SCALE UP
community-driven
bioeconomy development

SCALE-UP Information Package

T2.4 Review and preparation of existing scientific and technological information supporting bio-based solutions

Region:	Mazovia
Organization:	Unimos
Biomass stream/value chains:	Agri-food side streams and residues (e.g. apples, pepper)
Bio-based solutions:	1.Biocircular Farm 2.Apple pomace innovation

This information package aims at reviewing and collecting information relevant to the SCALE-UP project and for the regional platforms. Relevant studies should aim at supporting the bio-economy rollout in the SCALE-UP regions and of the specific bio-based solutions.

Information on the following topics will be gathered:

1. EU Policies and legislation
2. Research projects
3. Local policies
4. Technical Information on specific biobased solutions
5. Biomass availability & Nutrient recycling

1. EU Policies & Legislation

EU policies and legislation relevant to the SCALE-UP project and bio-based solution.

Other sources of interest:	JRC Knowledge Centre for Bioeconomy (English)	JRC Knowledge Centre for Bioeconomy (Polish)

List of important EU policies and legislation

	Date	Name	Link	Translation link (English → Polish)	Summary of contents	Relevance to the SCALE-UP project	Relevance to the specific bio-based solutions
1	02-2012	**EU bioeconomy strategy**	https://op.europa.eu/en/publication-detail/-/publication/edace3e3-e189-11e8-b690-01aa75ed71a1/language-en/format-PDF/source-149755478	https://op-europa-eu.translate.goog/en/publication-detail/-/publication/edace3e3-e189-11e8-b690-01aa75ed71a1/language-en/format-PDF/source-149755478?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	The 2012 European Bioeconomy Strategy paved the way for a more innovative, resource-efficient and competitive society that reconciles food security with the sustainable use of renewable resources for industrial purposes, while ensuring environmental protection. A comprehensive review concluded that it has been a success, notably at mobilising research and innovation, boosting private investments, developing new value chains, promoting the uptake of national bioeconomy strategies and involving stakeholders.	The EU bioeconomy strategy aims at strenghtening and scaling-up bio-based sectors, as well as deploying local bioeconomies across Europe. Through: -The deployment of the bioeconomy will lead to the creation of jobs, especially in rural areas through the growing participation of primary producers in local bioeconomies. -The bioeconomy strategy sets as one of its main goals to support research and innovation and deployment of innovative solutions for the production of new and sustainable bio-based products. -A Strategic Deployment Agenda will be developed, which will provide a long-term vision on pathways to deploy and scale up the bioeconomy in a sustainable and circular manner. -Enhance synergies between existing EU instruments to support local activities. -CAP to support bioeconomies in rural areas.	Relevant to the specific bio-based solutions: -It aims at increasing the availability of secondary materials (such as feed and biowaste) for further exploitation through conventional technologies (e.g. composting and anaerobic digestion) and innovative ways of extracting valuable substances. Innovation is expected to support markets for bio-based products, where one industry's waste becomes the starting material for another. -It addresses new opportunities for the forestry sector, where non-sustainable raw materials in various sectors are replaced with forestry-based materials and chemicals. -Biowaste and residues can be used as valuable resources and can help reduce food waste by 50% by 2030.
2	2019	**European Green Deal**	https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en	https://commission-europa-eu.translate.goog/strategy-and-policy/priorities-2019-2024/european-green-deal_en?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	European Green Deal is a set of comprehensive and integrated to transform the EU into a modern, resource-efficient and competitive economy, ensuring no net emissions of green house gases by 2050 and economic growth decoupled from reseource use.	The Green Deal includes measures in agriculture on the reduction of environmental and climate foodprint and increase of competative sustainablility from farm to fork (see below). In the energy sector the Green Deal includes measures to promote eco design of products en renewable energy from sustainable biomass resources.	
3		**European Digital Strategy**	https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age_en	https://commission-europa-eu.translate.goog/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age_en?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wa	The EU's digital strategy aims to make this transformation work for people and businesses, while helping to achieve its target of a climate-neutral Europe by 2050.	EU's digital strategy recognises that digital technologies are profoundly changing our world, and generate an ever-increasing amount of data, which if pooled and used properly, can lead to completely new means and levels of value creation, leading towards more sustainable solutions which are resource-efficient, circular and climate-neutral.	Real time tracking, new, added-value creations, interconnections, boosting bio-based solutions driven by new, high and/or deep technologies
4	02-2020	**European data strategy**	https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy_en	https://commission-europa-eu.translate.goog/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy_en?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	The European data strategy aims to make the EU a leader in a data-driven society. Creating a single market for data will allow it to flow freely within the EU and across sectors for the benefit of businesses, researchers and public administrations.	The EU is creating a single market for data where data can flow within the EU and across sectors, for the benefit of all European rules, in particular privacy and data protection, as well as competition law, are fully respected the rules for access and use of data are fair, practical and clear	By having more information, consumers and users such as farmers, airlines or construction companies will be in a position to take better decisions such as buying higher quality or more sustainable products and services, thereby contributing for example to the Green Deal objectives.

5	01-2023	**Common Agricultural Policy (CAP) CAP 2023-27**	https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en#cap2023-27_	https://agriculture-ec-europa-eu.translate.goog/common-agricultural-policy/cap-overview/cap-glance_en?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=en-US&_x_tr_pto=wapp#cap2023-27	The CAP 2023-2027 must be oriented more than ever to respond to the specific needs of the agricultural sector and rural areas in terms of equity, distribution of support, instruments and characteristics, after the serious health crisis caused by COVID. To achieve these objectives, the CAP is focusing on innovation, CAP Strategic Plans (in line with the objectives and targets of the "Green Deal"), giving the EU a greener and fairer CAP.	The CAP 2023-2027 includes "support for rural development" as one of its focal points through the development of a wide range of tools including: Funding for investment, knowledge creation, innovation and cooperation will in many cases be targeted at environmental and climate-related needs, but will also serve other CAP objectives.	Within the CAP 2023-2027, it is indicated that the improvement of existing requirements is also a necessary condition for the improvement of agricultural sustainability, for this purpose, measures are proposed to improve soil health in the long term, so farmers are required to carry out beneficial crop rotations (among other measures). On the other hand, a wide range of types of action are proposed, including ecosystems that support voluntary actions related to better nutrient management, agroecology, agroforestry, carbon farming or animal welfare (among others).
6	05-2020	**Farm to Fork strategy**	https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en	https://food-ec-europa-eu.translate.goog/horizontal-topics/farm-fork-strategy_en?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=en-US&_x_tr_pto=wapp	The Farm to Fork Strategy is a set of measures to accelerate the transition to a sustainable food system that should have a neutral or positive environmental impact help to mitigate climate change and adapt to its impacts, reverse the loss of biodiversity ensure food security, nutrition and public health, making sure that everyone has access to sufficient, safe, nutritious, sustainable food preserve affordability of food while generating fairer economic returns, fostering competitiveness of the EU supply sector and promoting fair trade.	The Farm to Fork Strategy includes measures to promote sustainable food production and processing (including nutrient recycling). This includes measures on the compatativeness of the EU food supply sector including use of residues for bioproducts	

2. Research Projects

Please add Interreg, Horizon 2020, Horizon Europe projects, and other projects that you find relevant to the SCALE-UP project and for your bio-based solutions.

Other sources of interest: JRC Knowledge Centre for Bioeconomy (English) | JRC Knowledge Centre for Bioeconomy (Polish)

List of relevant projects

	Start month	End month	Name	Project website	Translation link (English to Polish)	Project summary	Relevance to the SCALE-UP project	Relevance to the specific bio-based solutions	Activities of interest	Comments
c	02-2022	01-2024	**AURORA**	https://aurora-agrifood.eu	https://aurora--agrifood-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	Aurora is a project aimed at strengthening cluster management excellence, facilitate exchanges and strategic partnering between clusters and specialised eco-system actors and cities across Europe. Aurora will drive and catalyse digital and green transformation towards safe, resilient, healthy and environmentally friendly food systems. The project has a special focus on food quality, food safety and food authenticity and the application of novel, deep and Industry 4.0 technologies	Project working on food safety, quality and authenticity with strong component of circular economy and digitalization of agri-food value chains	The meta-cluster approach will be interested for metaCSEI SCALE-UP cluster	WP5	
2	05-2021	05-2025	**UNLOCK**	https://unlock-project.eu	https://unlock--project-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	UNLOCK proposes to valorise this waste stream and design a new economically and environmentally sustainable value chain. The bio-based products created will be tailored to the needs of the agriculture sector, with the creation of seed trays, nonwoven geotextiles, mulch films and hydroponic foams through four different technical processes.	The project is related to circular bioeconomy in agri-food sector and working on innovative materials (based on feather that are rich in keratin) using eco-design to close nutrient and carbon cycles	The project can serve as an inspiration for regional stakeholders for the implementation of bio-based solutions	WP4, WP5	
3	02-2023	01-2025	**BIO-BOOST**	https://bio-boost.eu	https://bio--boost-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	The overall objectives of the BIO-Boost project are to increase the latent potential of the participating innovation agencies, to learn from leading innovator regions, and to cement this knowledge and experience in the organisations, building and expanding networks, expanding the cooperation and enlarging the participation of more diverse innovation stakeholders and territories to existing successful initiatives in the bioeconomy, including agri-food, forestry, bio-based chemicals, materials and products, and bioenergy.	The project is boosting bioeconomy by implementing highly interactive events - hackathons and challenges (160 organisations involved), by providing direct SME support on innovation management (24 crossborder KAM cases), and helping widening country SMEs towards financing of innovation projects (50+ cases).	The project is complementary to SCALE UP because of the geographical and thematic scope and approach	WP4, WP5	
1	09-2022	08-2025	**MainstreamBIO**	https://mainstreambio-project.eu/	https://mainstreambio--project-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	MainstreamBIO sets out to get small-scale bio-based solutions into mainstream practice across rural Europe, providing a broader range of rural actors with the opportunity to engage in and speed up the development of the bioeconomy. Regional Multi-actor Innovation Platforms (MIPs) will be established in 7 EU countries (PL, DK, SE, BG, ES, IE and NL) to enhance cooperation among key rural players towards co-creating sustainable business model pathways in line with regional potentials and policy initiatives.	Innovation support services,Decision Support System, Multi-actor Innovation Platforms, Digitalisation and Practice abstracts.	Some cases related with our 12 bio-based solutions (potential exchange of good practices and Knowledge)	WP4, WP5	SCALE-UP sister project
2	10-2022	09-2025	**RuralBioUp**	https://www.ruralbioup.eu/	https://www-ruralbioup-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	RuralBioUp will strengthen the cooperation among regional key actors and knowledge holders, empowering them to establish an inclusive and long-lasting ecosystem (the RuralBioUp Regional Hubs) to support the mainstreaming of bio-based business models in rural areas. In particular, RuralBioUp will establish 9 Regional Hubs in 6 EU countries, that will co-design and implement 9 Action Plans on 18 value chains.	9 regional hubs (one multi-stakeholder hub) are established in 6 EU countries (France, Romania, Czech Republic, Ireland, Latvia and Italy). 9 Action Plans will be implemented in 18 value chains.	Biomass value chain development: Biomass logistic, Valorisation, Communities. Lessons learnt	WP4, WP5	SCALE-UP sister project

3	09-2022	08-2025	**BioRural**	https://biorural.eu/	https://biorural-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	BioRural's goal is to create a European Rural Bioeconomy Network to promote small-scale bio-based solutions in rural areas and support the transition towards a sustainable, regenerative, inclusive and just circular Bioeconomy across all Europe at local and regional scale.	BioRural focusses on EU-level developments, it does not feature any regional case studies.	Rural Bioeconomy Alliance. Network. Cooperate to promote the currently available small-scale bio-based solutions		SCALE-UP sister project
4	04-2019	07-2022	**BE-Rural**	https://be-rural.eu/	https://1-be--rural-eu.translate.goog/?_x_tr_enc=1&_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	BE-Rural aimed at exploring the potential of regional and local bio-based economies and support the development of bioeconomy strategies, roadmaps and business models. To this end, the project focused on establishing Open Innovation Platforms (OIPs) within selected regions in five countries: Bulgaria, Latvia, North Macedonia, Poland and Romania.		Case study in North Macedonia (focussing on Mycelium-based packaging and insulation material); Case study in Latvia (foussing on wood wool)	D5.1 "Briefing paper: Analysing market conditions and designing business models within BE-Rural's OIPs"; D5.2 "Summary report on small-scale bio-based business models and their market potentials"; D5.4 "Note on the development of a sustainability screening for regional bioeconomy strategies"	Power4Bio sister project
5	10-2018	03-2021	**POWER4BIO**	https://power4bio.eu/	https://power4bio-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	POWER4BIO project aimed at empowering regional stakeholders to boost the transition towards bioeconomy regions in Europe by providing them with the necessary tools, instruments and guidance to develop and implement sound sustainable bioeconomy strategies. POWER4BIO targeted 10 regions with a focus on regions in Central and Eastern Europe.		Case study in Andalusia (focussing on Bioeconomy Strategy and Available Biomass Sources At Regional Level (Olive Biomass, Intensive Horticulture and Seaweed production)) and Mazovia (agricultural residues)	D3.3 "Catalogue with bio-based solutions"; D6.4 "Training design and materials for increasing the bioeconomy capacity of regional stakeholders"	BE-Rural sister project; certain outputs related to the development of bio-based solutions were classified as confidential and are thus not publicly available.

Other projects

	Start month	End month	Name	Project website	Translation link (English to Polish)	Project summary	Relevance to SCALE-UP	Comments
1	09-2022	08-2025	**ShapingBio**	https://www.shapingbio.eu/	https://www-shapingbio-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	The overall aim of ShapingBio is to support and accelerate bioeconomy innovation and the deployment of new knowledge in the EU and its member states. ShapingBio aims to provide evidence-based and concrete information and recommendations for better policy alignment and stakeholder actions to realize the cross-sectoral potential of the bioeconomy and to reduce the fragmentation across bio-based sectors and food system and policies across regions, domains and governance levels.	Promote innovation in the EU bioeconomy.	ShapingBio focusses on EU macro-regions, it does not feature any rural case studies.
2	07-2022	06-2025	**BioModel4Regions**	https://www.biomodel4regions.eu/	https://www-biomodel4regions-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	BIOMODEL4REGIONS aims to support the establishment of the innovative governance models at local/regional level to achieve better-informed decision-making processes, social engagement and innovation to support and strengthen EU and international science-policy interfaces to achieve the Sustainable Development Goals.	Support regional bioeconomies.	
3	09-2022	08-2025	**CEE2ACT**	https://www.cee2act.eu/	https://www-cee2act-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	CEE2ACT will empower countries in Central Eastern Europe and beyond to develop circular bioeconomy strategies and action plans through knowledge transfer and innovative governance models enabling sustainability and resilience to achieve better informed decision-making processes, societal engagement and innovation, building on the practice of experienced countries serving as role models.	Development of bioeconomy strategies.	CEE2ACT focusses on national-level developments, it does not feature any regional/rural case studies.
4	09-2022	08-2025	**ROBIN**	https://robin-project.eu/	https://robin--project-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	ROBIN aims to empower Europe's regions to adapt their governance models and structures in ways that accelerate the achievement of their circular bioeconomy targets while promoting social innovation and accounting for different territorial contexts. In this context, ROBIN will support 5 regional authorities across Europe (Southern Region of Ireland, Central Macedonia, Andalusia, Baden-Wuerttemberg, Zilina) to adapt their governance models to support the scaling up of the bio-based value chains of their ecosystem.	Regional bioeconomy development, as well as social innovation in the bioeconomy, which is covered in WP5 of SCALE-UP.	
5	06-2022	05-2025	**RELIEF**	https://relief.uop.gr/	https://relief-uop-gr.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	RELIEF aims to develop and deliver an innovative approach for teaching bio-economy in farming, by developing specific learning resources addressing HEIs students and farming practitioners. RELIEF will deliver a training needs analysis and develop two curricula in bio-economy, for HE students, farming practitioners and farmers exploring the key areas that are critical for the implementation of business models and strategies towards bio-economy in farming.	Training courses on bioeconomy, also covered in WP3 of SCALE-UP.	
6	01-2021	06-2023	**COOPID**	https://coopid.eu/	https://coopid-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	Wtin COOPID, a network of bioeconomy clusters from 10 European countries has been created, involving a range of stakeholders: primary producers, in cooperatives or associations, within agriculture, forestry and aquaculture; industry; public sector; research and academia. So-called COOPID ambassadors showcased success stories, organised workshops and conducted interactive dissemination and communication campaigns. The focus was on the uptake of sustainable bio-based business models in the primary production sector.	Development of bioeconomy clusters.	D4.2 "Success story factors for biobased Business models"
7	12-2022	11-2026	**P2GreeN**	https://p2green.eu/	https://p2green-eu.translate.goog/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	P2GreeN will implement and demonstrate innovative N & P recovery solutions based on human sanitary waste from urban settlements and its conversion into safe bio-based fertilisers for agricultural production. The project will test the solutions in three pilot regions on a north-south trajectory.	Nutrient recovery is a part of SCALE-UP.	

3. Regional, National & Local policies

Please add the local policies (including strategies, roadmaps, incentives, subsidy schemes and regulatory information) that you find relevant to the SCALE-UP project and to your bio-based solutions. Please also look into your country's CAP Strategic Plans and see whether this is relevant to you.

List of relevant policies

	Year	Regional/Provincial/National	Title	Title (original language)	Link	Translation link	Author/Publisher:	Summary of contents	Relevance to the SCALE-UP project	Relevance to the specific bio-based solutions
1	2021	Regional	**RIS2030 Mazovia**	**Regionalna Strategia Innowacji dla Mazowsza do 2030 roku**	https://innowacyjni.mazovia.pl/dzialania/ris-mazovia/dokumenty/regionalna-strategia-innowacji-dla-mazowsza-do-2030-roku.html	https://innowacyjni-mazovia-pl.translate.goog/dzialania/ris-mazovia/dokumenty/regionalna-strategia-innowacji-dla-mazowsza-do-2030-roku.html?_x_tr_sl=pl&_x_tr_tl=en&_x_tr_hl=nl&_x_tr_pto=wapp	Mazovia Regional Government	Strategic framework for the regional innovation ecosystem and smart specialisation of the Mazowieckie voivodeship. RIS 2030 constitutes a kind of a signpost along the paths of regional innovation development, as it enables a better use of the region's resources in the area of research, innovation development or cooperation of entrepreneurs and scientific entities, business support institutions and administration. Strengthening the innovativeness of companies from our region is a necessary condition for meeting the challenge of growing competitiveness on national and international markets. The areas of smart specialisation identified together with the stakeholders areas of smart specialisation discerned along side with its stakeholders are some of the main tools for creating favourable conditions for the development of the Mazowieckie Voivodeship, as well as targeting the public support in line with in the financial perspective 2021-2027	Safe food is one of the Mazovia region RIS3 directly related to bio-based solutions in agri-food sector	Areas of smart specialisation: Safe Food, Smart Systems in Industry and Infrastructure, Modern Business Ecosystem and High Quality of Life indicate directions conducive to Mazovia's development and respond to key challenges at the European level
2	2021	Regional	**Mazovia Bioeconomy Strategy**	**Strategia rozwoju biogospodarki dla Województwa (projekt) Mazowieckiego**	https://www.mae.com.pl/images/PDF/POWER4BIO/Strategia_rozwoju_biogospodarki_dla_Województwa_Mazowieckiego.pdf	-	Mazowiecka Agencja Energetyczna	Project for the developments of bioeconomy in the Mazovia region	The project contains an overview of the Mazovian bioeconomy	

CAP Strategic Plans

	Year	Regional/Provincial/National	Title	Title (original language)	Link	Translation link	Author/Publisher:	Summary of contents	Relevance to the SCALE-UP project	Relevance to the specific bio-based solutions
1	2022	National	**CAP Strategic Plan 2023-2027**	**Plan Strategiczny dla Wsp**	https://www.gov.pl/web/rolnictwo/plan-strategiczny-dla-wspolnej-polityki-rolnej-na-lata-2023-27	https://www-gov-pl.translate.goog/web/rolnictwo/plan-strategiczny-dla-wspolnej-polityki-rolnej-na-lata-2023-27?_x_tr_sl=pl&_x_tr_tl=en&_x_tr_hl=nl&_x_tr_pto=wapp	Ministry of Agriculture and Rural Development Republic of Poland	This support includes interventions in the form of direct payments , i.e.: basic income support - the equivalent of SAPS, redistributive payment, payment for young farmers and production-related support granted in sector 13. A new element of the direct payments system, supporting the implementation of practices beneficial to the environment, climate and animal welfare, are ecoschemes (area and animal welfare). Transitional national supportis also provided(financed from national funds).	Also relates to the fruit production sector and development of rural areas. Possibilities of payments for farmers.	

4. Technical information on specific bio-based solutions

Please add technical information, including scientific information, peer-reviewed articles, reports, and other data or research that you find relevant to the bio-based solutions.

List of relevant technical information

Solution 1: Apple pomace innovation

Solution 2: Bio circular apple farm

	Date	Author(s)	Title	Link	Translation link (English -> Polish)	Organizations	Summary of contents	Relevant to which solution?	Why is it relevant?
1	2020	Fengzhi Lyu , Selma F. Luiz , Denise Rosane Perdomo Azeredo , Adriano G. Cruz , Said Ajlouni and Chaminda Senaka Ranadheera	Apple Pomace as a Functional and Healthy Ingredient in Food Products: A Review	https://www.mdpi.com/2227-9717/8/3/319	https://www-mdpi-com.translate.goog/2227-9717/8/3/319?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=nl&_x_tr_pto=wapp	University of Melbourne, Federal Institute of Rio de Janeiro	Apple pomace is a major by-product obtained during apple juice processing. Several million metric tons of apple pomace are estimated to be generated worldwide every year. However, the recovery rate of this by-product is low. Pomace is commonly disposed and thrown away as a waste, which results in environmental problems and even public health hazards. As a by-product of the apple juice processing industries, pomace contains plenty of different varieties of nutritionally important compounds, such as carbohydrates, phenolic compounds, dietary fiber and minerals. These important compounds can be recovered from apple pomace, or there is even a possibility of using apple pomace in the food systems directly or after minimal processing. Therefore, apple pomace can be utilized in food products to improve their health benefits and commercial values	Apple pomace innovation	This study describes the various industrial applications of apple pomace.
2	2022	Grispoldi L, Ianni F, Blasi F, Pollini L, Crotti S, Cruciani D, Cenci-Goga BT, Cossignani L.	Apple Pomace as Valuable Food Ingredient for Enhancing Nutritional and Antioxidant Properties of Italian Salami	https://pubmed.ncbi.nlm.nih.gov/35883713/	https://pubmed-ncbi-nlm-nih-gov.translate.goog/35883713/	University of Perugia, Istituto Zooprofilattico Sperimentale dell'Umbria	Nowadays, food fortification with bioactive compounds deriving from agri-food waste is of great interest all over the world. In this work, apple pomace (AP), the most abundant by-product of apple juice manufacturing, was characterised by chemical, chromatographic and spectrophotometric analyses.	Apple pomace innovation	
3	2202	Szabo K, Mitrea L, Călinoiu LF, Teleky BE, Martău GA, Plamada D, Pascuta MS, Nemeș SA, Varvara RA, Vodnar DC	Natural Polyphenol Recovery from Apple-, Cereal-, and Tomato-Processing By-Products and Related Health-Promoting Properties	https://pubmed.ncbi.nlm.nih.gov/36432076/	https://pubmed-ncbi-nlm-nih-gov.translate.goog/36432076/	Institute of Life Sciences, University of Agricultural Sciences and Veterinary Medicine, 400372 Cluj-Napoca, Romania	The present understanding of the functionality of polyphenols in health outcomes, specifically, noncommunicable illnesses, is summarized in this review, focusing on the applicability of this evidence in three extensive agrifood industries (apple, cereal, and tomato processing). Moreover, the reintegration of by-products into the food chain via functional food products and personalized nutrition (e.g., 3D food printing) is detailed, supporting a novel direction to be explored within the circular economy concept.	Bio circular apple farm	
4		Cossignani L, Ianni F, Blasi F, Pollini L, Di Michele A, Pagano C, Ricci M, Perioli L.	Effect of Different Drying Treatments and Sieving on Royal Gala Apple Pomace, a Thickening Agent with Antioxidant Properties	https://pubmed.ncbi.nlm.nih.gov/36840253/	https://pubmed-ncbi-nlm-nih-gov.translate.goog/36840253/	Section of Food Sciences and Nutrition, Department of Pharmaceutical Sciences, University of Perugia, 06126 Perugia, Italy.	Currently, there is an increasing interest in the search of natural derived materials as valuable substitutes for microplastics. One of the categories investigated, represented by thickening agents deriving from agri-food waste and apple pomace (AP), was considered of interest. In this study AP was submitted to three different treatments and drying conditions (oven drying at 55 °C for 12 h; homogenization and oven drying at 55 °C for 12 h; homogenization and freeze-drying), and then grinded and sieved obtaining three different dimensional fractions (>400 µm, 250-400 µm and <250 µm). The hydroalcoholic extracts of these fractions, obtained by ultrasound-assisted extraction, were analyzed to compare their total phenol content (TPC), antioxidant properties, and phenol profile.	Apple pomace innovation	

5. Biomass availability studies and nutrient recycling

Please add biomass availability and nutrient recycling studies that you find of interest to the deployment of your bio-based solutions.

List of relevant studies

Solution 1: Apple pomace innovation

Solution 2: Bio circular apple farm

	Year	Author(s)	Title	Link	Translation link	Summary of contents	Relevant to which solution?	Why is it relevant?
1	2021	Yumin Duan, Sanjeet Mehariya, Aman Kumar, Ekta Singh, Jianfeng Yang, Sunil Kumar, Huike Li & Mukesh Kumar Awasthi	Apple orchard waste recycling and valorization of valuable product-A review	https://www.tandfonline.com/doi/full/10.1080/21655979.2021.1872905	https://www-tandfonline-com.translate.goog/action/cookieAbsent?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=en-US&_x_tr_pto=wapp	Huge quantities of apple orchard waste (AOW) generated could be regarded as a promising alternative energy source for fuel and material production. Conventional and traditional processes for disposal of these wastes are neither economical nor environment friendly. Hence, sustainable technologies are required to be developed to solve this long-term existence and continuous growing problem. In light of these issues, this review pays attention towards sustainable and renewable systems, various value-added products from an economic and environmental perspective. Refined bio-product derived from AOW contributes to resource and energy demand comprising of biomethane, bioethanol, biofuels, bio-fertilizers, biochar, and biochemicals, such as organic acid, and enzymes. However, the market implementation of biological recovery requires reliable process technology integrated with an eco-friendly and economic production chain, classified management.	Apple pomace innovation	The study shows how nutrient recycling can be applied to carbohydrate-rich biomass from apple orchard waste, and produce biochemicals and biofertilizers.
2	2019	Arkadiusz Dyjakon	The Influence of Apple Orchard Management on Energy Performance and Pruned Biomass Harvesting for Energetic Applications	https://www.mdpi.com/1996-1073/12/4/632	https://www-mdpi-com.translate.goog/1996-1073/12/4/632?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=en-US&_x_tr_pto=wapp	Agricultural residues coming from permanent crops, such as apple orchards, can support local actions to combat climate change. However, the amount of pruned biomass possible to be harvested from apple orchards and, thus, the energy output, depend mainly on their proper preparation and management. The managing actions are important because they influence the energy balance, the productivity, and the economy of the harvesting process and the potential benefits from the biomass marketing.	Bio circular apple farm	In this study, two different variants of pruning management in an apple orchard during biomass harvesting applying baling technology were analyzed.
3	2018	Arkadiusz Dyjakon	Harvesting and Baling of Pruned Biomass in Apple Orchards for Energy Production	https://www.mdpi.com/1996-1073/11/7/1680	https://www-mdpi-com.translate.goog/1996-1073/11/7/1680?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=en-US&_x_tr_pto=wapp	Pruning residues belong to the agricultural wastes generated in the agro-food processing sector, whose energetic potential can have a significant influence on the local energy market. This study is focused on the assessment of the feasibility of using apple tree pruning residues in the form of bales for energetic purposes. The research was performed in a commercial apple orchard located in the central-western part of Poland, an area characterized by the largest concentration of apple orchard in Europe.	Bio circular apple farm	Assesment of the yearly harvested pruned biomass to be considered as an energy source for local heating systems.

4	2016	Janusz Wojdalski, Józef Grochowicz, Adam Ekielski, Kamila Radecka, Sylwester Stępniak, Arkadiusz Orłowski, Iwona Florczak, Bogdan Drożdż, Tomasz Żelaziński, Grzegorz Kosmala	Production and Properties of Apple Pomace Pellets and their Suitability for Energy Generation Purposes	https://ros.edu.pl/images/roczniki/2016/005_ROS_V18_R2016.pdf		The study was to determine the energy consumption of the pressure agglomeration process of dry apple pomace, and selected physicochemical properties of compressed material. Apple pomace is a by-product of fruit and vegetable processing, and it constitutes biodegradable waste. Small quantities of pomace are not harmful to the environment, but large amounts of waste could pose a problem for processing plants. Pressed pomace can be used in industrial processing and power generation.	Apple pomace innovation	This paper presents the methodology and the results of analyses investigating the properties of apple pomace and its manage- ment scenarios