



RESEARCH & INNOVATION ANALYSIS REPORT

SCAR Bioeconomy SWG

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Summary

The research & innovation analysis report highlights several key findings and conclusions of the portfolio analysis conducted on the theme 'Unveiling the demand-side'. The identified gaps provide insights into the areas where further research, innovation, and policy interventions are needed to accelerate the transition towards a sustainable and biobased economy. The main findings and conclusions can be summarised as follows:

- Geographical coverage and categorisation of projects:** The projects analysed were implemented by partners from 26 countries, covering a wide geographical scope. They were categorised into different project types, including Coordination and Support Actions (CSA) and Innovation Actions (IA), funded under Horizon 2020 (9 projects) and Interreg Programme (2 projects).
- The needs/gaps in the multi-actor approach:** The projects emphasised the importance of a participatory and multi-actor approach (clusters, regional hubs and digital tools) to foster collaboration & innovation, knowledge sharing, and co-creation of solutions. Engaging diverse stakeholders, such as industry, policy makers, researchers, and consumers as end-users, was recognised as essential. However, there is still a need to increase the outreach of communication and dissemination activities and promote the co-creation formats.
- Consumer-driven business models needs and gaps:** Transitioning to new circular business models and strategies to promote flexibility in customer-driven value chains requires a systemic approach. In addition, research on market trends, consumer preferences, and changing dynamics is required to ensure that the needs of the sector are met and knowledge is transferred effectively. Standardisation and labelling of biobased products, promoting circular economy practices, raising awareness, and fostering collaboration along the value chain were also identified as key needs.
- SMEs needs/gaps:** Support for small industries and start-ups, integration of ICT solutions (platforms or networks that facilitate knowledge sharing, partnerships, and connections between stakeholders), tailored decision-support tools (to assist decisions related to resource allocation, waste reduction, and sustainability), practical and financially viable solutions for ICT tools) were highlighted as crucial needs for SMEs in the bioeconomy sector.
- Digitalisation/ICT needs/gaps:** Data standardisation and interoperability, ICT integration and platforms (to secure the quantity and the quality of the feedstock, distribution and logistics along the consumer-driven value chain), predictive analytics and optimisation, traceability and certification, sustainability, and cybersecurity and data privacy were identified as R&I needs in digitalisation and ICT for biomass supply chains.
- Regulatory needs/gaps:** Clear and supportive regulatory frameworks, practical solutions to incentivise sustainable agriculture and food production, standardised norms and labelling, and targeted policies and incentives are needed to promote renewable energy, biobased products, and sustainable practices. Addressing gaps in biobased products regulations, and biomass industry and traceability regulations is crucial.

1. Introduction

The theme of the portfolio analysis is 'Unveiling the demand-side', one of the main focus areas identified by SCAR Bioeconomy Strategic Working Group (SCAR BSWG) as priorities to reveal RDI gaps within the European bioeconomy. The Terms of References of the current mandate mention: "Under this focus, consumption patterns and their influence on biomass production, management systems and business models will be covered. The question of introducing the notion of moderate consumption will be covered. Furthermore, issues related to capacity building along the entire value chain and to identifying policy needs to better understand the demand side, should be investigated."

The specific objectives of this portfolio analysis are to identify and analyse research projects conducted at the European level (Horizon2020 and beyond) in the bioeconomy area, with a main focus on the demand-side, and to reveal the research and innovation needs and gaps. The portfolio analysis was performed based on a systematic process of selecting relevant projects and a thorough analysis of their content. The report provides an overview of the selected projects and an explanation of why they are key to the objectives of the SCAR BSW and reveals R&I needs/gaps identified based on the projects findings.

2. Selection of the 30 relevant projects

The first step in the Portfolio Analysis (PA) was the selection of the 30 relevant projects related to the theme "Unveiling the demand-side". The systematic selection process of relevant projects was based on the following keywords requested by the co-chairs of SCAR BSWG: sustainable consumption, regulatory [aspects], value chains, B2B. The keywords related to the theme were identified through a co-creation exercise organised by the co-chairs with the participation of the BSWG members (Figure 1).

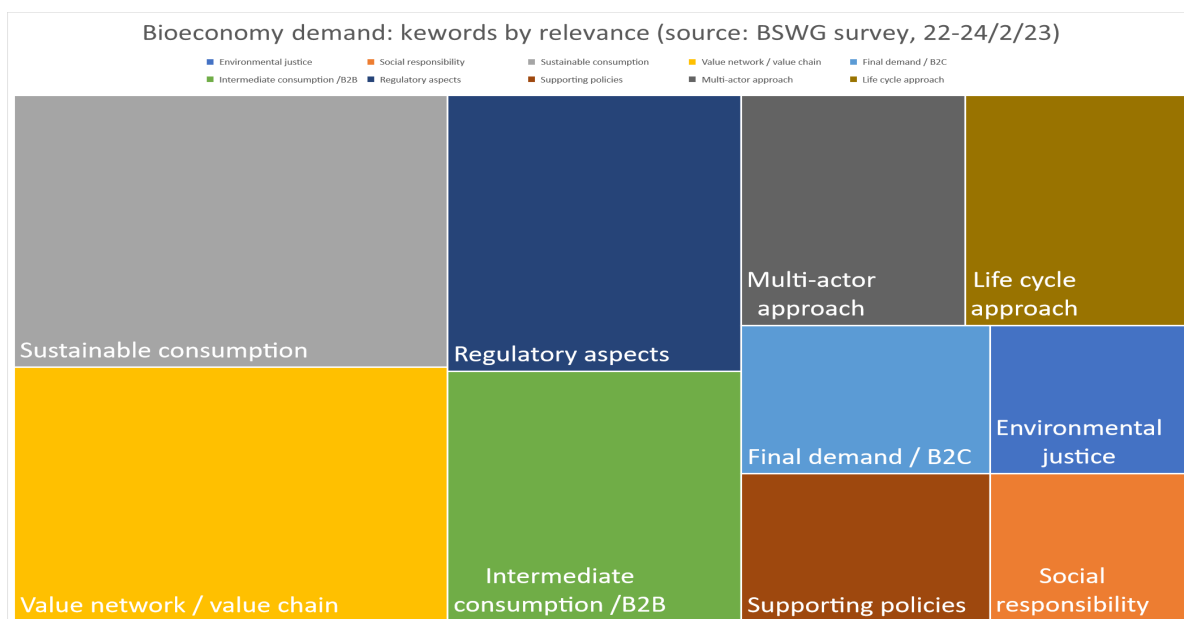


Figure 1 Fig. 1. Results of the co-creation exercise to identify keywords

Projects were searched in two databases: Cordis (<https://cordis.europa.eu/en>) and Interreg (<https://www.interregeurope.eu/>) during 28 February and 10 March 2023.

Queries were defined based on combinations of the four keywords. The final selection of queries that led to relevant projects is presented in Table 1 (combinations of keywords which led to irrelevant projects were not presented). The list of projects selected is presented in [Annex 1](#).

Table 1 Selection process of relevant projects

Database	Query	Number of projects selected as relevant for the portfolio analysis
CORDIS	Keywords: 'SUSTAINABLE CONSUMPTION' AND 'VALUE CHAIN' AND 'REGULATORY' AND 'BIO-ECONOMY' AND 'B2B'	10
CORDIS	Keywords: 'VALUE CHAIN' (criteria: field of bioeconomy)	16 (+1 also found in the previous search)
CORDIS	Keywords: 'VALUE CHAIN' AND 'B2B' (criteria: field of bioeconomy)	(1 also found in the previous searches)
CORDIS	Keywords: "SUSTAINABLE" AND "CONSUMPTION" (criteria: field of bioeconomy)	2
Interreg	Criteria: Approved projects; Topic: Green all except for Energy efficiency, Water management, Zero-carbon urban mobility; European countries	15

It is important to acknowledge the limitations of this study, which include the following aspects. Firstly, the selection of projects was primarily based on specific keywords selected by BSWG, which may have resulted in the omission of relevant projects to the theme. Secondly, the applied systematic approach relied on identifying the keywords within project abstracts, which may have overlooked relevant information contained in other sections of the projects. Furthermore, the availability of information varied among the projects, and in some cases it was more difficult to find and/or reveal clear recommendations based on project findings. These limitations should be taken into account when interpreting the findings of this study.

3. Selection of the 11 projects

The co-chairs of the SCAR BSW analysed the information provided in the Excel database for selected projects and identified a preliminary list of 10 most relevant projects which was presented to SCAR BSW for comments. On 28 April 2023, the co-chairs provided the final list of 11 most relevant projects to be further analysed (10 from the initial search + 1 project as suggested by the SCAR BSW).

The selected projects were analysed based on: information provided in the Excel database ([Annex 2](#)) and information extracted from projects' deliverables (activities, results, good practices, recommendations, and other relevant information). The in-depth analysis concluded in one project fiche for each selected project ([Annex 3](#)), gaps identified based on a synthesis of findings along with recommendations ([chapter 4](#)), and an overview of the R&I needs/gaps from the perspective of main aspects that define the theme of the portfolio analysis ([chapter 5](#)).

4. Gaps and cross-cutting aspects analysis

This section of the report summarises the research and innovation gaps, barriers and recommendations identified based on the projects' results. The information is gathered from project deliverables (available on Cordis platform, Interreg platform, project websites) and presented per project. More information can be found from the project fiches ([Annex 3](#)) and from the projects' web pages.

4.1 BIOBRIDGES - Bridging Consumers, Brands and Biobased Industry to improve the market of sustainable biobased products

The BIOBRIDGES project aimed to enhance the marketability of biobased products by establishing primary partnerships between biobased industries, brand owners and consumer representatives and in cooperation with other stakeholders like local communities, local authorities and industrial actors to create new cross-sector interconnections in a biobased economy cluster.

The project started on September 1, 2018, and ended on December 31, 2020.

The **project results include concrete recommendations** on how to improve the public acceptance of biobased products and processes. The recommendations were made based on stakeholder feedback received during 24 workshops organised in nine countries across Europe, on relevant results of other EU-funded projects (e.g. BioSTEP, BIOWAYS, Open-Bio), and on literature review:

1) Recommendation on how to improve knowledge, education, and awareness on the bioeconomy.

Despite efforts to increase public awareness, more urgent action is still required. The usage of biobased products and processes is generally well received by consumers, but more has to be done to further educate the public about the benefits of biobased products. The lack of knowledge combined with high expectations on product performance could result in expectations not being met, and thus, disappointment which may hinder the market adoption of biobased goods. Recommended actions:

- ✦ Enable a broader societal discussion on sustainability issues associated with the bioeconomy. Before promoting acceptance for biobased products, sustainability issues associated with the bioeconomy should be discussed with the broader public.

- ✎ Further invest in the standardisation and labelling of biobased products (preferably on a European level). The results of different surveys indicate that the standardisation and labelling of biobased products could have a significant positive impact on their uptake by boosting consumer confidence. A potential label should be multi-criteria as opposed to a single criterion, with sufficiently strict requirements to prevent greenwashing.
- ✎ Provide research funding for science communication. Investing in effective and interesting ways to make the public familiar with bioeconomy research could help to improve their understanding of the concept; clarifying, for example, the differences between the term "bioeconomy", "circular economy" or "green economy".
- ✎ Use success stories to help the public to better understand the bioeconomy concept. Success stories can be used to communicate to the public in a tangible way the multiple benefits – e.g. the use of renewable resources, but also price, looks and convenience, which biobased products can offer over fossil-based products.
- ✎ Pick the appropriate channel to disseminate information on the bioeconomy. The target audience should be taken into account when deciding on how to convey the message.

2) Recommendation on how to facilitate a transparent and credible participation of civil society in the development, implementation, and monitoring of bioeconomy strategies.

Due to its commitment to social progress, the civil society is a significant stakeholder in the bioeconomy. Efforts to engage consumers and citizens in innovation processes should continue. It is crucial that they play an active role as co-creators throughout the entire creation process (and beyond) and in the strategy development related to the bioeconomy. Recommended actions:

- ✎ Involve civil society early on in the development, implementation and monitoring of bioeconomy strategies. Participatory events could be approached (e.g. events initiated in the context of EU-funded Coordination and Support Actions – CSA).
- ✎ Provide civil society with appropriate instruments to engage in co-creation events (e.g. hackatons). Co-creation promotes the collaboration of different bioeconomy stakeholders with the goal of developing new ideas and concepts. Engaging civil society representatives can be difficult due to their limited time and financial capacities, barriers that could be overcome with public funding and scheduling flexibility.
- ✎ Clearly define which government departments are responsible for what part of the bioeconomy strategy. By clarifying and assigning responsibilities to all relevant departments with regard to developing the bioeconomy strategy, a high degree of transparency can be achieved (including accountability).

3) Recommendation on how to strengthen the regional dimension of the bioeconomy.

Regions have gained more recognition over time as crucial actors who are in a unique position to foster bioeconomy development, including in EU policy. Regional bioeconomy clusters are essential for citizens and consumers to experience the economic, social and environmental benefits of the bioeconomy. It is necessary to direct efforts towards developing solutions to assist European areas in maximising their bioeconomy potential. Recommended actions:

- ✎ Promote networking and knowledge exchange within regional bioeconomy clusters. Clusters play a crucial role for bringing stakeholders together by facilitating collaboration and exchange.

- ✎ Reserve funding for regional innovation labs/pilot projects. Establishing innovation labs is essential for finding new uses for biomass, whereas pilot projects are pivotal for demonstrating innovative applications on a large scale.
- ✎ Promote monitoring efforts at the regional level. Considering the increased regional importance of the bioeconomy, sufficient bioeconomy data should also be available on this level to facilitate effective policy-making.
- ✎ Good practice examples for each recommendation are available on the project website. (<https://www.biobridges-project.eu/news-events/news/policy-paper/>).

Addressing the following specific R&I needs/gaps and challenges

identified during the project require **continuous collaborative research**:

- ✎ Industry in collaboration with biomass suppliers: low feedstock availability; high transfer costs; differences in prices per quantity per region; differences in the level of biobased sector development in EU; lack of knowledge about bioeconomy practices; lack of skilled workforce; difficulties in networking with relevant suppliers; lack of standardised labelling and certifications.
- ✎ Industry in collaboration with brands: lack of knowledge and trust; high prices; low market demand; lack of support to small industries; IP and patent issues.
- ✎ Brand owners in collaboration with industry: lack of standardised labelling and certifications; Functionality and performance of biobased products; Life Cycle Assessment; connection with industry stakeholders.
- ✎ Brand owners in interaction with consumers: enhance acceptance of biobased products and communication of their benefits for the consumers; lack of standardised labelling and certifications; low demand; high cost.
- ✎ Consumers in interaction with brands: lack of standardised labelling and certifications; level of acceptance of biobased products in terms of safety and performance; absence of well-targeted promotion of biobased products.

Barriers that may prevent the diversification of products offer

with sustainable alternatives and affect the adoption of biobased products were identified as follows:

At business level (Brands):

- ✎ Low price of crude oil and natural gas make the use of biomass feedstock and biobased production processes economically unattractive;
- ✎ High cost of biobased products compared to their fossil-fuel derived equivalents;
- ✎ Lower performance of many biobased products compared to their fossil-fuel derived equivalents;
- ✎ No dedicated and detailed EU legislation framework, conflicts between sustainability goals and market needs, lack of uniform standardisation and certified labelling for biobased products;
- ✎ Gaps in the policy and subsidy framework;
- ✎ Intellectual property related barriers;
- ✎ Low public awareness of the benefits of using biobased products;
- ✎ Lack of reliable and sufficient information about biobased products.

At industry level:

- ✎ Low technology readiness level and commercialisation status for many biobased products;
- ✎ High costs of feedstock and seasonality of biomass cropping versus need of continuous feedstock supply;
- ✎ Lack of standards to guarantee the quality and stability of feedstock;
- ✎ Need to improve the cascade using of biomass, prioritising the extraction of added value compounds;
- ✎ Inefficient transport and distribution of biomass;
- ✎ Lack of cooperation between the stakeholders in the relevant value chains;
- ✎ Hurdles in establishing partnerships between academia and industry;
- ✎ Limited financial support for new production facilities;
- ✎ Lack of a trained/skilled workforce.

4.2 INSPIRE - Towards growth for business by flexible processing in customer-driven value chains

The INSPIRE project aimed to enhance business growth through flexible processing in customer-driven value chains. The project focused on developing innovative technologies, tools, and business models to promote flexibility and competitiveness in European manufacturing. The objectives include understanding the drivers for flexible and demand-driven manufacturing, shaping the future of manufacturing and process industries, defining research needs, formulating an industry-supported roadmap, and developing strategies for evaluating and replicating the new business models. The project also aims to address the needs of SMEs as value chain partners and provide a guideline to measure the performance of these novel models under different scenarios. Although there is no direct link to the biobased sector, the recommendations below could be still relevant if streamlined towards specific biobased sector needs by further research.

The project started on 16 September 2016, and ended on 31 August 2018.

Recommendations:

- ✎ Establishing strong relationships between manufacturers/suppliers and customers is crucial for the business model success. Prioritising collaboration and gaining a deep understanding of customers are the most important considerations when implementing the mass customisation business model, which emphasises catering to individual customer needs.
- ✎ Flexibility emerges as the primary factor determining the potential added value of the decentralised and modular production business model archetype for a specific company. This archetype allows adaptable and versatile production processes, enabling responsiveness to customer demands within the value chain.
- ✎ When evaluating the potential added value of the servitisation business model archetype for a particular company, the most influential factor is the company's capabilities to deliver the service. This emphasises the importance of focusing on providing high-quality services and meeting customer expectations throughout the value chain.
- ✎ Profitability holds significant influence when assessing the potential added value of the reuse, recycling, and sustainability (RR&S) business model archetype for a particular company. Strategic alignment with sustainability goals and the ability to organise waste collection are equally crucial. However, experts evaluating these factors consider resource consumption and security as relatively

less important. These results suggest that while efficiently collecting waste and maintaining profitability, excessive attention to resource availability may not be necessary.

- ✦ Companies interested in developing any of the proposed archetypes or hybrids should consider not only the potential benefits but also the challenges and risks they may encounter. Additionally, it is important to assess the implications of not implementing these archetypes in the most effective manner, taking into account the value chain dynamics and customer-centric approach.
- ✦ Understanding how companies can successfully implement the proposed business models is essential. By preparing different "case scenarios" that incorporate existing facilities, companies can explore practical strategies for aligning their operations with customer demands and achieving growth within customer-driven value chains.

Needs:

- ✦ Development of new tools for the configuration and design processes - there is a need for innovative tools that support the efficient configuration and design of innovative products, enabling businesses to adapt quickly to changing customer demands.
- ✦ Efficient manufacture of functional customised products - solutions are needed to enable the efficient manufacturing of customised products, considering factors such as production speed, cost-effectiveness, and flexibility.
- ✦ Models and tools for the creation and management of customer-driven networks - businesses require models and tools to establish and manage customer-driven networks, allowing for collaborative value creation and effective customer engagement throughout the value chain.
- ✦ Research and development in automation - automation technologies, such as factory automation, Industry 4.0, data networking, and design automation, require further research to enhance technical feasibility, reduce development costs, and improve deployment efficiency.
- ✦ Research and development in robotics - robotics technologies, including collaborative robotics, standardised interface design, sociability, shared control, safety, materials and fabrication schemes, and AI for robotics, need advancements to enable their effective integration into flexible processing and customer-driven value chains.
- ✦ Research and development in biodegradable materials - the project recognises the need for research and development in biodegradable materials, such as biodegradable polymers, semi-synthetic materials, bacteria-based plastics, soy-based plastics, and natural fibre-reinforced plastics, to support sustainable and environmentally friendly product manufacturing.
- ✦ Elderly support - the project acknowledges the need to address the specific needs of elderly individuals, including housing, care, and transportation, by developing innovative solutions that enhance their quality of life and support their well-being.

Gaps:

- ✦ Well-aging materials: the choice is limited and there are gaps in the material range that impede innovation towards longer product lifetimes.
- ✦ Limited focus on the needs of SMEs: While the project acknowledges the importance of SMEs as partners in value chains, there may be a need to further explore and address the specific needs and challenges faced by SMEs in adopting and implementing the proposed innovative business models. Ensuring that the developed models are applicable and beneficial for SMEs is crucial for their participation and success in the value chains.
- ✦ Insufficient measurement and evaluation framework: The project aims to develop innovative business models and promote more local production in Europe. However, there may be a need for a robust and comprehensive framework to measure the performance and effectiveness of these

novel models under different scenarios. Establishing clear evaluation criteria and metrics will help assess the impact and success of the developed models.

- ✦ Limited consideration of external factors: The project primarily focuses on the internal aspects of manufacturing, such as intensified processing, flexibility, and resource efficiency. However, it may be important to also consider external factors that can influence the competitiveness of European manufacturing, such as market dynamics, regulatory frameworks, and global trends. Incorporating these external factors into the project's analysis and recommendations can provide a more comprehensive and holistic approach.

4.3 ENHANCE - EMAS as a Nest to Help And Nurture the Circular Economy

ENHANCE supports public authorities to identify and implement incentives for organisations to adopt Ecomanagement and audit scheme (EMAS) as a tool for resource efficiency in the context of the transition towards a circular economy. The Eco-Management and Audit Scheme is considered as a driver of the circular economy by encouraging organisations to develop techniques which make better use of resources in the production phase and retain physical goods longer and more efficiently in productive use, thus increasing their competitiveness. Starting from these considerations, ENHANCE project overall objective is to improve the implementation of regional policy instruments oriented to increasing the efficiency of resources by the exchange of experiences and practices on supporting EMAS registration. Although there is no direct link to the biobased sector, the recommendations below could still be relevant if streamlined towards specific biobased sector needs by further research.

The project started on 1 January 2017, and ended on 31 December 2020.

Recommendations at country and region level to increasing the efficiency of resources:

- ✦ Reduction of Financial Guarantees for waste treatment activities; EMAS and Circular Economy (CE) funding programmes; Promotion of EMAS through Green Public Procurement; Reduction/simplification of inspections in EMAS registered companies; Tax and administrative fees reduction (Catalonia-Spain): special conditions for EMAS registered organisations participating to CE funding programmes; introducing EMAS as an award criterion in public tenders for the acquisition of goods, services and construction works;
- ✦ Public Recognition of EMAS registration; Proposals for the EMAS inclusion in the grants for the Sustainable Development of Marine Aquaculture in Andalusia; EMAS Club in Andalusia (Andalusia-Spain);
- ✦ Greening public tenders by EMAS, ISO 14001 and Eco-labelling certifications; Training and education programmes for the public authorities (Italy);
- ✦ Relief on energy audit requirement, Reduced inspection and reporting requirements (Estonia);
- ✦ Reduced inspection frequencies, EMAS Funding support, Training and education programmes for the public authorities (Czech Republic): e.g., newly frequency of CEI inspections are extended by one year for EMAS registered companies, if there isn't any high-risk potential;
- ✦ Environmental Impact Assessment (EIA) and EMAS - possible links and reliefs for EMAS organisations, Consideration of EMAS in the Austrian Energy Efficiency Law, Environmental Inspections - Using Synergies between EMAS verification and environmental inspections; Training and education programmes for the public authorities (Austria);

Needs:

- ✎ To improve the competitiveness of organisations, particularly SMEs, but taking into account a specific aspect of innovation: adding environmental added value to processes, products and services.
- ✎ To incentivize organisations from all sectors to adopt good environmental practices and eco-innovation within a systematic approach and not a one-in-time action
- ✎ To reduce and simplify inspections in EMAS registered organisations
- ✎ Tax breaks and reduction of administrative fees
- ✎ To improve the management of policy instruments to support resource efficiency and EMAS scheme
- ✎ Develop new measures to provide regulatory relief for EMAS organisations
- ✎ To increase collaboration between public administrations and EMAS
- ✎ Guidelines on how to carry out energy audits and who are eligible to do that. These guidelines should also provide clear procedure and conditions for EMAS registered companies to ensure their exemption from the energy audit requirement
- ✎ Policy instrument improvement in order to encourage organisations to adopt systematically good environmental practices, as well as to foster collaboration among public authorities and other stakeholders to guarantee a successful implementation of EMAS and other voluntary schemes by SMEs
- ✎ To link the procedure for calculating the financial guarantee to a new decree on waste management procedures.
- ✎ More training on the Eco-certifications and their role in supporting their daily job, including EMAS
- ✎ To increase collaboration between public administrations and organisations in order to increase the level of knowledge of legal requirements for the organisations, understand potential operational problems related to the implementation of those requirements, and to facilitate better performance and compliance
- ✎ To increase the number of green purchasing procedures in the public institutions
- ✎ To make firms aware of the importance of EMAS to obtain public contracts
- ✎ To increase the knowledge of public officers of the best modalities to use the EMAS in GPP following the national and international rules in the field

Gaps:

- ✎ Existing regulatory reliefs and tax breaks are not known by the target organisations
- ✎ Lack of training of public officers for EMAS and ecolabel certifications
- ✎ Lack of knowledge of public officers dealing with public tenders impose problems in recognising the matching between environmental management system and EMAS and also between environmental requirements and certifications provided by applicants.
- ✎ Still very little awareness about EMAS among contracting authorities and SMEs, while they do not use an environmental management system requirement at all
- ✎ In Czech Republic, no specified legal framework on how EMAS programme participation should be considered
- ✎ The short-term impact and the absence of further motivation for EMAS registration renewal
- ✎ High costs of EMAS audits
- ✎ No specific support of SMEs, while the SMEs cannot afford to have an environmental management system because they do not have financial funds for it
- ✎ The difficulties by public officers dealing with GPP in facing the drafting of tenders
- ✎ Ignorance of public authorities about EMAS programme and subsidies that the ministries offer

- ✦ In Estonia and Austria, there is currently no cooperation between the EMAS verifiers and environmental inspectors.
- ✦ Time-consuming reporting requirements
- ✦ The lack of collaboration among different public authorities and other interested parties to guarantee the effective implementation of voluntary instruments among the SME
- ✦ Authorities are rarely informed about EMAS, thus no synergies between inspections and audits

One of the **main barrier** for the implementation of regulatory relief is the reluctance of some public bodies to recognise voluntary schemes. Different partners have faced a similar situation in their countries, there's a lack of both credibility and knowledge on EMAS among certain enforcement authorities regardless the number of EMAS registrations in each country.

4.4 CIRC4Life - A circular economy approach for lifecycles of products and services

The CIRC4Life project's aim was to develop and implement a circular economy approach for sustainable products and services through their value and supply chains. Three circular economy business models (Co-creation of products/services; Sustainable consumption; Collaborative recycling/reuse) were developed and demonstrated in the electrical and electronic equipment sector and in the agri-food sector. Although there is no direct link with the biobased sector, the recommendations below could be still relevant if streamlined towards specific biobased sector needs by further research.

The project started on 1 May 2018, and ended on 31 October 2021.

Recommendations for local authorities and other stakeholders to implement and maximise the impact of incentives schemes for collaborative reuse/recycling of products:

- ✦ Analysis of the background to adapt the schemes to the place where they will be implemented (social and socio-economic aspects, cultural aspects, current results on waste management)
- ✦ Design the programme and define the intended objectives based on the review of the community and the analysis of the background, needs and concerns of the population
- ✦ Define the system of incentives (systems based on rewards for end-users, such as reverse vending programmes or initiatives working with smart containers and, systems based on charges or penalties for waste generation, such as Pay as You Throw (PAYT) programmes)
- ✦ The infrastructure for reuse and recycling must be both comprehensive and convenient for the end-user (enough containers and accessible, schedule for collections etc.)
- ✦ The incentives offered need to be simple and attractive, easy to understand by end-users
- ✦ Communication and awareness campaigns to be conducted before the start of the operations (the lack of information might produce misunderstandings and directly translated into non-citizenship participation)
- ✦ The benefits of the system must be clearly presented, including the understanding of the investments of resources, energy and impacts that the waste may represent.
- ✦ Participation of citizen in the definition of the programme is important to maximise the impact as a result through workshops
- ✦ To provide forums for the sharing of experiences with other public administrations and stakeholders from other regions
- ✦ To provide enough resources to the system (the use of economic instruments creates a direct incentive to recycle more and to generate less waste).

Recommendations for policy related to recycling and reuse:

- ✎ Establish a common framework for European countries regarding some key aspects, such as landfill taxes. It is estimated that imposing a fixed, minimum tax level through EU legislation is not desirable due to differences in economic conditions across Europe. It is suggested to develop a common method for calculating a common framework, taking into account the varying conditions of countries.
- ✎ Common normative in the use of economic instruments by public administrations to adopt incentive schemes to encourage people to reduce, reuse, and recycle by establishing common rules and giving legal certainty to all agents involved across Europe.
- ✎ Provide common regulation and assessment in the use of public funds and budget depending on local authorities to promote the development and application of incentive schemes in their municipalities and regions.
- ✎ Allowing some flexibility for local authorities and other stakeholders to implement economic instruments in the most appropriate way for their own particular conditions.
- ✎ Introducing rules that promote the creation of incentive schemes provided by private organisations and other stakeholders.
- ✎ Providing a clear policy framework for the foreseeable future within which stakeholders (e.g. waste management industry) can operate. Public administrations should consider the need to announce rates or taxes for several years ahead.
- ✎ The introduction of regulation to encourage the use of economic instruments such as charges or taxes that ensures waste generators face incentives in line with the waste hierarchy. First, introducing incentives to reduce waste generation and to make use of recycling services which are cost-effective under prevailing market conditions. For instance, landfill and incineration taxes will help discourage disposal of waste that could be dealt with higher up the waste hierarchy.
- ✎ Enforce bans and penalties on illegal diversion, including dumping and burning of waste and adding non-recyclable materials to recycling bins.
- ✎ Ensuring an appropriate balance between regulatory instruments (e.g. targets, technical standards, bans) and potential economic instruments. Whilst economic instruments are intended to incentivise an improvement in waste management behaviours, they can equally generate additional stimulus for illegal activity, so regulatory approaches need to be developed in parallel.

Recommendations based on the Consumer Satisfaction Survey:

- ✎ **To EU policy makers and industry:** Translate information on the sustainability of products, which is usually complex. The provision of accurate information needs to be presented in a way that consumers can understand and effectively use in order to engage in the circular economy transition. End-users need purpose and usable information which can happen by knowing the direct impact of their behaviour and choices (i.e. knowing the final destination of the device is one of the main drivers for recyclability and reuse)
- ✎ **To EU policy makers:** Adopt a bottom up approach by gathering good practices at local and national level integrating consumer insights into co-creation of CE strategies and making it relevant/accessible/affordable for all end-users (i.e. by using open innovation methods such as living labs for co-creation with end-users of new products and services as done in CIRC4Life project)
- ✎ **To EU policy makers and industry:** Encourage repair and reuse by building trust about the quality and warranty of refurbished or remanufactured electrical and electronic equipment (EEE). It was found within the project that most important to end-users when buying EEE is its durability and the main reason end-users did not buy second-hand EEE is because they do not trust the quality and warranty of these products. Policies should not only focus on replacing the purchase of certain

goods or services by more sustainable ones but about transforming consumption patterns by promoting reduce, reuse, refurbishment, repair and fighting planned obsolescence.

- ✦ **To EU, national and local policy makers:** It is crucial that any new CE policies that are proposed take into account the direct economic and social impact on all end-users and the required investment in time. Cost and time variables have to be considered. Often sustainable behaviours compared to the convenient alternative require an important time investment for end-users and the sustainable or green products are often more expensive. The sustainable option has to be made easier or the risk the user will choose not to do it will be very high.
- ✦ **To national, regional and local authorities:** Include in school curricula or extracurricular activities education on sustainable practices

Recommendations for organisation on involving consumer engagement in development processes:


- ✦ Understanding diversity of end-users (roles, cultural diversity, different demographic, behavioural, professional etc. profiles)
- ✦ Understanding why to engage users
- ✦ A jointly agreed ethical code of conduct
- ✦ A systematic approach to end-user involvement (actively involvement throughout the development project/activities)
- ✦ Using a co-creation methodology (open and safe environment, where all actors are giving and receiving, each user to be seen as an active and equal partner participating the development alongside other actors)
- ✦ Non-linear engagement (user and stakeholder engagement in development process is non-linear, meaning that it is iterative and cyclical)
- ✦ Active and systematic communication with engaged users
- ✦ Accepting the human factors (when developing solutions for humans)
- ✦ Having comprehensive stakeholder management tools
- ✦ Creating a common language and understanding

Main policy gaps identified within the EEE sector:

- ✦ Increase financial support for circular activities/companies (i.e. tax incentives in the form of VAT reductions for circular activities or other types of tax reductions for circular activities or businesses; public funding; further support for research and development, which can help provide new or improved circular solutions)
- ✦ Increase policy support for circular economy business models (desire to move towards more policy focus on circularity for all stages of a product's life or to promote new circular business models)
- ✦ Awareness raising (messaging should also focus more on the positive aspects and benefits of circular solutions; campaigns can motivate people to deliver their devices for recycling or reuse)
- ✦ Reforming or improving existing policies and legislation (i.e. extended producer responsibility scheme)





Main policy gaps identified within the agri-food sector:

- ✦ Incentivise sustainable agriculture and food production (i.e. carbon tax, which would ensure that companies and consumers pay for the external costs of food production)
- ✦ Support increased standardisation or certifications (companies should report the environmental impact of their products in a more standardised way)

-  Increase financial support for circular activities/companies (need for incentives to support investments in low-carbon technologies as well as subsidies for cultivating organic vegetables and fruits)

Key policy recommendations

applicable for both the EEE and agri-food sectors:

-  Increase the use of different forms of financial support for circular activities and businesses. Despite the various instruments at EU and national level in place to provide support for such activities, significant barriers to implementing CEBMs persist. Forms of financial support that can be further utilised include tax incentives and increased use of both green public procurement and research & innovation funds.
-  Better align requirements stemming from different pieces of legislation with an impact on circularity. In both the EEE and agri-food sectors it has been observed that requirements stemming from diverse policies, often from different policy domains, frequently may not support circularity goals. These findings indicate that efforts should be made to identify these policy conflicts and trade-offs as well as better align the goals of various pieces of legislation that have an impact on circularity.
-  Improve consumers' understanding of the benefits of circular solutions. Although various companies identify a positive consumer trend towards circular solutions as an important enabler, there is still a consumer segment that is not interested or does not trust such solutions. This suggests that awareness-raising measures, communicating in easy-to-understand language the environmental benefits of such solutions and how these are calculated, can have a positive impact on demand. Product labels can also serve as a reliable source of information about the environmental impact of products and increase consumers' motivation to choose products produced through more circular processes.
-  Support transparency and traceability across the supply chain through solutions involving all actors. A lack of transparency and traceability regarding products and their associated environmental impacts, components and substances represent a barrier for companies operating a variety of CEBMs. While traceability tools and solutions already exist, all actors would need to be involved - from suppliers of primary materials, to producers and recyclers - for such solutions to roll out. In addition, such solutions would need to be designed in a way that all actors across supply chains could adopt them, including small companies that do not have large capacities or the technical know-how.

4.5 ICT-BIOCHAIN - ICT Tools in Efficient Biomass Supply Chains for Sustainable Chemical Production

The ICT-BIOCHAIN project aimed to enhance the efficiency and sustainability of biomass supply chains in Europe by leveraging Information and Communication Technology (ICT) solutions. The project focused on the development of an ICT platform and standardised data collection protocols to optimise biomass logistics, improve decision-making, and promote resource efficiency. It sought to harness the power of ICT solutions to transform biomass supply chains into more efficient, sustainable, and technologically advanced systems. Overall, the project recognised the significance of value chain coalitions comprising multiple actors to address challenges related to distribution, logistics, and variations in feedstock quality. By providing ICT support, such coalitions can overcome these challenges and ensure efficient supply chain operations.

The project started on 1 June 2018, and ended on 31 May 2020.

Recommendations for Digital Innovation Hubs mobilisation:

The ICT-BIOCHAIN project has held different events as a way to mobilise the Digital Innovation Hubs (DIHs) and engage stakeholders, making the most out of this initiative. These events and the best practices learned from them are presented as a suggestion of potential activities to be conducted ([accession link](#)). The objective was to present the DIH structure, planned activities, methodology and potential benefits. Moreover, a Knowledge Transfer (KT) Workshop can be organised further aiming to promote opportunities for ICT, IoT and Industry 4.0 in optimisation of biomass supply chains. This event will facilitate networking, matchmaking, B2B, knowledge and innovation transfer between primary producers/industry, ICT, IoT and Industry 4.0 specialists, biobased industries, etc. having the competence centres as supporting nodes. The combined launch and KT event can:

- ✿ Introduce the region which is to be centre point of the Digital Innovation Hub
- ✿ Introduce the DIH: what is it? Why is it different?
- ✿ Introduce regional DIH structure (Hub manager, supported by Bioresource advisors, technology advisor, business development advisor, and the competence centre)
- ✿ Provide information on how to join the DIH and main benefits
- ✿ Provide information about scheduled DIH actions and events
- ✿ Facilitate knowledge transfer among stakeholders (e.g. industry, primary producers and tech providers) having the competence centre as supporting node
- ✿ Foster networking so as to promote new business opportunities
- ✿ Provide an introduction to the role of technology solutions for biomass supply chains

Needs and gaps

The general challenges identified within the project are related to the biomass supply chains. Three aspects that will play a major role in the viability of the value chain is the ability to secure sufficient amounts of the targeted feedstock, overcome distribution and logistical challenges and variation in the quality of the feedstock.

If the value chains' output is aimed at commodity products or products that are not considered to be high value products, larger scale is often required to provide an attractive business case and thus requires larger amounts of feedstock. From an economical and environmental perspective there is typically an acceptable radius around the biorefinery from where biomass can be sourced (e.g. 50 miles or 80 km) and to secure sufficient amounts the biorefinery may have to be flexible enough to handle multiple or mixed feedstocks of various quality (e.g. different kinds of straw, wood or algae). The challenge becomes even more complex when further variation is introduced by seasonable variability or field to field variability that may require the biorefinery process to adapt operational conditions to maintain a stable production.

Another aspect that influences both the transportation cost and stability of the biomass is the moisture content, where a low moisture content is desirable to achieve highest storage stability and lowest environmental impact and cost from transportation. The moisture content is especially impactful when developing concepts based on marine or green biomass or when considering diluted co-products and by-products from the food and drink industry. Efficient technologies to dewater and dry the feedstock is essential to overcome this challenge.

In Ireland, even though there is a clear clustering of materials (mainly manure) in Cork there is a wide distribution of this feedstock across all the counties in Ireland. Depending on biorefining concepts that will be developed with this feedstock in mind, there may be logistical and supply chain challenges that can be addressed and optimised by applying the suitable ICT/IoT and Industry 4.0 technology solutions. In Andalusia, Spain, even if the materials arising are fairly well concentrated to specific provinces there may

because of the chosen feedstocks and potential biorefining concepts be challenges around freshness unless stabilisation technologies are applied (e.g. drying). Lean and optimised supply chains in combinations with technology solutions for monitoring the quality of the feedstocks could be advantageous.

The lack of high potential application for the logistics and distribution highlights a technology gap where further development is needed to lay the foundation for further environmental and economic optimisation of the supply chain.





4.6 SUPERBIO - Support and PartnERship for the development of multiple sustainable and market-ready value chains in the BIObased economy

The SUPERBIO project had a specific focus on advancing the transition towards a biobased economy by actively supporting the development of sustainable and commercially viable value chains for biobased products. Through the facilitation of collaboration between academia, industry, and other key stakeholders, SUPERBIO aimed to drive the creation of innovative biobased products and processes that effectively reduced their environmental impact. By utilising biomass (plants, waste) as renewable raw material, the project aims to construct new value chains and provide SMEs with the necessary tools, collaboration spaces, and innovation support to attract investors and build emerging industries or enhance existing processes and products.


The project started on 1 June 2016, and ended on 31 March 2019.

Recommendations




At the level of the project:

-  Provide the value chain support only to those whose technology is sufficiently close to market
-  Keep the co-financing system
-  Offer larger vouchers for more expensive services
-  Adapt the language used when communicating to SMEs


At the level of the approach:

-  The possibility for companies to access services of organisations that are not part of the consortium through the use of vouchers should be examined.

From the perspective of the participating companies:

-  Building cross-border value chains is positive, but not all companies need it.
-  To maximise opportunities for SMEs to discover suitable applications for their technology and secure funding for its development, a more dedicated and intensive approach involving increased contact with end-users can be envisioned. This could be achieved by actively engaging with end-users through various means, such as conducting surveys, organising focus groups, or establishing direct communication channels.
-  Access to investors should be offered only when there is a need for it. In the framework of SUPERBIO, this demand was not present. The reasons for this are unclear (e.g. SMEs were too immature in technical terms or had already found their investors).

From the perspective of the partner organisations and the project setup:

-  The participation of clusters and service providers has a positive effect. On the one hand, these organisations participate in their own national and regional ecosystems and, hence, have a broad

access to SMEs and other stakeholders. On the other hand, it combines different (and complementary) perspectives of the needs of SMEs.

- ✎ The provision of cross-border services is key to generate a pan-European ecosystem.
- ✎ The process to achieve this, needs to take into account the reluctance of many SMEs to operate with organisations that they do not know in other countries. Maintaining a local contact point can be key for this.

At the policy level:

- ✎ Give SMEs the liberty to select the service provider they want to work with (within and outside the consortium).
- ✎ In-house innovation projects.
- ✎ Guarantee that sufficient time and means are devoted to the communication of the programme and to reaching out to SMEs.
- ✎ Offer flexibility over the project in terms of budget distribution across partners to adapt the budget to the efforts made by each of them.
- ✎ Consider the possibility of joint service offers to boost the knowledge transfer and strengthen the ecosystem.

Needs:

- ✎ More time is needed to reach out to SMEs in an effective way. It takes time for this type of initiatives to become known among the target SMEs and to attract them and convince them to apply for services.
- ✎ Several consortium partners have the impression that SMEs are not always aware of the value added of some services. Some cluster organisations consider that the communication of the benefits and advantages of the services should have been better communicated to the SMEs in order for them to have a more complete view on this before selecting the actual service.
- ✎ Working at costs is very difficult for non-profit service providers. The possibility of granting vouchers to external organisations not involved in the consortium could partially solve this problem, since it will allow this type of companies to operate in a sustainable business framework for them.
- ✎ SMEs might also need other services beyond those offered by the consortium. Offering some flexibility in those cases might be advisable. As in the previous point, offering vouchers to external organisations when the requested services are not provided by the consortium partners could help to solve this issue.

Gaps:

- ✎ Geographical representation: there might be gaps in terms of including stakeholders from specific regions or countries, potentially limiting the project's impact and reach.
- ✎ Scalability and long-term sustainability: although the project led to the development of new processes, technologies, and products, it is crucial to consider the scalability and long-term sustainability of these outcomes; the project results do not explicitly address the long-term viability and market adoption of the developed value chains; ensuring that the results are commercially viable and can continue to thrive beyond the project's duration would be a significant gap to address.

4.7 PerformFISH - Consumer-driven production: Integrating Innovative Approaches for Competitive and Sustainable Performance across the Mediterranean Aquaculture Value Chain

The aim of the PerformFISH project is to enhance the competitiveness of Mediterranean aquaculture by addressing biological, technical, and operational challenges through innovative and cost-effective solutions. The project aims to promote social and environmental responsibility while contributing to "Blue Growth." By actively involving industry stakeholders, PerformFISH seeks to develop Mediterranean Marine Fish Farming (MMFF) into a modern and dynamic sector that provides safe and healthy food with a low ecological footprint. The project focuses on improving the management and performance of gilthead sea bream and European sea bass, measured through Key Performance Indicators, and incorporates consumer demand, product design, certification, and marketing strategies to build consumer confidence. Additionally, PerformFISH establishes a numerical benchmarking system to comprehensively assess all aspects of Mediterranean marine fish farming. The project aims to generate new knowledge, innovative solutions, and a code of conduct while fostering capacity building within the Mediterranean aquaculture workforce.

The project started on 1 May 2017, and ended on 31 October 2022.

Recommendations:

- ✦ Focus on genetic improvement programmes and selective breeding to increase the use of genetically improved stocks in aquaculture production.
- ✦ Develop selective breeding programmes for European sea bass and gilthead sea bream, utilising genomic data and scientific approaches like genomic selection and genome-wide association mapping.
- ✦ Invest in the development of a high-density single nucleotide polymorphisms genotyping platform for aquaculture species to enhance genetic architecture studies and breeding program accuracy.
- ✦ Increase domestic production of seabream and reduce reliance on imports.
- ✦ The implementation of advanced technologies, methodologies, and best practices to attract and cater to environmentally conscious consumers by ensuring that the entire aquaculture process aligns with strict ecological standards and sustainable farming principles
- ✦ Improve the quality and distribution of smaller-sized fish to address challenges in the mass-market segment.
- ✦ Enhance collaboration and consultation with authorities, producers, and suppliers to develop sustainable practices and policies.
- ✦ Improve consumer information and communication through accurate labelling and digital means.
- ✦ Invest in research and innovation to improve the environmental performance and efficiency of the aquaculture industry.
- ✦ Engage with local communities to contribute to their social and economic development.
- ✦ Increase research on Nervous Necrosis Virus (NNV) in gilthead sea bream, including genetic basis and preventive measures.
- ✦ Monitor and adapt to changes in consumer preferences, adjusting product attributes to align with market trends.
- ✦ Invest in research and development to decrease the cost of genotyping and improve trait recording in aquaculture.
- ✦ Focus on sustainable aquatic food systems and enhance understanding of phenotypic plasticity in fish.

- ✿ Provide online training and specialised courses on improving Mediterranean marine fish farming practices.
- ✿ Foster collaboration among hatcheries to share best practices and develop standardised protocols.
- ✿ Implement effective dissemination and exploitation strategies tailored to specific target audiences.
- ✿ Enhance farm management practices to improve fish health and explore alternative disease control strategies.

Needs:

- ✿ Access to a reference genome map for European sea bass and gilthead sea bream.
- ✿ Investment in technology and innovation to improve farming techniques and productivity.
- ✿ Adaptation and mitigation of climate change impacts.
- ✿ Understanding early developmental stage infections and exploring alternative disease prevention methods.
- ✿ Research on market trends, consumer preferences, and changing dynamics.
- ✿ Ensuring the long-term sustainability of dissemination and exploitation efforts.
- ✿ Collaboration with experts in consumer behaviour research.
- ✿ Market research and collaboration to increase domestic consumption.
- ✿ Investment in product innovation, processing technologies, and packaging solutions.
- ✿ Partnerships with culinary experts and influencers for recipe promotion.

Gaps:

- ✿ Limited studies on early developmental stage infections and alternative disease prevention methods.
- ✿ Lack of consumer education on sustainable choices and collaboration between producers and retailers.
- ✿ Insufficient research on market trends, consumer preferences, and long-term sustainability of dissemination and exploitation efforts.
- ✿ Lack of standardised protocols for analysing body shape in finfish aquaculture.
- ✿ Limited consideration of environmental and sustainability aspects in feeding management practices.
- ✿ Incomplete analysis of barriers and challenges in marketing and promotion of seabass and seabream products.

4.8 EFFECTIVE - Advanced Eco-designed Fibres and Films for large consumer products from biobased polyamides and polyesters in a circular Economy perspective

The EFFECTIVE project intends to demonstrate first of its kind and economically viable routes for the production of biobased polyamides and polyesters from sustainable renewable feedstock for the obtaining of fibers and films with enhanced properties, market competitiveness and increased sustainability. Such materials will be applied into eco-designed large consumer products targeting different markets, i.e. construction, automotive, primary and secondary packaging and textile and with the potential of being applied into many other markets (fishing, engineering plastics, agriculture, hygiene and personal care).

The project started on 1 June 2018, and ended on 28 February 2023.

Recommendations

- ✦ Results showed the feasibility of using biobased PA6.9 for textile applications. However, the quality of the polymer should be improved, and properties require further investigation in order to better understand the market potential of this application.
- ✦ Enhance the assessment of environmental footprint: While the measurement of bio-based content is important, the wide recognition of bio-based products should also rely on the assessment of their environmental footprint. It is recommended to establish solid and reliable certification schemes, such as environmental product declarations, to ensure transparent and verifiable supply chains and to demonstrate the sustainability performance of biobased products.
- ✦ Further investigate the application potential of biobased polyamides and polyesters in various sectors beyond the ones mentioned, such as fishing, engineering plastics, agriculture, hygiene, and personal care.
- ✦ Explore additional biomass sources and feedstocks for the production of biobased materials.

Needs and gaps

- ✦ Standardisation for biobased products: The report on measures towards future standardisation of biobased products identifies gaps that can be covered by future standardisation activities. It emphasises the need for the development of standards that ensure reliable, transparent, and verifiable supply chains based on a segregated chain of custody model for biobased products. This will contribute to their wider recognition and acceptance, especially in comparison to fossil-based counterparts.
- ✦ Continuous improvement of biobased materials: To ensure the continuous development and improvement of biobased polyamides and polyesters, it is necessary to invest in ongoing research and innovation. This includes conducting further studies to optimise the quality, properties, and performance of these materials, as well as exploring new feedstock sources and refining the production processes.
- ✦ Strengthen collaboration and knowledge exchange: Given the systemic nature of the circular biobased transition, collaboration and knowledge exchange among stakeholders are crucial. The project has already established partnerships with other European funded projects, creating a network of networks. It is recommended to continue fostering collaboration with relevant projects and stakeholders to share best practices, exchange knowledge, and leverage synergies for the advancement of the biobased economy and circular regenerative models.

4.9 ROSEWOOD4.0 - Eu Network Of Regions On Sustainable Wood Mobilisation Ready For Digitalisation




The ROSEWOOD4.0 project was a comprehensive initiative aimed at reinforcing the sustainability of wood mobilisation in Europe by leveraging digital solutions and knowledge transfer. With a particular emphasis on Eastern Europe, the project focused on two key objectives: creating factsheets on best practices and innovations (BP&I) and improving the dissemination process. These objectives aimed to bridge knowledge gaps and enhance the adoption of ICT-driven solutions in forestry. Thus, a series of recommendations, needs and gaps were identified based on the project's outcomes, with a strong focus on the importance of effective knowledge sharing and dissemination for advancing sustainable wood mobilisation in Europe.

The project started on 1 January 2020, and ended on 30 June 2022.

Recommendations

-  To strengthen knowledge exchange and collaboration: foster cross-regional learning and collaboration among stakeholders in the forestry sector; facilitate knowledge exchange and best practice sharing through platforms, workshops, and study visits; establish a sustainable network of regional hubs to enhance cooperation and cooperation between different European regions. This will strengthen the individual regions onto their path towards a sustainable wood mobilisation and the transition to a biobased economy in Europe.
-  To enhance digitalisation and dissemination: continue developing and maintaining the multi-lingual knowledge platform containing factsheets on best practices and innovations; improve the accessibility and usability of the online knowledge repository to ensure wide dissemination and easy access to information; utilise digital tools and platforms, such as social media, e-learning, and videos, to effectively disseminate knowledge and engage with stakeholders; regularly update and expand the repository with new BP&I submissions from stakeholders, ensuring continuous learning and sharing of innovative solutions.
-  To strengthen training and skill development: develop comprehensive online courses (MOOCs) on digitalisation in forestry, covering a wide range of topics and available in multiple languages; provide educational and entrepreneurial training to practitioners, empowering them to implement new ideas and technologies in their daily business operations; foster a culture of continuous learning and skill development within the forestry sector, promoting the adoption of new techniques and approaches.
-  To promote business partnerships and market development: encourage the formation of business partnerships between stakeholders in the forestry and wood-using industries; facilitate the exploitation of near-market innovations by connecting actors within an open-innovation environment; align activities with local and regional development plans to support the growth and development of the forest industry and rural areas.
-  Strengthen policy integration and support: ensure the integration of project outcomes and recommendations into national and regional Agriculture Knowledge and Innovation Systems (AKIS) in forestry; advocate for policy support and funding mechanisms to drive the adoption of ICT-driven solutions in sustainable wood mobilisation; collaborate with European networks, such as EFI and InnovaWood, and initiatives like EIP-AGRI and EIP Raw Materials, to leverage their expertise and enhance policy impact; by implementing these recommendations, stakeholders can significantly contribute to the sustainability and competitiveness of the forest industry while promoting vital development in rural areas within the European Bioeconomy.
-  South-Eastern Hub partners in collaboration with stakeholders defined the principle “local wood for local use” as a main target for sustainable wood mobilisation. Local wood for local use is a precondition for a strong local forestry value chain which ensures a strong local biobased economy.

Recommendations regarding best practices and innovations best practices and innovations factsheets:

-  To include more countries into the initiative
-  To increase the number of languages in which the factsheets are available
-  To capture best practices and innovations that focus on the demand side and that are addressing the “social” challenges (in opposition to more “technical” challenges)

Needs and gaps:

- ✦ **Knowledge gaps in sustainable wood mobilisation:** The project recognised the existence of knowledge gaps within the field of sustainable wood mobilisation. These gaps often lead to suboptimal solutions due to a lack of specific knowledge in diverse European regions.
- ✦ **Digitalisation gap in forestry industry:** The project highlighted the importance of addressing the digitalisation gap within the forestry industry. It emphasised the need for adopting Industry 4.0 technologies and digital tools, such as social media, platforms, and e-learning, to enhance training, coaching, and know-how sharing.
- ✦ **Limited dissemination of best practices and innovations:** There was a need for wider dissemination and utilisation of best practices and innovations in sustainable wood mobilisation. The project aimed to bridge this gap by developing digital dissemination and training tools and fostering an open-innovation environment.
- ✦ **Limited collaboration and business partnerships:** The project identified a need for fostering collaboration and business partnerships between stakeholders in the forestry sector. It aimed to create opportunities for exploitation of near-market innovations and to align activities with local and regional development plans.

4.10 WoodCircus - Underpinning the vital role of the forest-based sector in the circular bioeconomy

WoodCircus is addressing the challenges and opportunities related to the process efficiency and wider uptake of circular economy in the woodworking value chains in Europe with the aim to enhance the wood construction sector and improve environmental, economic and societal sustainability. To sustain the European exchange and market uptake solutions, the project establishes a well-integrated network of the key existing stakeholders, notably between wood processing industries, the waste management sector and the RDTI (Research, Technology Development and Innovation) community.

The project started on 1 November 2018, and ended on 31 December 2021.

Recommendations:

- ✦ Promotion of holistic sustainability and further development of green building chains is needed. Holistic sustainability approaches must address economic, ecologic, social, and cultural aspects.
- ✦ Promotion of comprehensive sustainability and advanced green building chains. It is essential to adopt holistic sustainability approaches that encompass economic, ecological, social, and cultural dimensions. By addressing these aspects collectively, the project seeks to foster the further development of sustainable practices within the wood construction industry.
- ✦ Supporting system-wide performance increases in addition to targeted support for within-system aspects. This must include cross-border and triple helix collaboration.
- ✦ Consistent and predictable regulations and policy frameworks should focus on harmonisation across member states, consistency between impact assessment tools and regulations, limit disruption in consumer markets, and support (continuing) education changes to help companies adapt to circular approaches.
- ✦ Policy frameworks must consider economic incentives for companies that don't increase the economic burden on consumers. Societal thinking is needed to optimise incentives in this way.





Looking towards 2030s, 2040s, and beyond, ongoing assessments will be needed to identify emerging and insufficiently resolved gaps. Researchers, policy makers, industry members, and the public should engage

in on-going communication and discussions to discover, highlight, and resolve challenges faced by all stakeholders to solidify circular bioeconomy in Europe.

Needs & gaps:

A preliminary overview of the current situation of wood-based value chain management in the EU13 countries was established during the workshops and meetings of the WoodCircus project. The starting point is perceived as highly fragmented and heterogeneous, differences lying especially in regulations and level of technical advancement between the EU13 countries or regions. Low awareness of circular bioeconomy and consumers' unfavourable perceptions of wood-based products, besides modest visibility and acknowledgement are stated as common problems of the forestry sector. Whereas some of the existing regulations are still in the implementation phase, the data collection, classification, standardisation and labelling activities would profit from more transparency and less red tape. It would be crucial to promote mutual understanding between different stakeholders (industry – end users – policy makers – RTDI) as well as B2B collaboration in order to raise awareness, create market demand and increase forestry sector's visibility and social approval of wood-based products. The sector would profit from a more systematic and strategic approach, competence transfer and policy incentives when it comes to value chain optimisation and implementing bioeconomy principles.

Research needs and priorities supporting sustainable construction with natural materials under the European Green Deal. There is a clear need to close scientific gaps in organic materials and building research to accelerate the transformation of the construction sector. Organic materials, like wood, have a high potential for climate change mitigation, societal impact, and are prime candidates for greater research and innovation support related to the construction sector. Areas of key importance are:

-  Novel and enhanced construction systems for carbon-positive, long-life organic materials and building products to boost and move the market towards more diversity, higher circularity and affordable solutions. Key topics include: hybrid, modular and novel construction products and systems, maximising lightweight and insulation properties, design for disassembly and conversion of the building stock to material storage banks, (engineer from buildings back to resources and novel uses: reversible joints and structures, fire safety, alternative and undervalued tree species, wood modification, industrial upscaling, interior uses, standardisation (Eurocodes) and building regulations.
-  Circular Economy solutions fostering repair, reuse and recycling and tackling waste and environmental issues in the sector. Key topics include: Circular Design, assessing the life span of construction materials, long-life products and enhanced durability, resource and material efficiency, fossil-free, reversible adhesives for load-bearing structures, reverse logistics, waste wood and urban mines, cascade use of materials, valorisation of by-products and side streams, life cycle of buildings, incorporating the circular economy of functionalities and new business models into the construction sector.
-  Digitalisation and Industry 4.0 as key lever to overcome barriers faced by the SME-dominated sector and to support circularity. The goal is to connect entire value chains from resources to manufacturing, customers and users through end-of-life phases. Key topics include: material traceability, resource use optimisation (from product to landscape and market level), digital twins/digital design (materials, systems), automation in prefabrication, organic sensing, logistics and value chain networks, novel platforms and business models, building information models (BIM), intelligent buildings, digital hubs.
-  Interdisciplinary research and co-creation to break down silos, achieve a holistic perspective and widen societal impacts. Putting users in focus in all key topics: human health benefits through comfort, wellbeing and productivity enhancements, architecture and urban space, aesthetics,

biomimetic/ biophilic design, recovery of traditional knowledge/skills and cultural heritage, the creative sector, open innovation testbeds, citizen science.

- ✦ Fair and inclusive European Research Area for the sustainable built environment to overcome regional and rural-urban divides and unbalanced representation in research excellence and innovation capacity of organic materials. Key topics include: affordable solutions, proactivity for gender diversity in STEM, inclusive and participatory design, teaming with widening countries especially Central-Eastern Europe, mobility actions for capacity building, transdisciplinary higher education programmes, upskilling and dual learning of the sector workforce, internationalisation of the R&I ecosystem.

4.11. AgroRES - Investing in Renewable Energies for Agriculture

The main objective of the project is to develop measures that encourage the production and use of renewable energy (RE) in the agricultural and rural sector. AgroRES will support this sector by solving its energy needs in a sustainable, economic viable and socially responsible way. AgroRES raises awareness of the benefits of investing in renewable energy in agriculture and promotes public dialogue in order to overcome previously identified barriers and challenges. As a result of the project, partner regions designed their own action plan that support the use of renewable energy in agricultural and rural areas, for example implementation of new energy communities, with shared ownership of renewable energy installations, with the collaboration of public entities and citizen participation, the implementation of community-ownership.

The project started on 1 August 2019, and ended on 31 July 2023.









Recommended key measures to increase renewable energy use in the agricultural sector

Additional measures are needed to increase the use of renewable energy in agriculture and, thus, reduce the sector's greenhouse gas emissions. Most significant results would be gained through policies that encourage farm-scale biogas production and decrease use of fossil fuels in heating.

- ✦ Abandoning fossil fuels in heating:
 - Identifying alternative heating solutions for sites that use fossil fuels
 - Influencing the operating environment, e.g. to increase investment subsidies
 - Reduction of heating demand and energy efficiency measures
 - Guidance and advisory services to increase know-how on the benefits of new heating methods
 - Grants to support and accelerate investments

- ✦ Farm-scale biogas production:
 - Influencing the operating environment, e.g. promotion of various investment, energy and production subsidies to improve profitability
 - Incentives to replace natural gas with biogas
 - Making the permit process less complicated
 - Biomethane as part of national distribution obligation
 - Improving investment aid eligibility criteria: also investments that produce energy to other than agricultural production activities should be allowed
 - Improving financing possibilities
 - Increasing the use of biogas in transport, e.g. in public transport

Country-based recommended actions:

-  Technical and financial advice to develop new energy communities in rural areas through a specific section of the one-stop shop by centralising the different grants available from both ERDF and PRTR funds (Spain): The action is focused on the implementation of new energy communities, with shared ownership of renewable energy installations, with the collaboration of public entities and citizen participation (e.g. one-stop shop).
-  Amendment to the development strategy for the Lubelskie Voivodeship 2014-2020 (with a 2030 perspective) introducing renewable energy investing initiatives like bottom-up community energy groups (Poland): This action gives the possibility of a real influence on the shape of the provisions, on the definition of long-term development directions and the indication of specific objectives concerning renewable energy sources in agriculture and in rural areas and supporting bottom-up initiatives
-  Establishment of a consultation point as a result of the AgroRES project - Investing in Renewable Energies for Agriculture (Poland): the employees participating in the project significantly improved their professional competences in the field of renewable energy sources in agriculture and rural areas, as well as the principles of operation of energy cooperatives and energy clusters.
-  Increasing the use of renewable energy in the agricultural sector through the use of community ownership and new business models (UK): The action is to increase the use of renewable energy in the agricultural sector through the use of community ownership and new business models.
-  Improved governance of funding renewable energy projects in the field of renewable energy in agriculture and rural areas in line with the revised and updated Climate and Energy Programme and its Implementation Plan (Finland): This action supports achieving advancing production of decentralised and renewable energy and business opportunities related to them. Moreover, this action will advance for instance supporting decentralised energy units with hybrid energy solutions (for instance solar power, wind power, bioenergy, new energy sources), and supporting biogas investments and processing of biogas to transportation fuels.
-  Establishment of RES regional support services. Technical and financial assessment to increase the use of RE in agricultural sector through the specific grant from the BI ROP 2021-2027, by developing and implementing new projects (Romania): The proposed action refers to the development of support services to facilitate accessing ROP funds.
-  Support the establishment of new energy communities through a helpdesk set up to provide technical, financial and administrative assistance services to rural communities in the Lazio region (Italy): The action aims to provide a technical, financial and administrative assistance service to the rural communities of Lazio through a helpdesk set up by Arsial with the aim of creating new energy communities.
-  Revision and amendment of the Northern & Western Regional Spatial & Economic Strategy (RSES) 2020-2032 through the monitoring of RES projects in farming sector (Ireland): Establishment of a new technical advisory service for financial, technical and administrative assessment for the implementation of RES in the agri sector.

Needs & gaps/Challenges from policies and market for the spread of renewable energy in agriculture

The seven regional self-assessment reports showed that the uptake of RE in the agricultural sector remains very low. It is also evident that there is no current or emerging policy incentives for RE specifically in the agri sector. Therefore, several category-based challenges were identified, as follows:

At farm level:

- ✎ Small farms with limited financial or technical capacity for investment
- ✎ Farmers' lack of interest in implementing renewable energy solutions
- ✎ Farmers' lack of confidence in the stability of the financial conditions of RES-related activities
- ✎ Number of small farms declining

At market level:

- ✎ No available market tariff for small scale (50kW to 500kW) renewable electricity generation for export to grid
- ✎ Very limited market for energy crops
- ✎ Lack of information by the population regarding the energy services business

At social level:

- ✎ Lack of skilled labour to implement and operate new technologies (e.g., medium temperature solar thermal)
- ✎ Regional differences in the number of advisors available
- ✎ Low social awareness
- ✎ Lack of social acceptance for new technologies
- ✎ Activity of the energy lobby based on fossil sources

At financial level:

- ✎ Difficulties in accessing credit for renewable energy projects
- ✎ Cost and availability of grid connection
- ✎ Possible financial crises limit the possibility of credit/incentives
- ✎ Large fluctuations in the prices of agricultural raw materials
- ✎ Declining farm income - lack of capital to invest
- ✎ Modest income and volatile cash flow
- ✎ The compensation received for energy that is sold to national grid is very low
- ✎ Biogas plants do not receive gate fee (feedstock reception) for taking in manure
- ✎ Transporting manure from farms to biogas plants is expensive

At infrastructural level:

- ✎ Infrastructural deficits - proximity to electricity and natural gas grid
- ✎ Impossibility of disconnecting from the grid and single supply by renewable energies, due to lack of manageability
- ✎ Limited possibilities of connecting RES installations to local electricity, gas and heating networks

At policy level:

- ✎ Administrative burden of support schemes
- ✎ Regulatory barriers
- ✎ Complicated administrative processes for grid-connected renewable energy systems.
- ✎ Frequent changes in law regulations
- ✎ Lack of specific actions by decision-makers towards the development of renewable energy in rural areas
- ✎ Local opposition to onshore wind energy
- ✎ No clear emerging policy for 50kW to 500kW renewable electricity export to grid

- ✦ Lack of coordination of RES implementation activities with local resources
- ✦ The current policies are generic and not sector-specific to agriculture
- ✦ There is no quota within LP policies across the regions to deliver RE development
- ✦ Some local policies limit support to certain technologies of renewable development
- ✦ Policy wording could be stronger and sector-specific
- ✦ Policy aims to maximise RE development, but no defined quota
- ✦ Small scale RE installations may not be economically feasible without incentives
- ✦ Strict planning constraints
- ✦ Little incentive for investment in RE
- ✦ There are no policies on sale of energy

Barriers:

- ✦ The renewable energy to sufficient funding, legislation and financial support for the investments. Because of the high potential in biogas one crucial question is how to make farm scale biogas investments economically relevant. Investment payback time need to be reduced in all RE applications in order to make them more acceptable and tempting.
- ✦ To develop administrative and technical documentation that justifies the necessity for the grant and the viability of the action limits the possibility of participating, making the contribution of specialised companies necessary.
- ✦ Time lag of several months since the beneficiary makes the investment to implement the action and, after technical justification, receives the amount of the grants. This implies a need for capital that discourages participation.
- ✦ Implementation period is insufficient for certain ambitious actions, for example those related to biogas.
- ✦ Repetition of complete inquiry procedure when there is a change in the investment executed greatly delays the process of paying the grant.
- ✦ The inconvenience of not replacing existing facilities related to renewable energies in agricultural and agro-industrial sector considering the lack of alternative in the analysis of the feasibility of replacing a power generation facility.

Cross-cutting aspects

The analysed projects have a common focus on promoting and implementing circular economy principles across various sectors aiming to optimise resource utilisation, reduce waste generation, and enhance sustainability along the entire value chain including the consumer. The projects encompass cross-cutting aspects and aim to promote collaboration, knowledge sharing, and innovation across different sectors and stakeholders. Not all projects have a clear link to the biobased sector, however recommendations could be still relevant if streamlined towards specific biobased sector needs. The following cross-cutting aspects are identified based on the analysis of the projects findings:

-  **Cooperation in research and innovation:** The projects adopt a multi-actor and participatory approach and stress the value of collaboration among all stakeholders along the value chain. For example, BIOBRIDGES established partnerships between biobased industries, brand owners, and consumer representatives. INSPIRE focused on developing flexible and demand-driven solutions through collaboration. ENHANCE highlighted the role of public authorities in supporting organisations adopting EMAS. Circ4LIFE involved a wide range of stakeholders along value and supply chains. WoodCircus highlights the need for stakeholder engagement and organised workshops, interviews, and an open call for innovative practices in SMEs. Workshops, co-creation events organised at different levels, regional hubs as cooperation platforms and innovation networks proved to foster cooperation and partnership along the value chains.
-  **Innovative technologies, tools, and methodologies:** Some of the projects concentrated on creating cutting-edge solutions to tackle particular difficulties associated with the shift to a more sustainable biobased economy. Concepts such as co-creation, collaborative recycling and reuse, and sustainable consumption were explored into building innovative business model to support the circular economy. For example, BIOBRIDGES developed studies, methodologies, and frameworks for multi-stakeholder collaboration in the bioeconomy sector. INSPIRE developed innovative production systems, advanced sensing and monitoring technologies, and data analytics tools to enhance flexibility in manufacturing value chains. ENHANCE aimed to improve environmental and resource efficiency through the development of new approaches and methodologies. CIRC4Life project developed circular economy business models to engage consumers in the transition towards a circular economy. SUPERBIO emphasised the biobased economy and biobased value chains and sought to support the development and scaling-up of new value chains. ICT-BIOCHAIN optimised the biomass supply chains through ICT integration.
-  **Data integration and analysis:** Projects recognise the need to use technology and information systems to enable the adoption of new business models and shift to a circular economy. For example, ICT-BIOCHAIN developed an ICT platform for standardised data collection and analysis in biomass supply chains. SUPERBIO focused on building a database of biobased value chains. Circ4LIFE developed a tool to boost recycling and reuse with an ICT system.

- Sustainability and resource efficiency:** Projects recognised the importance to enhance sustainability and resource efficiency along the value chain in various sectors. For example, BIOBRIDGES focused on promoting the bioeconomy and biobased products as a more sustainable alternative to fossil-based products. INSPIRE aimed to enhance competitiveness and sustainability in European manufacturing through flexible processing. Circ4LIFE focused on designing new sustainable products and services by creating new markets, shortening supply chain length, reducing consumption of resources and materials, and recovery of raw materials from waste electrical and electronic equipment. ICT-BIOCHAIN sought to optimise biomass logistics and resource allocation to reduce waste and improve overall sustainability. WoodCircus focused on resource-efficient processing and recycling in wood-based value chains. ROSEWOOD4.0 aimed to support sustainable wood mobilisation in EU regions.
- Knowledge sharing and dissemination:** All projects place a high priority on information exchange, communication, and dissemination of their initiatives, findings, and best practices. They aimed to raise awareness at consumer level, engage stakeholders, and provide policy recommendations to promote the adoption of circular economy practices. Through events, publications, communication materials, and social media platforms, they actively communicated and disseminated project information, goals, and outcomes to a large number of stakeholders, including at the consumer level as the end-user. They also published reports, newsletters, and press releases to share project results and recommendations.
- Policy recommendations and guidelines:** Projects provided policy recommendations and guidelines to support the implementation of their outcomes. BIOBRIDGES developed policy papers and recommendations for improving the public acceptance of biobased products and processes. INSPIRE addressed policy and regulatory aspects related to flexible processing in value chains and provided recommendations to policy makers and regulatory bodies. ENHANCE, as an Interreg Europe project, aimed to influence policy development and implementation at the regional level. Circ4LIFE provided guidelines for the implementation of the traceability method in the industry sector. WoodCircus addressed differences between member states in wood recycling performance, technology readiness, and legal and policy frameworks. ROSEWOOD4.0 supported the exploitation of actual funding, educational, and regulatory policies while identifying gaps and establishing synergies between funding instruments and research and innovation investments.

5. Overview of the R&I needs/gaps

5.1 Geographical coverage and categorisation of the projects

The projects have been implemented by partners from 26 countries. The number of projects in which each country was involved is depicted in Figure 2. The consortia consisted of 4 to 41 partners depending on the complexity and topic of the project (4-9 partners in 5 projects, 12-21 partners in 5 projects, 41 in 1 project).

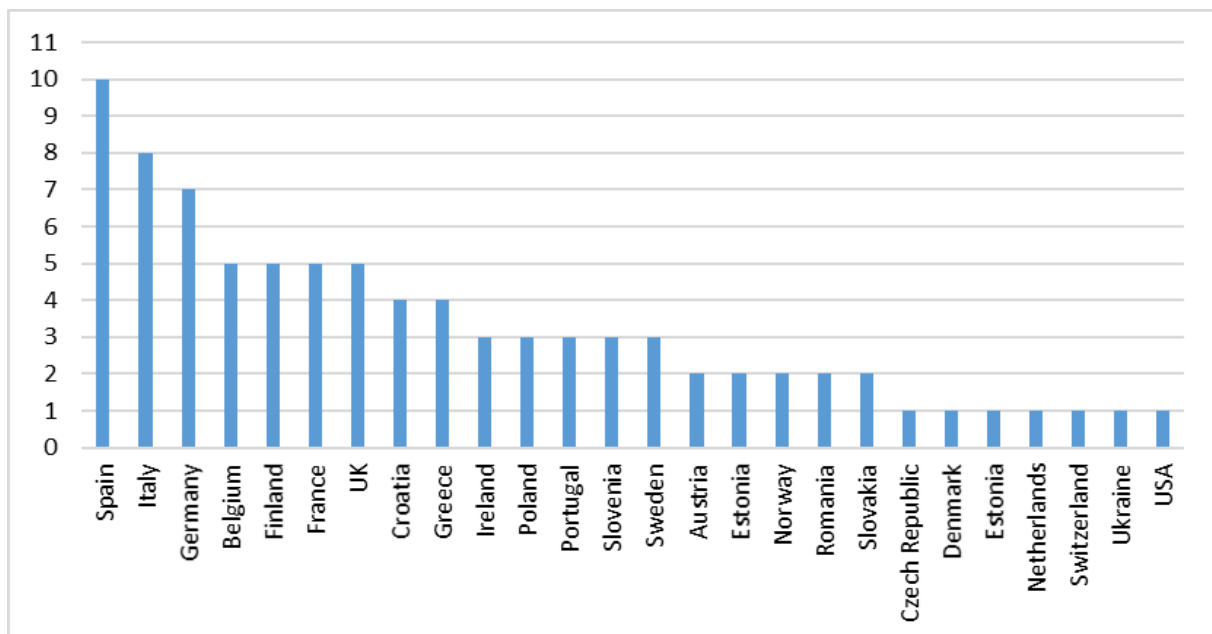


Figure 2 Number of projects by countries

Out of the 11 projects, 81% were funded under Horizon 2020 (67% were Coordination and Support Actions (CSA) type of projects, 33% were Innovations Actions (IA) type of projects and 18% projects funded under Interreg Programme.

5.2 The needs/gaps in the multi-actor approach

The participatory and multi-actor approach enables collaboration, knowledge sharing, and co-creation of solutions and projects among stakeholders and fosters innovation. This approach recognises the need for diverse perspectives, expertise, and resources. By engaging multiple stakeholders, decisions become more inclusive and effective, leading to sustainable solutions. The analysed projects recognised the importance of involving various stakeholders, including industry, policy makers, researchers, and consumers as end-users, in their activities. They recognised the crucial role of stakeholder cooperation in achieving sustainability goals through promoting knowledge sharing, innovation adoption, and the implementation of sustainable practices. Based on the portfolio analysis, an overview of the R&I needs/ gaps can be summarised as follows:

- Identify/develop functional models to foster innovation through participatory approaches (clusters, regional hubs and digital tools).** It is necessary to fill the gap between research and implementation and facilitate the adoption of innovative solutions by enhancing both multi-stakeholder and cross-sectoral collaborations. The projects highlighted the need for cooperative environments, partnerships, and knowledge transfer within the bioeconomy sector to address the gap of fragmented efforts and encouraged a more unified and coordinated approach. Knowledge transfer events, training sessions, demonstration activities, clusters play a crucial role in bringing stakeholders together and supporting R&D activities. The BIOBRIDGES project emphasises the important role in enhancing both multi-stakeholder and cross-sectoral collaborations by creating and validating a “Value chain collaboration challenges model” which is a map of all existing barriers among brands, biobased industry and consumers. ROSEWOOD4.0 highlighted the need to create networks of regional hubs (especially in the less connected Eastern Europe) and employ digital tools (social media, platforms, e-learning) for training and coaching, and to enable practitioners to share know-how with much wider impact.
- Identify value chains business models that support cross-sector interconnections.** The projects emphasised the need to actively involve stakeholders in decision-making processes, policy debates, and project activities. This engagement helps bridge the gap between research and practice, and ensures the relevance and impact of the project outcomes. Projects such as ICT-BIOCHAIN, INSPIRE, CIRC4Life, ENHANCE engaged stakeholders from the entire value chain to respond to their specific needs. PerformFISH project highlighted the need to develop partnerships with culinary experts and influencers for recipe promotion. Facilitating policy debates and engaging policy makers were recognised as crucial for shaping a supportive regulatory environment for the bioeconomy. Collaboration between stakeholders and policy makers is essential to enable a favourable ecosystem for the bioeconomy to thrive. BIOBRIDGES facilitated policy debates and engagement with policy makers to shape the regulatory environment supporting the bioeconomy. CIRC4Life emphasises the role of public actors in creating tailored regulations, supporting sustainable behaviour, and penalising opposite behaviour.
- Develop/promote market readiness solutions.** There is a needs to increase the cooperation between best practice owners and best practice adopters along the value chain in order to develop sustainable and market-ready solutions for biobased products. The lack of collaboration along the value chain of biobased products was recognised as a significant challenge in several projects. Challenges include addressing fragmentation within the value chain, promoting awareness and dialogue among stakeholders, and overcoming legislative and financial barriers. The BIOBRIDGES project developed: a business model (Bridge2brands) validated to demonstrate the efficacy of the process in facilitating collaboration among a brand and several solution providers and also the creation of several cross-collaborations; and a format (Bridge2Value) which aimed to create cross-sector interconnections and develop new circular bioeconomy value chains. In the Rosewood4.0 project, the focus was on B2B training for stakeholders to support and ensure a better connection between best practice owners and best practice adopters. The project INSPIRE emphasises the importance of flexibility, collaboration, and adapting to market dynamics to drive growth and competitiveness.

5.3 Consumer-driven business models needs and gaps

Transitioning to a transferable and scalable circular business model requires a systemic and long-term approach. It involves not only operational changes but also a shift in mindset and values, as well as collaboration with stakeholders across the value chain, including consumers. Efforts are required to enhance the efficiency, sustainability, and market readiness of value chains in the biobased sector, and also constantly create demand for consumption by educating consumers about the benefits of the biobased products. Based on the portfolio analysis, an overview of the R&I needs/gaps can be summarised as follows:

-  **Research on market trends, consumer preferences, and changing dynamics.** The sustainability growth of an industry depends on the ability to reveal consumer perceptions and real market requirements. Studies on a regular basis ensure that the needs of the sector are met and knowledge is transferred effectively. PerformFISH project emphasises the need to understand the dynamics of the market, the motivation behind the consumer's behaviour towards biobased products and the role of product origin and labelling. In the BIOBRIDGES project, policy recommendations were made based on a consumer satisfaction survey (adopting a bottom-up approach to integrate consumers into co-creation of CE strategies, encourage sustainable practice such as repair and reuse (EEE)).
-  **The need for thematic network to identify innovations dedicated to enhance consumers' knowledge, education, and awareness.** There is a strong and continuous need for actions to improve the level of knowledge at the consumer level, respond quickly to changing customer demands, and optimise the value chains. The analysed projects confirm the importance of continuous efforts in this direction. In the BIOBRIDGES project, it was emphasised that even with initiatives to raise public awareness, more immediate action is still needed. Although there has been a recognised increase in consumers choosing brands that make responsible use of the limited resources in the world and adopting eco-conscious lifestyles, the public continues to lack knowledge about what precisely biobased products are and what advantages they may provide. The WoodCircus project also stresses the need to promote collaboration along the value chain in order to raise awareness, create market demand, and increase the visibility of the sector and social approval of biobased products at the consumer level. The PerformFISH project emphasises the lack of consumer education on sustainable choices, insufficient research on market trends, consumption preferences, changing dynamics, and long-term sustainability of dissemination and exploitation efforts. Awareness campaigns and educational initiatives can help bridge this gap and promote sustainable consumption practices.
-  **Identify and develop innovation for consumer-driven biobased production.** Research and innovation investments are needed to assure the transition to sustainable food production systems from primary production to consumption (PerformFISH Code of conduct). This implies involving customers in the production chain, revealing and incorporating their needs and expectations in the design of the product, a research need emphasised in the INSPIRE project. The prosumer concept in the renewable energy (RE) in agriculture was identified as a need in the AgroRES project. This may allow and support the emergency of a new type of electricity user, called "prosumers", who produces electricity from renewable sources, next uses & shares them smartly within the smart grid and finally stores them (e.g. photovoltaic energy prosumers are considered one of the most important actors in the energy transition and seem to be ready to introduce significant amounts of electricity within the grid).

✦ **New business models and strategies to promote flexibility in customer-driven value chains.**

The need to demonstrate on a larger scale the benefits of using a more sustainable approach along the entire value chain remains a challenge, although business models have been developed in several projects. For example, within the CIRC4Life project, three collaborative and circular business models were developed and validated (co-creation of products and services, sustainable consumption, collaborative recycling and reuse) with the aim of engaging consumers in the transition towards circular economy. It proved the constant need to build circular economy business models to stimulate sustainable consumption and end-user engagement in the process of developing products and services. The transition to circular economy business models requires a collective effort, long-term commitment, and greater collaboration between companies, consumers, and regulators to ensure businesses, people, and society all benefit from circular products and materials.

5.4 SMEs needs/gaps

In the biobased products field, SMEs often face neglect from larger brands and retailers due to their small size and limited reputation. The needs and gaps identified include support for small industries and start-ups, integration of ICT solutions, access to information and collaboration opportunities, decision support tools tailored for SMEs, regulatory compliance support, promotion of renewable energy solutions and low-carbon agriculture, empowerment of SMEs in aquaculture, and effective environmental performance management with incentives. Addressing these needs can contribute to the growth, competitiveness, and sustainability of SMEs in various sectors. Based on the portfolio analysis, an overview of the R&I needs/ gaps can be summarised as follows:

- ✦ **The need of integration of ICT solutions in biomass supply chains focusing on SMEs.** Further research and innovation are needed to develop advanced ICT tools that streamline operations, optimise logistics, and reduce costs for small and medium-sized enterprises (SMEs) in the biomass sector. The ICT-BIOCHAIN project highlighted the importance of integrating information and communication technology (ICT) solutions in biomass supply chains to improve efficiency.
- ✦ **The need for developing platforms or networks that facilitate knowledge sharing, partnerships, and connections among stakeholders.** Access to information and collaboration opportunities is crucial in ensuring the sustainability of the value chain. SMEs in the biomass and wood industries require better access to real-time information on biomass availability, transport logistics, market trends, and collaboration opportunities. The platforms and networks have the role of enabling SMEs to make informed decisions, expand their markets, and leverage collaborative synergies.
- ✦ **The need to develop/improve decision support tools** tailored for SMEs. In the biomass sector, the SMEs can benefit from decision support tools that assist them in making data-driven decisions related to resource allocation, waste reduction, and sustainability. Research and innovation efforts should focus on developing user-friendly and scalable tools that address the specific needs and constraints of SMEs, enabling them to improve their decision-making processes and overall effectiveness.

- The need of research and innovation efforts on developing practical and financially viable solutions that enable SMEs to invest in renewable energy production.** The projects highlight the importance of supporting SMEs in adopting renewable energy solutions and promoting low-carbon agriculture and business activities. It is important to find solutions improve energy efficiency, and contribute to the transition to a low-carbon economy.

5.5 Digitalisation/ICT needs/gaps

In the context of international projects, digitalisation and ICT (Information and Communication Technology) are needed to enhance the use and integration of digital technologies, systems, and communication tools to further facilitate project implementation, collaboration, and information management across international boundaries. Digitalisation and ICT in international projects involve leveraging digital technologies and communication tools to enable effective communication, collaboration, data sharing, project monitoring, and knowledge exchange across international boundaries. These advancements enhance project efficiency, transparency, and coordination, ultimately contributing to the successful implementation of international initiatives. Based on the portfolio analysis, an overview of the R&I needs/ gaps can be summarised as follows:

- The need to improve ICT-enabled tools and platforms to secure the quantity and the quality of the feedstock, distribution and logistics along the consumer-driven value chain.** R&I in digitalisation and ICT for biomass supply chains is crucial for enhancing traceability, certification, data standardisation, interoperability, and ICT integration. Developing systems that accurately track biomass sources, production processes, and sustainability criteria, along with common standards and protocols for data collection and exchange, enables compliance, certification schemes, transparency, and improved data quality. Integration of digital technologies like IoT, cloud computing, and big data analytics will facilitate real-time data collection, analysis, and decision-making, leading to enhanced efficiency and advanced supply chain management in the biomass industry.
- The need for comprehensive digitalisation and ICT solutions to enhance transparency, traceability, and sustainability in biomass supply chains.** This involves the use of common data protocols and formats to facilitate seamless information sharing across the supply chain. Standardised data collection, integration, and interoperability enable improved logistics optimisation, decision support tools, and resource efficiency. By developing platforms and systems, such as the ICT-BIOCHAIN project, stakeholders can make informed decisions regarding biomass resource allocation, waste reduction, and sustainability, leading to enhanced efficiency. Implementing the sustainable consumption model and promoting awareness of circular economy principles contribute to monitoring sustainability along the value chain. Additionally, the development of ICT solutions for traceability and certification ensures accurate tracking of biomass sources, production processes, and compliance with regulations. This holistic approach fosters knowledge sharing, industry confidence, and enables the implementation of sustainable practices throughout the biomass value chain. As another example, a main goal of the ROSEWOOD4.0 project is to develop and set up an open online knowledge repository that is widely accessible, easy to read and understandable by the target groups in the forest sector. The final platform will serve as an open repository, which means that any stakeholder can access the information and submit new best practices & innovations to be published on the platform via an online upload form ('factsheet').

- ✦ The need to develop and integrate advanced ICT solutions, predictive tools, and algorithms throughout biomass supply chains.** By leveraging historical and real-time data, standardised data protocols, and common formats, these technologies can optimise logistics, support strategic planning, and improve decision-making. The integration of IoT, cloud computing, and big data analytics enables real-time data collection and analysis, leading to efficient resource allocation, reduced waste, and improved overall supply chain performance. This approach promotes sustainability, enhances traceability, and facilitates the implementation of circular economy principles, ultimately benefiting all stakeholders in the biomass value chains.
- ✦ The need for robust cybersecurity tools and data privacy.** As digitalisation and ICT integration increase in the biomass sector, addressing cybersecurity and data privacy becomes critical. R&I efforts should focus on developing robust cybersecurity measures, data protection frameworks, and secure data exchange protocols to safeguard sensitive information and prevent unauthorised access or data breaches.

5.6 Regulatory needs/gaps

Overall, the identified needs and gaps highlight the importance of clear and supportive regulatory frameworks, standardised norms and labelling, and targeted policies and incentives to promote renewable energy, biobased products, and sustainable practices in various sectors. Based on the portfolio analysis, an overview of the R&I needs/gaps can be summarised as follows:

- ✦ The need to identify practical solutions to incentivise sustainable agriculture and food production.** For example, there is a need for carbon tax reduction, which would ensure that companies and consumers pay for the external costs of food production; also incentivise the support for investments in low-carbon technologies as well as subsidies for cultivating organic vegetables and fruits. Another important issue raised in the project findings is the need of systems of incentives based on rewards for end-users, such as reverse vending programmes or initiatives working with smart containers, systems of incentives based on charges or penalties for waste generation (Circ4Life project).
- ✦ The need for research solutions to harmonised biobased products and processes standards.** There are gaps in labelling, standardisation and certification systems for biobased products, hindering collaboration between industries and impeding consumer acceptance of biobased products. By labelling biobased products, consumers can gain better understanding, confidence, and trust in the sustainable and innovative attributes of these products, helping them make informed purchasing decisions. BIOBRIDGES, EFFECTIVE and Circ4Life projects emphasise the need to have a labelling system (based on standards) at the European level based on multi criteria. PerformFISH underlined the need to improve consumer information and communication through accurate labelling and digital means. Such a system would boost consumer confidence but also help industry stakeholders, which consider it an important constraint to the development, market diffusion, or waste management of biobased products. The absence of labelling and certification is recognised as one of the most common challenges that businesses face in enhancing collaboration with the industry and their suppliers. Moreover, the lack of harmonised intellectual property (IP) regulations and high patent costs, is limiting collaboration and innovation in the biobased products sector.

- ✦ **The need for developing effective incentives for Eco-Management and Audit Scheme (EMAS) adoption.** There is a lack of both credibility and knowledge on EMAS among certain enforcement authorities nevertheless the number of EMAS registrations in each country. The ENHANCE project emphasises the importance of environmental performance management for companies and organisations to support resource efficiency underlying the need for research and innovation in developing effective incentives, such as financial gains, that motivate companies to evaluate, report, and improve their environmental performance. These incentives should align with the profit-oriented nature of businesses and provide tangible benefits to encourage their participation. Moreover, these incentives should respond to the need for an improved governance in areas related to regulatory reliefs and promotional incentives for EMAS organisations, and in green public procurement.
- ✦ **The need to identify policies and incentives targeting Renewable Energy (RE) sources from agriculture to meet sustainability and climate change goals.** Gaps exist in the regulatory framework and policies related to renewable energy implementation requiring further improvements and updates, as well in the current regulations regarding electricity grid connection for RE generators requiring simplified and streamlined application processes. Moreover, there is a policy gap regarding the explicit promotion of renewables in the agricultural sector, particularly in relation to bioenergy production. The AgroRES project underlines the need for continued support and funding through the Operational Program of the European Regional Development Fund (ERDF) to promote the implementation of renewable energies, as well for clearer regulations and guidelines regarding planning permission for certain RE installations to avoid confusion and delays.

Annex 1 - List of projects selected

No.	Project title	Project Acronym	Database	Link	Selected as relevant in the list of 30 projects
1	Hyper-Network for electroMobility	NeMo	CORDIS	https://cordis.europa.eu/project/id/713794	No
2	Valorisation of mushroom agrowastes to obtain high value products	FUNGUSCHAIN	CORDIS	https://cordis.europa.eu/project/id/720720	Yes
3	European Framework Initiative for Energy and Environmental Efficiency in the ICT Sector	ICTFOOTPRINT.eu	CORDIS	https://cordis.europa.eu/project/id/690911	No
4	Greywater optimisation and microplastic mitigation for washing machines	MIMBOX	CORDIS	https://cordis.europa.eu/project/id/101010214	No
5	Circular European Economy Innovative Training Network	CircEuit	CORDIS	https://cordis.europa.eu/project/id/721909	No
6	Underpinning the vital role of the forest-based sector in the Circular Bio-Economy	WoodCircus	CORDIS	https://cordis.europa.eu/project/id/820892	Yes
7	Priorities for Addressing Opportunities and Gaps of Industrial Biotechnology for an efficient use of funding resources	PROGRESS	CORDIS	https://cordis.europa.eu/project/id/723687	No
8	A thematic network to design the penetration PAth of Non-food Agricultural Crops into European Agriculture	PANACEA	CORDIS	https://cordis.europa.eu/project/id/773501	Yes
9	Bridging Consumers, Brands and Biobased Industry to improve the market of sustainable biobased products	BIOBRIDGES	CORDIS	https://cordis.europa.eu/project/id/792236	Yes
10	Empowering Photonics through Regional Innovation Strategies in Europe	EPRISE	CORDIS	https://cordis.europa.eu/project/id/732695	No
11	ICT Tools in Efficient Biomass Supply Chains for Sustainable Chemical Production	ICT-BIOCHAIN	CORDIS	https://cordis.europa.eu/project/id/792221	Yes
12	SUpport and PartnERship for the development of multiple sustainable and market ready value chains in the BIObased economy	SUPERBIO	CORDIS	https://cordis.europa.eu/project/id/691555	Yes
13	Towards growth for business by flexible processing in customer-driven value chains	INSPIRE	CORDIS	https://cordis.europa.eu/project/id/723748	Yes
14	Boosting scientific excellence and innovation capacity in biorefineries based on marine resources	BLUEandGREEN	CORDIS	https://cordis.europa.eu/project/id/692419	Yes

15	Creating links to speed-up innovation in the bio economy	BioLinX	CORDIS	https://cordis.europa.eu/project/id/652692	Yes
16	Promoting stakeholder engagement and public awareness for a participative governance of the European bioeconomy	BioSTEP	CORDIS	https://cordis.europa.eu/project/id/652682	Yes
17	BIOSKOH's Innovation Stepping Stones for a novel European Second Generation BioEconomy	BIOSKOH	CORDIS	https://cordis.europa.eu/project/id/709557	Yes
18	Fuel and chemicals from lignin through enzymatic and chemical conversion	FALCON	CORDIS	https://cordis.europa.eu/project/id/720918	Yes
19	Nutrient recovery from biobased Waste for Fertilizer production	NewFert	CORDIS	https://cordis.europa.eu/project/id/668128	Yes
20	Advancing Sustainable Circular Bioeconomy in Central and Eastern European countries	BIOEASTsUP	CORDIS	https://cordis.europa.eu/project/id/862699	Yes
21	Renewable systems engineering for waste valorisation II	RENESENG II	CORDIS	https://cordis.europa.eu/project/id/778332	Yes
22	Novel processes for sustainable cellulose-based materials	NeoCel	CORDIS	https://cordis.europa.eu/project/id/720729	Yes
23	A circular economy approach for lifecycles of products and services	CIRC4Life	CORDIS	https://cordis.europa.eu/project/id/776503	Yes
24	Green Aquaculture Intensification in Europe	GAIN	CORDIS	https://cordis.europa.eu/project/id/773330	Yes
25	EU network of regions on sustainable wood mobilisation ready for digitalisation	ROSEWOOD4.0	CORDIS	https://cordis.europa.eu/project/id/862681	Yes
26	Digital twins for the optimisation of agrifood value chain processes and the supply of quality biomass for bio-processing	BBTWINS	CORDIS	https://cordis.europa.eu/project/id/101023334	Yes
27	Take-off for sustainable supply of woody biomass from agrarian pruning and plantation removal	uP_running	CORDIS	https://cordis.europa.eu/project/id/691748	Yes
28	Advanced Eco-designed Fibres and Films for large consumer products from biobased polyamides and polyesters in a circular Economy perspective	EFFECTIVE	CORDIS	https://cordis.europa.eu/project/id/792195	Yes
29	Investing in Renewable Energies for Agriculture	AgroRES	INTERREG	https://projects2014-2020.interregeurope.eu/agrores/	Yes
30	REgional PoLicy Actions for Circular Economy	REPLACE	INTERREG	https://projects2014-2020.interregeurope.eu/replace/	Yes
31	COncnecting and empowering LOCAL authorities with Research capacities to unlock the full potential of CIRCular economy	COLOR CIRCLE	INTERREG	https://projects2014-2020.interregeurope.eu/colorcircle/	Yes
32	Citizen involvement in circular economy implementation	CECI	INTERREG	https://projects2014-2020.interregeurope.eu/ceci/	No

33	Innovation in Waste Management Policies	SMART WASTE	INTERREG	https://projects2014-2020.interregeurope.eu/smartwaste/	No
34	Improved Environment and Resource Efficiency through use of Life Cycle Instruments for implementation of regional policies of the European Union	LCA4Regions	INTERREG	https://projects2014-2020.interregeurope.eu/lca4regions/	No
35	Construction & demolition waste management policies for improved resource efficiency	CONDEREFF	INTERREG	https://projects2014-2020.interregeurope.eu/condereff/	No
36	Supporting eco-innovation to reduce food waste and promote a better resource efficient economy	ECOWASTE4FOOD	INTERREG	https://projects2014-2020.interregeurope.eu/ecowaste4food/	No
37	Regional circular economy models and best available technologies for biological streams	BIOREGIO	INTERREG	https://projects2014-2020.interregeurope.eu/bioregio/	Yes
38	Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy	SYMBI	INTERREG	https://projects2014-2020.interregeurope.eu/symbi/	No
39	A Systemic Approach for Regions Transitioning towards a Circular Economy	RETRACE	INTERREG	https://projects2014-2020.interregeurope.eu/retrace/	Yes
40	Sustainable regional bioenergy policies: a game changer	BIO4ECO	INTERREG	https://projects2014-2020.interregeurope.eu/bio4eco/	Yes
41	Circular Economy for SMEs	CESME	INTERREG	https://projects2014-2020.interregeurope.eu/cesme/	No
42	EMAS as a Nest to Help And Nurture the Circular Economy	ENHANCE	INTERREG	https://projects2014-2020.interregeurope.eu/enhance/	Yes
43	European regions toward Circular Economy	CircE	INTERREG	https://projects2014-2020.interregeurope.eu/circe/	Yes

Annex 2 – 30 R&I projects database

Information on the most relevant 30 projects is presented in an Excel file in attachment to this report (see file Annex 2_Excel database)

Annex 3 – 11 projects' fiches

Project 1: Bridging Consumers, Brands and Biobased Industry to improve the market of sustainable biobased products – BIOBRIDGES



Source(s)

<https://cordis.europa.eu/project/id/792236>



Funding details

Source of funding: H2020-EU.3.2.; H2020-EU.3.2.6.1
Type of project (+ cluster if relevant): CSA
Contract number : Grant agreement ID: 792236
Project total budget: € 995 485



Start and end date of the project

01/09/2018-31/12/2020



Project summary

The project's overall aim was to enhance the marketability of biobased products by establishing primary partnerships between biobased industries, brand owners and consumer representatives and in cooperation with other stakeholders like local communities, local authorities and industrial actors to create new cross-sector interconnections in biobased economy cluster.

The main objectives were:

- Identify the cooperation challenges among consumers, brand owners and biobased industries
- Increase consumers' and brand owners' confidence, trust and benefits' awareness (social, environmental and economic) and improved performance of biobased products compared to the fossil-based counterparts.
- Establish primary partnerships between consumers' representatives, brand owners and biobased industries to foster the acceptance and uptake of biobased products to consumer markets, thus creating new biobased value chains.
- Create at least 2 new cross-cutting interconnections in biobased economy clusters.
- Define replicable procedures and good practices leading to the establishment of new cross-sector partnerships and business opportunities and cooperation brands/biobased industries

- Stimulate the multi-stakeholders discussion toward pre-and co-normative research, new standardisation/labelling and emerging co-creation models (B2B and B2C).
- In order to have long-lasting impact on biobased value chains, the project has designed and implemented replicable methodologies, procedures and good practices supporting multi-stakeholders co-creation, leading to new cross-sector partnerships. A replicable model on how to establish, support and valorise the results of the cross-sector partnerships in the biobased economy was developed.
- BIOBRIDGES produced brand new policy papers and recommendations that policy makers, brand owners and researchers can follow to increase consumer awareness. A general public survey conducted on 39 countries provides raw data on consumer awareness and purchasing habits that anyone can use to conduct further research, propose policy changes or launch a communication campaign.



Project results

More information about the project results: <https://www.biobridges-project.eu/> ; <https://cordis.europa.eu/project/id/792236>

The project has established partnerships between brand owners, industries and consumers to foster acceptance and uptake of biobased products to consumer markets, creating new biobased value chains. The implementation of the project led to 15 exploitable assets ready to be adopted and freely available to anyone interested in fostering the bioeconomy (detailed information about the assets can be found in the website <https://www.biobridges-project.eu/>). The results are grouped in 5 categories as follows:

1) Studies, analysis and methodologies

1.1 Identified cooperation challenges among consumers, brand owners and biobased industries

The challenges were identified based on a literature review of relevant studies, market reports, results and conclusions derived from EU-funded projects, followed by 60 semi-structured interviews with representatives from industry, brands, and consumers associations around Europe, aiming to collect insight on the challenges that each stakeholder faces in terms of collaboration with his providers and clients in the value chain, as well as suggestions on how to tackle the barriers and enhance their cooperation towards the market uptake of biobased products.

1.2 Framework and good practices for multi-stakeholders and cross-sector interconnections

18 regional and national bioeconomy-related clusters all over Europe were analysed based on desk research and in-depth interviews with key representatives of clusters. Good practices of multi-stakeholder and cross-sector collaboration were identified. The main focus is on tools for gathering stakeholders representing different group affiliations (research, industry, policy etc.) and less on cross-sectoral collaboration among these groups. Good examples found in terms of concrete outcomes of multi-stakeholder collaboration, innovative and effective engagement tools for fostering multi-stakeholder collaboration, support of start-ups with a clear vision towards sustainability, working groups that bring a wide range of stakeholders and facilitate exchange of knowledge and ideas, collaboration between clusters and regions at national and international level. Cross-sector and multi-stakeholder collaboration is a key factor to foster the growth of the bioeconomy in Europe, but it remains as a major challenge.

1.3 Stakeholders' consultation on cooperation drivers and barriers and hints for improvements

A focus group with 20 experts of the bioeconomy sector was conducted to identify the most marketable biobased application fields, the challenges that affect the collaboration in the value chain, the stakeholders needed to be mobilised and cooperate; and the actions needed in order to strengthen their

collaboration. The experts validated the 'Value chain collaboration challenges model', a map of all existing barriers among brands, biobased industry and consumers. The model enables the identification, structure and visualisation of the challenges inside or outside the value chain (related to the supportive environment); the stakeholders mostly affected/involved (where the challenges are positioned); the additional stakeholders to be involved. The model of the value chain includes 4 key groups of stakeholders i.e. feedstock suppliers, industry & clusters, market (brands/retailers) and consumers (available at <https://www.biobridges-project.eu/en/results/biobridges-value-chain-collaboration-challenges-model/>). The model was validated with experts. It is recommended that in order to address the challenges within the value chain the support of researchers and policy makers ("the supporting environment") is highly required, and strong networks/clusters need to be formed involving all type of actors of the chain.

1.4 BIOBRIDGES' methodology for co-creation events

Unique perspectives on partnerships between biobased industries, brand owners and consumer representatives were gathered during the 24 co-creation events at different geographical levels. Moreover, policy debates took place at local and regional events. The information gathered during these co-creation events constituted the basis of the policy paper created to provide recommendations on how to improve the public acceptance of biobased products and processes at the regional and local level.

1.5 BIOBRIDGES gamified and interactive co-creation experiences

Based on the projects results, a guide was developed with a methodology on how to organise co-creation activities.

2) Communication and awareness campaigns

2.1 Biobased economy awareness toolkit

Visual materials were developed to inform about the benefits of bioeconomy and the positive effects of switching from fossil-based to biobased products.

2.2 #BioHeroes campaign

A campaign was launched for engaging influencer and people committed with sustainability

3) Connections and networking

3.1 Bridge2brands - pitching of sustainable solutions

The Bridge2brands initiative was launched to facilitate the connection and collaboration between biobased industries and brands (identify brands' specific challenges on sustainability and connect them with innovative solution providers working in the biobased sector). The format was validated on two cases: Procter & Gamble and Fiat Chrysler Automotive.

3.2 Bridge2value - fostering connections for value chain generation

Bridge2value format was designed to create cross interconnections among stakeholders of the quadruple helix, and to facilitate the creation of a new value chain. The format was validated on 2 events (country level and European level)

3.3 Synergies and exchange of experience established with other initiatives

The project focused also on the links with other networks and initiatives and setting up favourable conditions for the project's outputs sustainability after its end.

4) Policy papers and recommendations

4.1 Proceedings from co-creation events and policy debates

All the co-creation events organised by BIOBRIDGES at regional, national and European level are comprised in the documents "Proceedings from the European, national and regional co-creation events"

and policy debates” (v.1, v.2, v.3) (available at <https://www.biobridges-project.eu/en/results/proceedings-from-the-european-national-and-regional-co-creation-events/>)

4.2 Policy paper - “Improving the public acceptance of biobased products and processes at the local and regional level”

The policy paper explores on how to effectively put recommendations into practice. The recommendations provide insight on how to improve the public acceptance of biobased products and processes. Good practice examples are listed for each. The recommendations are mainly based on stakeholder feedback received in workshops organised in nine countries across Europe within the project and the results of other European research projects (e.g. BioSTEP, BIOWAYS, Open-Bio). (available at <https://www.biobridges-project.eu/news-events/news/policy-paper/>)

4.3 Good practices, procedures and recommendations for boosting inter-sectorial cooperation

Good practices related to multi-stakeholder and cross-sector interconnections are summarised in the factsheet: Best practices and challenges on multi-stakeholder and cross-sector interconnections (available at <https://www.biobridges-project.eu/en/results/factsheet-best-practices-and-challenges-on-cross-sector-interconnections/>)

4.4 BIOBRIDGES’ action plan for raising consumers’ awareness on bioeconomy and biobased products

The action plan is based on the results of a survey (>1000; 39 countries) and provides guidelines and recommendations that policy makers, brand owners, researchers and other actors can implement to increase consumers awareness (available at <https://www.biobridges-project.eu/results/action-plan-for-raising-consumers-e2-80-99-awareness/>)

5) Data

5.1 Survey for assessing consumers’ awareness on biobased products - raw data

The raw data of the survey on consumer awareness and purchasing habits in the bioeconomy are available at <https://www.biobridges-project.eu/results/biobridges-consultation/> for use by others for research, proposal for policy change or communication campaign.



Lead partner

GLOBAZ, S.A., Portugal



Other partners

The consortium is made up of nine partners from eight different countries: Portugal, Estonia, Greece, Italy, Slovakia, Germany, Croatia and Spain.

CIVITTA EESTI AS (Estonia)

Q-PLAN INTERNATIONAL ADVISORS PC (Greece)

AGENZIA PER LA PROMOZIONE DELLA RICERCA EUROPEA (Italy)

PEDAL CONSULTING SRO (Slovakia)

FVA SAS DI LOUIS FERRINI & C (Italy)

ECOLOGIC INSTITUT Gemeinnützige GmbH (Germany)

PARTICULA GROUP DRUSTVO S OGRANICENOM ODGOVORNOSCU ZA ISTRAZIVANJE

RAZVOJ I PROIZVODNJU (Croatia)

ASOCIACION ESPANOLA DE BIOEMPRESAS (Spain)



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Relevant links

- <https://www.biobridges-project.eu/> ; <https://www.facebook.com/BiobridgesH2020/> ; <https://www.linkedin.com/company/biobridgesh2020/>



Relation to the WG meeting

Bioeconomy value chain, Horizontal

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.

Project 2: ICT Tools in Efficient Biomass Supply Chains for Sustainable Chemical Production - ICT-BIOCHAIN



Source(s)

<https://cordis.europa.eu/project/id/792221>



Funding details

Source of funding: H2020-BBI-JTI-2017
Type of project (+ cluster if relevant): BBI-CSA
Contract number: Grant agreement ID: 792221
Project total budget: € 999 668



Start and end date of the project

01/06/2018- 31/05/2020



Project summary

ICT-BIOCHAIN brings leading experts and support networks to develop Digital Innovation Hubs (DIHs) within ready-made test bed bioeconomy regions to examine opportunities for information and communication technologies (ICT), Internet of Things (IoT) and Industry 4.0. to increase the efficiency of high potential value biomass supply chains.

The specific aims of the project and the performed activities were:

- Establishing multi-actor DIHs for biomass supply chains within the two Model Demonstrator Regions (MDRs). DIHs in both regions were formed following a multi-actor approach including primary producers, biobased industries, and ICT specialists. Several activities were held: launching, knowledge transfer, demonstration and investment events.
- Developing region-specific bioresource data models and providing access within the DIHs to stakeholders for a better knowledge, information and technology to promote opportunities for state-of-the-art technologies to be integrated into biomass supply chains. A database with descriptions of 107 examples of technology solutions and two regional bioresource data models were developed.
- Establishing a user-friendly online platform to allow for wider exploitation of ICT, IoT and Industry 4.0 tools and bioresource data for improving the supply chain efficiency, supporting the growth of the EU bioeconomy by facilitating greater availability of competitively priced biomass for sustainable chemical production. Relevant stakeholders in the EU and beyond were able to access these data from April 2020 and at least until May 2022.

- Developing value chain coalitions of multi-actors through knowledge transfer, dissemination and exploitation activities. A programme for regional transference was established from both DIHs with several activities (above-mentioned). These events provided opportunities for stakeholders from various sectors to meet and discuss their interests, to exploit arising opportunities for cooperation and to explore different financing options.
- Paving the way for replicating DIHs in other EU bioeconomy regions by providing a roadmap training towards replication of DIHs for the biobased sector in Europe and building networks with other bioeconomy regions. The roadmap was shared during a train-the-trainer workshop and the final public event, both supported by e-learning materials.



Project results

More information about the project results can be seen at: <https://cordis.europa.eu/project/id/792221>.

ICT-BIOCHAIN project identified opportunities for using ICT to increase the efficiency of biomass supply chains. An extensive mapping of ICT, IoT and Industry 4.0 solutions and opportunities has been performed resulting in a database (online platform input).

The project platform was developed (<https://bioeconomyfoundation.com/ictbiochain/>), serving as the first-of-its-kind point to store and share the information including: *regional biomass and waste resources* and *the state of the art in ICT*. One of the main outputs of the project was the organisation of the train-the-trainer event. This was done as a virtual event coordinated with STAR-ProBio (Horizon 2020) attracting a wider audience.

The biomass supply chains for sustainable chemical production in bioeconomy regions across Europe was achieved, by being established two digital innovation hubs located in ready-made, test-bed bioeconomy regions: one in *south-east Ireland* that focused on lignocellulose, manures and horticulture value chains, and one in *Andalusia, Spain* that focused on olive, horticulture and algae value chains. Within regions, bioresource data collection enabled the implementation of the biomass arising and composition models.

The consortium consisted of *eight partners from five different European countries*: Finland, Germany, Ireland, Spain and the United Kingdom. The Irish and the Andalusian DIHs (Digital Innovation Hub) were launched in June and July 2019 and both were followed by their corresponding dynamisation activities. More than 50 different organisations related to primary production, tech industry, biobased industry, academia, and policy stakeholders got connected throughout the meetings of the project. ICT-BIOCHAIN fostered collaboration between businesses operating within the biomass supply chain. The project helped in establishing connections and promoting information shared among biomass producers, suppliers, logistics providers, and end-users. This collaboration aimed to optimise biomass logistics, improve decision-making processes, and enhance overall efficiency in the biomass sector. One of the key aspects of ICT-BIOCHAIN was the standardisation of data collection and exchange within the biomass supply chain. By implementing common data protocols and formats, businesses could seamlessly share information across the supply chain. This standardisation aimed to reduce data fragmentation and enhance interoperability among different B2B stakeholders. The ICT platform developed by the project provided real-time data on biomass availability, transport logistics, and storage. This information enabled businesses to optimise their logistics operations, improve supply chain visibility, and minimise costs associated with biomass transportation and storage. The ICT-BIOCHAIN platform provided decision support tools for businesses in the biomass sector. By leveraging data analytics and predictive models, the platform assisted B2B stakeholders in making informed decisions related to biomass resource allocation, waste reduction, and sustainability. The project enhanced overall resource efficiency and promoted sustainable practices within the biomass supply chain.

These digital innovation hubs in both regions were formed following a multi-actor approach that included primary producers, biobased industries and ICT specialists. Several activities were held: knowledge transfer, demonstration and investment events. These events provided opportunities for stakeholders from various sectors to meet and discuss their interests, exploit arising opportunities for cooperation and explore different financing options. Leading experts and support networks also developed region-specific bioresource data models and provided access to stakeholders to acquire best practices, expert knowledge and information. The knowledge and roadmap generated during ICT-BIOCHAIN will be transferred to other bioeconomy regions building capacity across Europe. In addition, platform business model strategies were defined, focusing on identifying the most suitable archetypes considering the platform prototype and its “first-of-its-kind” online tool. ICT-BIOCHAIN implemented participatory methodologies to actively involve stakeholders in decision-making processes and project activities. The project fostered collaboration, knowledge sharing, and co-creation among stakeholders. By engaging stakeholders directly, the project ensured that the developed ICT solutions aligned with their requirements and addressed their specific challenges.

The project had relevance and potential benefits for small and medium-sized enterprises (SMEs) within the biomass sector. Here's how ICT-BIOCHAIN supported and impacted SMEs:

- *Enhanced Efficiency:* The project improved the overall efficiency of biomass supply chains through the integration of ICT solutions. This benefited SMEs by streamlining their operations, optimising logistics, and reducing costs. By leveraging digital tools and data-driven insights, SMEs improved their resource allocation, minimised waste, and enhanced productivity within their biomass-related processes.
- *Access to Information:* ICT-BIOCHAIN provided SMEs with better access to relevant information throughout the biomass value chain. The ICT platform enabled SMEs to access real-time data on biomass availability, transport logistics, and market trends. This information helped SMEs make more informed decisions about biomass sourcing, processing, and distribution, improving their competitiveness in the market.
- *Collaboration Opportunities:* The project fostered collaboration among stakeholders within the biomass sector, including SMEs. The ICT platform created a space for SMEs to connect and collaborate with other actors in the value chain, such as biomass producers, suppliers, logistics providers, and end-users. This collaborative environment offered SMEs opportunities for partnerships, knowledge sharing, and access to new markets or business opportunities.
- *Decision Support Tools:* The ICT platform provided decision support tools specifically tailored for SMEs. These tools assisted SMEs in making data-driven decisions related to biomass resource allocation, waste reduction, and sustainability. By leveraging the capabilities of the ICT platform, SMEs could enhance their decision-making processes and improve the overall effectiveness of their biomass-related operations.
- *Regulatory Compliance Support:* ICT-BIOCHAIN have provided support and guidance to SMEs in understanding and complying with relevant regulations and standards. This assistance helped SMEs navigate the complex regulatory landscape and ensure compliance within their operations.



Lead partner

CONSEJERIA DE AGRICULTURA ,PESCA, AGUA Y DESARROLLO RURAL, Spain



Other partners

Countries represented by partners: 7 partners from 5 different countries: Spain, Ireland, Finland, Germany, UK
FUNDACION CORPORACION TECNOLOGICA DE ANDALUCIA (Spain)

IRISH BIOECONOMY FOUNDATION (Ireland)
MUNSTER TECHNOLOGICAL UNIVERSITY (Ireland)
TEKNOLOGIAN TUTKIMUSKESKUS VTT OY (Finland)
FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
(Germany)
SUSTAINABLE INNOVATIONS EUROPE SL (Spain)
UNIVERSITY OF STRATHCLYDE (United Kingdom)



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Relevant links

- <https://www.corporaciontecnologica.com/en/quienes-somos/que-es-cta/>
- <https://www.corporaciontecnologica.com/en/area-internacional/proyectos-europeos/ictbiochain/>
- <https://www.bioeconomy-library.eu/project/ict-biochain/>



Relation to the WG meeting

Bioeconomy value chain, Chemical

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.

Project 3: Support and PartnERship for the development of multiple sustainable and market ready value chains in the BIObased economy – SUPERBIO



Source(s)

<https://cordis.europa.eu/project/id/691555>



Funding details

Source of funding: H2020-EU.2.3, H2020-EU.2.3.2
Type of project (+ cluster if relevant): IA
Contract number : Grant agreement ID: 691555
Project total budget: € 3 638 272,68



Start and end date of the project

01/06/2016- 31/03/2019



Project summary

SUPERBIO focuses on the biobased economy. This emerging economy relies on the use of biomass (e.g. plants, waste) as renewable raw material for the production of new or existing products. The technologies used are a combination of biochemistry, biotechnology, chemistry and processing technology. The cluster coordinating SUPERBIO (GBEV) has already more than three years' experience in building new biobased economy value chains at regional level and is active in European projects aimed at supporting SMEs to bring innovations to the market. The consortium consists of three cluster organisations specialised in the biobased economy from regions with synergetic smart specialisations, four highly skilled and experienced SME intermediates considered as important opinion makers in the biobased economy and two cross-sectorial SMEs regarded as specialists in their respective activities. The biobased economy goes along at least 19 different industrial sectors. The project aims at constructing and validating new value chains providing the SMEs in the new value chains the tools to convince investors to contribute to building new emerging industries or to generate improved processes or products. SUPERBIO will create a comprehensive open collaboration space-based on the combined network of all partners, an idea validation procedure and a complementary innovation support program. Specifically, we expect to identify 10 validated value chains. With an average of three SMEs per value chain, this would result in providing support to about 30 SMEs or 10 SME groups. Our approach ensures the validation of sustainable and commercially viable value chains. The output of this project will lead to the

implementation of new value chains, the production of drop-in chemicals and products the production of new chemicals and products with improved features and can lead to investments in dedicated industrial production sites.

SuperBIO objectives are:

1. creating open collaboration spaces for SMEs
2. identifying new industrial value chain concepts
3. constructing highly promising, disruptive and sustainable new industrial value chains
4. providing a diverse, stepwise and comprehensive innovation support program that enables to efficiently and optimally validate the new value chains and to bring them closer to the market.



Project results

More information about the project results <https://cordis.europa.eu/project/id/691555>

The SUPERBIO project aimed to accelerate the transition towards a biobased economy by supporting the development of sustainable and commercially viable value chains. By fostering collaboration between academia, industry, and other stakeholders, SUPERBIO sought to create new biobased products and processes with reduced environmental impact.

The project SUPERBIO achieved the following results:

- The project successfully implemented 42 value chains involving multiple stakeholders from 19 EU and associated countries. This demonstrated the efficiency and sustainability of the value chain building process in SUPERBIO.
- Out of 60 applications, 37 companies received innovation services, resulting in the development of 37 new technologies, processes, or products in the biobased sector.
- SUPERBIO developed 49 support plans, one for each value chain, to bring the value chains closer to the market. A total of 72 detailed service offers were made by service providers, with 54 being selected by SMEs for further support. The value chain building process engaged 137 stakeholders, including 41 additional SMEs and 48 large enterprises.
- The project resulted in the development, optimisation, or scaling up of 21 new processes, including four for converting food waste. Additionally, eight new biobased chemicals, seven agrochemicals, five biobased materials, seven food ingredients, and two feed ingredients were developed.
- SUPERBIO supported SMEs in leveraging additional funding and attracting private investors. Several companies secured investments and funding during the project, while others expected it in the next two years after the end of the project. The project made a measurable contribution to innovation performance, knowledge acquisition, turnover increase, and employment growth among supported SMEs.

Overall, the SUPERBIO project played a crucial role in advancing the biobased economy by supporting the development of sustainable value chains, providing business coaching, conducting sustainability assessments, analysing markets and policies, and promoting collaboration and knowledge exchange among stakeholders. Through its efforts, SUPERBIO aimed to accelerate the commercialisation and adoption of biobased innovations, contributing to a more sustainable and resource-efficient future.



Lead partner

FLANDERS BIOBASED VALLEY, Belgium



Other partners

The consortium is made up of 12 partners from six different countries: Belgium, Poland, France, Spain, United Kingdom, and Germany.

POLITECHNIKA LODZKA (Poland)

INSTITUT NATIONAL DE RECHERCHE POUR L'AGRICULTURE, L'ALIMENTATION ET L'ENVIRONNEMENT (France), INRAE TRANSFERT SAS (France)

FUNDACION CORPORACION TECNOLOGICA DE ANDALUCIA (Spain)

BIO BASE EUROPE PILOT PLANT VZW (Belgium)

THE NATIONAL NON FOOD CROPS CENTRELBG (United Kingdom)

NOVA-INSTITUT FUR POLITISCHE UND OKOLOGISCHE INNOVATION GMBH (Germany)

PATERGRUS BVBA (Belgium)

CERATIUM LIMITED (United Kingdom)

GILL JENNINGS & EVERY LLP (United Kingdom)

BCNP CONSULTANTS GMBH (Germany)



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Relevant links

- <https://nova-institute.eu/project/superbio/>



Relation to the WG meeting

Bioeconomy value chain, Chemical

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.

Project 4: Towards growth for business by flexible processing in customer-driven value chains – INSPIRE



Source(s)

<https://cordis.europa.eu/project/id/723748>



Funding details

Source of funding: H2020-EU.2.1.5, H2020-EU.2.1.5.3
Type of project (+ cluster if relevant): CSA
Contract number : Grant agreement ID: 723748
Project total budget: € 495 065



Start and end date of the project

01/09/2016- 31/08/2018



Project summary

INSPIRE aims at increasing the competitiveness of European manufacturing which depends on producing differentiated and high added value products in an efficient and sustainable manner, with reduced production costs, increased product quality, minimised time to market and optimised strategies towards resource efficiency. The main focus of this project is the development of innovative business models creating flexible networks through the use of intensified processing that would promote more local production in Europe within the five years after the end of this study. The project takes an interesting and valuable approach by bringing together the (downstream) manufacturing ("Factory of the Future") community with the (upstream) process industry (SPIRE) community, as well as regional industrial clusters (parks) to study required changes of business models in Europe, due to a.o. 1) further integration of these industries in the value chain leading to more flexible and demand driven business operation and 2) increased trends towards resource sharing and optimisation across multiple process industries (e.g. through industrial symbiosis within regional contexts such as industrial parks). Special attention will also be given to how this approach would be responding to the needs of SMEs as partners in value chains. Expected outcome of this project would be the description of the current European landscape and link between intensified processing and flexibility, development of innovative business models for different sectors in general, and providing a guideline to measure the performance of such novel models under different scenarios.

INSPIRE objectives are:

1. Understanding the major drivers and requirements for more flexible and demand-driven sustainable manufacturing and processing
2. Deriving how these drivers and requirements for more flexible, demand-driven and sustainable operations and intensified processing will shape the future manufacturing and process industries and what kind of business models it would necessitate.
3. Define the research needs and formulate an industry supported roadmap for the development of ambitious but realistic transition of industry to adopt the proposed business model solutions.
4. Develop replication strategies and KPI-based methodology to stimulate evaluation and benefits taking up new developed business models



Project results

More information about the project results <https://cordis.europa.eu/project/id/723748>.

The results of the INSPIRE project included the following aspects:

- The INSPIRE project aimed to enhance business growth through flexible processing in customer-driven value chains. The project focused on developing innovative technologies, tools, and business models to promote flexibility and competitiveness in European manufacturing.
- The project successfully developed innovative production systems that are modular and adaptable to changing customer demands. These systems enable companies to easily reconfigure their production processes and optimise resource utilisation based on specific customer requirements.
- INSPIRE focused on the development of advanced sensing and monitoring technologies that provide real-time data on production processes. These technologies enable companies to gather accurate information about production performance, quality, and resource utilisation. This data can be used to identify areas for improvement and make data-driven decisions to enhance efficiency.
- The project developed data analytics tools that enable companies to analyse and interpret the data collected from production processes. These tools facilitate predictive and prescriptive analytics, helping businesses optimise their operations, identify patterns, and make informed decisions to improve productivity and customer satisfaction.
- INSPIRE emphasised the importance of adopting new business models and strategies to promote flexibility in customer-driven value chains. The project identified collaborative networks, knowledge sharing, and rethinking traditional approaches as key elements for success. By embracing these new models, companies can create value propositions that align with customer needs and achieve sustainable growth.
- INSPIRE addressed policy and regulatory aspects related to flexible processing in value chains. The project provided recommendations and guidelines to policy makers and regulatory bodies to create a favourable environment for the adoption of flexible processing technologies. This ensures that legal and regulatory frameworks support the implementation of innovative solutions.
- The implementation of the INSPIRE project outcomes has the potential to enhance the competitiveness and sustainability of European businesses. By adopting flexible processing technologies, companies can respond more efficiently to customer demands, reduce production costs, and gain a competitive edge in the global market. This contributes to economic growth and job creation in Europe.



Lead partner

PNO INNOVATION, Belgium



Other partners

The consortium is made up of 4 partners from 4 different countries: Belgium, Spain, Netherlands, and Italy.

FUNDACION ZARAGOZA LOGISTICS CENTRE (Spain)

NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO (Netherlands)

CONSIGLIO NAZIONALE DELLE RICERCHE (Italy)



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Relevant links

- <https://www.pnoconsultants.com/be/>

Relation to the WG meeting

Bioeconomy value chain, Horizontal

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the final report.

Project 5: A circular economy approach for lifecycles of products and services – CIRC4Life



Source(s)

<https://cordis.europa.eu/project/id/776503>



Funding details

Source of funding: H2020-EU.3.5.; H2020-EU.3.5.4
Type of project (+ cluster if relevant): IA
Contract number : Grant agreement ID: 776503
Project total budget: € 7 228 773,75



Start and end date of the project

01/05/2018- 31/10/2021



Project summary

The project's overall aim was to develop and implement a circular economy approach for sustainable products and services through their value and supply chains.

The project objectives include:

- develop three new circular economy business models that underpin new services based on performance/functionality.
- support the realisation of the business models through development of a vendor-neutral, open source-based information logistical infrastructure.
- demonstrate the economic and environmental feasibility of the new circular economy business models and exploit EU eco-innovative solutions in electrical and electronic and farming/agri-foods sectors.
- provide support for end-users to be actively involved in developing, testing and implementing the circular economy models, by awareness raising and knowledge sharing in effective ways.
- make effective impacts on designing new sustainable products and services by creating new markets, shortening supply chain length, reducing consumption of resources and materials, and recovery of raw materials from waste electrical and electronic equipment (WEEE).
- communicate and disseminate the project's activities and results to stakeholders, EU decision makers and wider communities in effective ways such as conferences and workshops, exhibitions, and association networks.
- produce cross-cutting policy recommendations on circular economy, based on the integration of lessons learnt in conducting this project, which is aligned with European Circular Economy package.



Project results

More information about the project results: <https://cordis.europa.eu/project/id/776503> ; <https://www.circ4life.eu/>

Main results are:

(1). Development of three new circular economy business models (CEBMs) that aim to engage consumers in the transition towards a circular economy:

- CEBM 1: Co-creation of products and services - Co-creation is an underlying methodology to integrate stakeholder feedback in the development of a new products and services. It includes product design specification with eco-constraints, sustainable production scoping, environmental and social LCA, eco-point method and eco-accounting platform, online LCA and impact assessment tool, consumer and supply chain interaction, and production by integration of sustainable design and manufacturing tools/methods. This business model aims to bring end-users closer to the design and manufacturing phases by identifying consumer preferences and needs. It also foster an improved understanding of interactions between the different actors of the supply chain.
- CEBM 2: Sustainable consumption - The circular business model for driving sustainable consumption aims to deliver accountable, eco-oriented processing along the value chain, from producer to consumer. By presenting the customer with options and the right methodology to assess the environmental impact of products, this model enables the consumer to make a more sustainable decision. The model also provides a traceability solution to monitor a product's sustainability along the value chain and supports end-users and stakeholders to actively implement the circular economy via awareness raising and knowledge sharing activities. It includes eco-shopping, sustainable consumption awareness and informative campaign, big-data method for online mining consumer views, and consumer satisfaction survey. A tool was developed to boost recycling and reuse with an ICT system by means of intelligent bins, trace ability technique and an ICT platform, and awareness campaigns regarding circular economy principles in schools.
- CEBM 3: Collaborative recycling and reuse - This collaborative model is based on a user-friendly waste collection system and aims to put citizens at the heart of the process. It includes a strategy of reuse and recycling for agri-food sector based on food waste and for electric and electronic equipment such as tablets and LED lamps, method to calculate eco-credits, incentive schemes for reducing/reuse/recycling. The owner of the business model will develop a collection system for sorted residues by involving all stakeholders: citizens, but also municipalities, businesses and companies exploiting waste. The recycling is supported by a free smartphone app, a traceability module and an eco-credits incentives scheme, which rewards citizens for sorting their waste and recycling reusable or repairable items.

The business models were demonstrated and piloted by partners in two industrial sectors: electronics and farming/agri-foods (LED Lighting Products; meat supply chain; computer tablets; vegetable farming) over several months. The demonstration was conducted through the product lifecycles and supported by the ICT platform developed in the project. Implemented demo activities have been preceded by Living Lab (LL) testing activities.

Consumer groups, stakeholder groups, and their interactions in the planned demonstration scenarios were examined with regard to the necessary information for the three CEBMs design and those processes were identified that could contribute sustainable demonstrators' development. Three surveys were conducted to uncover ways to engage consumers in the circular eEconomy: 1. Attitudes to reuse and

recycling practices and product End-of-Life information; 2. Consumers' attitudes and understanding on the eco-point calculation and their presentation method; 3. Consumer's feedback and preferences to sustainable lighting products.

(2) Development of an ICT platform for implementing the CEBMS, and related databases and services provision, access management layer, integration activities with traceability module, recycling module and end-user applications. Provision of support to all the partners on technical aspects and quality management of the project, a simplified marketplace to be used by the project participants and possibly external stakeholders, and a matchmaking logic into the brokerage system based on the maturity level of the stakeholder in circular business models.

(3). Development of traceability solutions for implementation of the CEBMs, including EPCIS method for capturing traceability data of eco-impacts in product lifecycle. Design and development of core EPCIS tools, capture services to collect process data into EPCIS events, data models and interfaces between the traceability components as well as with the ICT platform and improved peer to peer Data Access Model to enable access control to the EPCIS data. Implementation of the developed tools into the CEBMs and validation of the traceability solutions.

(4). To support the development of the CEBMS, in addition to the ITC platform and traceability solutions, a set of living lab activities have been conducted, involving a large number of end-users and stakeholders along product supply chain. The first Innovation Camp was organised with over 80 participants of high-level CE experts.

The involved companies went through an iterative learning process together with all other partners to build up their supply chains interactions by applying the Living Lab approach. Each demonstrator illustrates that this process leads to eco-innovation providing significant environmental impact reductions. This can be related to increased resource efficiency as well as to improved energy efficiency.

(5). A plan has been made for demonstration of the CEBMs in industrial sectors of lighting products, vegetable farming and food, meat supply chain and recycling/reuse of tablets. The project outcome has been disseminated and communicated to the public and a wide range of external parties. The exploitation plan has also been developed.

(6) Informative and Awareness Campaign for sustainable consumption. Activities to increase awareness about the importance of migrating from linear to circular economy: online handbooks; awareness session dedicated to public administration, business and consumers; a brief mock-up module version for sustainable consumption of food)



Lead partner

THE NOTTINGHAM TRENT UNIVERSITY, United Kingdom



Other partners

The consortium is made up of 17 partners from eight different countries: United Kingdom, Sweden, Spain, Germany, Poland, Belgium, Finland, Greece

ENVIRO DATA (Sweden)
JONATHAN MICHAEL SMITH (UK)
KOSNIC LIGHTING LIMITED (UK)

CENTRE OF RESEARCH FOR ENERGY RESOURCES AND CONSUMPTION (Spain)
 EUROPEAN EPC COMPETENCE CENTRE GmbH (Germany)
 THE INSTITUTE FOR ECOLOGY OF INDUSTRIAL AREAS (Poland)
 SWEREA IVF AB (Sweden)
 MAKE MOTHERS MATTER EU DELEGATION (Belgium)
 ONA PRODUCT SL (Spain)
 INDUMETAL RECYCLING SA (Spain)
 GS1 GERMANY GMBH (Germany)
 LAUREA UNIVERSITY OF APPLIED SCIENCE (Finland)
 CENTRE FOR EUROPEAN POLICY STUDIES (Belgium)
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Relevant links

- <https://www.circ4life.eu/> ; https://www.youtube.com/channel/UCjyybbG1Fq7GQJ_VE-kbGJQ ; <https://twitter.com/Circ4L> ; <https://www.linkedin.com/company/circ4life-eu/> ; <https://www.facebook.com/CIRC4Life/> ; <https://www.instagram.com/circ.4life/?hl=en>



Relation to the WG meeting

Bioeconomy value chain, Horizontal

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the final report.

Project 6: EU network of regions on sustainable wood mobilisation ready for digitalisation – ROSEWOOD4.0



Source(s)

<https://cordis.europa.eu/project/id/862681>



Funding details

Source of funding: H2020-EU.3.2.; H2020-EU.3.2.1.1; H2020-EU.3.2.1.3.; H2020-EU.3.2.2.3.; H2020-EU.3.2.4.1.; H2020-EU.3.2.1.4.; H2020-EU.3.2.1.2.
Type of project (+ cluster if relevant): CSA
Contract number : Grant agreement ID: 862681
Project total budget: € 2 047 901,25



Start and end date of the project

01/01/2020- 30/06/2022



Project summary

The ROSEWOOD4.0 project aimed to address the challenges in sustainable wood mobilisation and digitalisation within the European forestry industry. Through the implementation of regional hubs and digital tools, the project sought to bridge knowledge gaps and create new opportunities for economic partnerships.

ROSEWOOD4.0 builds on the well-established ROSEWOOD network of regional hubs connecting multiple actors along the forest value chain to reinforce the sustainability of wood mobilisation in Europe. The new action will especially reinforce and enlarge the links with Eastern Europe by creating a new Eastern Hub including new countries (Poland, Slovakia, Ukraine). Secondly, the action puts special emphasis on digitalisation (forestry industry 4.0) and digital tools (social media, platforms, e-learning) for training and coaching, enabling practitioners to share know-how with much wider impact. The focus on ICT addresses the two main challenges in wood mobilisation: 1) better access to resources through defragmentation of forest owners and 2) increased volume to the market and higher transparency. The project's extensive dissemination of best practices, technological and non-technological innovations and research results feeds directly into national and regional Agriculture Knowledge and Innovation Systems (AKIS) in forestry and builds an efficient interface with the EIP-AGRI and the EIP Raw Materials, supported by the European networks European Forest Institute (EFI) and InnovaWood. The multi-actor action closes knowledge gaps, connects and transfers tangible knowledge and best practice between forestry practitioners across the whole Europe. In an open innovation environment, the coordination of regional hubs also facilitates new opportunities for exploitation of near to market innovations and fosters business partnerships between stakeholders, aligned with local and regional development plans, to complement existing or initiate new Operational Groups within the EIP-AGRI. ROSEWOOD4.0 will contribute to

enhanced competitiveness of the forest industry and to vital development in rural areas within the European bioeconomy by responding to the imminent need for broader sharing of ICT-driven solutions in forestry.

ROSEWOOD4.0 connected actors to address and find answers to the main challenges in the field by putting a focus on digital solutions, tools, and corresponding knowledge transfer actions. By creating adapted materials and sharing knowledge on technological and non-technological best practices, ROSEWOOD4.0 helped to close the knowledge gaps and create new opportunities for economic partnerships. ROSEWOOD4.0 focused on the tailored transfer of practical knowledge that supports stakeholders in exploiting Best Practices and Innovations (BP&I) and facilitates the capture of innovative ideas. The project also provided practitioners with developed skills (educational and entrepreneurial), leveraging the uptake of new ideas in daily business. To allow wider dissemination and use, ROSEWOOD4.0 addressed 'digitalisation' as a transversal theme by developing digital dissemination and training tools supporting the implementation of BP&I (online knowledge platform, Massive Open Online Courses - MOOCs, B2B training materials, factsheets, videos, etc.) but also aiming at connecting stakeholders in an open-innovation environment. The consortium identified, shared and disseminated BP&I with a focus on facilitating uptake through the development of new collaborations. The project's actions were implemented via five Wood Mobilisation Regional Hubs (South-West, South-East, North, Central-East and Central-West Europe) providing greater opportunities for European forestry and wood-using industries by aligning their activities with local and regional development plans.



Project results

More information about the project results: <https://cordis.europa.eu/project/id/862681/results>

The ROSEWOOD4.0 project successfully addressed key challenges in the forestry industry by focusing on digital solutions, knowledge transfer, and the dissemination of best practices and innovations. Through the development of adapted materials and the sharing of technological and non-technological knowledge, ROSEWOOD4.0 closed knowledge gaps and created new economic partnership opportunities. The project prioritised the transfer of practical knowledge, empowering stakeholders to effectively utilise best practices and innovations and fostering the generation of innovative ideas. The project's emphasis on digitalisation led to the creation of various dissemination and training tools, such as an online knowledge platform, Massive Open Online Courses - MOOCs, B2B training materials, and videos, which facilitated wider adoption of best practices and innovations. By establishing collaboration networks and fostering new partnerships, ROSEWOOD4.0 ensured the efficient uptake of best practices and innovations.

The main aim of the ROSEWOOD4.0 project is to collect suitable content about best practices and Innovations (BP&I) in the field of sustainable wood mobilisation and digitalisation. The main objective is to speed up cross-regional learning and fertilisation about best practices and the latest managerial, social and technological innovations, especially digital solutions facilitating sustainable wood mobilisation. The main specific outputs of the project were:

- Multi-lingual knowledge platform containing 279 factsheets (project fiches for BP&I) based on selected BP&I (15 European languages). A main goal of the ROSEWOOD4.0 project is to develop and set up an open online knowledge repository that is widely accessible, easy to read and understandable by the target groups in the forest sector. The final platform will serve as an open repository, which means that any stakeholder can access the information and submit new BP&I to be published on the platform via an online upload form ('factsheet'). Such external submissions will be reviewed and approved before publication by an editorial team, which includes experts from the five Hubs and related partners, to cover a vast range of countries and topics. It notably builds on the structure of a BP&I factsheet dataset with defined fields that

contain all essential descriptors, classification codes and references. The factsheets exist both as HTML pages and as exportable PDF files that can be generated on the fly. Additional references use DOIs and active links.

- 3 complete Massive Open Online Courses - MOOCs (trailers, video lectures, webinars and podcasts) around digitalisation in forestry available in 13 European languages
- 5 Regional roadmaps for knowledge transfer between regions and 1 cross-regional roadmap for international collaboration. Throughout Europe, the challenges for a sustainable wood mobilisation are diverse and often a lack of specific knowledge leads to non-ideal solutions. Against this background, the ROSEWOOD4.0 project has initiated five regional Hubs throughout Europe bringing together 21 partners from 18 countries to steer the interregional knowledge transfer on sustainable wood mobilisation: Northern Europe: Finland, Sweden, Norway, Baltic countries, Denmark; Central-West Europe: Germany, Belgium, France, Switzerland, Austria; Central-East Europe: Czech Republic, Hungary, Poland, Romania, Slovakia, Ukraine; Southern-West Europe: Spain, Italy, Portugal and South of France; Southern-East Europe: Bulgaria, Croatia, Greece, Slovenia. These five communities will facilitate wood mobilisation through mutual learning across European regions. The roadmaps represent the collection, the analysis and strategic direction of the results from the five hub regions including their validation. The main objective of the roadmaps on hub level is to strengthen the regions through transfer of the gathered knowledge, experiences and circumstances. With the accurate description and assessment of well-functioning best practices and innovations as inputs, there is an active support in strengthening the local wood value chain development thanks to newly developed digital tools. Further, the roadmaps enhance cooperations by increasing interactions between stakeholders and regions for creating opportunities to initiate further and new developments.
- More than 25 workshops for knowledge transfer and collaborative work (validation & business idea creation workshops) and 16 study visits
- 8 implementation groups for practical knowledge transfer of selected BP&I
- Dissemination materials around best practices (more than 32 videos, 100 EIP-AGRI practice abstracts, 3 dissemination notes, etc.)



Lead partner

STEINBEIS INNOVATION GGMBH, Germany, Research organisation



Other partners

Countries represented by partners: 21 partners from 18 countries: Belgium, Finland, Austria, France, Switzerland, Germany, Croatia, Slovenia, Greece, Spain, Italy, Portugal, Ukraine, Poland, Romania, Slovakia, Sweden, Norway

STEINBEIS 2I GMBH - Germany

INNOVAWOOD ASBL - Belgium

EUROPEAN FOREST INSTITUTE - Finland

HOLZCLUSTER STEIERMARK GMBH - Austria

CENTRE NATIONAL DE LA PROPRIETE FORESTIERE - France

BERNER FACHHOCHSCHULE - Switzerland

Ministerium für Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-

Westfalen - Germany

CENTAR KOMPETENCIJA DOO ZA ISTRAZIVANJE I RAZVOJ - Croatia
 GOZDARSKI INSTITUT SLOVENIJE - Slovenia
 CLUSTER VIOOIKONOMIAS KAI PERIVALLONTOS DYTIKIS MAKEDONIAS - Greece
 FUNDACION CENTRO DE SERVICIOS Y PROMOCION FORESTAL Y DE SU INDUSTRIA DE CASTILLA Y LEON - Spain
 AIEL ASSOCIAZIONE ITALIANA ENERGIE AGROFORESTALI - Italy
 INSTITUTO SUPERIOR DE AGRONOMIA - Portugal
 FORZA AGENCY FOR SUSTAINABLE DEVELOPMENT OF THE CARPATHIAN REGION NONPROFIT ORGANISATION - Ukraine
 SIEC BADAWCZA LUKASIEWICZ - INSTYTUT TECHNOLOGII DREWNA - Poland
 ASOCIATIA KO-FA - Romania
 NARODNE LESNICKE CENTRUM - Slovakia
 LAPIN AMMATTIKORKEAKOULU OY - Finland
 LUONNONVARAKESKUS - Finland
 THE PAPER PROVINCE EKONOMISK FOERENING - Sweden
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Relevant links

- <https://rosewood-network.eu/>
- <https://www.youtube.com/@rosewood4.0network98>
- <https://www.linkedin.com/in/rosewood-network-2b9682165/>
- <https://twitter.com/networkrosewood>



Relation to the WG meeting

Bioeconomy value chain, Wood

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.

Project 7: Advanced Eco-designed Fibres and Films for large consumer products from biobased polyamides and polyesters in a circular Economy perspective – EFFECTIVE



Source(s)

<https://cordis.europa.eu/project/id/792195>



Funding details

Source of funding: H2020-EU.3.2.; H2020-EU.3.2.6.1.
Type of project (+ cluster if relevant): IA
Contract number : Grant agreement ID: 792195
Project total budget: € 11 790 447,58



Start and end date of the project

01/06/2018- 28/02/2023



Project summary

The EFFECTIVE project intends to demonstrate first of its kind and economically viable routes for the production of biobased polyamides and polyesters from sustainable renewable feedstock for the obtaining of fibres and films with enhanced properties, market competitiveness and increased sustainability. Such materials will be applied into eco-designed large consumer products targeting different markets, i.e. construction, automotive, primary and secondary packaging and textile and with the potential of being applied into many other markets (fishing, engineering plastics, agriculture, hygiene and personal care).

Following a circular economy approach, the sustainability of the value chains will be further enhanced by the demonstration of an improved end-of-life of the developed eco-designed biobased solutions through the application of monomer regeneration, recycling (for polyamides based fibres and films) and composting/anaerobic digestion (for polyesters based films) processes. The idea that “the end is a new beginning” will indeed drive the product’s design and realisation.

The project covers the whole value chain: feedstock production, conversion into innovative biobased building blocks through biotechnological and chemical processes, formulation of innovative biobased polymers (polyesters and polyamides), final products development, end-of-life products management and processing.

The project intends to represent a key milestone towards the future industrialisation of biobased fibres and films production in Europe foreseeing the mobilisation of relevant investments by involved industry partners and fostering the adoption of multi-stakeholders collaboration models to demonstrate effective ways to develop new cases of biobased economy interconnected with circular regenerative economy joining environmental sustainability and economic profitability.

In the last years, all industrial sectors have been experiencing an increasing wave of sustainability, mainly as a result of consumers' demand for greener materials and products, as well as of good practices that reduce the waste generation and the carbon footprint of entire value chains. The recent COVID-19 pandemic has likely reinforced this trend, highlighting the importance of sustainable production models that are decoupled from the use of non-renewable resources, and whose impact on the environment is limited at the most.

A few main topics have arisen during the last months, changing the market scenario: firstly, the limits of the traditional economic model, with many global supply chains facing bottleneck on the procurement of raw materials; secondly, the price of fossil-based derivatives hitting record high and pushing higher the price of polymer too; thirdly, force of major experienced by many refineries in the world, that have further pushed high the price of fossil derivatives.

In this scenario, the biobased sector represents the driving force for the sustainable recovery of the EU economy. This is particularly true when biobased economy meets circular economy: the establishment of regional economic models to produce biobased products through a direct link between the primary sector (and its products) and industrial activities which traditionally rely on fossil resources (e.g. production of chemicals, plastics, etc.) should also ensure that those products that are manufactured from renewable resources do not find their way to landfill or incineration, but they enter a close loop system where they never become waste.

This is the approach of project EFFECTIVE, which aims at establishing a bridge between biobased economy and circular economy by demonstrating the production of innovative biobased polyamides and polyesters from sustainable feedstock and their validation into large consumers products (i.e. garments, carpets, films for food and non-food packaging applications). The project will also establish circular models of biobased economy, where the targeted biobased products at the end of their useful life will not become waste, but valuable raw materials to be fed into regeneration, recycling or composting processes that enable to close the loop in the material cycle



Project results

Starting from the production of suitable renewable feedstock, the process to simultaneously produce 1st & 2nd generation sugars was validated and optimised at lab scale, and was further upscaled to pilot scale. The fermentability of the obtained sugars was validated via preliminary fermentation trials. In parallel, additional sources of vegetable oil from the food industry and the Ho.Re.Ca. sectors such as used cooked oil (or waste oil) were explored for the preparation of biobased dicarboxylic acids.

These feedstocks have been then used in the production of innovative biobased monomers through chemical and biotechnological processes: biobased caprolactam was successfully produced at pilot scale with quality suitable for its further polymerisation, while high-quality di-carboxylic acids have been produced at pilot scale and purified through innovative downstream processes.

These monomers were then converted in biobased polyamides and biobased & biodegradable polyesters. The first-ever batches of biobased Nylon 6 were successfully produced at pilot scale, while large scale samples of biobased specialty polyamides have been manufactured both at pilot and industrial scale. The synthesis of novel grades of biobased & biodegradable polyesters and biomaterials with increased renewable content was also demonstrated at large scale.

Biobased polymers and biomaterials were validated in the production of different products by also applying eco-design principles. Biobased polyamides were successfully spun and reprocessed into

bulk continuous filament (BCF) and Nylon textile filament (NTF) yarns for application into fabric and carpet prototypes production. While biobased specialty polyamides and biodegradable biomaterials (based on biobased polyesters) were successfully used in the manufacturing of several films (for food and non-food applications) via cast extrusion lines and blow extrusion lines.

In parallel, eco-design guidelines were applied to carpet manufacturing, and preliminary recycling trials were carried out delivering promising results. Also, biodegradation and disintegration trials, as well as home composting trials of biomaterials, have delivered positive results.

For the sustainability aspects, a dedicated webtool for LCA/LCC was set up and preliminary assessments on manufacturing processes of some products/biomaterials have been conducted. In the framework of S-LCA and social aspects, the most relevant social topics related to EFFECTIVE were identified through a materiality analysis, and a dedicated survey to collect information from stakeholders and improve the social acceptance of the biobased products has been elaborated in seven languages and launched. In parallel, a review of the main standards related to biobased products, the carpet and the textile sector was carried out.

Though the COVID-19 pandemic has certainly affected dissemination activities, significant efforts in communication and stakeholder involvement activities was carried out: the project has been presented at 42 different events or initiatives, and several communications tools have been developed and used to promote the project at different levels. Along with dissemination activities, the evolution of the market scenario in response to the pandemic is being evaluated, paving the way to the development of the business plan in the next reporting period. Concerning exploitation and results management, the Key Exploitable Results were listed and characterised.

Within the first 36 months of the project, the following innovations were developed and validated at pilot scale, and activities towards their scale up are already started: i) process for the simultaneous production of 1st & 2nd generation sugars via sugar beet liquefaction; ii) processes (both upstream and downstream) to obtain high quality biobased dicarboxylic acids from new sources of sugars and oils; iii) innovative bio polyesters and compostable biomaterials based on aforementioned dicarboxylic acids suitable for non-food packaging applications; iv) an innovative process to produce biobased Nylon six starting from sugars; v) the production of innovative specialty polyamides from biobased raw materials; vi) the production of yarns from the biobased polyamides and their validation in the manufacturing of fabric and carpet prototypes; vii) the production of films for food and non-food applications from biobased specialty polyamides and biodegradable biomaterials, respectively; viii) eco-design guidelines for manufacturing more recyclable garment and carpet products; ix) assessment of the effectiveness of eco-design measures through recycling trials.



Lead partner

AQUAFILSLO PROIZVODNJA POLIAMIDNIH FILAMENTOV IN GRANULATOV DOO, Slovenia, Private for-profit entities



Other partners

Countries represented by partners: 15 partners from 7 countries: US, Croatia, Italy, Germany, France, Sweden, Spain, Slovenia

GENOMATICA INC - US

AQUAFILCRO DOO - Croatia

AQUAFIL SPA - Italy

TESSILQUATTRO S.P.A. - Italy

NOVAMONT SPA - Italy

MATER-BIOPOLYMER SRL - Italy

SUDZUCKER AG - Germany

CARVICO SPA - Italy
VAUDE SPORT GMBH & CO KG - Germany
BALSAN SAS - France
HENNES & MAURITZ GBC AB - Sweden
BIO-MI DRUSTVO S OGRANICENOM ODGOVORNOSCU ZA PROIZVODNJU,
ISTRAZIVANJEI RAZVOJ - Croatia
FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS
ENERGETICOS - Spain
LIFE CYCLE ENGINEERING SPA -Italy
CIRCULAR CHANGE, INSTITUT ZA KROZNO GOSPODARSTVO - Slovenia



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Relevant links

- <https://effective-project.eu/>
- https://twitter.com/EFFECTIVE_BIO
- <https://www.linkedin.com/showcase/project-effective/>



Relation to the WG meeting

Bioeconomy value chain, Biopolymers

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.

Project 8: Underpinning the vital role of the forest-based sector in the Circular Bio-Economy - WoodCircus



Source(s)

<https://cordis.europa.eu/project/id/820892>



Funding details

Source of funding: H2020-EU.3.5, H2020-EU.3.5.3.
Type of project (+ cluster if relevant): CSA
Contract number: 820892
Project total budget: € 2 973 953,75



Start and end date of the project

01/11/2018- 31/12/2021



Project summary

The main goal of the WoodCircus is to increase knowledge, raise awareness and improve conditions for uptake of resource-efficient processing and recycling in wood-based value chains, fostering increased competitiveness of the European woodworking sector. WoodCircus identifies, evaluates, and disseminates outstanding good practices in process efficiency, wood waste collection, management, and recycling in the woodworking value chains in Europe with a focus on construction with wood. Achieving a thorough evaluation of the overall system's performance and a validation of the most relevant transferable solutions, WoodCircus produces sound, critical evidence and tangible decision-support information for market actors, stakeholders, and policy makers. WoodCircus establishes a well-integrated network between wood processing industries and the waste management sector engaging excellence for future-oriented joint promotion of the wood sector in the circular bioeconomy. WoodCircus implements the EU Action Plan for the Circular Economy and the EU Bioeconomy Strategy targets ensuring intelligent utilisation of forest resources and sets up an interface to the EC Raw Materials Information System and the JRC Bioeconomy Knowledge Centre. WoodCircus major outcomes are:

- Good practice database
- Open competition on individual good practice showcases and awards to SMEs
- Performance and sustainability assessment
- Validated best performing supply chain typology for broad transfer
- RDTI plan wood industries towards the circular economy
- White paper including policy recommendations and communication strategies
- WoodCircus Network, established on solid commitments from partners and stakeholders for follow-up beyond the project lifetime. WoodCircus is based on a balanced mix of leading RTO

and companies with proven expertise all along the woodworking and construction value chains including waste valorisation and associations at local, national and international level

WoodCircus is addressing the challenges and opportunities related to the process efficiency and wider uptake of circular economy in the woodworking value chains in Europe with the aim to enhance the wood construction sector and improve environmental, economic and societal sustainability. With its enormous economic and social significance for the European Union (18 million direct jobs, approx. 9% of the Union's GDP), the construction sector is nonetheless one of the biggest sources of waste in volume terms and only one third of waste wood is currently being recycled. Moreover, there are great differences between the member states in wood recycling performance, technology readiness and in legal, policy and socioeconomic framework. Clear and in-depth profiles have been developed for four macro-regions in Europe. Industrial innovations on circular economy are supported by identifying, evaluating and disseminating the identified transferable good practices in process efficiency, wood waste collection, management and recycling in the woodworking value chains in Europe. Achieving a thorough evaluation of the overall system's performance and a validation of the most relevant transferable solutions, the project produces sound, critical evidence and tangible decision support information for market actors, stakeholders and policy makers. Enhancing conscious management of forest resources fosters increased competitiveness of the European woodworking sector as well as sustainable growth and well-being in the EU. To sustain the European exchange and market uptake solutions, the project establishes a well-integrated network of the key existing stakeholders, notably between wood processing industries, the waste management sector and the RDTI (Research, Technology Development and Innovation) community.



Project results

The WoodCircus project closely examined the state of circular practice in the woodworking industries through various mechanisms: literature reviews, analysis of existing regulations, data collection from workshops and stakeholder interviews, and a pan-European Open Call for innovative practices in SMEs. These fact-finding activities have resulted in an extensive compilation of the current state of the art of recovery and recycling processes, and organisation of value chains in different European regions, accompanied by a comprehensive SWOT analysis by region, and a preliminary identification of best practices. That review resulted, in part, **in the identification of several good practices**. Some are company specific (those from the 3W Factor), while others are synthesised from various inputs (those in the Good Practice Catalogue, available at <https://doi.org/10.32040/woodcircus-gpc> and at <https://woodcircus.eu/index.php/publications/>).

The WoodCircus consortium was formed by *seventeen partners* from *seven European countries*: France, Slovenia, Germany, Spain, Italy, Finland, and Belgium, consisting of research and technology institutes, private sector companies, industrial associations, and interest groups. Furthermore, the WoodCircus project has a large number of external stakeholders from the EU and third countries supporting WoodCircus activities, which further expands the geographical scope of the project.

In terms of business models, WoodCircus developed and implemented **circular business models**, based on 'recycling and reuse' concepts. New business models that supplant those based on a linear economy were needed to transform the woodworking industries. Transitioning between linear and circular models and operations requires greater collaboration between companies, consumers, and regulators to ensure businesses, people, and society all benefit from circular products and materials. Examples of circular business models approached within the project: circular supply models; sharing models; product life extension models; product service systems models; resource recovery models.

These circular business models launched the call for new employee profiles, providing opportunities for new careers in the woodworking industries.

A pool of more than 70 identified case studies (i.e. value chains) have been assessed using a trialled and validated set of criteria and indicators for efficient processing and recycling operations. In a two-step selection process, the most promising candidates (24 cases) were identified for a good practice analysis and for further environmental and social analysis using Life Cycle Assessment (LCA). The general framework for the upcoming LCA has been outlined including definitions, settings, impact categories and system boundaries for the best practice candidates and their value chains. In the medium and long term, the project results and concluded strategies are thought to create added value and new jobs and increase the overall competitiveness of the EU woodworking industries and related value chains through uptake of resource-, water and energy-efficient solutions. Based on the fact-finding, evaluation and validation of best transferable practices, a European good practices catalogue represents one of the major outcomes of the project. This database is a thorough documentation of the state of the art, including an active interface to the European Commission's Raw Materials Information System (RMIS) and the Bioeconomy Knowledge Centre (BKC). Information provided by the catalogue, combined with the elaborated best-performing supply chains typology and the RTDI plan for wood industries towards the circular economy, contributes to achieving a higher resource efficiency and wood waste recycling rates in public and private sectors, and an improved knowledge of EU stakeholders about identified challenges, opportunities and proposed solutions.

Building on positions and statements of various stakeholders, WoodCircus activities result in a detailed policy paper and distilled policy brief (the "Wood Circus White Paper"), which lead to better informed decision-making on wood recycling and resource efficiency at the EU, national and local levels in the private and public sectors.

The consortium was composed to cover all the relevant wood-based value chain actors of the construction industry, side stream utilisation and cascading, varying from typical woodworking sub-sectors (sawmilling, wood-based panels, builders' carpentry, joinery, prefabricated element and house manufacturing, furniture, flooring, packaging and other wooden articles) to more refined value chain actors (construction planning and building design, wood product, construction and demolition waste management and recycling, valorisation of wood wastes).

All consortium partners have utilised their existing, extensive networks and databases in order to communicate the project effectively. Event-specific stakeholders and participants, as well as the open call participants and support letter signatories complement the stakeholder database including all relevant target groups. It has been used for invitations to workshops and events, specific announcements, and dissemination of project results.

Enhancing conscious management of forest resources fosters increased competitiveness of the European woodworking sector as well as sustainable growth and well-being in the EU. Considering the progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project), WoodCircus strengthened the acceptance of secondary wood sources as raw materials among businesses and consumers. Communication activities will continue to promote the use of wood-based products in different markets, especially the construction area, and point to effective options for a higher resource efficiency based on the project results.

The WoodCircus project focused on providing assistance, resources, and opportunities specifically tailored to SMEs operating within the wood industry. Here are a few ways the WoodCircus project potentially supported SMEs:

- *Networking and Collaboration:* The project facilitated networking events, workshops, conferences where SMEs got connected, collaborated, and shared knowledge and experiences with each other. This helped foster partnerships, exchange best practices, and promote synergies among SMEs in the wood industry.

- *Access to Markets:* The project enhanced SMEs' access to domestic and international markets by providing them with market needs, trade promotion activities, or matchmaking services.
- *Innovation and Research:* The WoodCircus project focused on promoting research and innovation within the wood industry, supporting SMEs in developing and implementing new technologies, processes, or products. This helped SMEs stay competitive, improve their offerings, and adapt to changing market demands.
- *Funding and Resources:* The project provided information and guidance on funding opportunities, grants, and financial support available to SMEs in the wood sector.

In addition, in the context of the 3W Factor, the WoodCircus project has challenged the wood sector SMEs with an open call. The 3W Factor addresses companies in the wood construction value chain and challenges them to prepare and implement advanced solutions for innovations in **wood processing**, **wood recycling**, and **wood reuse** for resource efficiency and value chain optimisation.



Lead partner

TEKNOLOGIAN TUTKIMUSKESKUS VTT OY, Finland



Other partners

Countries represented by partners: 17 partners from 7 countries: France, Slovenia, Germany, Spain, Italy, Finland, Belgium:

INSTITUT TECHNOLOGIQUE FCBA (FORETCELLULOSE BOIS-CONSTRUCTION AMEUBLEMENT) (France)

INNORENEW COE CENTRE ODLICNOSTI ZA RAZISKAVE IN INOVACIJE NA PODROCJU OBNOVLJIVIH MATERIALOV IN ZDRAVEGA BIVANJSKEGA OKOLJA (Slovenia)

NOVA-INSTITUT FUR POLITISCHE UND OKOLOGISCHE INNOVATION GMBH (Germany)

FUNDACION TECNALIA RESEARCH & INNOVATION (Spain)

CONSORZIO DEL MOBILE SCPA (Italy)

LUONNONVARAKESKUS (Finland)

INNOVAWOOD ASBL (Belgium)

SAHATEOLLISUUS RY (Finland)

XILOPAN SPA (Italy)

ALFA NATURA NACRTOVANJE INZENIRINGDOO (Slovenia)

ASOCIACION DEL SECTOR FORESTAL - MADERA DE EUSKADI BASKEGUR (Spain)

CONSORZIO NAZIONALE PER LA RACCOLTA IL RECUPERO E IL RICICLAGGIO DEGLI IMBALLAGGI DI LEGNO (Italy)

EGOIN SA (Spain)

FOREST-BASED SECTOR TECHNOLOGY PLATFORM (Belgium)

FEDERATION EUROPEENNE DE PANNEAUX A BASE DE BOIS (Belgium)

VEOLIA PROPLETE (France)

S.A.I.B. SOCIETA AGGLOMERATI INDUSTRIALI BOSI SPA (Italy)



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Relevant links

- <https://woodcircus.eu/index.php/about/>
- <https://fi.linkedin.com/in/anne-christine-ritschkoff>



Relation to the WG meeting

Bioeconomy value chain, Wood

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.

Project 9: Investing in Renewable Energies for Agriculture – AgroRES



Source(s)

<https://projects2014-2020.interregeurope.eu/agrores/>



Funding details

Source of funding: Interreg Europe
Type of project (+ cluster if relevant):
Contract number:
Project total budget: € 1,540,286.00



Start and end date of the project

01/08/2019- 31/07/2023



Project summary

The agricultural sector accounts for almost 10% of greenhouse gas emissions in the EU, mainly for food production and transport. While there is an enormous potential to produce renewable energy on farms due to the availability of wind, sun, biomass and agricultural waste, important barriers and challenges still remain. Recent studies have proven that the main barriers identified by farmers to produce renewable energy are: complex permit and subsidy procedures, high investment costs, limited access to credit and doubts about profitability. Subsidies and feed-in tariffs are a key factor in encouraging farmers to shift towards a more environmentally friendly production and use of energy.

The EU's rural development policy helps the rural areas meet economic, environmental and social challenges, and it shares objectives with other ESIF funds. MS and regions draw up their rural development programmes based on the needs of their territories, and addressing some of the common EU priorities. At least 30% of funding for each RDP must be dedicated to measures relevant for the environment and climate change.

The main objective is to develop measures that encourage the production and use of renewable energy (RE) in the agricultural and rural sector. AgroRES will support this sector by solving its energy needs in a sustainable, economic viable and socially responsible way. AgroRES raises awareness of the benefits of investing in renewable energy in agriculture and promotes public dialogue in order to overcome previously identified barriers and challenges. As a result of the project, partner regions will design policies that support the use of renewable energy in agricultural and rural areas.



Project results

More information about the project results: <https://projects2014-2020.interregeurope.eu/agrores/library/>

The first three years of AgroRES project have been full of interregional learning, exchange of knowledge and sharing learnings from other regions in own region. Phase 1 of AgroRES project ended on 31 July 2022. After phase 1, one year of phase 2 continues until 31 July 2023.

During phase 1, AgroRES partners have identified 70 good practices and published good practices guide for disseminating good practices to wider audience interested in advancing renewable energy (These examples demonstrated the feasibility of renewable energy communities in rural areas, emphasising the collaboration between the public sector and citizens to reduce fossil fuel usage). The partners have compiled 7 regional self-assessment documents on potential of renewable energy in their region. They have organised five interregional events in Spain, Ireland, Finland, the UK and Italy. From all the interregional learning partners have drawn inspiration for action plans in their regions.

Thanks to the project, each AgroRES partner has designed their action plan, which will that support the integration of renewable energy technologies that are best suited for each agricultural and rural area. The action plans will be implemented during the project's second phase and provide details on how the lessons learnt from the cooperation will be implemented, in order to improve the policy instrument addressed within the region. These documents specify the nature of the actions to be carried out, their timeframe, the stakeholders involved, the costs and the funding sources. The action plans are the key documents elaborated throughout the project which integrates conclusions from the regional self-assessment regarding the use of renewable energies in rural areas, the lessons learnt from the stakeholders' participation in project activities, and the exchange of knowledge achieved through different project activities and events. All this will develop in long-lasting results and impacts in the region.

As part of the learning process, AGENEX has been elaborating a guide and a road map to be used as a tool to make the municipal representatives of Extremadura aware of the versatility and potential of this collaborative formula between citizens, companies and institutions that can generate important benefits for the local economy and, at the same time, important positive impacts on the social and environmental surroundings of the rural regions of Extremadura. In order to understand the legal forms, AGENEX has elaborate a pre-feasibility study 1 that analyses the possibility of integrating community energy projects in rural municipalities. The action plan is focused on the implementation of new energy communities, with shared ownership of renewable energy installations, with the collaboration of public entities and citizen participation. To this end, in the one-stop shop (SICAREx) that has recently been established to advise citizens on energy efficiency and renewable energies, and thanks to the AgroRES project, a specific section will be created that will encompass all grants and/or financing mechanisms that seek to promote the creation of new energy communities. The development of this tool will promote renewable energy communities, which will encourage the use of renewable energies in the rural sector of Extremadura. In addition, AGENEX will be able to monitor the progress and development of these new communities.

(https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1659505595.pdf)

The Lubelskie Voivodeship is a Local Government Unit and at the same time the Managing Authority of the Regional Operational Programme. The scope of activities also includes the development and implementation of strategies, development plans and programmes for the entire region. This gives the possibility of a real influence on the shape of the provisions, on the definition of long-term development directions and the indication of specific objectives of activities. Updating one of the main documents made it possible to change the content and introduce provisions specifying activities in the scope covered in the AgroRES project, concerning renewable energy sources in agriculture and in rural areas and supporting bottom-up initiatives.

Thanks to all these activities, the employees participating in the project significantly improved their professional competences in the field of renewable energy sources in agriculture and rural areas, as well as the principles of operation of energy cooperatives and energy clusters. The best model for disseminating this knowledge in the region should now be worked out. There is no energy agency operating in the Lubelskie Voivodeship, so the establishment of a consultation point as part of the Marshal's Office will allow for information activities on the voivodeship level. The term "consultation point" will not refer to a physical place of functioning, but rather define the performance of its function.

Regarding Lazio, the action plan provides a technical, financial and administrative assistance service to the rural communities of Lazio through a helpdesk set up by Arisial with the aim of creating new energy communities.

Some actions are preparatory to the helpdesk service. Therefore, the action plan is divided into the following sub-actions:

1. Digital implementation of a help desk containing separate sections (administrative-technical-financial);
2. Identification and designation of a pool of experts able to respond to the needs of the constituent Energy Communities through the AgroRES Help Desk;
3. Information and meetings in presence or through webinars to make known the new form of support represented by the AgroRES Help Desk;
4. Providing the actual support service through the AgroRES Help Desk
5. Monitoring of the results of the support action in relation to the setting up of new Energy

(https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1657616571.pdf)

The Romanian action plan targets the development of support services to facilitate accessing ROP funds. The regional services will provide to key local actors, practical information on most relevant financing sources and innovations in the field, with their positive effects on the profitability of the organisations but also on the environment. It will also provide guidance and support to farmers regarding the steps required by the entire process of installation and operation of the facilities but will also provide information on accessing European funds to support these investments. By bringing to the fore the benefits of sustainable energy use, but also by presenting specific technological information and different types of renewable energy production facilities, the transferability of know-how in the region will be supported, creating the premises for the development of this phenomenon.

The action proposed will also contribute to the improving of the policy instrument addressed by creating, through the regional services, the competition environment that will allow new projects dealing with this thematic to be proposed for financing under BI ROP 2021 - 2027. (https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1657873431.pdf)

The AgroRes action plan for North Karelia targets an improved governance of funding renewable energy projects in the field of renewable energy in agriculture and rural area in line with the revised and updated climate and energy programme and its implementation plan. This action will be monitored during phase 2 for quantifiable measures in increasing use of renewable energy and reducing greenhouse gas emissions through new projects in the subject area starting in North Karelia. These projects will also act as examples of renewable energy advancement for different agricultural and rural actors and individuals in the region. (https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1657873497.pdf)

The action plan for Devon Region supports the use of renewable energy in the agricultural sector through the means of community-ownership and new business models. To be able to complete this action and achieve its objective, the following activities (or sub-actions) were implemented by the DCC AgroRES team:

- 1.1- Develop a Synthetic Power Purchase Agreement (SPPA) business plan and secure backing of DCC and other public sector organisations in Devon to enter into the SPPA with a community energy organisation. The aim will be to develop sufficient demand (c.100GWh) that installations of renewable energy totalling 100 kWp are developed on low-grade, agricultural land.

1.2 - Develop a community-owned energy storage and solar PV installation sited on a dairy farm. The aim will be to deliver at least one demonstration site on the DCC farms estate using the business plan to secure approvals and investment. (https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1659087538.pdf)

The aim of the action plan for Ireland-Northern & Western Region is to support increased uptake of renewable energy technologies in the agricultural and rural sectors, by addressing these key challenges. The resulted actions are:

1. Revision and amendment of the Northern & Western Regional Spatial & Economic Strategy (RSES) 2020-2032 through the monitoring of RES projects in farming sector
2. Establishment new Energy Agency service in the Northwest region to provide a broader long- term support for energy projects and initiatives (https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1659331939.pdf).

Overall outputs of the AgroRes project: 3,8 M€ Structural funding influenced; 1,4 M€ Regional funding influenced; 100 people with increased professional capacity; 37 policy learning events; 1 guide on good practices on RE in agricultural areas; 7 self-assessment documents of the situation of RE in agriculture; 7 action plans to improve 7 policy instruments



Lead partner

Extremadura Energy Agency, AGENEX (ES)



Other partners

Eight partners from seven European regions (Spain, Poland, United Kingdom, Finland, Romania, Italy and Ireland) exchange experiences and know- how on renewable energy investments. The partnership consists of public organisations that have an interest to develop their regional development policies and Structural Fund or other funding programmes in such a way that they support the use of renewable energy in agricultural and rural sector more effectively.

LUBELSKIE VOIVODESHIP (Poland)

DEVON COUNTY COUNCIL (United Kingdom)

REGIONAL COUNCIL OF NORTH KARELIA (Finland)

BUCHAREST-ILFOV REGIONAL DEVELOPMENT AGENCY (Romania)

ARSIAL (Italy)

INSTITUTE OF TECHNOLOGY, SLIGO (Ireland)

NORTHERN AND WESTERN REGIONAL ASSEMBLY (Ireland)



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- Communication: Tanja Kähkönen, tanja.kahkonen@pohjois-karjala.fi



Relevant links

- [https://projects2014-2020.interregeurope.eu/agrores/;](https://projects2014-2020.interregeurope.eu/agrores/)
[https://www.facebook.com/InterregAgroRES/;](https://www.facebook.com/InterregAgroRES/) [https://twitter.com/AgroRESproject;](https://twitter.com/AgroRESproject)
<https://www.linkedin.com/company/agrores/>



Relation to the WG meeting

Agri-residues (Renewable energy)

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.

Project 10: EMAS as a Nest to Help And Nurture the Circular Economy – ENHANCE



Source(s)

<https://projects2014-2020.interregeurope.eu/enhance/>



Funding details

Source of funding: Interreg Europe
Type of project (+ cluster if relevant): Environment and resource efficiency
Contract number: -
Project total budget: € 1,238,416.00



Start and end date of the project

01/01/2017- 31/12/2020



Project summary

ENHANCE supports public authorities to identify and implement incentives for organisations to adopt Eco-Management and Audit Scheme (EMAS) as a tool for resource efficiency in the context of the transition towards a circular economy.

Organisations, large and Small and Medium-sized enterprises (SMEs) are increasingly aware of the benefits of closing loops by improving resource efficiency: saving material costs, creating competitive advantages and new markets are among the main reasons for organisations to take action. At this respect, the Eco-Management and Audit Scheme (EMAS) is considered as a driver of the circular economy by encouraging organisations to develop techniques which make better use of resources in the production phase and retain physical goods longer and more efficiently in productive use, thus increasing their competitiveness. Starting from these considerations, ENHANCE project's overall objective is to improve the implementation of regional policy instruments oriented to increasing the efficiency of resources by the exchange of experiences and practices on supporting EMAS registration.

Main barriers perceived by EMAS adopters are: lack of EMAS recognition from the market and Public Authorities (PA), technical support from PA and external incentives; high cost, etc. In this regard, the role of PA supporting EMAS as a competent body becomes essential in order to remove these barriers and to encourage organisations to adopt EMAS through various means, such as reducing the technical barriers for EMAS adoption, enhancing benefits derived from EMAS, public subsidies and rewarding EMAS implementers with reduced enforcement (e.g., regulatory relief). Derived from the activities to be carried, such expected changes shall become effective upon the production of these main outputs: 1) Regional Studies on supporting EMAS registration 2) Methodology to assess the feasibility of good practices on supporting EMAS registration 3) EMAS Joint Database. 4) Thematic workshops to exchange experiences 5) Regional Studies on the exchange process 6) Toward EMAS action plans. Main beneficiaries from the cooperation will be PA, but direct effects resulting from the project will also affect organisations as EMAS adopters



Project results

More information about the project results:

<https://projects2014-2020.interregeurope.eu/enhance/library/>

ENHANCE is one of the 67 Interreg Europe projects working on the Environment and resource efficiency, one of the four programme topics. ENHANCE focuses on the environmental performance management and is dealing with the EU Eco- Management and Audit Scheme (EMAS). EMAS is an instrument developed by the European Commission for companies and other organisations to evaluate, report, and improve their environmental performance.

ENHANCE has reported policy improvements and changes in six European regions represented in the project. Thanks to the project, they have been able to improve governance in areas related to regulatory reliefs and promotional incentives for EMAS organisations, and in green public procurement.

ENHANCE has brought the knowledge about EMAS to many regions in Europe and can be useful also in promoting circular economy models through EMAS application also in regions, in which the scheme has not been established yet.

The project has developed actions aimed at helping organisations to identify the added value of a resource efficiency management and the competitive advantage that EMAS registration can have, especially for SMEs. ENHANCE results are ensured by the improvement of regional policies over which it

has had an influence. ENHANCE contributes to a better EMAS governance through further integration of EMAS into certain regional and national legal frameworks. Below are summarised the action plans, results, indicators and lessons learnt in the Interreg Europe ENHANCE project that has been carried out for 4 years of work.

In the project, 24 Good practices on supporting EMAS has been identified and validated by the Policy learning Platform experts. This 24 Good Practices are available at the project website. (<https://projects2014-2020.interregeurope.eu/enhance/good-practices/>). The 24 Good Practices has proved to be successful in a region and are of potential interest to other regions. Of these 24 GPs, 11 have been included in the good practice database of the Policy Learning Platform, a collection of 'expert-validated' good practices available at the following link (<https://projects2014-2020.interregeurope.eu/enhance/library/>)

At the end of the 2nd year of the project, each partner has established an action plan with five actions, in the case of SEI (Stockholm Environment Institute) in Estonia, their action plan has included six actions. Partners have defined per each action, the sub actions, the related policy instrument and other possible policy instruments affected (and their geographical coverage), the responsible and main features of the policy instrument and the stakeholders involved. For the purpose of monitoring the implementation of the action plans, partners have also defined the responsible organisation for the implementation of each sub action and the deadlines. The implementation of action plans has also included the definition of a specific communication action in order to ensure an effective impact of the actions carried out.

For the purpose of the ENHANCE project, 12 regulatory reliefs and promotional incentives were taken into account:

- Fast-track permits/simplification in the application
- Extension of validity of permits/authorisations
- Reduced reporting and monitoring requirements
- Reduced inspections frequencies
- Self-declaration in the procedure of extension of a permit
- Self-declaration in the procedure of achieving a new permit
- Modification in the scope of a permit
- Green Public Procurement (GPP)
- Credit access and Funding support
- Tax breaks
- Reduction of administrative fees
- Reduction of financial guarantees

Most of the actions are transversal in nature and therefore apply to all or several sectors of economic activity (9 actions) or in a slightly more specific way to companies that provide products and services to public administrations (7 actions). But there are also actions specifically focused in the industry sector (7 actions, one of which linked to the Environmental Impact Assessment procedure) or in the waste sector (2), and single actions addressed to the construction, maintenance and waste sector, aquaculture, healthcare, organisations operating in the packaging sector and public administration. The majority of actions have been successfully implemented, but due to the coronavirus pandemic, some actions faced delays in their implementation, and two of them will not be able to be implemented at the moment.

Other output project indicators and achievements are the following: methodology to assess the feasibility of good practices on supporting EMAS reg, regional studies.



Lead partner

Ministry of Territory and Sustainability of the Government of Catalonia (MTS), Spain



Other partners

Six partners from five EU countries (Spain, Italy, Estonia, Austria, Czech Republic) have been involved in the project:

MINISTRY OF TERRITORY AND SUSTAINABILITY, GOVERNMENT OF CATALONIA (Spain)
 MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND SUSTAINABLE DEVELOPMENT
 REGIONAL GOVERNMENT OF ANDALUSIA SANT'ANNA SCHOOL OF ADVANCED
 STUDIES (Spain)
 STOCKHOLM ENVIRONMENT INSTITUTE TALLINN CENTRE (Estonia)
 CENIA - CZECH ENVIRONMENTAL INFORMATION AGENCY (Czech Republic)
 ENVIRONMENT AGENCY (Austria)



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Relevant links

- <https://projects2014-2020.interregeurope.eu/enhance/>
https://twitter.com/enhance_eu?ref_src=twsrc%5Etfw%7Ctwcamp%5Eembeddedtimeline%7Ctwtterm%5Escreen-name%3Aenhance_eu%7Ctwcon%5Es2
- <https://keep.eu/projects/18839/EMAS-as-a-Nest-to-Help-And-EN/>



Relation to the WG meeting

Circular economy, Horizontal

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.

Project 11: Consumer driven Production: Integrating Innovative Approaches for Competitive and Sustainable Performance across the Mediterranean Aquaculture Value Chain – PerformFISH



Source(s)

<https://cordis.europa.eu/project/id/727610>



Funding details

Source of funding: H2020-EU.3.2.3; H2020-EU.3.2

Type of project (+ cluster if relevant): CSA

Contract number : Grant agreement ID: 727610

Project total budget: € 7 045 060,74



Start and end date of the project

01/05/2017- 31/10/2022



Project summary

Gilthead sea bream and European sea bass are by volume the third and fourth most farmed fish species in the EU, while their collective value surpasses that of salmon, trout or mussel. These two species are farmed and contribute significantly to wealth and job creation in rural and coastal areas in all EU Mediterranean countries. However, production of sea bream/bass in the EU has remained stagnant for the last decade and the industry faces significant sustainability challenges.

The overarching objective of PerformFISH is to increase the competitiveness of Mediterranean aquaculture by overcoming biological, technical and operational issues with innovative, cost-effective, integrated solutions, while addressing social and environmental responsibility and contributing to “Blue Growth”. PerformFISH adopts a holistic approach constructed with active industry involvement to ensure that Mediterranean marine fish farming matures into a modern dynamic sector, highly appreciated by consumers and society for providing safe and healthy food with a low ecological footprint, and employment and trade in rural, peripheral regions.

PerformFISH brings together a representative multi-stakeholder, multi-disciplinary consortium to generate, validate and apply new knowledge in real farming conditions to substantially improve the management and performance of the focal fish species, measured through Key Performance Indicators.

At the core of PerformFISH design are, a) a link between consumer demand and product design, complemented with product certification and marketing strategies to drive consumer confidence, and b) the establishment and use of a numerical benchmarking system to cover all aspects of Mediterranean marine fish farming performance. Created knowledge and innovative solutions will underpin the developed code of conduct and good practices and will foster modernisation through capacity building of the Mediterranean aquaculture workforce.

Specific Objectives

Scientific and Technical

- To develop customised genomic tools for marker-assisted selection, validate and apply them in on-going industrial breeding programmes
- To validate novel larvae rearing protocols based on early programming strategies that exploit species maximum biological capacity and improve juvenile quality
- To determine optimal product quality and performance metrics for different stages of the production cycle, construct growth trajectory curves to predict performance and establish management tools to improve production predictability
- To develop sustainable, cost-effective fish feeds to meet the updated nutritional requirements for consumers and markets throughout the production cycle and support enhanced growth performance, robustness and welfare
- To optimise feed management through advanced modelling and technology development and to estimate cage biomass in production systems
- To advance epidemiological mapping and molecular tools to implement a multidisciplinary integrated diagnostic approach, and to test and validate effective preventive measures (vaccines, prophylactics, nutraceuticals) to reduce mortalities and alleviate negative impacts of stressors
- To establish a validated framework of Operational Welfare Indicators
- To combine new knowledge on marker-assisted selection, rearing practices, feeding strategies and disease management into integrated efficient industrial solutions applicable across the complex production landscape of European Mediterranean Marine Fish Farming (MMFF)

Benchmarking and Certification

- To establish a quantitative benchmarking system based on Key Performance Indicators (KPIs) to cover all aspects of the MMFF performance and to serve as an effective management tool
- To establish a framework for a European juvenile quality certificate
- To develop a code of conduct, implement good practices, and effectively communicate them to raise consumer awareness and advocate social and environmental responsibility
- To ensure the PerformFISH project legacy resonates beyond the funded duration of the project by drawing-up and implementing common MMFF strategic actions and measures

Consumer and Society

- To capitalise on the existing fish food health claims and design innovative and smart marketing actions to address consumer desires and market needs, thereby increasing confidence in the activities and products of the MMFF industry
- To construct a generic branding framework for a "Made in EU" MMFF product label to accommodate the standards of product quality, environmental and social responsibility
- To carry out capacity building activities (targeting technical, vocational and tertiary levels) that ensure transfer of best practice, create conditions for uptake and application of competitive knowledge by the MMFF, and build a competent, versatile workforce contributing to Blue Growth
- To effectively link to the relevant EU policy frameworks (Common Fisheries Policy, BLUEMED Initiative, Marine Strategic Framework Directive), contributing knowledge and recommendations for appropriate policy making in relation to marine aquaculture development.



Project results

More information about the project results <https://cordis.europa.eu/project/id/727610/results>

The project "Consumer driven Production: Integrating Innovative Approaches for Competitive and Sustainable Performance across the Mediterranean Aquaculture Value Chain," also known as PerformFISH, aims to improve the performance, sustainability, and competitiveness of the Mediterranean Marine Fish Farming (MMFF) sector. The project focuses on two key species, sea bream (SBG) and sea bass (BSS), which are important for the EU-Med countries in terms of wealth creation and job opportunities.

The project has made significant progress in various areas. A genomic tool called the Med_FISH array was developed and successfully validated for both BSS and SBG, used to study the heritability of resistance to diseases, feed efficiency, and morphology, among other factors. Collaboration with hatcheries across the Mediterranean helped identify and validate quality indicators for eggs, larvae, and juveniles. A biobank was created, and molecular markers were identified to assess the quality of SBG larvae. A real-time monitoring system based on histopathological indicators was developed to support hatchery production quality. PerformFISH has also focused on disease prevention and control strategies, including the development and validation of novel vaccines. Reports and guidelines were created to address health risks, diagnostics, treatments, and welfare indicators for the industry. The project has worked towards sustainable and optimised feeds by formulating cost-effective fish feeds with reduced fishmeal and fish oil content. Protocols for using low fishmeal and fish oil diets were developed, along with a system for total fish biomass estimation. To ensure the practical application of innovative solutions, PerformFISH conducted extensive demonstration and validation activities in operational environments across the Mediterranean. Key Performance Indicators (KPIs) were identified, validated, and adopted by Producers Associations. The PerformFISH-KPIs Virtual Research Environment (VRE) was developed to manage and analyse data related to KPIs, providing insights into the performance and efficiency of MMFF companies. The project also aimed to develop innovative marketing strategies for SBG and BSS products from the MMFF sector. Market analyses, consumer surveys, and marketing strategies were conducted for Italy, Spain, Greece, France, Germany, and the UK. A revised Code of Conduct based on scientific knowledge and European policies was prepared.

PerformFISH has utilised various communication tools to promote the project and its results, including videos, factsheets, newsletters, social media channels, press releases, and articles. Training has been provided to students and aquaculture professionals, generating qualified scientists and disseminating knowledge in health management, feeding strategies, and KPI benchmarking. The project has gone beyond the state of the art by impacting KPIs, genomic selection, juvenile quality, fish disease management, feeds and nutrition, and consumer-oriented production.



Lead partner

University of Thessaly (UTH)



Other partners

Countries represented by partners:

PANEPISTIMIO THESSALIAS (UNIVERSITY OF THESSALY) (Greece)
 UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA (Spain)
 ASOCIACION EMPRESARIAL DE ACUICULTURA DE ESPANA (Spain)
 AQUANARIA SL (Spain)
 SONRIONANSA SL (Spain)
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 INTERNATIONAL ORGANISATION FOR THE DEVELOPMENT OF FISHERIES AND
 AQUACULTURE IN EUROPE (Denmark)
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Relevant links

- <http://performfish.eu/>



Relation to the WG meeting

Bioeconomy value chain, Blue

Overlaps and gaps in the content compared to the other projects

An integrated analysis is presented in the report.