Selection of Textile-Related Horizon Europe Calls 2023-2024

1. HORIZON-CL6-2023-CircBio-02-2-two-stage: Novel, sustainable and circular bio-based textiles

- Innovation Action
- Activities are expected to achieve TRL 6-8 by the end of the project –
- 7 MEUR
- Deadline(s): 28 Mar 2023 (First Stage), 26 Sep 2023 (Second Stage)

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

- Significantly reduce the negative environmental impact of textiles throughout their lifecycle. This impact encompasses primary raw materials and water consumption, land use and indirect land use change, as well as GHGs and other pollutants emissions (zero pollution), via addressing circularity-by-design and sustainable production aspects (the latter including thus also resource efficiency and circularity of resources improvements).

- Significantly increase recyclability and circularity of textiles; it is estimated that currently there is a very low rate of recyclability of textiles into new textiles, worldwide[276].

- Increase the use of EU (locally/regionally-sourced) alternative, bio-based fibres (including the reuse of bio-based textiles in their present form and in novel forms of use).

- Address social impacts (e.g., HS&E and working conditions), in addition to environmental effects; projects should ensure sustainable, circular and socially just textile production and consumption at EU level, while international cooperation is strongly encouraged. The latter will allow for enhancing further on the sustainable production and consumption of textiles while improving on the replication potential of the proposed innovations.

- Empower and increase SMEs participation and improve academia/industry/feedstock &fibres suppliers' interactions and collaboration.

- Establish new and innovative circular bio-based value chains with a positive impact on EU competitiveness and jobs creation at regional, rural and local levels

Scope:

Overall, the call addresses the design, demonstration and scale-up of production of sustainable and circular, bio-based textiles for one or more applications: e.g., technical textiles, garments, industrial textiles, home textiles; including also innovative smart textiles and those providing additional

functionalities (e.g., antimicrobial or fire resistance properties). Blended, but only bio-based compositions, are included hereby.

More specifically, the overall scope should be addressed by the projects via:

- Valorisation of secondary biomass, residues and under-utilised (primary or secondary) biomass (sustainable biomass sourcing, land use, land-use change and forestry (LULUCF) and biodiversity considerations should be addressed/showcased) for bio-based textiles. Moreover, the reuse of fibres from bio-based textiles to produce circular bio-based textiles is in scope;
- Design for circularity, enabling thus material design for durability, end-of-life recyclability, re-use and upcycling (including usability of waste fibres), with attention to the final application(s)/end use of textiles;
- Design for end-product quality, safety, and durability, with consideration of the sustainability and circularity of textiles value chains and the final application/end-use; this does include preventing micro- and nano- plastics/fibres release throughout the lifecycle of textiles;
- Development, demonstration and scale-up of novel processes by deploying appropriate enabling technologies to significantly reduce the environmental footprint of textiles, across their production steps (pre-treatment, mordanting, dyeing, and finishing steps), improving notably on climate neutrality and against zero pollution. Moreover, apply industrial, industrial-urban and other symbiosis concepts, where necessary to achieve and enhance targeted outcomes and impacts;
- Assess the environmental and social sustainability performance of the proposed innovations (textiles production and textiles lifecycle), while including technoeconomic feasibility assessment as well. The methodologies of assessment should follow existing EU standards;
- Integrate the Safe-and-Sustainable-by-Design (SSbD) framework, developed by the Commission, for assessing the safety and sustainability of chemicals and materials.[278] Contribute with and develop recommendations that can advance further the application of the SSbD framework. More specifically, provide thresholds that can support the criteria definition and improvements for the assessment SSbD methodologies, including any specificities related with bio-based textiles. Recommendations can also include identification of data gaps, especially safety, environmental, but also socio-economic factors, as well as priorities for data collection.
- Address, consumer behaviour, acceptance and demand aspects for circular and sustainable bio-based textiles;
- Assess existing barriers to implementing circular economy business models for textiles; on this basis create innovative, sustainable and circular business models for the (EU and local) production and consumption of circular bio-based textiles. The participation of industry and particularly SMEs is strongly encouraged

2. HORIZON-CL6-2024-CircBio-01-2: Circular solutions for textile value chains based on extended producer responsibility

- Innovation Action
- Activities are expected to achieve TRL 6-8 by the end of the project –
- 7 MEUR
- Deadline(s): 22 Feb 2024

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

- Recommendations on best innovative solutions for the identification of material composition of used textiles/textile waste embedded in the design of textile products;
- Recommendations on design for recycling for textile products that allows the use of targeted Extended Producer Responsibility (EPR) schemes;
- Recommendations on policy tools to reach EU greenhouse gas reduction targets till 2050 (climate neutrality), including the 2030 target

Scope:

Textiles are the fourth highest-pressure category for the use of primary raw materials and water and fifth for greenhouse gas emissions and a major source of microplastic pollution in production and use phases. They are also a key material and product stream in the circular economy action plan. Improvements in the circularity of the textile value chains will help reduce GHG emissions and environmental pressure. EPR schemes are a lever for circularity. The purpose of this topic is to enable the optimal functioning of EPR schemes for textiles within the EU and to take into account the commitments of the textile strategy on EPR. The circular economy action plan establishes the policy objective to make the textiles sector more sustainable by boosting the circularity of textile consumption i.a. through reuse, separate collection, sorting and recycling of textiles. It also wants to limit textile waste generation and restrict exports of waste that have harmful environmental and health impacts in third countries or that can be treated within the EU. Furthermore, increased amounts of separately collected textile waste are expected because of the Waste Framework Directive's obligation to separately collect textiles as of 202

Extended Producer Responsibility (EPR) schemes have proven to be an effective tool for improving the treatment of other waste streams and therefore are being considered as necessary in recent consultations by the stakeholders of the textile sector. In view of that, the Commission is assessing the feasibility of introducing EPR for textiles into EU legislation. Proposals should aim to support the high-quality separate collection, preparation for treatment and treatment of used textiles and textile waste, thereby enabling the optimal functioning of EPR schemes in this sector. It will do so by providing recommendations on improving the ease of identification of material composition in a wide range of used textile products/waste to inform the different actors in the use and end-of-life stages of textiles (consumers for use and disposal, social enterprises to enable reuse, waste management operators to enable preliminary treatment and treatment operations). To do so, it will inter alia identify, develop and test innovative labelling of textile products (including through the use of technologies such as AI, blockchain or Internet of Things) to ease separate collection for re-use or end-of-life treatment that leads to high quality secondary raw materials.

Proposals should bring together different stakeholders active in the sector along the value chain, such as waste collectors, waste sorters, repair and reuse organisations. Proposals should also try to address historical liabilities and the impact of textiles coming from outside the EU. Proposals should analyse how EPR schemes can improve the circularity of textiles, assess the material composition in a wide range of used textile products and waste with a view to targeted EPR schemes for improved collection and recycling, and test separate collection options for reuse or end-of-life treatment that could be enforced through EPR schemes. Projects should also identify novel solutions for textile reuse. They should also consider possible rebound effects and only propose

measures that will not hamper the market uptake of more sustainable novel textile materials. Projects should also recommend/identify/define tools (policy, legislation, governance, market-based, etc.) that the EU institutions (Commission, Parliament, Council of the EU) could implement or propose in order to reduce the overall greenhouse gas (GHG) emissions from the textile sector (including from final consumption, not only production) in the EU in line with the EU greenhouse gas emissions reduction targets till 2050 (climate neutrality), including the 2030 target; for this, the projects should take into account the relevant possible rebound effect

3. HORIZON-CL6-2024-CircBio-02-1-two-stage: Circular solutions for textile value chains through innovative sorting, recycling, and design for recycling

- Research and Innovation Action
- Activities are expected to achieve TRL 5-6 by the end of the project –
- 5 MEUR
- Deadline(s): 22 Feb 2024 (First Stage), 17 Sep 2024 (Second Stage)

Project results are expected to contribute to at least two of the following outcomes:

- Roll-out of systemic solutions for textile sorting, using innovative digital technologies (such as AI, robotics, IoT and blockchain);
- Roll-out of feasible solutions for facilitated disintegration to be incorporated in product design, as an enabler for recycling;
- Increased uptake of mechanical recycling solutions that deliver competitive, high-quality secondary materials;
- Roll-out of thermo-mechanical, chemical and other (e.g., enzymatic) recycling solutions that are sustainable from a zero-pollution, circular material and energy efficiency perspective.

Scope:

The topic aims at improved management of the end-of-life phase of textile products. Proposals should address one or more of the following subjects and aim to combine them where relevant in a systemic way: facilitation of the disintegration of textile products through design, sorting, and recycling of textiles.

Textiles are the fourth highest-pressure category for the use of primary raw materials and water and fifth for GHG emissions and a major source of microplastic pollution in production and use phases. They are also a key material and product stream in the circular economy action plan. The purpose of this initiative is also to minimise the use of hazardous substances in processing and textile treatments. Proposals shall also demonstrate and deploy innovative solutions for increased quality, non-toxicity and durability of secondary textile materials and their processing and treatments.

Facilitation of the disintegration of textile products:

Beside the fibre composition affecting recyclability, textile products can also consist of various non-textile components or accessories, and can be coated, laminated or printed on. These hard parts, trims, coatings and laminated layers hamper recycling and are a major barrier for practically all textile fibre recycling technologies, especially chemical recycling technologies. The removal of these non-textile components requires disassembly prior to recycling, adding costs to the overall recycling process. Despite the various research projects on this topic, the implementation and uptake of these techniques is still far from reality. Proposals should address these challenges. New

approaches should also be tested, involving technologies such as robotics and AI. Irrespective of the remaining technological and economical challenges, the implementation of disintegration techniques also requires a system, in which products that are fitted with any of these techniques are properly collected, recognised, and sent towards the right facility to apply the appropriate triggering mechanism.

Systemic solutions for sorting:

Over the coming years, the collected volumes of post-consumer textile waste are expected to increase by a further 65,000 to 90,000 tonnes per year due to the increased amounts of textiles placed on the market and the obligation to separately collect textile waste, which Member States have to put in place by 1 January 2025. This will further increase the need for advanced sorting for collecting organisations in order to create economic value out of this. At the moment, sorting is still mainly a manual process, having a significant contribution to the total process costs of recycled textile fibres. The cost of manual sorting is a major barrier to cost effective production of feedstock for textile fibre recycling. Automated sorting has the potential to deliver sufficient, well-defined and low-cost input to recycling processes, however, to date, this potential is not yet fulfilled. New technologies exist, but their limitations need to be addressed. Due to the limited penetration depth of NIR light, only the surface composition of textiles can be detected. RFID technology requires the textile products to carry an RFID tag and an entire system behind, adapted by all parts of the value chain. Therefore, proposals should develop systemic digital solutions that facilitate traceability and comprehensive exchange of information along the entire value chain, involving the use of technologies such as blockchain, AI and IoT. Proposals should build knowledge and competence regarding information system models, systems for data collection, provide an overview of existing standards and mapping of standardisation needs, include cost calculations and evaluation of Return On Investment (ROI), and consider implications of integrating digital information carriers in textile products.

Further development of textile recycling technologies:

In view of the huge amount of textile waste, which will have to be handled due to the soon mandatory separate collection, possible product requirements such as recycled content and the potential offered by different types of textile recycling, different ways of textile recycling remain relevant and will all be needed in the implementation of the textiles strategy. Mechanical recycling of textiles is an established technology in the market. However, the amount of spinnable fibre and the quality of the fibres should be improved. The integration of robotics, AI, or IoT components will play a role in the improvement of these processes.

Thermo-mechanical recycling is a process that is still under development and further research is needed to improve the yield of recycled content and the use of chemicals to increase the quality of the polymer. Chemical and enzymatic recycling are novel technologies. Proposals should upscale polymer recycling of cotton via a pulping process and incorporate customer feedback for optimisation of the process and continuous delivery of suitable textile waste (in terms of purity and composition) as feedstock. Other options that can be explored are the recycling of polycotton blends and the monomer recycling of PET. The application of these technologies in research and innovation should also be extended to other types of fibres.

A lifecycle perspective using LCA and LCC should be used when validating the technical and economic feasibility of the developed, improved, demonstrated and up-scaled processes. Proposals should also address the issue of side streams such as wastewater and the treatment and reuse.

Novel value chain-based solutions through industrial symbiosis should be encouraged. For comparability reasons, LCAs should use well-established methods and be based on PEF wherever feasible. Proposals should fully incorporate the Safe and Sustainable by Design (SSbD) approach. Particular attention should also be given to the implementation of traceability solutions, also with a view to recent policy developments, e.g. the digital product passport. The participation of SMEs and industry is encouraged.

4. HORIZON-CL6-2023-ZEROPOLLUTION-02-2-two-stage: Safe-and-sustainable-by-design bio-based platform chemicals, additives, materials or products as alternatives

- Research and Innovation Action
- Activities are expected to achieve TRL 4-5 by the end of the project –
- 4 MEUR
- Deadline(s): 28 Mar 2023 (First Stage), 26 Sep 2023 (Second Stage)

Projects are expected to contribute to:

- Enable circularity(-by-design) of final products, predominantly in applications where recyclability is currently hindered or very challenging, especially due safety implications;
- In addition to fossil-feedstock substitution, reduce the dependency on or replace harmful substances, in particular in materials and formulations, leading eventually to safe(r) (low human and eco-toxicity) final bio-based products, while meeting overall environmental sustainability requirements;
- Build on a portfolio of promising bio-based solutions showing potential for scaled up production and future market uptake of alternative, safe, circular and sustainable bio-based products

Scope: To deliver on the expected outcome, proposals should:

- Perform a wider scoping exercise, including opportunities and challenges, to propose priority areas and which (optimised or novel) bio-based solutions (chemicals, materials) show 'solid' potential as safer and sustainable alternatives/substitutes. This 'exercise'/analysis should especially cover, but not only, areas where substances of very high concern (SVHC), substances of concern, persistent organic pollutants or legacy additives are currently in (end) use (e.g. textiles, plastics value chains);
- Select chemicals/group of chemicals/(advanced)materials/products and justify. Proceed then with design, (process) development and testing (to targeted TRL) of the chosen bio-based alternatives;
- Embed and assess functionality and value chain considerations for any novel solutions designed and developed, providing equivalent or improved functional performance versus existing and specified benchmarks. Functional performance should be assessed together with showcasing benefits on safety and environmental performance.
- Integrate the safe-and-sustainable-by-design (SSbD) framework, developed by the Commission, for assessing the safety and sustainability of chemicals and materials.
- Contribute with and develop recommendations that can advance further the application of the SSbD framework.[328] More specifically, provide thresholds that can support the criteria definition and improvements for the assessment SSbD methodologies, including any specificities related with bio-based chemicals and materials. Recommendations should also

include identification of data gaps, especially safety, environmental, but also socio-economic factors, as well as priorities for data collection.
- Contribute with relevant data generated, along targeted value chain(s) (e.g. with regards to the bio-based substance/group of chemical substances or material). Projects have to make data, results and methodologies FAIR. They are also encouraged to link with trusted repositories for data, results and methodologies.

Where relevant, proposals should seek links and synergies and capitalise on the results of past and ongoing EU research projects (including the Bio-based Industries Joint Undertaking (BBI JU) /Circular Bio-based Europe Joint Undertaking (CBE JU)). This topic has important synergies and complementarities with Horizon Europe Cluster 4 calls (including its PPPs) as well as ongoing projects that should be taken into account.[329,330,331].

Proposals should also include a dedicated task, appropriate resources and a plan on how they will collaborate with other projects funded under this topic and other relevant topics

5. HORIZON-CL6-2024-CircBio-01-3: Innovative circular solutions for furniture

- Innovation Action
- Activities are expected to achieve TRL 6-8 by the end of the project –
- 5 MEUR
- Deadline(s): 22 Feb 2024

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

- Increased deployment and demonstrated benefits of advanced digital solutions (e.g., through AI, robotics, IoT, blockchain) in circular businesses including waste management and recycling
- Emergence of new value chains using upcycled, recycled and/or biobased;
- resources, e.g. through industrial symbiosis, with particular attention to SMEs;
- Increased recycling rates and upcycling to new higher-value products;
- Increased uptake of recycled and/or renewable material;
- Increased deployment and market uptake of circular design, including design for easy maintenance, repair, remanufacturing and recycling;
- Increased reuse, refurbishment and remanufacturing rates and diffusion of new circular business practices, in particular in the uptake of repair, reuse, refurbishment and remanufacturing;
- Increased resource efficiency along and across value chains, causing a measurable reduction in GHG emissions, release of microplastics, other environmental pollution, and in the use of hazardous substances, and an increase of carbon removals

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

- Maintain – using preventative maintenance to maximise product lifetime, e.g., a chair remains a chair;
- Repair – corrective maintenance, e.g., a chair remains a chair;
- Reuse – redistributing products through a change in ownership, e.g., a chair remains a chair;
- Refurbish or remanufacture products to optimize lifetime, e.g., by resizing a desk or changing the appearance of a chair through re-upholstering to extend 'fashion' service life, or resizing desks;
- Repurpose – change functionality of the product, e.g., a desk becomes a table;

- Recycle – recovering the value of components and materials for feedstock as secondary materials in new products.

Key strategies to achieve the circularity transition are circular design including the smart use of biobased materials, a shift from products to services, extended product life through design, safe and circular material choices, increased material efficiency, and modular design. It is evident that circularity concepts must be anchored in the design phase of products and aim at the user. All proposals should therefore address to some extent circular design strategies.
Projects should demonstrate and deploy at large scale innovative solutions and designs for increased quality, non-toxicity and durability of secondary and renewable materials and increased share of secondary and renewable materials in new products. Projects should demonstrate increased recovery, recycling and upcycling rates and a higher uptake of secondary materials for high value applications. Projects should also demonstrate circular business practices, in particular in the uptake of repair and reuse, remanufacture, product-service-systems, and in the full lifetime of products or services. To achieve this, targeted market size, economic feasibility, cost efficiency and social acceptance need to be addressed. To break down the barriers for this transition, it is important that proposals involve and address the different perspectives of all relevant actors, e.g., manufacturers, retailers, consumers and Civil Society Organisations (CSOs). Proposals should consider the use of digital solutions (including technologies such as AI, robotics, IoT and blockchain) in particular with a view to the implementation of the digital product passport, and demonstrate their benefits for increased circularity. They should also help produce harmonised and robust methods to assess the amount of recycled content in sectoral products, which is key for a future review of green claims through authorities and consumer organisations. Environmental, social and economic impacts should be assessed from a lifecycle perspective as product, organisation and consumption environmental footprints, using the respective methods developed by the European Commission (Product Environmental Footprint, PEF, should be used for the assessment of the environmental impacts) and through costing methods and a dynamic LCA; relevant data should be fed into the European Platform on Life Cycle Assessment, following the specific Environmental Footprint data and format requirements. The functional performance of technologies and secondary materials can be assessed through the EU Environmental Technology Verification (ETV) scheme. Considering the microplastics and microfiber pollution and hazardous substances that are present in the targeted waste streams, their removal from the materials used for the products in concern as well as from the recovered material is crucial, in addition to applying less-polluting production and consumption procedures. Decontamination levels need to be properly addressed and accumulation prevented. Proposals should fully incorporate the Safe and Sustainable by Design (SSbD) approach. All results should be validated using quantitative indicators and targets wherever possible.
Proposals should also envisage policy recommendations for increased warranty and cascading use. They should also provide for the development of training material to endow workers in this occupational group with the right skillset in order to deploy the new technologies developed. Proposals should consider the development of learning resources for the current and future generations of employees, with the possibility to integrate them in existing curricula and modules for undergraduate level and lifelong learning programmes. The projects should provide contributions to relevant standards or best practices.
Social innovation is recommended when the solution is at the socio-technical interface and requires social change, new social practices, social ownership or market uptake.
To the extent that proposed solutions will address the role of the consumer, proposals should seek to contribute to the goals and cooperate with the services of the European Commission's Circular Cities and Regions Initiative (CCRI). Joint activities with CCRI projects are encouraged