end of the project – see General Annex B.
Exceptional page limits to	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally

proposals/applications	extended by 3 pages.

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials[109] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

-Increase recovery rates of valuable raw materials, particularly critical raw materials from low grade or complex ores and/or from extractive waste;

-Significantly increase economic performance in terms of higher material-, water-, energy- and cost-efficiency and flexibility in minerals processing and metallurgical processes;

-Significantly improve the health, safety and environmental performance of the operations throughout the whole life cycle which is considered, including a reduction in waste, wastewater and emissions generation and a better recovery of resources from generated waste;

-Improve responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[110]

Actions are expected to contribute to the implementation the EU action plan on Critical Raw Materials.[111]

Scope: Actions should demonstrate new or improved systems integrating relevant processing and refining technologies for better recovery of raw materials from low grade and/or complex ores from extractive wastes, reduction of waste, higher energy efficiency. The action can also reduce the content of toxic elements or compounds in the resulting material products. The actions should target minerals and metals, particularly critical raw materials.

The solution proposed should be flexible enough to adapt to different or variable ore grades and extractive waste streams and should be supported by efficient and robust process control. Where relevant, any solution proposed for the reduction of the content of toxic elements or compounds in the resulting materials should also include the appropriate management of the hazardous substances removed.

Actions should develop intelligent and innovative production systems which better utilise natural resources by minimising losses during waste-rock separation in an optimised and energy-efficient process and by minimising use of water.

109 https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en
110 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1
111 COM (2020) 474

Recycling of end-of-life products is excluded from this topic, though joint processing of waste streams originating from end-of-life products recycling could be included and has to be duly justified.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

Actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider standardisation aspects when relevant. The action should also include the analysis of financial opportunities ensuring the market exploitation and replication of the circular business model behind the developed solutions as new processes, products and/or services.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. For TRLs 6-7, 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.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

HORIZON-CL4-2023-RESILIENCE-01-05: Recycling technologies for critical raw materials from EoL products (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 7.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 28.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: To increase EU resilience in raw materials supply chains and thus reduce the serious risk to the Union's strategic assets, economic and societal interests, autonomy and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials

	necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. *"*African Union member states" includes countries whose membership has been temporarily suspended.* If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to start at TRL 6 and achieve TRL 7 by the end of the project – see General Annex B.
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects outcomes will enable the expected impacts of the destination by increasing access to secondary raw materials, in particular critical raw materials[112] for EU industrial value chains and strategic sectors which will alleviate critical raw materials dependency.

Projects are expected to contribute to the following outcomes:

- Develop raw materials recycling and re-use of components and/or products from end-of-life products technologies and urban mines, including efficient sorting technologies for

[112] https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en

separation and recycling and the sustainable embedment of the process regarding energy, resource and water efficiency.

- Improve responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[113] [114]

- Demonstrate contribution to EU climate neutrality objectives.

Scope: Actions should develop material efficient high-quality recycling and preparation for re-use of one or more of the following end-of-life product categories/key waste streams: waste electrical and electronic equipment (WEEE), end-of-life vehicles[115], waste windmills[116] and solar PV and machine tools (e.g. hard metal scrap). Rare earths permanent magnets are excluded from this topic since they are subject to a dedicated call HORIZON-CL4-2023/2024-RESILIENCE-01-08: Recyclability and resource efficiency of Rare Earth based magnets.

Their processing, reuse, recycling and recovery schemes are complex and imply different steps, ranging from collection, logistics, sorting and separation to cleaning, refining and purification of materials.

Actions should focus on the whole chain of recycling processes and procedures - from collection, logistics, characterisation, sorting, cleaning, refining and purification of secondary raw materials and quality of produced outputs.

Recycling and re-use where the recycled material is of lower quality and functionality than the original material (downcycling), is not in the scope of the topic.

Actions should acquire new data on secondary raw materials via in situ sampling from different regions across the EU, collect existing data and present in a harmonised UNFC format (United Nations Framework Classification for Resources) and develop sampling protocols, methodologies, and technologies to quantify and characterise the CRM resources in specific products, urban mines and waste repositories.

Actions should envisage clustering activities with other projects aiming at second life, re-use, repurposing, remanufacturing of products and/or components relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

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113 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1

114 COM (2020) 474

115 With the exception of permanent magnets in motors which are included in action 11: ERMA action plan on rare earths magnets: Recyclability and resource efficiency of Rare Earth based magnets

116 With the exception of permanent magnets in motors which are included in action 11: ERMA action plan on rare earths magnets: Recyclability and resource efficiency of Rare Earth based magnets

Actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider standardisation aspects when relevant. The action should also include the analysis of financial opportunities ensuring the market exploitation and replication of the circular business model behind the developed solutions as new processes, products and/or services.

Actions should clearly demonstrate how they contribute to a decreased level of resource and energy consumption, leading to a lower CO_2 footprint.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. For TRLs 6-7, 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.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

HORIZON-CL4-2023-RESILIENCE-01-06: Earth Observation platform, products and services for raw materials (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 6.70 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 20.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: To increase EU resilience in raw materials supply chains and thus reduce the serious risk to the Union's strategic assets, economic and societal interests, autonomy and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and

	countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. *"*African Union member states" includes countries whose membership has been temporarily suspended.* If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to start at TRL 6 and achieve TRL 7 by the end of the project – see General Annex B.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [117].
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

[117] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials[118] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

-Develop and deploy innovative technologies, products and services based on satellite, airborne and ground-based remote sensing data combined with other in-situ data sources (e.g. geophysical and geological data), supporting the whole raw materials value chain, from mineral exploration to post-closure activities.;

-Improve responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[119]

Improve knowledge on raw materials resources in Europe.

Actions are expected to contribute to the implementation the EU action plan on Critical Raw Materials.[120]

-Develop best practices and standards for innovate EO technologies, products and services for a more efficient permitting and environmental compliance processes.

Scope: Actions should develop leverage on existing Copernicus DIAS[121] or other Earth Observation platform for raw materials similar to ESA [122] platforms, and create a sustainable business model that can facilitate access to developed Earth Observation technologies, products and services to be integrated into the mining industry and public stakeholder workflows supporting any phase in the full mine life cycle.

The Earth Observation platform for Raw Materials should support the implementation of the EU's international strategic partnerships with resource rich countries (e.g. Canada, Ukraine, Africa countries or Latin America).

Actions should increase the uptake of the Earth Observation technologies to deliver a responsible and sustainable mining industry, including mining of secondary deposits (e.g. old mine tailings).

Actions should deliver on-line processing tools, services and / or products to generate value-added raw materials information products, pre-processed optical and radar data from the Sentinel satellites and related Copernicus services of the EU Copernicus programme, as well as access to data and services from other high-resolution satellites, airborne, ground-based and in situ data.

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118 https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en
119 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1
120 COM (2020) 474
121 Data and Information Access Services
122 European Space Agency

Actions should improve mineral exploration at regional scale and target definition at local scale, exploiting European multi- and hyperspectral satellite, airborne and ground-based sensors and relevant subsurface data.

Actions should monitor the volume and rate of extraction of materials in opencast mining based on European airborne and satellites high and very high-resolution imagery.

Actions should map and monitor secondary raw materials in the Europe exploiting the Copernicus Land Monitoring Service or other EO satellites derived products.

Actions should monitor ground stability in active and/or abandoned mining areas in Europe, exploiting the European Ground Monitoring Service of Europe (Copernicus EGMS) and similar initiatives, as well as data form Sentinels and/or Copernicus Contributing Missions.

Actions should map and monitor the environmental impact of mining activities with a focus on soil, water and air pollution and their possible impacts on the socio-economic and environmental health of mining areas. Also, it should assist in remediation activities following mine closure.

Actions should develop best practices and standards for innovate EO technologies, products and services in the raw materials life cycle for a safer, efficient, responsible and sustainable mining.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

Actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider standardisation aspects when relevant. The action should also include the analysis of financial opportunities ensuring the market exploitation and replication of the circular business model behind the developed solutions as new processes, products and/or services.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. For TRLs 6-7, 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.

Only terrestrial activities will be considered eligible.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

HORIZON-CL4-2023-RESILIENCE-01-07: Expert network on Critical raw materials (CSA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 3.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 3.00 million.
Type of Action	Coordination and Support Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: To increase EU resilience in raw materials supply chains and thus reduce the serious risk to the Union's strategic assets, economic and societal interests, autonomy and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. *"*African Union member states" includes countries whose membership has been temporarily suspended.* If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may

	additionally be used).
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [123].

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials (CRM) [124] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

-Strengthening the expert capacity in the EU in a wide range of raw materials along the whole value chain;

-Better informed and more effective decision-making by the EU and National policy makers and the producers and users of raw materials regarding the supply and demand of raw materials and the associated environmental and social aspects;

-Improving EU official statistics and building the EU knowledge base of primary and secondary raw materials.

-Improving awareness of society across the EU about importance of the critical raw materials and other relevant materials for strategic value chains in support of the implementation of the green and digital transitions;

-In the longer term improved diversification of CRMs supply to the EU.

-Improve responsible supply of raw materials to the EU in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[125]

Actions are expected to contribute to the implementation the EU action plan on Critical Raw Materials.[126]

123 This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

124 https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en

125 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1

126 COM (2020) 474

Scope: Actions should strengthen an EU expert network and community covering all raw materials screened in the CRM assessment of 2020 , and additional raw materials screened in 2023 assessment (neon, krypton, xenon, roundwood). Flexibility in screening additional raw materials is an added value.

The consortium should build the EU expert community covering each screened raw material with expertise on primary and secondary resources; production, including exploration, mining, processing, recycling and refining; substitution of CRM; raw materials markets; future demand and supply; supply risk management and stress tests; materials flows; raw materials standardisation; socio-economic analysis, and strategic value chains and end-use sectors, including batteries, e-mobility, renewable energy, electronics, security and aerospace.

The actions should flexibly support the Commission in policy making related to Critical Raw Materials in general or linked to specific applications or sectors; as well in the relevant events organised by the Commission.

The actions should also improve data and knowledge on all screened raw materials; and support the Commission in the analysis of the future supply and demand of raw materials, technology gaps and innovation potential along the raw materials value chains.

The action should update the data and information fact sheets from the previous criticality exercise for all screened raw materials, and ensure their quality by relevant raw material experts. Factsheets are to be finalised by the end of 2025, and could be fine-tuned before publication expected in 2026.

The action is expected to organise two expert validation workshops in 2025 to support the EU criticality assessment, and validate draft factsheets for all screened materials. On request of the Commission, organise in-depth workshops on several strategic metals (agreed with the Commission) for renewable energy, e-mobility and security with recognised commodity experts from industry and other organisations.

The action should provide policy briefs and analyses based on requests from the Commission and proposed work shall be coordinated with the Commission's work and relevance reviewed in the light of policy development and needs.

The actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

HORIZON-CL4-2023-RESILIENCE-01-09: Recyclability and resource efficiency of Rare Earth based magnets (IA)

Specific conditions	
Expected EU contribution	The Commission estimates that an EU contribution of around

per project	EUR 6.70 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 20.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: To increase EU resilience in raw materials supply chains and thus reduce the serious risk to the Union's strategic assets, economic and societal interests, autonomy and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. *"*African Union member states" includes countries whose membership has been temporarily suspended.* If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness	Activities are expected to start at TRL 6 and achieve TRL 7 by

Level	the end of the project – see General Annex B.
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials[127] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

- Develop more cost effective and resource efficient rare earth permanent magnets.
- Improve recyclability, re-use, refurbishment and/or repurposing of end-of-life magnets.
- Improve responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[128]
- Demonstrate contributions to EU climate neutrality objectives.

Actions are expected to contribute to the implementation the EU action plan on Critical Raw Materials[129] and the action plan on Rare Earth Magnets and Motors from the European Raw Materials Alliance[130].

Scope: Actions should improve design of rare earth permanent magnets that facilitate the reuse, re-use, refurbishment and/or repurposing and recycling and/or reduce the use of the critical raw materials. Priority is neodymium magnets, but other highly performant magnets can also be targeted if duly justified. The actions should finish at the TRL levels 6-7. Developed improved magnets and their recyclability should be tested in the final application in relevant motors or generators.

Actions could additionally address disruptive technologies for highly performant magnets.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

Actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider

127 https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en
128 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1
129 COM (2020) 474
130 https://erma.eu/european-call-for-action/

standardisation aspects when relevant. The action should also include the analysis of financial opportunities ensuring the market exploitation and replication of the circular business model behind the developed solutions as new processes, products and/or services.

Actions should clearly demonstrate how they contribute to a decreased level of resource and energy consumption, and thus lead to a lower CO2 footprint.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. For TRLs 6-7, 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.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

Safe and Sustainable by Design (SSbD) Chemicals and Materials

Proposals are invited against the following topic(s):

HORIZON-CL4-2023-RESILIENCE-01-21: Innovative methods for safety and sustainability assessments of chemicals and materials (RIA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 6.00 and 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 29.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.
Technology Readiness Level	Activities are expected to start at TRL 3 and achieve TRL 6 by the end of the project – see General Annex B.

Expected Outcome: Proposals are expected to contribute to the following outcomes:

- EU strategies/policies and regulations, such as the (proposed) Ecodesign for Sustainable Products Regulation[131], the EU Ecolabel[132], REACH[133] or CLP[134] can build on new methods and the associated data for chemicals and materials;

- Methods and data will be made available in a format which will allow existing validation networks or bodies (e.g., the EU Reference Laboratory for alternatives to animal testing (EURL ECVAM) or the OECD) or other platforms to launch a validation/standardisation process and to promote wider uptake of the new methods developed;

- Industry and public authorities have access to innovative tools for more comprehensive safety and sustainability assessment covering a wider range of chemicals and advanced materials including composites/mixtures and nanomaterials, supporting the implementation of the Safe and Sustainable by Design framework[135].

Scope: The Commission initiative for Safe and Sustainable by Design[136] (SSbD) sets a framework for assessing the safety and sustainability of chemicals and materials, which should be considered as a reference for project proposals. This topic aims at developing new methods, or improve existing methods, to support the improvement of safety and sustainability assessment.

In the EU, the legislation regulating chemical substances often includes their safety screening and testing according to the EU test methods regulation[137], which predominantly contains test methods harmonised under the OECD[138]. For safety assessment, e.g., human and eco-toxicity, there is a lack of validated *in vitro* and *in silico* tools for a variety of substances and materials. An advance in alternative methods for safety assessment (e.g., New Approach Methodologies, NAMs) is needed, preferably without animal models, but also to support modelling and design of new Safe and Sustainable by Design chemicals and materials. Research should improve and harmonise screening and testing protocols/strategies and hazard/risk assessments by developing robust, reliable and faster test methods or models, including high-throughput and *in silico* models.

Sustainability aspects cover the entire life cycle including the design phase, raw material extraction, production, use and end-of-life. Sustainability assessment across the life cycle is in growing demand and there is the need to further develop methods for a robust assessment.

131 https://ec.europa.eu/environment/publications/proposal-ecodesign-sustainable-products-regulation_en
132 https://ec.europa.eu/environment/ecolabel/the-ecolabel-scheme.html
133 https://ec.europa.eu/environment/chemicals/reach/reach_en.htm
134 https://echa.europa.eu/regulations/clp/legislation
135 See documents defining the SSbD framework on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en
136 See documents defining the SSbD framework on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en
137 https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX%3A32008R0440
138 https://www.oecd.org/chemicalsafety/testing/oecd-guidelines-testing-chemicals-related-documents.htm

The development of absolute sustainability methods[139] that consider ecosystems carrying capacities are also needed. The integration of life cycle assessment with risk assessment is likewise a challenge. New and improved approaches are needed to increase the quality, the efficiency and the effectiveness of existing methods to drive innovation and to bridge gaps in the data for sustainability and life cycle assessment.

Proposals should consider all the following activities:

- Address a set of at least three chemicals/groups of chemicals/(advanced) materials for which the project consortium will develop new methods and models for safety and sustainability assessment along their life cycle in accordance with the Safe and Sustainable by Design Framework[140]. Selected materials can be composed of/contain the selected chemicals. The justification for their selection should include socio-economic aspects and a gap analysis with regards to existing methods and models and their relevance to improve the current safety and sustainability assessments;

- Methods and models developed can be either for the already existing chemicals and materials or to be used during the design phase of future chemicals and materials;

- For each method or model developed an 'in project interlaboratory' validation should be done, and the method or model shall be shared via the most appropriate open platform, e.g., the Horizon Europe Partnership on the Assessment of Risks from Chemicals (PARC)[141], to encourage use and feedback from stakeholders. In addition, an initial standardisation or validation dossier should be prepared and submitted to an appropriate body/initiative, e.g., the OECD, EU Reference Laboratory for alternatives to animal testing (EURL ECVAM);

- Data produced during the development process and in particular for inclusion in the validation/standardisation dossier must be FAIR [142] and shared through available platforms (e.g., the Information Platform for Chemical Monitoring – IPCHEM[143]). Data for the validation/standardisation dossier shall be produced according to existing guidelines and stored in standardised data formats.

International collaboration on uptake of new methods and/or models shall be enhanced involving relevant players from academia, public authorities and the private sector.

139 The term absolute sustainability refers to the possibility of a chemical to comply with safety and to carry limited environmental impacts within the planetary boundaries.

140 See documents defining the SSbD framework on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

141 https://www.anses.fr/en/content/european-partnership-assessment-risks-chemicals-parc

142 Findable, Accessible, Interoperable, Reusable

143 https://ipchem.jrc.ec.europa.eu/

Proposals should indicate to which chapters of the Strategic Research and Innovation Plan for chemicals and materials[144] they will contribute.

Proposals submitted under this topic should demonstrate synergies with the EU-funded projects resulting from the topic HORIZON-CL4-2023-RESILIENCE-01-22. In addition, collaboration with the European Partnership on Assessments of Risks from Chemicals (PARC)[145] is encouraged with regards to their task on delivering the SSbD toolbox. Proposals should allocate the necessary resources for collaboration with the relevant projects mentioned above. Proposals should also build on the extensive experience from European, national or regional clusters/platforms and initiatives such as the Malta Initiative [146] engaged in validation/standardisation of methods.

Co-operation with the European Commission's Joint Research Centre (JRC) may be envisaged in areas of mutual interest with regards to new methods development and their wider uptake.

Synergies with Horizon Europe missions as relevant are encouraged.

HORIZON-CL4-2023-RESILIENCE-01-22: Integrated approach for impact assessment of safe and sustainable chemicals and materials (RIA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 3.00 and 4.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 15.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.
Technology Readiness Level	Activities are expected to achieve TRL 2-5 by the end of the project – see General Annex B.

Expected Outcome: Proposals are expected to contribute to the following outcomes:

144 https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en
145 https://www.anses.fr/en/content/european-partnership-assessment-risks-chemicals-parc
146 https://www.bmuv.de/en/topics/health-chemicals/nanotechnology/the-malta-initiative

- The stakeholder community including academia, industry, public authorities and NGOs will have access to more robust and consistent guidelines and methodologies for integrative social, economic, health and environment impact assessment;

- Industry will be enabled to make impact-based informed investment decisions for future chemicals and materials;

- Public authorities and policy makers at EU and national level will be supported in the implementation of policies, including the transition to safe and sustainable chemicals and materials through improved understanding of potential sustainability trade-offs.

Scope: The Commission initiative for Safe and Sustainable by Design[147] sets a framework for assessing safety and sustainability of chemicals and materials, which should be considered as a reference in the proposal.

Proposals should aim to develop integrated approaches for the assessment of health and environmental impacts together with the social and economic sustainability aspects of a chemical or material, all along their life-cycle. The projects should acknowledge and account for the fact that safety and sustainability of a chemical or material are the result of a mix of intrinsic properties (dependent only on the chemical or material itself) and extrinsic properties (dependent on how the chemical or material is produced or used, and in which quantity and resulting exposures). The proposals should also aim to foster the acceptance and effective uptake of the developed approaches within different sectors. The developed methodologies should support and facilitate decision making when having to weight multiple sustainability criteria against each other. The developed methodologies should contribute to the estimation of health, environmental as well as social and economic impacts at EU and global scale.

Proposals should consider all the following activities:

- Select chemicals/group of chemicals/(advanced)materials for which they will develop an integrated approach for health, environment, social and economic impact assessments and justify this selection in view of their societal relevance;

- Development of methodologies and associated guidelines for integrated health, environment, social and economic impact assessments. Existing life cycle methodologies should be built on;

- Identification of data gaps and data availability along the value chain as regards all relevant sustainability dimensions (environmental, health, social and economic factors) for the targeted substance/group of substances and in particular identification and monetization of externalities arising during the life cycle of a chemical or a material;

- Identification and engagement of all relevant stakeholders along the value chain to take into account the existence of conflicting interests and potential impacts affecting

147 See documents defining the SSbD framework on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

differently each of them. Foster a shared support and agreement on developed methodologies;

- Develop a demonstration of the integrated approach, which can contribute towards its effective acceptance and implementation by different stakeholders;
- Delivery of FAIR[148] data and methodologies including results obtained from applying the methodologies to allow for further testing of the methodologies, enhance acceptance and their wider applications.

Proposals submitted under this topic should demonstrate synergies with the EU-funded projects from the topic CE-NMBP-42-2020 and the forthcoming topic HORIZON-CL4-2023-RESILIENCE-01-21. In addition, collaboration with the European Partnership on Assessment of Risks from Chemicals (PARC)[149] with regards to their task on delivering the SSbD toolbox is encouraged. Concerning health impact assessment, projects are encouraged to establish synergies with projects resulting from the topic HORIZON-HLTH-2022-ENVHLTH-04-01. Proposals should allocate the necessary resources for collaboration with the above-mentioned relevant projects.

Proposals should indicate to which chapters of the Strategic Research and Innovation Plan for chemicals and materials[150] they will contribute.

Proposals should involve appropriate expertise in Social Sciences and Humanities (SSH), in particular in social and economic assessments, to achieve efficient integration of techno-economic, safety and life cycle assessment.

Co-operation with the European Commission's Joint Research Centre (JRC) may be envisaged in areas of mutual interest with regards to methods development and their wider uptake.

Synergies with Horizon Europe missions as relevant are encouraged.

HORIZON-CL4-2023-RESILIENCE-01-23: Computational models for the development of safe and sustainable by design chemicals and materials (RIA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 6.00 and 7.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

148 Findable, Accessible, Interoperable, Reusable

149 https://www.anses.fr/en/content/european-partnership-assessment-risks-chemicals-parc

150 https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

Indicative budget	The total indicative budget for the topic is EUR 29.00 million.
Type of Action	Research and Innovation Actions
Technology Readiness Level	Activities are expected to achieve TRL 3-6 by the end of the project – see General Annex B.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [151].
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects are expected to contribute to the following outcomes:

- The 'chemicals and materials' community will be provided with computational models supported by artificial intelligence for the design of new chemicals and materials integrating functionality and the Safe and Sustainable by Design framework[152];
- The innovation capacity of SMEs and industry will be boosted with cost effective tools to find safe and sustainable alternatives to substances of concern[153];
- Industry will lower the environmental footprint of materials and chemicals through improved production methods and optimised applications from the design phase on;
- Industry will be more agile to respond to external and internal influences, e.g., new market demands for chemicals and advanced materials, regulatory requirements or the potential shortage of currently used raw materials;

151 This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

152 See documents defining the SSbD framework on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

153 Preliminary definition as provided in the Chemicals Strategy for Sustainability: Substances "having a chronic effect for human health or the environment (Candidate list in REACH and Annex VI to the CLP Regulation) but also those which hamper recycling for safe and high quality secondary raw materials. A more detailed description is given in the Commission Proposal for an Ecodesign for Sustainable Products Regulation (30.3.2022, COM(2022) 142 final)."

- The EU climate ambitions [154] will be supported by contributing to a decrease of greenhouse gas emissions through a more sustainable production and use of chemicals and materials;

Scope: The Commission initiative for Safe and Sustainable by Design[155] sets a framework for assessing safety and sustainability of chemicals and materials, which should be considered as a reference in the proposal.

For an effective substitution of substances of concern [156] it is crucial that the developed alternatives provide the functionality that is required of those that are replaced (e.g., water or dirt repellent properties, insulation, etc.), and have an improved safety and sustainability performance. The integration by computational modelling of the chemicals and materials functionality with the Safe and Sustainable by Design framework will have a key role in the green and digital transition of the European industry. These tools will allow the exploration of which technical solutions are the most appropriate for respecting the Safe and Sustainable by Design requirements in a cost- and policy-effective manner and thereby accelerate the innovation process for Safe and Sustainable by Design chemicals and materials.

Proposals should therefore:

- Produce innovative modelling software for the development of chemicals and materials (including advanced materials) building on high-throughput chemicals and materials characterisation facilities and relevant models and make it available and interlinked through open platforms accessible to SMEs and industry;

- Develop predictive computational models and software to forecast the sustainability performance and support the assessment of sustainability aspects for newly designed chemicals or materials, in a tiered approach, already in the early stages and along the innovation process;

- Enable the integration of materials modelling, safety and sustainability assessment tools and databases into a single workflow. Apply AI techniques for data search and missing data, including statistical analysis (sensitivity and uncertainty), in all the areas covered: modelling of the functionality, safety and sustainability assessment (including life cycle assessment);

- Address information exchange on chemicals and materials along value chains and throughout their life cycle and provide solutions for data accessibility in the different steps of the value chain for modelling/assessment purposes;

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154 https://ec.europa.eu/clima/eu-action/european-green-deal/2030-climate-target-plan_en

155 See documents defining the SSbD framework on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

156 See Article 2 of the Proposal for a regulation of the European Parliament and of the Council establishing a framework for setting Ecodesign requirements for sustainable products and repealing Directive 2009/125/EC; https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12567-Sustainable-products-initiative_en

- Make developed models on chemicals, materials and their production process FAIR[157], and accompany them with a set of associated test data,
- Apply FAIR data principles. The interoperability for data sharing should be addressed, including synergies with other European projects addressing ontologies for data documentation, for example projects resulting from topic DT-NMBP-39-2020;
- Explore collaboration with existing Open Innovation Test Beds (OITBs)[158], where relevant;
- The tools should be validated against existing data. Application of the tools by external users should be tested within the project (industry and SMEs outside the project consortium, liaise eventually with projects resulting from the topic HORIZON-CL4-2024-RESILIENCE-01-24 in this Work Programme).

Proposals should indicate to which chapters of the Strategic Research and Innovation Plan for chemicals and materials[159] they would contribute.

Research should build on existing standards, where possible, and contribute to standardisation.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination.

A strategy for skills development should be presented, associating social partners when relevant, for developers of computational modelling and users of the models.

Projects should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms, such as projects resulting from the topics HORIZON-CL4-2021-RESILIENCE-01-08, HORIZON-CL6-2023-ZEROPOLLUTION and/or HORIZON-CL4-2023-RESILIENCE-01-39. Proposals should allocate the necessary resources for collaboration with other relevant projects.

Synergies with Horizon Europe missions as relevant are encouraged.

Strategic innovation markets driven by advanced materials

Proposals are invited against the following topic(s):

157 Findable, Accessible, Interoperable, Reusable

158 https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/sustainable-production-processes_en

159 https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

HORIZON-CL4-2023-RESILIENCE-01-39: Coordination and knowledge sharing across materials development communities (CSA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 2.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 2.00 million.
Type of Action	Coordination and Support Actions
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [160].

Expected Outcome:

- A pathway for accelerating advanced material research in line with strategic innovation markets, in particular for generating reliable data and information and for providing easy access to any interested stakeholder;
- A common knowledge base for researchers and industry increasing collaboration between strategic innovation markets driven by advanced materials;
- Overcoming hurdles with regards to the use of digital tools for improved access to and valorisation of data.

Scope: There is a need to integrate and unify digital and materials competences and resources, including data, ontologies, characterisation and modelling, as well as robotics and machine learning, to accelerate the design, development, production and application of advanced materials with the desired manufacturing processes, properties, durability, and end of life. The lack of integration is a major challenge for the advanced materials design and development serving the innovation markets, including the related value chains.[161]

[160] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

[161] advanced-materials-2030-manifesto.pdf (europa.eu)

Such collaboration should be extended to the manufacturing industries and their digital marketplaces so that data and information to design new materials can be shared by all interested stakeholders in a faster way.

Platforms integrating materials data management, modelling, characterisation and harnessing machine learning and automation have the potential to accelerate substantially the design, development and upscaling of new advanced materials by a time factor of 5-10 and decrease the costs associated with innovation chain and market exploitation. The necessary acceleration and cost decrease should be directly beneficial for any subsequent manufacturing process.

Actions are required that ensure synergies and common approaches across strategic innovation markets driven by advanced materials, to capitalise on commonalities and to ensure interoperability and integration of all methodologies. There should be collaboration with existing European and national data spaces and marketplaces on interfaces and metadata, in order to ease the access and improve the (re-) use of materials data.

Proposals should address all of the following activities:

- Establish an inventory of relevant existing collaborative materials data and information systems (platforms, databases and infrastructures) serving strategic innovation markets.
- Network the identified data and information systems and make them accessible and usable for any stakeholder interested in the research, development or deployment of advanced materials research results.
- Establish common methodologies for data acquisition and knowledge generation:
    - Modelling, including data- and physics-based materials modelling
    - Characterisation, including multi-scale, multi-technique, in/on-line
    - Materials synthesis and fabrication technologies including autonomous robotics platforms
    - Machine learning and AI-based methods
- Based on the scope of the strategic innovation markets, and on the methodologies above for acquiring data and generating knowledge, develop a common language for data documentation and exchange on advanced materials and related manufacturing processes through widely agreed vocabularies, taxonomies as well as relevant domain ontologies based on the Industry Commons Ontology Commons EcoSystem (OCES)128 and the Elementary Multiperspective Material Ontology (EMMO)129, covering all relevant methodologies (including modelling and characterisation).
- Demonstrate easy access to reliable data and information/knowledge by connection of identified databases with the ontologies, providing a resource for the materials developers community and for industries. This demonstration should be done with a

number of case studies in different areas of application of advanced materials and considering the entire value chain.

- Integrate data and methods for life-cycle assessment and take into account the safe and sustainable by design framework for chemicals and materials.
- Establish a cost overview and a business plan for the sustainability for a digital knowledge sharing system and the supporting coordination network across materials development communities and industries up to 2035 and beyond.
- Establish training schemes to facilitate skills development, reskilling and upskilling in the relevant methodologies, with particular emphasis on digital skills for all interested stakeholders.

Proposals should build on or seek collaboration with existing projects and develop synergies with other relevant European and national initiatives, funding programmes and platforms, in particular with the "Materials 2030 Roadmap" and any follow up actions.[162]

In order to ensure interoperability and coordination of data architectures, projects should in particular exploit synergies with:

- the projects selected on computational modelling on Safe and Sustainable by Design (HORIZON-CL4-2023-RESILIENCE-01-23);
- the Data Spaces support centre funded under the Digital Europe programme,
- projects related to Common European data spaces, in particular on manufacturing.

Improving the resilience of EU businesses, especially SMEs and Startups

Proposals are invited against the following topic(s):

HORIZON-CL4-2023-RESILIENCE-01-42: Boosting generation and diffusion of advanced technologies in SMEs based on a supply chain model (CSA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 2.00 and 3.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Coordination and Support Actions
Eligibility	The conditions are described in General Annex B. The following

[162] https://www.ami2030.eu/

conditions	exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [163].

Expected Outcome: Projects are expected to contribute to the following outcomes:

- Build a model for each industrial ecosystem to identify disruptions and technological opportunities for the uptake of advanced technologies in a supply chain;
- Alert on current disruptions and identify potential future disruptions;
- Identify potential alternate suppliers of critical advanced technologies;
- Launch one pilot project per each industrial ecosystem focused on building alliances among traditional and tech-savvy SMEs through industrial cluster organisations;
- Explore concrete collaboration opportunities between different type of EU businesses, particularly tech-savvy SMEs and traditional SMEs;
- Increase the adoption of advanced technologies in traditional SMEs, looking at skills shortages among other barriers, and help EU tech-savvy SMEs that developed critical technology applications to expand their market potential in the EU;
- Demonstrate how the adoption of advanced technologies in SMEs can enable them to reduce resource, material and energy consumption, thus contributing to EU climate neutrality objectives.

Scope: All the EU industrial ecosystems should adapt to the post-crisis economic environment, with new consumer and industrial demand, changed competition and new resilience and sustainability objectives. This adaptation will be particularly challenging for SMEs. The economic recovery in Europe, after the COVID-19 pandemic, will only

[163] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

materialise if SMEs are properly supported by adequate actions and policy measures to adapt to changed value-chains and demand.

It is essential for companies to map their supply chain in order to identify critical dependencies and weaknesses in specific industrial ecosystem. There is a need for developing methodology or model that can assist companies in detecting and anticipating disruptions in their supply chains. Such a model would contribute to reduce strategic dependencies on critical products, services or technologies.

Through the adoption of advanced technologies, the manufacturing industry will achieve operational independence. This operational improvement will be of paramount importance in ensuring performance during the next normal. In fact, COVID-19's impact on trade caught many firms unprepared, with negative consequences on supply chains. This event drastically changed the focus from a low-cost country sourcing mantra to a more resilient and simpler network. Implementing new technologies is turning supply chain processes and activities towards less uncertainty and complexity. Technologies like robotics, AI, IoT, blockchain, and edge computing are the key drivers to achieve these goals, together with efficiency benefits and zero-touch production (ZTP) processes, the latter being pushed significantly during the pandemic and becoming a strategic asset for the future of enterprises.

Efficiency is also fostered by AR/VR solutions, which enable experts to provide remote support to on-field operators and provide step-by-step instructions. B2B digital platforms are also a key trend in the manufacturing industry, pushing for a more collaborative relation between colleagues, peers, and employees. This opportunity is deeply connected to Big Data/analytics technology, which allows the user to track and analyse processes, improve operational visibility, and understand improvements and trends. 3D printing has shown its huge potential in creating and modifying manufacturing and healthcare products during the pandemic and is likely to be a key trend in the coming years. Product innovation is also driving the adoption of advanced materials, micro- and nanoelectronics, nanotechnologies, and photonics with the aims of improving products and reducing costs.

HORIZON-CL4-2023-RESILIENCE-01-44: Affordable Housing District Demonstrator (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Innovation Actions

Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Evaluation Procedure	The procedure is described in General Annex F. The following exceptions apply: To ensure a balanced portfolio covering demonstration activities in diverse geographical areas of the European Union and Associated Countries, grants will be awarded first to the highest ranked application according to the standard procedure described in Horizon Europe General Annexes D and F, followed by other applications that are the highest ranked among those that ensure the most complementary geographical coverage, provided that the applications attain all thresholds. When assessing geographical coverage, the evaluation will take into account the location of the application's demonstration activities, not the location of the application's participants/beneficiaries.

Expected Outcome: Projects are expected to contribute to following outcomes:

- **Demonstrate innovation in renovation or construction of social housing** districts to obtain replicable demonstrators or "*lighthouse affordable housing districts"* following the principles of the *Affordable Housing Initiative*[164] and, more broadly, taking into account the values *and the concept of the New European Bauhaus*[165]. Demonstrators can contribute to a smart neighbourhood approach setting liveability of local communities and residents at the forefront.

- Mobilise within the project a cross-sectoral industrial [166] and multi-stakeholder partnerships at local level to develop, adapt, design new processes, methods or technologies on affordable housing (by developing one or more innovative strands), with a focus on SMEs active in the area of social housing construction, renovation and development. Examples include SMEs related to construction, energy efficiency, circular economy, modular building, smart living, eco-design, social housing service etc.. Equally engaging other non SME stakeholders such as residents, social and public housing associations, civil society actors, public authorities will be key to boost tailor-made and fit for purpose innovation;

164 *https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757&uri=CELEX:52020DC0662*
165 *https://europa.eu/new-european-bauhaus/index_nl*
166 Refers to the 14 Industrial Ecosystems for Recovery

- Demonstrators should go the 'extra mile' and prove continuity in terms of a more integrated renovation or new build approach at district level by demonstrating **one or more innovative strand(s)**:

    a. **Adapted and affordable technological innovation** fostering liveability for local communities and residents, accessibility, access to (social) services, improving cohabitation amongst residents and interaction with social housing providers.

    b. **Social innovation,** addressing specific social challenges in housing districts and neighbourhoods. Examples could be models improving the wellbeing of residents, addressing basic needs and services, promote new forms of housing and housing organisation such as intergenerational and mixed forms of housing and accessible architecture open for cultural and creative innovation. Social innovation may also promote social business models fostering economic activity at district or neighbourhood level.

    c. **Innovative partnership and engagement models**: project, financial, investment and business models based on inclusivity and cooperation, as well as partnership models improving stakeholders' involvement in the construction process. Examples could be cooperative models for housing and utilities (cooperative housing, community land trust), leveraging social engagement models to empower and engage residents, public private partnership and impact investment schemes, post renovation planning and spatial organisation allowing socio-economic regeneration of the district.

    d. **Green innovation**. Examples could be: resource efficiency, circular and environment friendly techniques during the construction process as well as facilities and interventions fostering the ecologic ambition of housing once the construction is completed (such as integration of green spaces, improvement of biodiversity, landscaping, water-, waste- and energy management, shared consumption models, clean mobility provision, green spaces, city agriculture, air quality, monitoring instruments,…) as well as deployment of a Positive Energy District[167].

Replicability of innovative solutions demonstrated by the project is important. To this extent, relevant indicators and metrics, with baseline values, should be stated clearly in the proposal.

Effectively capture and disseminate learnings and major innovation outcomes to support the implementation of industrial-urban symbiosis, connection to European communities of practices established by the *Affordable Housing Initiative* and the *New European Bauhaus* or other relevant initiatives such as the European Urban Agenda.

The ultimate objective of the proposed action is to obtain a set of lighthouse affordable housing districts that each have followed a different approach, focussing on one or a combination of different innovative strands.

[167] https://jpi-urbaneurope.eu/ped/

The proposed action supports the **New European Bauhaus** and **Affordable Housing Initiative**, as lighthouse districts should display the application of the New European Bauhaus practices focussing on co-creation with the affected populations as well as on their improved quality of experience (including in terms of aesthetic or cultural meaningfulness) resulting from the renovation and building of social housing districts.

Scope: Industrial symbiosis needs to be fostered amongst most relevant partners engaged in construction and renovation of social housing facilities. The local and regional dimension is important since local energy and utility networks, adjacent industrial infrastructures and available by-products and services in such districts needs to be considered in a holistic and integrated approach.

Where appropriate, projects can address **COVID-19 related challenges and opportunities** such as reorganisation of housing areas and districts, conversion of office buildings into housing units, (inter)generational living, housing facilities addressing new work-life standards and needs, neighbourhoods driving local economic activity and new entrepreneurial opportunities, energy price shocks, increased material costs, etc.

When proposing the demonstrating district, projects are expected to address all following aspects:

- Identify districts that are "ready to go" or at least in an advanced planning stage allowing the integration of an “extra mile” effort in terms of one or more innovation strands.
- As a basic condition, energy efficiency and insulation aspects should be already integrated in the renovation scheme; potentially including local renewable energy production and energy communities.
- Generate results that are replicable for other districts. In this context ‘replicable’ is to be understood as: outcomes generated by the demonstrator projects’ implantation (for example, know-how, innovative solutions, proof of feasibility, new business models, adapted and scaled technology usage, policy recommendations, guidelines, prototypes, demonstrators, databases and datasets, trained researchers, new infrastructures, networks) should be directly usable or transferable for implementation after the project ends. Results should be appropriately documented to serve as guidance for actors in other territories outside the project interested in applying or adapting the solutions to their specific context.
- Plan actions for overcoming relevant barriers for renovation at district level (e.g. regulatory limits, lack of trust amongst different stakeholders, lack of private investors and awareness of the integrated approach potential);
- Guarantee a majority (+50%) of social housing dwellings including a dominant focus on affordability for the remaining dwellings.

- Ensure to prevent potential perverse effects are taken into account such as energy poverty, gentrification effect, creaming and *'renovictions'* or '*ghettoisation'* and make sure resident engagement is embedded.

In terms of project design and methodology, proposals should include:

- The development of an ambitious, mission-oriented, quality co-design process, based on citizens' and stakeholders' participation and multidisciplinary and multilevel collaboration An ambitious and credible executive plan that identifies and analyses the challenges and resources of a given territory (e.g. neighbourhood, district, ecosystem) in terms of sustainability (in line with the European Green Deal), inclusiveness (including social cohesion, accessibility and affordability) and aesthetics (including functionality, comfort, attractiveness, etc.).

- Deployment of an initial set of solutions as demonstrators within a two-year timeframe, accompanied by a rigorous impact evaluation methodology. Involvement in the testing of the innovation actions within the demonstrators with international experts.

- A detailed roadmap for implementation, with a sustainable financial plan identifying potential and substantial additional investment based on involvement and partnerships with different actors (national, regional, local, public and private sources).

- Projects are expected to participate in European-level networking opportunities in the context of the Affordable Housing Initiative

- Projects are expected to contribute to the New European Bauhaus initiative by interacting with the New European Bauhaus Community, NEBLab and other relevant actions of the initiative through sharing information, best practice, and, where relevant, results.
  In the context of this topic, geographical areas of the European Union and Associated Countries are NUTS level 1 regions of European Union Member States and of Associated Countries for which they are defined. In the case of Associated Countries without NUTS classification, the country as a whole is to be considered as one geographical area:

- List of Associated Countries not defined by NUTS level 1: Armenia; Bosnia and Herzegovina; Faroe Islands; Georgia; Kosovo;[168] Israel; Moldova; Tunisia; Ukraine.

- List of countries not defined by NUTS level 1 with which association negotiations are being processed or where association is imminent: Morocco.

Call - RESILIENT VALUE CHAINS 2024 TWO STAGE

HORIZON-CL4-2024-RESILIENCE-01-TWO-STAGE

168 This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

Conditions for the Call

Indicative budget(s)[169]

Topics	Type of Action	Budgets (EUR million)	Expected EU contribution per project (EUR million)[170]	Indicative number of projects expected to be funded
		2024		
Opening: 19 Sep 2023 Deadline(s): 07 Feb 2024 (First Stage), 24 Sep 2024 (Second Stage)				
HORIZON-CL4-2024-RESILIENCE-01-35	IA	31.00	6.00 to 8.00	4
HORIZON-CL4-2024-RESILIENCE-01-36	IA	31.00	6.00 to 8.00	4
Overall indicative budget		62.00		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General Annex B.
Financial and operational capacity and exclusion	The criteria are described in General Annex C.
Award criteria	The criteria are described in General Annex D.
Documents	The documents are described in General Annex E.
Procedure	The procedure is described in General Annex F.

169 The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

170 Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Strategic innovation markets driven by advanced materials

Proposals are invited against the following topic(s):

HORIZON-CL4-2024-RESILIENCE-01-35: Biodegradable polymers for sustainable packaging materials (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 6.00 and 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 31.00 million.
Type of Action	Innovation Actions
Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms, logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to start at TRL 4 and achieve TRL 6-7 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.

Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects are expected to contribute to the following outcomes:

- The packaging industry will have access to the next generation of biodegradable polymer materials, which will also be recyclable materials. Plastic materials producers will switch from PP, PE, and PET to bio-degradable materials with reduced GHG emissions along the value chain.
- The packaging industry will apply business model of circularity-by-design and sustainable end-of-life (EoL) solutions for plastic packaging materials. This has the potential to lead to a reduction in landfill waste volume of packaging materials; and to a reduction of littering of plastics, coherent with the ambition of the Horizon Europe Ocean and Waters mission, to reduce the plastic pollution of the oceans. Projects are expected to contribute to the Plastics strategy, the Single-use Plastics Directive and the EU Circular Economy Action plan (CEAP).
- Standards and labels for specific applications will be further defined based on the development of testing of biodegradability of plastics in open environments

Scope: Proposals **should address at least four of the following activities**:

- Develop new, demonstrate and scale-up novel advanced bio-degradable polymer materials and innovative processes that will allow the bio-degradable polymers to be produced at a large scale with a similar economy of scale to replace present production with PE, PP and PET, and with an improved sustainability profile compared to present production and EoL characteristics.
- Develop sustainable additives and catalysts to support the production of bio-degradable polymers.
- Provide evidence with life cycle and techno-economic assessment (LCA/TEA) that the cost for the novel advanced biodegradable polymer products are not significantly higher compared to existing polymer products (PE, PP, PET) on the market.
- Scale up the production of packaging materials at pilot level.
- Identify and test the biodegradability pathways in all environmentally relevant conditions (for the application of the developed material in relevant shape or form); and extensive quantified risk analysis from both a human and environmental perspective for all the different intermediate and end products of biodegradation, including quantification of the contribution to GHG emissions. Contribute to further defining standards and labels for specific applications. Model the lifetime of the developed

polymers along the biodegradation pathway in environmentally relevant conditions, both in natural, (terrestrial and marine), and in waste processing environments.

- Demonstrate complete biodegradability in all relevant conditions and environmental compartments (e.g. landfill, compost site, litter in marine-freshwater-sediment-soil) within acceptable timeframes, determination of the main influencing environmental conditions; and assessment of the impact on the environment. Integrate a holistic sustainability assessment, accounting for the full life cycle (including sourcing of feedstock).

Develop and demonstrate circular business model for production at industrial level, where the release of GHG emissions is; and assess significantly reduced; and assess the potential of secondary raw materials as a feedstock (including from renewable sources) for the production of bio-degradable polymers.

To enable a fast development of new advanced materials, digital tools, such as modelling and simulation, and characterisation techniques (including those provided by analytical infrastructures) are under the scope, assisted by advanced methods, e.g. physics-based methods or artificial intelligence (including machine learning).

The future Commission initiative for Safe and Sustainable by Design will set a framework for assessing safety and sustainability of chemicals and materials and should be considered as a baseline in the proposal.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination.

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. An early involvement of end users could be essential.

Projects should build on or seek collaboration with existing projects (e.g. Open Innovation Testbeds) and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms. Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded research projects, including the ones under Cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' and Circular Bio-based Europe JU (CBE JU).

HORIZON-CL4-2024-RESILIENCE-01-36: Advanced biomaterials for the Health Care (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 6.00 and 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude

	submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 31.00 million.
Type of Action	Innovation Actions
Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms, logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Technology Readiness Level	Activities are expected to start at TRL 3-4 achieve TRL 5-6 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [171].
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: This topic refers to the innovation market for *Healthcare and Medicine*, which affects many citizens and their needs. Several materials specifications and related innovations needs will support this topic such as renewable and recyclable materials, alternative active ingredients, design for circularity, lightweight materials. The topic should address several key policies of the European Union such as Circular Economy Action Plan, EU Chemicals strategy.

[171] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

Projects are expected to contribute to the following outcomes:

- Develop the swiftly growing innovation market of medical applications, which is dependent on advanced biocompatible materials that can be printed or injected, including 4D materials that change their 3D structures following external impact (e.g. thermic, electric, mechanical or radiation treatment).
- Medical and/or surgical procedures will benefit from injectable materials for non-invasive surgical procedures.
- Some of their advantages include easy deliverability into the body, increased implantation precision, controllable release of therapeutic agents, antimicrobial properties and the possibility of monitoring or stimulating biological events.

Medical suppliers can commercialise injectable hydrogels, including those made of nanocomposite, natural and synthetic polymer-based biomaterials, bone cements, bio-ceramics and electronics.

Scope: Proposals **should address at least four of the following activities**:

- To enable a fast development of new advanced novel injectable biomaterials, digital tools such as modelling, simulation and characterisation techniques (including those provided by analytical infrastructures) assisted by advanced methods e.g. physics-based methods, machine learning or artificial intelligence.
- The innovation market of medical applications is fast growing and dependent on advanced biocompatible materials that can be printed or injected. The 4D materials will change their 3D structures after external impact such as thermic, electric, mechanical or radiation treatment.
- Proposals shall demonstrate new engineering strategies that present functional characteristics beyond bio-compatibility, and express properties that can be used to control the physiological environment (shape-memory, self-healing properties) and induce a response.
- Proposals shall address biomaterials with antibacterial properties contributing to the widespread bottleneck of antimicrobial resistance often encountered in clinical care
- Demonstrate the scaling of injectable hydrogels, including those made of nanocomposite, natural and synthetic polymer-based biomaterials, bone cements, bio-ceramics and electronics.
- The design for circularity has to develop, when relevant, bio-degradable or bio-absorbable biomaterials that are gradually eliminated by the body after fulfilling a purpose.

The biomaterials used should be safe and sustainable by design (SSbD), taking also into account any specific medical requirements.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination.

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. An early involvement of end users could be essential.

Projects should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms.#

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded research projects, including the ones under Cluster 1 “Health” and Cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture and Environment.

Improving the resilience of EU businesses, especially SMEs and Startups

Call - RESILIENT VALUE CHAINS 2024

HORIZON-CL4-2024-RESILIENCE-01

Conditions for the Call

Indicative budget(s)[172]

Topics	Type of Action	Budgets (EUR million)	Expected EU contribution per project (EUR million)[173]	Indicative number of projects expected to be funded
		2024		
Opening: 19 Sep 2023 Deadline(s): 07 Feb 2024				
HORIZON-CL4-2024-RESILIENCE-01-01	RIA	20.00	Around 5.00	4
HORIZON-CL4-2024-RESILIENCE-01-04	IA	22.00	Around 7.30	3

[172] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

[173] Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

HORIZON-CL4-2024-RESILIENCE-01-08	IA	32.00	Around 16.00	2
HORIZON-CL4-2024-RESILIENCE-01-10	CSA	2.20	Around 2.20	1
HORIZON-CL4-2024-RESILIENCE-01-11	IA	15.00	Around 7.50	2
HORIZON-CL4-2024-RESILIENCE-01-24	IA	59.00	12.00 to 15.00	4
HORIZON-CL4-2024-RESILIENCE-01-41	CSA	10.00	Around 5.00	2
Overall indicative budget		160.20		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General Annex B.
Financial and operational capacity and exclusion	The criteria are described in General Annex C.
Award criteria	The criteria are described in General Annex D.
Documents	The documents are described in General Annex E.
Procedure	The procedure is described in General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Raw Materials for EU open strategic autonomy and successful transition to a climate-neutral and circular economy

Proposals are invited against the following topic(s):

HORIZON-CL4-2024-RESILIENCE-01-01: Exploration of critical raw materials in deep land deposits (RIA)

Specific conditions	
Expected EU contribution per	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal

project	requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 20.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used). To increase EU resilience in raw materials supply chains and thus reduce the serious risks to the Union's strategic assets, economic and societal interests, autonomy, and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. ** "African Union member states" includes countries whose membership has been temporarily suspended.*
Technology Readiness Level	Activities are expected to achieve TRL 3-5 by the end of the project – see General Annex B.

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials[174] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

-Develop innovative technologies for exploration of critical raw materials in deep land deposits in the EU and non-EU countries;

-Increase the resources and reserves of various primary critical raw materials within the EU and non-EU countries;

-Accelerate development of EU domestic critical raw materials exploration projects integrating innovative technologies;

-Strengthen EU autonomy and ethical sourcing of raw materials by developing socially and environmentally acceptable means of discovery of primary raw materials.

-Improve responsible supply of raw materials to the EU in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[175]

-Promote the utilisation of UNFC (United Nations Framework Classification for Resources) and UNRMS (United Nations Resource Management System) in the raw materials sector.

Actions are expected to contribute to the implementation of the EU action plan on Critical Raw Materials.[176]

Scope: Actions should map Europe's primary raw materials potential and raw materials production, using geoscientific approaches and refining capacities in a harmonised form, using UNFC (United Nations Framework Classification for Resources) and UNRMS (United Nations Resource Management System).

-Develop and deploy new or improved highly efficient, sustainable exploration technologies, such as UAV assisted geological exploration in remote areas, geophysics, 3D modelling, new drilling techniques, models of whole mineral systems related to critical raw materials, high resolution laboratory techniques, artificial intelligence and data processing to identify deep seated mineral deposits of critical raw materials.

Actions should also contribute to improving the awareness of the general public across the EU about:

-The importance of raw materials for a successful transition to a climate-neutral and digitised economy and society; and

174 https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en
175 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1
176 COM (2020) 474

-The ensuing need for a secure, sustainable, and responsibly-sourced supply of raw materials, including from domestic sources to strengthen EU open strategic autonomy and reduce over-dependence on third countries.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

HORIZON-CL4-2024-RESILIENCE-01-04: Technologies for processing and refining of critical raw materials (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 7.30 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 22.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used). To increase EU resilience in raw materials supply chains and thus reduce the serious risks to the Union's strategic assets, economic and societal interests, autonomy, and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which

	the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. ** "African Union member states" includes countries whose membership has been temporarily suspended.*
Technology Readiness Level	Activities are expected to achieve TRL 6-7 by the end of the project – see General Annex B.
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials[177] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

-Increase recovery rates of valuable raw materials, particularly critical raw materials from low grade or complex ores and/or from extractive waste;

-Significantly increase economic performance in terms of higher material-, water-, energy- and cost-efficiency and flexibility in minerals processing and metallurgical processes;

-Significantly improve the health, safety and environmental performance of the operations throughout the whole life cycle which is considered, including a reduction in waste, wastewater and emissions generation and a better recovery of resources from generated waste;

-Improve responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing

[177] https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en

in Europe in terms of social, environmental and economic performance.[178] Actions are expected to contribute to the implementation the EU action plan on Critical Raw Materials.[179]

Scope: Actions should demonstrate new or improved systems integrating relevant processing and refining technologies for better recovery of raw materials from low grade and/or complex ores from extractive wastes, less waste, higher energy efficiency. The action could also reduce the content of toxic elements or compounds in the resulting material products. The actions should target minerals and metals, particularly critical raw materials.

The solution proposed should be flexible enough to adapt to different or variable primary and secondary raw materials grades and should be supported by efficient and robust process control. Where relevant, any solution proposed for the reduction of the content of toxic elements or compounds in the resulting materials should also include the appropriate management of the hazardous substances removed.

Actions should develop intelligent and innovative production systems which better utilise natural resources by minimising losses during waste-rock separation in an optimised and energy-efficient process and by minimising use of water

Recycling of end-of-life products is excluded from this topic, though joint processing of waste streams originating from end-of-life products recycling could be included and has to be duly justified.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

Actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider standardisation aspects when relevant. The action should also include the analysis of financial opportunities ensuring the market exploitation and replication of the circular business model behind the developed solutions as new processes, products and/or services.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. For TRLs 6-7, 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.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

178 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1
179 COM (2020) 474

HORIZON-CL4-2024-RESILIENCE-01-08: Rare Earth and magnets innovation hubs (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 16.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 32.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used). To increase EU resilience in raw materials supply chains and thus reduce the serious risks to the Union's strategic assets, economic and societal interests, autonomy, and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition

	systems will be ineligible. ** "African Union member states" includes countries whose membership has been temporarily suspended.*
Technology Readiness Level	Activities are expected to achieve TRL 6-7 by the end of the project – see General Annex B.
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials[180] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

-Significantly improve supply security and reduced environmental footprint of rare earth value chains in the EU

-Broad access to materials development facilities and services across Europe through a single entry point – innovation hub;

-Accelerate development of products and processes for a faster market entry;

-Reduce costs for both industry and users and increased return on investment in research;

-Improve access to end users and easier marketability of products in Europe;

-Improve responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[181]

Actions are expected to contribute to the implementation the EU action plan on Critical Raw Materials[182] and the action plan on Rare Earth Magnets and Motors from the European Raw Materials Alliance[183].

Scope: The action should create an innovation hub that enables the development, demonstration and testing of new processes for production of rare earths and related products, particularly neodymium permanent magnets in the industrial environments. This hub should connect critical mass of the existing laboratories, industrial pilots and other research facilities and services across different regions in the Europe and if duly justified also in third countries.

180 https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en
181 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1
182 COM (2020) 474
183 https://erma.eu/european-call-for-action/

The hub should demonstrate its functionality on a range of concrete developments up to the TRL levels 6-7 to be executed within the duration of the action. Demonstrations could cover novel, cost-effective and environmentally sound rare earths extraction, processing and separation routes; consider unconventional rare earth sources, like low grade ores, non-ferrous metals beneficiation tailings and iron ore tailings, metallurgical waste apatite; and/or recycling, re-use, refurbishment and/or repurposing of end-of-life products and components containing rare earth magnets. The hub could additionally address development of breakthrough separation, fragmentation and magnetization approaches, finishing at TRL levels 4-5.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

Actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider standardisation aspects when relevant. The action should also include the analysis of financial opportunities ensuring the market exploitation and replication of the circular business model behind the developed solutions as new processes, products and/or services.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. For TRLs 6-7, 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.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

HORIZON-CL4-2024-RESILIENCE-01-10: Addressing due diligence requirements in raw materials supply chains. (CSA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 2.20 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 2.20 million.
Type of Action	Coordination and Support Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply:

	If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used). To increase EU resilience in raw materials supply chains and thus reduce the serious risks to the Union's strategic assets, economic and societal interests, autonomy, and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries, OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. ** "African Union member states" includes countries whose membership has been temporarily suspended.*
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training

	Programme of the European Atomic Energy Community (2021-2025). [184].
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials[185] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

-Improve responsible sourcing of raw materials and responsible business conduct initiatives with regard to raw materials;

-Equip the raw materials sector with tools to enable implementation of relevant regulatory initiatives;

-Identify and address gaps in the raw materials supply chains due diligence;

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-Improve responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[186]

Actions are expected to contribute to the implementation the EU action plan on Critical Raw Materials.[187]

Scope: Responsible sourcing and due diligence are growing in importance throughout the raw materials value chain, highlighting the need to address possible risks of adverse impact to human rights and the environment in corporate behaviour. Consumers and investors increasingly expect supply chain transparency where due diligence obligations are an important part. Recent regulatory initiatives are underway for responsible sourcing and supply chain due diligence.

Knowledge in the area supply chain due diligence needs to be strengthened to limit complexity and enable a level playing field for responsible sourcing of raw materials.

184 This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

185 https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en

186 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1

187 COM (2020) 474

The proposal should build on the state of the art in sustainable raw materials traceability and on the experience of existing EU projects on international responsible sourcing and contribute to strengthening responsible sourcing agenda.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

Actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider standardisation aspects when relevant. The action should also include the analysis of financial opportunities ensuring the market exploitation and replication of the circular business model behind the developed solutions as new processes, products and/or services.

HORIZON-CL4-2024-RESILIENCE-01-11: Technologies for extraction and processing of critical raw materials (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 7.50 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 15.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used). To increase EU resilience in raw materials supply chains and thus reduce the serious risks to the Union's strategic assets, economic and societal interests, autonomy, and security associated with the current EU reliance on a few third countries for critical raw materials, by increasing sustainable and responsible sourcing of primary and secondary raw materials necessary to enable the green and digital transition and in alignment with the Communication (2020) 474 on Critical Raw Materials Resilience, participation in this topic is limited to legal entities established in Member States, associated countries,

	OECD countries, African Union Member States*, MERCOSUR, CARIFORUM, Andean Community and countries with which the EU has concluded strategic partnerships on raw materials. The choice of these countries was made taking into consideration the development of strategic international partnerships on raw materials and avoidance of reinforcing existing over-dependencies, as well as the importance of involving partners committed to pursuing open trade in such materials. Proposals including legal entities which are not established in the countries that fall under the criteria above will be ineligible. Any activity aimed at deploying subliminal techniques beyond a person's consciousness, exploiting any of the vulnerabilities of a specific group of persons and at using emotion recognition systems will be ineligible. ** "African Union member states" includes countries whose membership has been temporarily suspended.*
Technology Readiness Level	Activities are expected to achieve TRL 6-7 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: To ensure a balanced portfolio covering the partners from the two partner countries mentioned in the scope below, grants will be awarded to applications in order of ranking but also to at least one project per each partner country, provided that the applications attain all thresholds.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [188].

[188] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects outcomes will enable achieving the expected impacts of the destination by increasing access to primary raw materials and secondary raw materials, in particular critical raw materials[189] for EU industrial value chains and strategic sectors.

Projects are expected to contribute to the following outcomes:

-Strengthen EU cooperation with resource rich countries;

-Provide new relevant life cycle inventory data sets based on requirements for Environmental Footprint compliant datasets[190] and in line with the 2021 Recommendation on the use of the Environmental Footprint methods[191], particularly focusing on the existing knowledge gaps (e.g., new technologies for open pit and underground mining).

-To evaluate the environmental performance of the technologies a Product Environmental Footprint (PEF) study will be produced.

-Improved industrial viability, safety and environmental impacts of the operation in a way that leads to measureable improvements;

-Improved diversification EU sourcing of critical raw materials from third countries;

-Improved responsible supply of raw materials to Europe in line with the EU principles for sustainable raw materials, which are a non-regulatory set of principles based on the EU acquis. They set out requirements for sustainable raw materials and extraction and processing in Europe in terms of social, environmental and economic performance.[192]

Dissemination and exploitation of projects outputs is tailored for organisations and industry dealing with raw materials in the EU and project partner countries in resource rich countries;

In order to achieve the expected outcomes, international cooperation with partners established in resource rich countries with which the EU has strategic partnerships on raw materials is strongly encouraged.

Actions are expected to contribute to the implementation the EU action plan on Critical Raw Materials.[193]

Scope: The actions in this call should also be pursued with a view on developments in the call "HORIZON-CL4-2023/2024-RESILIENCE-01-02: Innovative technologies for sustainable

189 https://ec.europa.eu/growth/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en
190 See JRC Guide_EF_DATA.pdf (europa.eu)
191 Commission Recommendation (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations C/2021/9332, OJ L 471, 30.12.2021, p. 1–396
192 https://op.europa.eu/en/publication-detail/-/publication/6d541f66-0f81-11ec-9151-01aa75ed71a1
193 COM (2020) 474

and decarbonised extraction" in terms of industrial viability, safety and environmental impacts.

Actions are expected to develop and demonstrate extraction and processing technologies to facilitate exploitation of the primary raw critical raw materials (minerals and metals only) for the EU to strengthen the EU supply chains.

Actions have to collaborate with Canada or Ukraine, following the strategic partnership on raw materials established in 2021 between the EU and Canada[194] and with Ukraine. [195] [196]. The consortia should contain raw materials industry from at least one of the partner countries and raw materials users from the EU. Technology should be demonstrated on the resources of the partner country.

Actions should envisage clustering activities with other relevant selected projects for cross-projects co-operation, consultations and joint activities on cross-cutting 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.

Actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider standardisation aspects when relevant. The action should also include the analysis of financial opportunities ensuring the market exploitation and replication of the circular business model behind the developed solutions as new processes, products and/or services.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination. For TRLs 6-7, 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.

In this topic the integration of the gender dimension (sex and/or gender analysis) in research and innovation content is not a mandatory requirement, however, should you consider it to be of relevance for your specific proposal, you are strongly encouraged to do it.

Safe and Sustainable by Design (SSbD) Chemicals and Materials

Proposals are invited against the following topic(s):

HORIZON-CL4-2024-RESILIENCE-01-24: Development of safe and sustainable by design alternatives (IA)

Specific conditions

194 https://ec.europa.eu/growth/news/eu-and-canada-set-strategic-partnership-raw-materials-2021-06-21_en

195 https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3633

196 The geographical scope of the topic may be revised before the call is launched, should new circumstances or priorities emerge

Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 12.00 and 15.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 59.00 million.
Type of Action	Innovation Actions
Technology Readiness Level	Activities are expected to start at TRL 4-5 and achieve TRL 6-7 by the end of the project – see General Annex B.
Exceptional page limits to proposals/applications	In order to include a business case and exploitation strategy, the page limit in part B of the General Annexes is exceptionally extended by 3 pages.

Expected Outcome: Projects are expected to contribute to the following outcomes:

- European industry will have access to safer and more sustainable innovative alternatives of chemicals and materials with reduced substitution barriers (e.g., performance, cost and supply demand);
- Industry will be able to test and demonstrate the applicability of the Safe and Sustainable by Design framework [197] to develop innovative chemicals or materials to substitute substances of concern [198];
- The EU climate ambitions [199] will be supported by contributing to a decrease of greenhouse gas emissions through a more sustainable production and use of Safe and Sustainable by Design chemicals and materials;
- The EU strategies/policies and regulation, such as the proposal for the Ecodesign for Sustainable Products Regulation[200], the EU Ecolabel[201], REACH[202] or CLP[203] will be supported with safe and sustainable alternatives of chemicals and materials;

197 See documents defining the SSbD framework on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

198 See Article 2 of the Proposal for a regulation of the European Parliament and of the Council establishing a framework for setting Ecodesign requirements for sustainable products and repealing Directive 2009/125/EC; https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12567-Sustainable-products-initiative_en

199 https://ec.europa.eu/clima/eu-action/european-green-deal/2030-climate-target-plan_en

200 https://ec.europa.eu/environment/publications/proposal-ecodesign-sustainable-products-regulation_en

201 https://ec.europa.eu/environment/ecolabel/the-ecolabel-scheme.html

202 https://ec.europa.eu/environment/chemicals/reach/reach_en.htm

203 https://echa.europa.eu/regulations/clp/legislation

- The proof of concept of developing new Safe and Sustainable by Design chemicals or materials will bring evidence for new skills needed to apply the Safe and Sustainable by Design framework;

- Market uptake of the Safe and Sustainable by Design chemicals and materials will be encouraged by citizens better understanding their benefits.

Scope: The Commission initiative for Safe and Sustainable by Design [204] sets a framework for assessing safety and sustainability of chemicals and materials and which should be considered as a reference in the proposal.

Proposals should develop one or more new chemical substances or materials to replace existing substances of concern with surfactant, flame retardant or plasticising functionalities for a chosen application. Proposals should address at least one industrial application. The new substances or materials shall be aligned with the Safe and Sustainable by Design framework, and demonstrate improved sustainability and a contribution to lower the impact on climate. The selected industrial application(s) should be in areas where substitution with safer and more sustainable solutions is not yet in place, or in progress.

Proposals should address all of the following:

- Proof of concept of the Safe and Sustainable by Design framework. The developed substances or materials will have to comply with the Safe and Sustainable by Design framework. Findings from the selected projects will be considered for the further refinement of the defined framework, if applicable;

- The selection of the chemical/materials to be developed should be justified with a technology and socio-economic analysis;

- Proposals should involve all relevant actors along the value chain;

- Identify the substitution barriers for the selected applications and propose a driving mechanism for a maximal substitution in the targeted value chains;

- Identify and address challenges for the adaption of existing production lines;

- Explore collaboration with existing Open Innovation Test Beds (OITBs) [205], where relevant;

- Interoperability for data sharing should be addressed across the entire value chain;

- Communication actions to all stakeholders and specifically citizens about the benefits of the developed Safe and Sustainable by Design chemicals and materials.

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[204] See documents defining the SSbD framework on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

[205] https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/sustainable-production-processes_en

Proposals should indicate to which chapters of the Strategic Research and Innovation Plan for chemicals and materials[206] they will contribute.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination.

Proposals should involve appropriate expertise in Social Sciences and Humanities (SSH), in particular in the socio-economic analysis of the relevant substance or application.

Projects should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms. For example, with projects resulting from the topic, HORIZON-CL4-2021-RESILIENCE-01-08 as well as other relevant projects from the topic HORIZON-CL6-2023-ZEROPOLLUTION. Proposals should allocate the necessary resources for collaboration with other relevant projects.

Synergies with Horizon Europe missions as relevant are encouraged.

Improving the resilience of EU businesses, especially SMEs and Startups

Proposals are invited against the following topic(s):

HORIZON-CL4-2024-RESILIENCE-01-41: 'Innovate to transform' support for SME's sustainability transition (CSA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Coordination and Support Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used). The following additional eligibility criteria apply: In order to achieve the expected objectives and/or the specific policy requirements of the

206 https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en

	topic, the applicant consortium must include at least three entities from at least three Member States or Associated Countries. Moreover, the same legal entity which have received funding under this topic in the 2021-22 work programme, will not be eligible to funding under the 2024 call, in addition geographical and sectorial complementarities in relation to the 2021-22 results will be considered for the 2024 call.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [207]. Beneficiaries may provide financial support to third parties. The support to third parties can only be provided in the form of grants. The maximum amount to be granted to each third party is EUR 50 000.

Expected Outcome: Projects are expected to contribute to the following outcomes:

- Support objectives of the European Green Deal and of the EU SME Strategy for a sustainable and digital Europe;
- Increased resilience of SMEs, by fostering technological and social innovation in SMEs to support their transition to more sustainable business models and more resource-efficient and circular processes and infrastructures;
- Increased competitive sustainability of SMEs through the uptake of advanced technologies;
- Stronger innovation support ecosystems supporting the green, social and economic transition of SMEs, by leveraging synergies between existing EU networks and SME support initiatives.

Scope: Achieving European Green Deal objectives, and notably a climate neutral and resource efficient economy, requires the full mobilisation of SMEs. The COVID-19 pandemic has also led to companies redesigning their supply chains and facing a new industrial revolution, brought on by a new generation of advanced technologies, which are underpinning the potential for competitive sustainability of SMEs.

[207] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

The action will build on and further connect existing EU specialised business support networks and centres – such as the Enterprise Europe Network, the European industry clusters registered under the European Cluster Collaboration Platform, Centres for Advanced Technologies for Industry. They will work in complementarity and close interaction with Open Innovation Test beds, European Digital Innovation Hubs, Start-up Europe etc., but also with academia, social partners and other social innovation actors.

This action will consist in:

A. Advisory services

Dedicated innovation and capacity building support will be provided to SMEs, to assess their ability to transform their business models and increase their resilience.

This will consist of an assessment of SMEs' innovation and sustainability practices, elaboration of recommendations, notably in view of the uptake of advanced technologies and/or social innovations.

Based on these recommendations, SMEs could receive further advisory services according to their level of preparedness such as help and advice on proof of concept, investment readiness, intellectual property (in cooperation with EU funded IP support), technology transfer, adaptation to standards, adaptation to environmental rules, design management, skill development, partner search (including social partners). SMEs will receive targeted assistance for the uptake of advanced technologies.

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

This action will also include the set-up of a community, building on the SME Alliance projects, in which best practices should be exchanged and SMEs could benefit from dedicated peer-learning activities in order to learn from leaders (SMEs or larger corporates) of their own sector. Incentives for leaders to share their best practices with peers should be identified in the context of EU support to industrial ecosystems.

B. Financial support in the form of 'Third party financing'

As a result of the advisory services and initial assessments, SMEs will receive financial support through calls for SMEs, to implement the elaborated recommendations.

This should support amongst other activities the financing of a feasibility study, prototyping, pilot testing, demonstrating, procurement of further specialised consultancy services and coaching services that cannot be provided directly by the project partners, adaptation of business processes, free access and support to use testing facilities, introduction of new IT solutions etc.

The Commission estimates that at least half of the budget should be allocated to financial support to SMEs in the form of third party financing.

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

Proposals can consider the involvement of the European Commission's Joint Research Centre as an associated partner providing its expertise in industrial innovation and dynamics.