



Roadmap for the Bioeconomy Development for Mazowieckie Voivodship

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The Roadmap for the Bioeconomy Development for Mazowieckie Voivodship

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Introduction to the Roadmap

The Roadmap directly follows the Bioeconomy Strategy for Mazovia Region. It extends in more details topics mentioned in the Strategy. Actions planned in the Strategy are divided on more detailed tasks in the Roadmap. Tasks names should be treated flexible as an approach to the action completion. The Roadmap is designed as a support for persons who would like to actively engage in the Bioeconomy development in Mazovia especially for politics, decisions makers, local government workers, scientists, business sector, Non-Government Organizations, general public and all other persons or organizations. In intention, it should illustrate how the Bioeconomy Strategy may be carried out. Tasks described in the Roadmap should be help in actions executions which are defined in the Strategy. They do not define all possible tasks. Other tasks are also encouraged to do for The Bioeconomy development in Mazovia. Science advances on different fields opens new possibilities to solve old problems or elaborate quite new products, technologies or organizational solutions. For example Internet dissemination on rural areas positively influenced on access to different kinds of information for farmers such as actual prices of agricultural products, fertilizers or herbicides. Now suppliers for farmers actively compete for customers and they try to offer lower prices than their competitors. Access to the Internet is improving on rural areas. It supports to develop e-commerce and shorter logistic way between raw material producers and highly processed goods consumers. This shorter way save CO2 emissions and cuts delivery costs what is in line with the Bioeconomy goals. At this moment is strongly developing Internet of Things. The Internet of Things (IoT) describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools. Such solutions gives not limited possibilities to development of the Bioeconomy in practice due to removal of distance barrier. For example now it is possible to construct a plant on place near raw materials and control it remotely by workers who are not physically present in the plant but they virtually supervise all processes from different distant from the plant places. Those workers can live both in town or village without need to travel to the plant. Plants construction near raw materials source and any need to travel to the plant by workers saves fuel, decrease emissions, makes logistic chain shorter and cuts costs in effect. Other solutions are becoming possible with the science and technology progress. Due to this reason the Roadmap should be regarded as a guide of proposals to activities execution.

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The most important activities

The Roadmap is divided on topics and subtopics in the same way as the Strategy. To each activity has been assigned one or more tasks for execution (projects proposals to do). The first column in the Roadmap presents an expression from SWOT Analysis (Challenge/Weakness/Opportunity). The second one presents common action name. The third express different tasks names for the action complete. Other columns presents implementation time (Short/Medium/Long), timeframe and estimated budget. Each project can have scientific component and/or implementation part. Typically scientific projects should be financed by grants and typical business (implementation) projects by loans. However there are many projects which includes both types of tasks. They can be financed by grants and/or loans. Identified financial sources for projects allows to combine scientific and implementation tasks. Identified institutions which can finance the Roadmap tasks are as follows Regional Operational Program of the Mazowieckie Voivodeship (RPO), National Centre for Research and Development (NCBiR), Polish Agency for Enterprise Development (PARP), Polish Development Fund (PFR), Agency for Restructuring and Modernization of Agriculture (ARiMR), Bank of the National Economy (BGK), Bank of Environment Protection (BOŚ).

Projects

Table 1 presents the Roadmap as actions from the Strategy developed to projects/tasks.

Table 1. The Roadmap

Challenge/ Weakness/ Opportunity	Action planned in the Roadmap	Project/Task name	Implementa- tion time (short- medium-long term)	Timeframe (e.g. 2021- 2025)	Estimated budget
8.1 Efficient resource management in line with sustainable development 8.1.1 Agriculture and fisheries <i>8.1.1.1 Rational use of agricultural production space and maintaining the production potential of soils and waters</i> Activities					
Challenge	Ensuring sustainable soil fertility through: preventing soil degradation, improving the pH of acidic soils, increasing the availability of fertilizers,	Preventing soil degradation	Medium term	2021-2025	3 mln PLN
		pH improving of acidic soils	Medium term	2021-2025	3 mln PLN
		The availability of fertilizers increasing	Medium term	2021-2025	5 mln PLN
Challenge	Adaptation of branches and directions of production, plant varieties and animal breeds to natural, economic and organizational conditions	Diversification of plant varieties introduction to production according to natural, economic and organizational conditions	Medium term	2021-2025	5 mln PLN
		Diversification of animal breeds in production according to natural, economic and organizational conditions	Medium term	2021-2025	5 mln PLN
		New plant species breeding	Long term	2021-2030	5 mln PLN
Challenge	Sustainable balance of organic matter,	Breeding new breeds of animals	Long term	2021-2030	5 mln PLN
		Activities for supporting of organic matter sustainable balance	Long term	2021-2030	5 mln PLN
		Reclamation of degraded soils; planting multiyears perennial crops for soil purification from contamination	Long term	2021-2030	5 mln PLN
Challenge	Reclamation of degraded soils and protection of agricultural land,	Protection of agricultural land by environmentally balanced crop technologies	Long term	2021-2030	5 mln PLN
Challenge	Sustainable balance of nutrients (fertilizers),	Activities introduction for implementation of sustainable balance of nutrients in agriculture	Medium term	2021-2025	5 mln PLN
Challenge	High index of soil vegetation,	Carrying out of activities for obtaining high index of vegetation; introduction new, efficient crop technologies	Medium term	2021-2025	5 mln PLN
Challenge	Observing the principles of proper agrotechnology and zootechnics,	Supervision of agrotechnology and zootechnics; monitoring and control systems implementation	Medium term	2021-2025	5 mln PLN
Opportunity	Introduction of integrated soil monitoring systems to optimize irrigation and the use of plant protection products	Integrated soil monitoring systems elaboration	Medium term	2021-2025	3 mln PLN
		Irrigation optimisation	Medium term	2021-2025	5 mln PLN
		Plant protection products use	Medium term	2021-2025	4 mln PLN
		Integrated soil monitoring systems reuse with irrigation	Medium term	2021-2025	8 mln PLN
		Integrated soil monitoring systems use with plant protection products	Medium term	2021-2025	8 mln PLN
Challenge	Construction of small water reservoirs, devices and systems for water retention and modernization of existing devices and systems to increase the share of small-scale water retention in the water balance,	Small water reservoirs design and construction	Long term	2021-2030	30 mln PLN
		Devices and systems design and construction for water retention	Long term	2021-2030	20 mln PLN
		Modernization of existing devices and systems to increase the share of small-scale retention in the water balance	Long term	2021-2030	50 mln PLN
Opportunity	Promotion, construction and development of already existing circular facilities (in the case of the fisheries sector, aquaculture facilities using recirculation and water retention methods in production are of particular importance; at the same time, traditional carp ponds, where fish growth depends on natural food and water management is based on the principle of water retention, which prevents this resource from being wasted, also remain important),	Promotion of solutions for water recirculation and retention methods	Long term	2021-2030	30 mln PLN
		Design and construction of systems or devices for water recirculation or retention	Long term	2021-2030	20 mln PLN
		Development of new systems or devices for water recirculation or retention	Long term	2021-2030	50 mln PLN
Opportunity	Ensuring preservation of biodiversity and elimination of monocultures,	Biodiversity preservation by environmentally friendly and sustainable crop technologies introduction	Medium term	2021-2025	8 mln PLN
		Monocultures elimination by crop rotation introduction	Medium term	2021-2025	8 mln PLN
Opportunity	Stocking density adjusted to the absorption potential of the ecosystem,	Breeding animals and agricultural plants amount adjusting to the ecosystems potential	Short term	2021-2023	3 mln PLN
Opportunity	Rational farm equipping in terms of technical infrastructure	Improving of farms technical infrastructure; design, construction, manufacturing new technical devices, technologies or machinery relating to technical infrastructure	Long term	2021-2030	50 mln PLN
Opportunity	Adapting agriculture to the effects of climate change,	Introduction of new species resistant for drought	Long term	2021-2030	50 mln PLN
		Water irrigation systems design, construction and implementation	Long term	2021-2030	50 mln PLN
Opportunity	Observing the principles of the Code of Good Agricultural Practice	Monitoring of implementation of the Code of Good Agricultural Practice	Long term	2021-2030	3 mln PLN
Opportunity	Rational organisation of work and rational use of agricultural technology and skilful farm management,	Activities introduction for implementation of rational work organization in agriculture	Long term	2021-2030	3 mln PLN
		Activities introduction for implementation of proper agricultural technology	Long term	2021-2030	3 mln PLN
		Skillful farm management development and implementation	Long term	2021-2030	3 mln PLN
Challenge	Perceiving farms in their relationship with the environment (rural areas),	Improving farms relations according to the environment	Long term	2021-2030	3 mln PLN

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Opportunity	Achieving remuneration for work and development resources comparable to those gained for work performed outside the agriculture industry (investments and minimising intermediaries in the sales chain),	Creation of new sales channel through Internet (farmers virtual shops, local or global agricultural exchanges creation), new marketing solutions introduction to agriculture and agri-food industry (funnels, value ladders, personalized shopping paths, etc.)	Long term	2021-2030	3 mln PLN
		Remote work introduction on rural areas	Long term	2021-2030	3 mln PLN
		Internet connections improvement on rural areas, Internet of Things (IoT) introduction on rural areas	Long term	2021-2030	3 mln PLN
		Polish law accommodation to requirements of remote work or Internet of Things (IoT)	Long term	2021-2030	3 mln PLN
Opportunity	Improving the standard and accessibility of information society tools.	Digital infrastructure development on rural areas	Long term	2021-2030	3 mln PLN
		Improving the standard of information society tools by different kinds of media (e.g. social media)	Long term	2021-2030	3 mln PLN
Challenge	Promotion of organic farming based on latitude-specific crops.	Improving the accessibility of information society tools by dissemination activities and digital infrastructure improvement	Long term	2021-2030	10 mln PLN
		Organic farming dissemination	Medium term	2021-2025	4 mln PLN
Weakness	Use of agricultural biofilms, systems of recycling traditional films.	Agricultural biofilms use	Medium term	2021-2025	4 mln PLN
		Implementation of recycling systems for traditional films	Medium term	2021-2025	4 mln PLN
Opportunity	Environmental education,	Elaboration of materials and programs for environmental education	Medium term	2021-2025	2 mln PLN
		Implementation of programs for environmental education	Medium term	2021-2025	3,8 mln PLN
Challenge	Building hygiene awareness and promoting and supporting education related to hygiene and ecology,	Hygiene awareness building	Short term	2021-2023	3 mln PLN
		Promoting and supporting education related to hygiene and ecology	Short term	2021-2023	5 mln PLN
Opportunity	Building awareness of food respect - activities supporting the promotion of "zero waste" in the areas of food and education on minimizing the scale of food waste ("food waste").	Food respect awareness building	Long term	2021-2030	3 mln PLN
		Education activities related to food wastes minimizing	Long term	2021-2030	3 mln PLN
		Implementation of "Zero waste" principle for food	Long term	2021-2030	3 mln PLN
8.1.1.2 Production of raw materials with the desired quantitative and qualitative parameters expected by consumers and the industry					
Activities					
Opportunity	Adjustment of production structures to demand,	Activities of market research, supply prediction, customers' needs recognition,	Long term	2021-2030	3 mln PLN
		New products and measures development, production and market introduction	Long term	2021-2030	5 mln PLN
Opportunity	Improving the quality of plant and animal raw materials (e.g. creative breeding of plants, animals and fungi of a higher value, with the possibility of using molecular and biotechnological tools, taking into account biodiversity and resistance to climate and environmental change; animal nutrition and husbandry systems that enhance the nutritional and health benefits of animal products, including those that increase productivity and reduce environmental burden, taking into account animal welfare),	Molecular tools implementation for agricultural material improvement	Long term	2021-2030	3 mln PLN
		Biotechnological tools implementation for agricultural material improvement	Long term	2021-2030	3 mln PLN
		Other tools implementation than molecular or biotechnological	Long term	2021-2030	3 mln PLN
Opportunity	Reduction of the presence of undesirable substances in raw materials (e.g. production of high quality seed and nursery stock, with increased resistance to diseases and pests; integrated protection of plants and cultivated fungi against diseases and pests using innovative biopreparats, biotechnological methods and agrotechnical treatments),	High quality seed production	Long term	2021-2030	5 mln PLN
		High quality nursery stock production	Long term	2021-2030	5 mln PLN
		Implementation of integrated protection of plants	Long term	2021-2030	5 mln PLN
		Innovative methods elaboration and implementation	Long term	2021-2030	5 mln PLN
Opportunity	Development and promotion of organic farming,	Organic farming development	Long term	2021-2030	3 mln PLN
		Organic farming promotion	Long term	2021-2030	3 mln PLN
Opportunity	Benefiting from the possibilities of precision farming,	Dissemination of benefits from the possibilities of precision farming	Long term	2021-2030	3 mln PLN
Opportunity	Optimisation of by-product management,	By-product management improvement	Long term	2021-2030	3 mln PLN
Opportunity	Supporting traditional forms of farming: (beekeeping and apiary management, inland fishing, herbal, fibrous plants)	Activities for traditional farming support, especially marketing activities, promotion and export organization	Long term	2021-2030	5 mln PLN
Opportunity	Use of agricultural production space for renewable energy production.	Elaboration and implementation of new, efficient technologies, lines, devices or machinery for renewable energy production (eg. energy production from biomass in different scale –small or medium near biomass place of origin; implementation of biomass micronization technology, energy production from micronized biomass with the use of converted turbine engines from aircrafts or helicopters; biomass gasification and use as a gaseous fuel for cogenerators based on internal ignition engines; utilization of biogas from waste biomass fermentation as fuel for internal ignition engines)	Long term	2021-2030	50 mln PLN
		Design, construction and implementation of technologies, lines, devices and machinery (e.g. dryers) for drying waste wet agricultural biomass			
8.1.1.3 Reduction or elimination of threats to the environment and ensuring preservation of biodiversity					
Activities					
Challenge	Introduction of environmentally friendly technologies and machinery and equipment for soil cultivation, sowing and fertilization, planting, plant care and protection, harvesting, conservation and storage of agricultural crops, improving agrotechnical parameters and ensuring high quality of agricultural products, RES-powered irrigation systems,	Environmental friendly technologies elaboration	Long term	2021-2030	5 mln PLN
		New machinery and equipment design, construction and implementation	Long term	2021-2030	15 mln PLN
		Elaboration of plants care natural substances	Long term	2021-2030	5 mln PLN
		Renewable energy sources irrigation systems design, construction and implementation	Long term	2021-2030	25 mln PLN
Challenge	Implementation of innovative formulations in plant protection products and biocidal products, reducing negative impacts on humans and the environment, compatible with the principles of integrated pest management,	Innovative formulations elaboration	Long term	2021-2030	5 mln PLN
		Innovative formulas implementation in production	Long term	2021-2030	5 mln PLN
Challenge	Protection and successive improvement of water quality through reduction of pollution and extension and modernization of sewage treatment systems,	Sewage treatment systems extension or modernization	Long term	2021-2030	30 mln PLN

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Opportunity	Rationalizing water management in plant and animal production.	Water management rationalization in animal and plant production	Medium term	2021-2025	7 mln PLN		
Challenge	Reducing the negative impact of agriculture on ground and surface waters.	Ground and surface waters protection against agricultural contaminations	Medium term	2021-2025	8 mln PLN		
Challenge	Improving animal welfare and health protection.	Activities for animal welfare and health protection	Medium term	2021-2025	4 mln PLN		
Challenge	Protection of pollinating insects, including bumblebees and solitary bees.	Activities for protection of pollinating insects	Medium term	2021-2025	4 mln PLN		
Challenge	Counteracting the effects of threats of natural origin, including natural disasters disrupting the sustainable development of agricultural, forestry and water areas.	Design and construction of small water retention objects	Medium term	2021-2025	14 mln PLN		
		Warning systems against natural disasters	Medium term	2021-2025	5 mln PLN		
		Activities for protecting measures introduction against natural disasters	Medium term	2021-2025	4 mln PLN		
Challenge	Implementation and promotion of technologies minimizing the consumption of natural resources and energy carriers.	Technologies elaboration	Medium term	2021-2025	4 mln PLN		
		Investments in technologies	Medium term	2021-2025	4 mln PLN		
		Technologies promotion, marketing, dissemination and export	Medium term	2021-2025	40 mln PLN		
8.1.1.4 Improving the quality and availability of advisory services and measures for integration and transformation in the agricultural and processing sector, as well as the efficiency of the use of Common Agricultural Policy or European Regional Development Funds Activities							
Opportunity	Increasing the availability, quality and use of advisory and training services for farmers, including information society tools, as well as research potential in creating product and technological innovations.	Social media use	Medium term	2021-2025	0,5 mln PLN		
		Trainings for trainers preparation, promotion and dissemination	Medium term	2021-2025	1 mln PLN		
		Video courses elaboration, Internet courses elaboration	Medium term	2021-2025	1 mln PLN		
		Elaboration of trainings or courses for innovators, researchers, for new technologies or solutions creation	Medium term	2021-2025	1 mln PLN		
Opportunity	Using intelligent systems and technologies and tools for monitoring the production process and assessing the quality of raw materials and finished products of the highest biological, health and technological quality, taking into account the latest analytical methods, e.g. remote positioning (GPS), drones for quantitative and qualitative analyses of soils and crops.	New technologies or solutions creation for increasing availability, quality and use of training services	Medium term	2021-2025	4 mln PLN		
		Intelligent systems or intelligent technologies use with Artificial Intelligence implementation	Medium term	2021-2025	40 mln PLN		
		Investments in production processes control with assessing raw materials quality	Long term	2021-2030	5 mln PLN		
		Quality testing of raw agricultural material and processed products	Long term	2021-2030	15 mln PLN		
		Implementation of remote positioning systems (GPS) in agriculture	Long term	2021-2030	15 mln PLN		
		Design, construction and implementation of unmanned vehicles in agriculture	Long term	2021-2030	15 mln PLN		
		Design, construction and implementation of robots in agriculture	Long term	2021-2030	15 mln PLN		
		Design, construction and implementation of drones in agriculture	Long term	2021-2030	15 mln PLN		
		Design, construction and implementation of airships in agriculture	Long term	2021-2030	15 mln PLN		
		New method elaboration and implementation for soils or crops analyses	Long term	2021-2030	15 mln PLN		
		Artificial Intelligence methods implementation in agriculture or food processing	Long term	2021-2030	15 mln PLN		
Opportunity	Supporting creation and development of agricultural manufacturing groups, agricultural cooperatives and other forms of horizontal and vertical integration.	Electric tractors or electric harvesters design, construction and implementation	Long term	2021-2030	15 mln PLN		
		Activities for creation or development of agricultural groups, cooperatives or other forms of integration	Medium term	2021-2025	4 mln PLN		
Opportunity	Promoting good practices of cooperation between all shareholders in the agri-food sector, taking into account new models of organizing production and trade, including the use of new (communication) technologies.	Good practices codification, elaboration and dissemination	Medium term	2021-2025	4 mln PLN		
		Elaboration of new models of organizing production and trade including new communication technologies	Medium term	2021-2025	4 mln PLN		
Opportunity	Improving the area structure and management capacity of agricultural holdings.	Agricultural holdings improvement according to management, capacity and areas	Long term	2021-2030	15 mln PLN		
Opportunity	Strengthening vertical links between agricultural producers and the processing sector.	Linking together farmers (agricultural producers) and agri-food industry	Long term	2021-2030	15 mln PLN		
Opportunity	Increasing interest in the use of EU funds targeted at innovation-related objectives.	Information dissemination about EU funds	Long term	2021-2030	15 mln PLN		
Opportunity	Implementation of research projects (national and international) aimed at innovative solutions in the agri-food sector.	Support for development and investments in implementation of R&D projects in practice	Long term	2021-2030	15 mln PLN		
Opportunity	Implementing innovation in agriculture and fisheries and increasing demand for innovation among producers.	Automation or digitalization technologies implementation	Long term	2021-2030	15 mln PLN		
		Implementation of satellite technologies, precision agriculture, herd management systems, decision support systems, Artificial Intelligence	Long term	2021-2030	15 mln PLN		
		Support for development and investments in breeding technologies, animals, devices, machinery or objects	Long term	2021-2030	15 mln PLN		
		Support for development and investments in plant varieties implementation (less sensitive to environmental conditions), technologies enabling mechanization of fruit and vegetable harvesting, increasing the efficiency of feed use, use of fully automated technology - robots	Long term	2021-2030	15 mln PLN		
		Support for development and investments in use of automatic feed machines, monitoring of livestock buildings by means of cameras.	Long term	2021-2030	15 mln PLN		
		Support for development and investments in use of natural biological methods for reclamation of ponds and water reservoirs	Long term	2021-2030	15 mln PLN		
Opportunity	Modernization of agriculture and fisheries aimed at using the possibility of adaptation of the latest technologies, including: automation, digitalization (use of satellite technologies, precision agriculture, herd management systems, decision support programs), breeding (including plant varieties less sensitive to environmental conditions, technologies enabling mechanization of fruit and vegetable harvesting, increasing the efficiency of feed use, use of fully automated technology - robots, use of automatic feed machines, monitoring of livestock buildings by means of cameras, use of natural biological methods for reclamation of ponds and water reservoirs).	Support for development and investments of technologies, devices or machinery for biomass processing on non food purposes	Long term	2021-2030	15 mln PLN		
		8.1.2 Forestry					
		8.1.2.1 Sustainable forest management					
		Activities					
		Challenge	Increasing forest resources while maintaining their stability and biodiversity.	Activities for forest resources increase	Long term	2021-2030	3 mln PLN
Challenge	Reducing soil degradation and surface runoff to increase the degree of retention.	Soil degradation reduction	Long term	2021-2030	1,5 mln PLN		
		Surface runoff reduction	Long term	2021-2030	1,5 mln PLN		

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		Retention degree increase	Long term	2021-2030	3 mln PLN
Challenge	Adaptation of stand species composition to the habitat and increasing genetic and species diversity of forest biocenoses,	Adaptation of stand species composition to the habitat	Long term	2021-2030	3 mln PLN
Challenge	Optimisation of forest production capacity to increase wood supply,	Increase of genetic and species diversity of forest biocenoses	Long term	2021-2030	3 mln PLN
Challenge	Increasing the quality of stands and raw material for the wood industry,	Activities for optimisation of forest production capacity to increase wood supply	Long term	2021-2030	3 mln PLN
Challenge	Acquisition, selection and implementation of planting of selected species of trees and shrubs, taking into account their genotypes, in order to select the desired utility characteristics for selected branches of the wood sector,	Taking measures for quality increase	Long term	2021-2030	3 mln PLN
Challenge	Efficient and environmentally safe logging,	R&D projects for plant choose which will have the desired utility characteristics, for selected branches of the wood sector,	Long term	2021-2030	1,5 mln PLN
Challenge	Protection of stands against pests,	Research and development of technologies, devices and machinery for safe logging	Long term	2021-2030	1,5 mln PLN
		Debarking of raw wood and its timely removal from the forest	Long term	2021-2030	3 mln PLN
		Flooding and sprinkling of un-debarked wood	Long term	2021-2030	1,3 mln PLN
		Laying out trees and trap piles	Long term	2021-2030	2 mln PLN
		Designation and removal of trees inhabited by secondary pests	Long term	2021-2030	3 mln PLN
Opportunity	Planting of woody plants with increased resistance characteristics, taking into account climatic, soil, water and biocenosis conditions,	Other previously not mentioned measures	Long term	2021-2030	3 mln PLN
		Plantations establishment	Long term	2021-2030	8 mln PLN
Opportunity	Development of energy crops with high mass growth, resistance and high dryness for fuel production,	Energy crops plantation establishment and cultivation	Long term	2021-2030	7 mln PLN
Opportunity	Rational hunting economy for environmental protection and agricultural development,	Implementation of environment protection in rational hunting economy	Medium term	2021-2025	1 mln PLN
Opportunity	Adaptation of forest management to climate change and changing environmental conditions,	Decisive support systems implementation in forest management	Medium term	2021-2025	1,5 mln PLN
Opportunity	Forest and woodland management using Life Cycle Assessment (LCA) techniques,	LCA implementation in forest and woodland management	Medium term	2021-2025	1,4 mln PLN
Challenge	Monitoring as well as early warning systems (e.g. satellite observations, drones) and measures to reduce fires and their effects, e.g. use of non-environmental RES sources as a power source for fire protection systems or principles,	Antifire forest monitoring	Medium term	2021-2025	2 mln PLN
		Implementation of early warning systems against fire (with drones or satellite observations)	Medium term	2021-2025	4 mln PLN
		Use of non-environmental RES sources as a power source for fire protection systems or principles,	Medium term	2021-2025	3 mln PLN
Opportunity	Development of forest infrastructure,	Taking means for forest infrastructure development	Long term	2021-2030	4,5 mln PLN
8.1.2.2. Enhancing the role of forests and forest management in mitigating climate change Activities					
Challenge	Continuous expansion of forest resources and their contribution to the global carbon cycle,	Forest plantating on new areas	Long term	2021-2030	4,5 mln PLN
		Linking new areas to forest development from abandoned or agriculturally unused land or marginal soils	Long term	2021-2030	4,5 mln PLN
		Planting new forest plantations for carbon capture from global carbon cycle	Long term	2021-2030	4,5 mln PLN
Challenge	Increasing carbon accumulation in biomass and forest soils,	Implementation of forest planting or use of cultivation methods for carbon accumulation in biomass and forest soils	Long term	2021-2030	1,5 mln PLN
Challenge	Mobilisation of wood resources, also from non-forest areas,	Planting fast rotation forests	Long term	2021-2030	1,5 mln PLN
		Wodden plants planting on mid-field bushes	Long term	2021-2030	0,5 mln PLN
		Promotion of trees planting	Long term	2021-2030	0,5 mln PLN
Challenge	Wood substitution of non-renewable materials and products,	Elaboration of materials from wood which should exchange plastic or metal materials	Long term	2021-2030	4,5 mln PLN
		Technologies, devices or machinery elaboration or production for materials production from wood	Long term	2021-2030	5,5 mln PLN
		Taking measures for exchanging plastic or metal materials by materials derived from wood	Long term	2021-2030	1,5 mln PLN
Challenge	Promoting the use of wood waste as local fuel.	Wood waste processing for local fuel	Long term	2021-2030	1,5 mln PLN
		Marketing campaigns or promotional activities for use wood wastes as local fuel	Long term	2021-2030	1,5 mln PLN
8.1.2.3. Use of pro-environmental and pro-social functions of the forest Activities					
Challenge	Maintenance and improvement of environmental functions of the forest (protection of forest soil and water resources),	Means for maintenance of the protection of forest soil or water resources	Long term	2021-2030	1,5 mln PLN
		Activities for improvement of forest environmental functions	Long term	2021-2030	1,5 mln PLN
Opportunity	Maintaining health and vitality of forest ecosystems,	Preventing forest fires	Medium term	2021-2025	1 mln PLN
		Preventing against insects and diseases	Medium term	2021-2025	1 mln PLN
		Preventing other disturbances (including wind, snow, ice, floods, tropical storms, drought and damage by animals)	Medium term	2021-2025	1 mln PLN
Challenge	Enhancing biodiversity in forest ecosystems,	Seed dispersal	Long term	2021-2030	1,5 mln PLN
		Soil formation and nutrients by introduction of invertebrates (e.g., arthro pods), microInvertebrates (e.g., arthro pods)	Long term	2021-2030	1,5 mln PLN
		Forests ecosystems productivity enhancement by species diversity introduction	Long term	2021-2030	1,5 mln PLN
Challenge	Prevention of illegal logging and trade in forest products,	Reduction or prevention against of invasive species	Long term	2021-2030	1,5 mln PLN
Opportunity	Supporting private forest owners and their associations,	Actions with security, police, custom services and forest rangers against illegal logging or trade of forest products	Long term	2021-2030	15 mln PLN
Opportunity	Strengthening socio-economic functions of the forest,	Strengthening collaboration with private owners or their associations	Long term	2021-2030	1,5 mln PLN
Opportunity	Using the potential of forests, especially forest promotion complexes, to shape the ecological awareness of society,	Actions for wider forest use in socio-economic aspect	Long term	2021-2030	1,5 mln PLN
Opportunity		Increase of ecological awareness of society by taking actions in forest promotion complexes or forests	Long term	2021-2030	1,5 mln PLN

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Opportunity	Expansion of the functions of the forest gene banks.	Gene banks functions increase for forest related genes	Long term	2021-2030	4,5 mln PLN
8.1.3. Waste management 8.1.3.1 Municipal waste, including food waste and other biodegradable waste Activities					
Weakness	Reduction of the share of mixed municipal waste in the whole stream of collected waste and the amount of biodegradable municipal waste directed to landfills,	Wider implementation of municipal wastes sorting systems	Long term	2021-2030	15 mln PLN
		Biodegradable wastes redirection from landfills to biogas stations	Long term	2021-2030	10 mln PLN
		Elaboration and implementation of new, efficient technologies for biodegradable wastes recycling	Long term	2021-2030	7 mln PLN
Challenge	Raising public awareness of waste prevention and proper management of municipal waste, including food waste and other biodegradable waste,	Dissemination actions about waste prevention and proper management of municipal waste	Medium term	2021-2025	1 mln PLN
Challenge	Reduction of the share of mixed municipal waste in the whole stream of collected waste and the amount of biodegradable municipal waste directed to landfills,	Elaboration of technologies, devices and machinery for wastes sorting	Long term	2021-2030	7 mln PLN
		Implementation of technologies, devices and machinery for wastes sorting	Long term	2021-2030	70 mln PLN
		Elaboration of technologies, devices and machinery for reduction or utilization of biodegradable fraction of municipal wastes	Long term	2021-2030	7 mln PLN
Weakness	Implementation of solutions allowing for proper monitoring and control of the handling of the municipal waste fraction sorted from the mixed municipal waste stream and not intended for storage,	Implementation of technologies, devices and machinery for reduction or utilization of biodegradable fraction of municipal wastes for reduction or utilization of biodegradable fraction of municipal wastes	Long term	2021-2030	70 mln PLN
		Solutions elaboration and implementation for monitoring of waste fraction not intended for storage	Short term	2021-2023	3 mln PLN
		Solutions elaboration and implementation for control of waste fraction not intended for storage	Short term	2021-2023	4 mln PLN
Weakness	Implementation of an effective system of selective waste collection and collection at source (paper and cardboard; metals, plastics, multi-material packaging; glass, bio-waste, segregation into wet and dry waste),	Solutions elaboration and implementation for handling of waste fraction not intended for storage	Short term	2021-2023	8 mln PLN
		Elaboration of an effective system of selective waste collection	Short term	2021-2023	3 mln PLN
		Elaboration of an effective system of at source wastes collection	Short term	2021-2023	3 mln PLN
Challenge	Promoting technologies for the treatment of bio-waste which result in a fully-fledged and environmentally safe material for fertilizer or reclamation,	Implementation of an effective system of selective waste collection	Short term	2021-2023	8 mln PLN
		Implementation of an effective system of at source wastes collection	Short term	2021-2023	8 mln PLN
Challenge	Promoting technologies for the treatment of bio-waste which result in a fully-fledged and environmentally safe material for fertilizer or reclamation,	Marketing and dissemination activities for technologies promotion	Long term	2021-2030	1,5 mln PLN
Challenge	Promotion and implementation of activities to prepare for re-use and recycle suitable products or materials separated from the municipal waste stream,	Marketing and dissemination activities for re-use and recycle suitable products or materials	Long term	2021-2030	1,5 mln PLN
Opportunity	Stimulating the development of the market for secondary raw materials and products containing secondary raw materials by supporting cooperation between producers and the recovery organisations representing them, industry and local authorities and the consistent enforcement of the obligations for preparation for re-use and recycling,	Supporting cooperation between producers and the recovery organisations	Long term	2021-2030	1,5 mln PLN
Challenge	Promoting products made from waste materials through appropriate promotion and education measures as well as public procurement,	Marketing and dissemination activities for products promotion	Long term	2021-2030	1,5 mln PLN
Weakness	Achieving a recycling and re-use preparation rate of at least 80% of the paper, metal, plastic and glass fractions from municipal waste by 2030,	Technologies implementation for sorting, recycling and reuse of the paper, metal, plastic and glass	Medium term	2021-2025	5 mln PLN
Challenge	Dissemination and support of eco-design in the scope of extending the product life cycle (design focused on extending the product life cycle and allowing for maximum use of elements for reuse and recycling, creation of products with the use of raw materials recovered from waste and sewage, providing substitutes for hazardous, complex and burdensome substances in the recycling process, including the implementation of research projects in the above-mentioned scope),	Marketing and dissemination activities for eco-design promotion	Long term	2021-2030	1,5 mln PLN
Opportunity	Implementation and dissemination of sustainable methods of converting municipal waste with energy recovery, including the use of segregated oversize as an energy source for the industrial sector,	Implementation of sustainable methods of converting municipal waste with energy recovery, including the use of segregated oversize as an energy source for the industrial sector	Long term	2021-2030	15 mln PLN
		Dissemination of sustainable methods of converting municipal waste with energy recovery, including the use of segregated oversize as an energy source for the industrial sector,	Long term	2021-2030	1,5 mln PLN
Challenge	Dissemination of waste treatment technologies that reduce emissions of CO ₂ and other greenhouse gases into the atmosphere,	Marketing and dissemination activities for waste treatment technologies promotion	Long term	2021-2030	1,5 mln PLN
Challenge	Development, research and support of composting facilities: introduction of an assortment of wet biodegradable waste and implementation of technology for the process of obtaining a wholesome compost.	Research above composting facilities	Long term	2021-2030	1,5 mln PLN
		Development of composting facilities	Long term	2021-2030	30 mln PLN
		Support of composting facilities	Long term	2021-2030	1,5 mln PLN
Opportunity	Supporting and implementing methods of using out-of-date food waste	Activities for methods implementation and support	Long term	2021-2030	30 mln PLN
8.1.3.2 Post-consumer waste Activities					
Opportunity	Development of the existing system for collecting waste oils, including those from dispersed sources, and	Systems development for collecting waste oils, including those from dispersed sources	Medium term	2021-2025	5 mln PLN

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	their transfer to authorised entities for management.	Systems transfer to authorised entities	Medium term	2021-2025	5 mln PLN
Opportunity	Management and regeneration of refrigerants,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for refrigerants management	Long term	2021-2030	30 mln PLN
		Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for refrigerants regeneration	Long term	2021-2030	30 mln PLN
Challenge	Introduction of improved technologies for the use of waste in the form of fly ash, slag, ash-slag mixture, and post-reaction products from installations in the construction industry.	Investments, marketing and dissemination activities for technologies introduction	Long term	2021-2030	30 mln PLN
Challenge	Technologies for optimal production and use of alternative fuels obtained from waste, including RDF.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for technologies	Long term	2021-2030	30 mln PLN
Challenge	Use of anthropogenic minerals in the process of reclamation of post-extractive areas,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for use of anthropogenic minerals	Long term	2021-2030	30 mln PLN
Challenge	Application of selective technological processes to obtain highly processed chemical compounds from waste.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for application of selective processes	Long term	2021-2030	30 mln PLN
Challenge	Production of multi-material and composite materials based on waste for use in various industries.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production	Long term	2021-2030	30 mln PLN
8.1.3.3 Sewage sludge					
Activities					
Weakness	Preventing and reducing the amount of municipal sewage sludge generated in sewage treatment plants as waste and eliminating the production of municipal sewage sludge which, due to its quality, creates problems with its management in accordance with the regulations, through thermal transformation, application of over ground facilities, production of fertilizers or crop-enhancing agents etc.,	Taking measures for preventing municipal sludge production	Long term	2021-2030	30 mln PLN
		Reducing amount of sewage sludge generation	Long term	2021-2030	30 mln PLN
Weakness	Increasing the amount of municipal sewage sludge treated before its introduction into the environment and increasing the amount of municipal sewage sludge subjected to thermal treatment,	Eliminating sewage sludge production	Long term	2021-2030	30 mln PLN
		Taking measures for increasing the amount of municipal sewage sludge treated	Long term	2021-2030	30 mln PLN
Challenge	Aiming to maximise the use of nutrients contained in sediments while meeting all sanitary, chemical and environmental safety requirements,	Taking measures for increasing the amount of municipal sewage sludge given to thermal treatment	Long term	2021-2030	30 mln PLN
		Actions (elaboration of technologies, devices, machinery or organizational solutions, etc.) for maximal use of nutrients contained in sediments	Long term	2021-2030	30 mln PLN
Challenge	Application of solutions allowing the use of industrial wastewater streams carrying a load of organic compounds as substrates in heterotrophic wastewater treatment processes,	Actions (elaboration of technologies, devices, machinery or organizational solutions, etc.) for maximal use of industrial wastewater streams	Long term	2021-2030	30 mln PLN
		Design, construction and dissemination of water treatment stations based on soil-plant solutions	Long term	2021-2030	30 mln PLN
Weakness	Closing water and sewage circuits, using pre-treated wastewater; treatment of rinse water for municipal and industrial purposes,	Design, construction and dissemination of water treatment stations based on heterotrophic processes	Long term	2021-2030	30 mln PLN
		Actions (elaboration of technologies, devices, machinery or organizational solutions, etc.) for closing water and sewage circuits	Long term	2021-2030	30 mln PLN
Weakness	Wastewater treatment through introducing integrated treatment systems taking into account the use of RES and CO ₂ binding, e.g. additional algae reactors,	Actions (elaboration of technologies, devices, machinery or organizational solutions, etc.) for treatment or rinse water	Long term	2021-2030	30 mln PLN
Challenge	Implementation of solutions aimed at optimising energy consumption, including the use of renewable energy sources in water and sewage management,	Design, construction and dissemination of water treatment stations based on the use of RES and CO ₂ binding, e.g. additional algae reactors,	Long term	2021-2030	30 mln PLN
Opportunity	Development and implementation of technological solutions for the use of energy from wastewater in combined energy systems, including wastewater treatment systems integrated with water and heat recovery,	Taking measures for implementation of solutions aimed at optimising energy consumption, including the use of renewable energy sources in water and sewage management,	Long term	2021-2030	30 mln PLN
Weakness	Elimination of micro-pollution from sewage sludge (micro plastics, pharmaceuticals),	Actions (elaboration of technologies, devices, machinery or organizational solutions, etc.) for solutions, for the use of energy from wastewater in combined energy systems, including wastewater treatment systems integrated with water and heat recovery,	Long term	2021-2030	30 mln PLN
Challenge	Management and recycling of ashes from the thermal conversion of sludge in construction,	Actions (elaboration of technologies, devices, machinery or organizational solutions, etc.) for elimination of micro-pollution from sewage sludge (micro plastics, pharmaceuticals), Elimination of micro-pollution from sewage sludge (micro plastics, pharmaceuticals).	Long term	2021-2030	30 mln PLN
Opportunity	Recovery of phosphorus and other biogens from sewage sludge,	Design, construction and dissemination of technologies for ashes from the thermal conversion of sludge in construction	Long term	2021-2030	30 mln PLN
Challenge	Introduction of successive stages of wastewater treatment, e.g. disinfection for partial use of wastewater treated as municipal water (street cleaning, equipment, refrigeration, etc.).	Design, construction and dissemination of water treatment stations based on soil-plant solutions or other solutions	Long term	2021-2030	30 mln PLN
		Actions (elaboration of technologies, devices, machinery or organizational solutions, etc.) for introduction of successive stages of wastewater treatment	Long term	2021-2030	30 mln PLN
8.2 Increase in the use of renewable biological resources in the sectors which create high add value					
8.2.1 Processing of agricultural raw materials and animal products					
Activities					
Opportunity	Production of high-quality food:	Actions for high quality food production	Long term	2021-2030	50 mln PLN
Opportunity	– reformulation of existing products to improve their quality,	Elaboration of new formulas for existing products	Long term	2021-2030	1 mln PLN
Opportunity	– improving existing and introducing new, innovative food production and processing technologies,	Improvement of existing food production or processing technologies	Long term	2021-2030	24 mln PLN
		Elaboration of new food production or processing technologies	Long term	2021-2030	1 mln PLN

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		Implementation of new formulas or new or improved existing food production or processing technologies	Long term	2021-2030	24 mln PLN
Opportunity	– taking actions aimed at minimising food processing and preserving nutrients and beneficial bioactive substances as fully as possible,	Actions for minimising food processing or preserving nutrients or beneficial bioactive substances	Long term	2021-2030	5 mln PLN
Opportunity	– prevention or minimisation and monitoring of additives to intensify macro-phage cultures (antibiotics, hormones),	Intensification of macro-phage cultures production with reduced additives amount	Long term	2021-2030	5 mln PLN
Opportunity		Maximalization of natural materials share in food production	Long term	2021-2030	5 mln PLN
Opportunity	– taking actions to maximise the share of natural raw materials and reduce the use of food additives,	Food additives reduction in food production	Long term	2021-2030	5 mln PLN
Opportunity	– reduction or elimination of anti-nutritional ingredients and allergens in food;	Activities for reduction or elimination of anti-nutritional ingredients or allergens in food	Long term	2021-2030	5 mln PLN
Opportunity	Production of foodstuffs for particular nutritional uses and other products with designed nutritional and health characteristics adapted to different consumer groups,	Taking measures for particular nutritional uses ors with designed nutritional and health characteristics	Long term	2021-2030	5 mln PLN
Opportunity	Processing of animal products to increase their dietary value,	Dietary value increase of animal products by processing means	Long term	2021-2030	15 mln PLN
Opportunity	Production and distribution of high quality and innovative products, including traditional, regional and ecological ones,	Elaboration and production of high quality and innovative products including traditional, regional an ecological ones	Long term	2021-2030	24 mln PLN
		Marketing activities for promotion and distribution of high quality and innovative products including traditional, regional an ecological ones high quality and innovative products including traditional, regional an ecological ones	Long term	2021-2030	5 mln PLN
Opportunity	Support and promotion of the quality food sector.	Marketing activities for promotion and support of the quality food sector	Long term	2021-2030	5 mln PLN
8.2.2 Wood sector Activities					
Challenge	Use of wood and forest biomass to produce materials to replace other non-renewable raw materials,	Non-renewable raw materials replacement by wood or forest biomass	Long term	2021-2030	5 mln PLN
Challenge	Developing recycling technologies for contaminated wood materials (e.g. railway sleepers)	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for recycling contaminated wood materials	Long term	2021-2030	24 mln PLN
Challenge	Processing aimed at obtaining wood and wood-based materials with extended durability under conditions of internal and external use, increased resistance to destructive factors such as biotic, fire, weathering, photolithic ageing factors,	Activities for processing of wood or wood-based materials to materials with special features as eg. extended durability under conditions of internal and external use, increased resistance to destructive factors such as biotic, fire, weathering, photolithic ageing factors, extended durability under conditions of internal and external use, increased resistance to destructive factors such as biotic, fire, weathering, photolithic ageing factors,	Long term	2021-2030	24 mln PLN
Opportunity	Production of durable joinery, using micro-coatings, nanotechnology, mimetic,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for durable joinery with use of micro-coatings, nanotechnology, mimetic	Long term	2021-2030	24 mln PLN
Opportunity	Use of wood as the main elements of large-size structures,	Implementation of wood as the main elements of large-size structures, wodden houses or buildings construction, log houses construction	Long term	2021-2030	15 mln PLN
Opportunity	Implementation of technologies focused on intelligent tools, methods and processes leading to the production and recycling of pulp, paper, cardboard, corrugated board and related products aimed at minimising the share of basic raw materials in order to protect forest resources (including increased share of recovered paper and other fibres, including synthetic ones), while obtaining high performance parameters,	Elaboration, implementation and dissemination of new, intelligent technologies, devices, machinery or organisational solutions for paper industry	Long term	2021-2030	35 mln PLN
Opportunity	Development of wood-based materials for modern construction applications:	Wood-based materials development for modern construction applications	Long term	2021-2030	5 mln PLN
Challenge	– new generation materials that would show better properties, lower emissions, biodegradability, but also, under normal use, resistance to biological agents (fungi, insects, rodents),	Elaboration, implementation and dissemination of new generation materials with better properties, higher biodegradability and resistance to biological agents under normal use	Long term	2021-2030	5 mln PLN
Opportunity	– technologies for the extraction of bioactive compounds from forests, wood industry waste, including conifer waste, for economic use,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for bioactive compounds extraction	Long term	2021-2030	25 mln PLN
Challenge	– modern, biodegradable, reusable and removable wood and wood-based, paper and cardboard packaging,	Elaboration, implementation and dissemination of new generation materials from wood, wood-based materials, paper and cardboard packaging	Long term	2021-2030	5 mln PLN
Opportunity	– products, processes and technologies for the management of industrial waste using wood, optimisation of the use of production residues from solid wood processing for products with high added value.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for industrial wastes from wood processing	Long term	2021-2030	25 mln PLN
8.2.3 Medical sector Activities					
Opportunity	Research and development of production of biological and biosimilar drugs,	Elaboration, implementation and dissemination of biological and biosimilar drugs	Long term	2021-2030	5 mln PLN
Challenge	Development of new technologies for the production of innovative and generic medicinal products, biological and biosimilar drugs, medical devices and dietary supplements as well as foodstuffs for special nutritional purposes,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for innovative and generic medicinal products, biological and biosimilar drugs, medical devices and dietary supplements as well as foodstuffs for special nutritional purposes,	Long term	2021-2030	35 mln PLN
Opportunity	Production of medicinal substances of natural origin for treatment of the following conditions:		Long term	2021-2030	25 mln PLN
	– pre-diabetes and prehypertension,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production of medical substances of natural origin	Long term	2021-2030	5 mln PLN
	– threat of destabilisation of atherosclerotic plaque (prevention of myocardial infarction and stroke),		Long term	2021-2030	5 mln PLN
	– related to chemical and radiotherapy and immunosuppressive treatment,		Long term	2021-2030	5 mln PLN

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	– chronic inflammation, – related to chronic hepatitis, pancreatitis and digestive tract diseases - small intestine and large intestine.		Long term	2021-2030	5 mln PLN
Challenge	Research on the creation of new forms of herbal medicinal products - micro and nano technologies,	Elaboration and research on the creation of new forms of herbal medicinal products with the use of micro and nano technologies.	Long term	2021-2030	5 mln PLN
Opportunity	Implementation and dissemination of production and use of bioactive substances with improved bioavailability and tolerability used for prevention purposes, including modern-age diseases, and to increase the effectiveness of treatment.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production and use of medical bioactive substances	Long term	2021-2030	25 mln PLN
Opportunity	Application of new technological solutions to improve the bioavailability of substances contained in food supplements and foodstuffs for particular nutritional uses and to achieve the effect of controlled administration, release or supply of substances contained in food supplements and foodstuffs for particular nutritional uses.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production and use of nutritional bioactive substances	Long term	2021-2030	25 mln PLN
Challenge	Monitoring of hospital and pharmaceutical waste segregation systems and implementation of technologies allowing to recover high quality raw materials from them.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for hospital or pharmaceutical waste segregation systems and these wastes recycling	Long term	2021-2030	25 mln PLN
Challenge	Minimising hospital waste	Taking measures for hospital wastes minimising	Long term	2021-2030	5 mln PLN
8.2.4 Biotechnology, chemical and environmental sectors 8.2.4.1 Use of innovative biotechnological processes to produce bio-products Activities					
Challenge	Biomass and waste as a medium for the production of new tools for biotechnology (including cultures of macro- and micro-algae, bacteria, fungi and other organisms),	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for biomass and waste preparation for the implementation in biotechnology	Long term	2021-2030	25 mln PLN
		Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for products production from biomass and wastes by biotechnology	Long term	2021-2030	25 mln PLN
		Marketing activities for promotion and distribution of products from biomass or wastes	Long term	2021-2030	1,5 mln PLN
Opportunity	Development of new sources of biocatalysts and unique metabolites, construction and modelling of effective biocatalytic tools for biosynthesis and bioconversion processes, bio-refining and biotransformation and for environmental protection processes,	Taking measures for R&D activities for elaboration of effective biocatalytic tools for biosynthesis, bioconversion, biotransformation or environmental protection processes	Long term	2021-2030	5 mln PLN
Challenge	Development of bioprocesses based on the use of biomass and waste from the agro-food, forest-wood and herbal industries to obtain substrates for various industries, including chemical, cosmetic, pharmaceutical, agricultural, textile, packaging, pulp and paper and other products,	Taking measures for R&D activities for elaboration of bioprocesses based on the use of biomass and waste from the agro-food, forest-wood and herbal industries to obtain substrates for various industries, including chemical, cosmetic, pharmaceutical, agricultural, textile, packaging, pulp and paper and other products,	Medium term	2021-2030	5 mln PLN
Opportunity	Biorefining of renewable raw materials, including waste from the agri-food, forest-wood and herbal industries (using microorganisms, including microalgae and microscopic fungi) for their comprehensive management and use in the production of added value compounds,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for biorefining of renewable raw materials, including waste from the agri-food, forest-wood and herbal industries (using microorganisms, including microalgae and microscopic fungi) for their comprehensive management and use in the production of added value compounds,	Long term	2021-2030	25 mln PLN
Opportunity	Use of renewable natural resources in synthesis and biosynthesis of specialist intermediates used in the production of biologically active substances of plant protection products, biocidal products and veterinary medicinal products,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for use of renewable natural resources in synthesis and biosynthesis of specialist intermediates used in the production of biologically active substances of plant protection products, biocidal products and veterinary medicinal products,	Medium term	2021-2025	15 mln PLN
Opportunity	Production of bioactive materials for medical and multifunctional uses for various industries,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production of bioactive materials for medical and multifunctional uses for various industries	Long term	2021-2030	25 mln PLN
Challenge	Application of bionic engineering in the processes of modification and functionalisation of polymer materials (including bionics of structures, material features, biochemical processes, biological resistance, ergonomics and other phenomena).	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for bionic engineering in the processes of modification and functionalisation of polymer materials (including bionics of structures, material features, biochemical processes, biological resistance, ergonomics and other phenomena), bionic engineering in the processes of modification and functionalisation of polymer materials (including bionics of structures, material features, biochemical processes, biological resistance, ergonomics and other phenomena).	Long term	2021-2030	25 mln PLN
8.2.4.2 Advanced processing of biomass into specialised chemical products Activities					
Opportunity	Production of specialist market products from plant, animal and animal raw materials and their derivatives and by-products from biomass processing by chemical, physico-chemical or biochemical processes,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production of specialist market products from plant, animal and animal raw materials and their derivatives and by-products from biomass processing by chemical, physico-chemical or biochemical processes	Long term	2021-2030	25 mln PLN
Opportunity	Use of renewable raw materials in the synthesis of polymers and plastics using those polymers,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for use of renewable raw materials in the synthesis of polymers and plastics using those polymers	Long term	2021-2030	25 mln PLN
Opportunity	Efficient use of biomass in thermal processes e.g. biocarbon for agriculture, industry and sewage treatment plants,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for efficient use of biomass in thermal processes e.g. biocarbon for agriculture, industry and sewage treatment plants	Long term	2021-2030	25 mln PLN

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Challenge	Development and use in practice of complex technologies of processing plant, animal and waste materials from agri-food, chemical, energy, landfill sewage treatment plants, etc. for production of semi-finished products for further processing for chemical, pharmaceutical, household and other industries.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for development and use in practice of complex technologies of processing plant, animal and waste materials from agri-food, chemical, energy, landfill sewage treatment plants, etc. for production of semi-finished products for further processing for chemical, pharmaceutical, household and other industries.	Long term	2021-2030	25 mln PLN
8.2.4.3 Bioproducts and performance chemicals Activities					
Challenge	Manufacture of dietetic and medicinal products and food additives of plant origin (including extracts of herbal, fibrous and oleaginous plants), animal and microbiological origin,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for development and use in practice of manufacture of dietetic and medicinal products and food additives of plant origin (including extracts of herbal, fibrous and oleaginous plants), animal and microbiological origin,	Long term	2021-2030	25 mln PLN
Opportunity	Implementation of effective technologies for the production, processing, refining and modification of natural and renewable fibres,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for development and use in practice of implementation of effective technologies for the production, processing, refining and modification of natural and renewable fibres,	Long term	2021-2030	25 mln PLN
Challenge	Production of polymeric composites with the use of plant raw materials (bionanocomposites, integrated multilayer and multifunctional composites),	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for development and use in practice of production of polymeric composites with the use of plant raw materials (bionanocomposites, integrated multilayer and multifunctional composites),	Long term	2021-2030	25 mln PLN
Opportunity	Production of fibrous biomaterials and innovative polymeric materials for specialised technical, hygienic, medical, agricultural and other applications,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production of fibrous biomaterials and innovative polymeric materials for specialised technical, hygienic, medical, agricultural and other applications,	Long term	2021-2030	25 mln PLN
Challenge	Development of forms of biopreparations for their application in biosynthesis, biocatalysis and biomass and waste processing,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for development of forms of biopreparations for their application in biosynthesis, biocatalysis and biomass and waste processing,	Long term	2021-2030	25 mln PLN
Opportunity	Production of bioagrochemicals, biopharmaceuticals and soil conditioners, slow-acting fertilizers, agrobiosorbents, root-layer preparations, microbiological vaccines, biopesticides, biosurfactants.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production of bioagrochemicals, biopharmaceuticals and soil conditioners, slow-acting fertilizers, agrobiosorbents, root-layer preparations, microbiological vaccines, biopesticides, biosurfactants.	Long term	2021-2030	25 mln PLN
8.2.4.4 Application of innovative biotechnological methods in environmental protection Activities					
Weakness	Popularisation of methods of biological removal of fatty and oil-derived pollutants, heavy metals, biodegradation of anthropogenic organic substances in waste streams,	Marketing activities for popularisation of methods of biological removal of fatty and oil-derived pollutants, heavy metals, biodegradation of anthropogenic organic substances in waste streams, Popularisation of methods of biological removal of fatty and oil-derived pollutants, heavy metals, biodegradation of anthropogenic organic substances in waste streams,	Long term	2021-2030	1,55 mln PLN
Challenge	Application of innovative fermentation processes for processing waste from the agri-food industry and municipal waste,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for application of innovative fermentation processes for processing waste from the agri-food industry and municipal waste	Long term	2021-2030	25 mln PLN
Challenge	Intensification of efforts to prevent eutrophication processes by removing phosphorus and nitrogen from aquatic ecosystems, urban and industrial wastewater,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for prevention of eutrophication processes by removing phosphorus and nitrogen from aquatic ecosystems, urban and industrial wastewater,	Long term	2021-2030	25 mln PLN
Opportunity	Development and implementation of new bio- and phyto-remediation technologies for water and ground environment,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for new bio- and phyto-remediation technologies for water and ground environment	Long term	2021-2030	25 mln PLN
Opportunity	Integration of biological and physico-chemical processes in the treatment of industrial wastewater, enabling the closure of water and energy cycles,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for integration of biological and physico-chemical processes in the treatment of industrial wastewater, enabling the closure of water and energy cycles,	Long term	2021-2030	25 mln PLN
Challenge	Development of biological methods of deodorizing municipal, industrial and livestock waste,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for development of biological methods of deodorizing municipal, industrial and livestock waste,	Long term	2021-2030	25 mln PLN
Weakness	Dissemination of biological pest control methods in agricultural and forestry crops and food storage and sanitary hygiene (pheromones, repellents, biopesticides, others),	Marketing activities for promotion and dissemination of biological pest control methods in agricultural and forestry crops and food storage and sanitary hygiene (pheromones, repellents, biopesticides, others),	Long term	2021-2030	1,5 mln PLN
Challenge	Application of biological methods for removal of micro-pollutants from water and wastewater and recovery of biogenes.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for application of biological methods for removal of micro-pollutants from water and wastewater and recovery of biogenes.	Long term	2021-2030	25 mln PLN
8.2.5 Energy sector Activities					
Challenge	Development of technologies to prepare and inject biomethane into the distribution and direct networks,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for preparation and injecting biomethane into the distribution and direct networks,	Long term	2021-2030	25 mln PLN
Weakness	Biomass gasification for energy purposes (including, inter alia, innovative small-scale technologies - up to 5 MW for biomass combustion, excluding co-firing),	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for biomass gasification for energy purposes (including, inter alia, innovative small-scale technologies - up to 5 MW for biomass combustion, excluding co-firing)	Long term	2021-2030	25 mln PLN
Challenge	Degassing of biomass for energy, heating or both; combined with the production of charcoal, biocarbon as manure or activated carbon,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for degassing of biomass for energy, heating or both; combined with the production of charcoal, biocarbon as manure	Long term	2021-2030	25 mln PLN

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		or activated carbon,			
Challenge	Production of liquid biofuels, biocomponents, other second and next generation chemicals,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production of liquid biofuels, biocomponents, other second and next generation chemicals,	Long term	2021-2030	25 mln PLN
Challenge	Replacement of the technology of using natural gas as fossil fuel for the benefit of agricultural and landfill biogas from sewage treatment plants,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for replacement of the technology of using natural gas as fossil fuel for the benefit of agricultural and landfill biogas from sewage treatment plants	Long term	2021-2030	25 mln PLN
Opportunity	Biomass thermal processing based on the capture of chemical carbon in the form of charcoal or biocarbon, combined with energy production based on volatile components, with no or minimal carbon content (BECCS - Negative CO ₂ Energy),	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for biomass thermal processing based on the capture of chemical carbon in the form of charcoal or biocarbon, combined with energy production based on volatile components, with no or minimal carbon content (BECCS - Negative CO ₂ Energy),	Long term	2021-2030	25 mln PLN
Challenge	Production of fuels, biopolymers, chemicals and fertilizers based on the release or synthesis of valuable chemicals in bio-refinery processes,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for production of fuels, biopolymers, chemicals and fertilizers based on the release or synthesis of valuable chemicals in bio-refinery processes,	Long term	2021-2030	25 mln PLN
Challenge	Development of energy technology for waste management in WTE processes (including the combined system).	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for development of energy technology for waste management in WTE processes (including the combined system).	Long term	2021-2030	25 mln PLN
8.3 Contribution to climate policy 8.3.1 Reduction of greenhouse gas emissions and biosecurity of CO₂ Activities					
Opportunity	Taking measures to reduce greenhouse gas emissions from agriculture and the agri-food chain (e.g. rationalisation of nitrogen fertilization, proper storage and application of natural fertilizers, promotion of bean plant cultivation, use of nitrification inhibitors, extending the life span of females, slurry acidification, composting of natural fertilizers),	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for reduction of greenhouse gas emissions from agriculture and the agri-food chain (e.g. rationalisation of nitrogen fertilization, proper storage and application of natural fertilizers, promotion of bean plant cultivation, use of nitrification inhibitors, extending the life span of females, slurry acidification, composting of natural fertilizers)	Long term	2021-2030	25 mln PLN
Challenge	Carbon sequestration in soil and biomass produced in agriculture (e.g. catch crop cultivation, conservation tillage, maintenance of permanent grassland),	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for carbon sequestration in soil and biomass produced in agriculture (e.g. catch crop cultivation, conservation tillage, maintenance of permanent grassland),	Long term	2021-2030	25 mln PLN
Challenge	Increasing carbon accumulation in biomass and forest soils,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for increasing carbon accumulation in biomass and forest soils	Long term	2021-2030	25 mln PLN
Opportunity	Mobilisation of wood resources, also from non-forest areas,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for mobilisation of wood resources, also from non-forest areas,	Long term	2021-2030	25 mln PLN
Challenge	Restoring stands after natural disasters and increasing and rebuilding forest resources to improve the greenhouse gas balance,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for restoring stands after natural disasters and increasing and rebuilding forest resources to improve the greenhouse gas balance.	Long term	2021-2030	25 mln PLN
Challenge	Developing and disseminating knowledge on climate-friendly practices,	Marketing activities for developing and disseminating knowledge on climate-friendly practices,	Long term	2021-2030	25 mln PLN
Opportunity	Public procurement and preference for CO ₂ reduction solutions.	Marketing activities for public procurement and preference for CO ₂ reduction solutions.	Long term	2021-2030	25 mln PLN
8.3.2 Production of energy from renewable sources Activities					
Opportunity	Biomass use in energy generation:	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for biomass use in energy generation: solid fuels, conventional (eg. bioethanol, biodiesel, biobutanol) and high-tech biofuels, biogas.	Long term	2021-2030	25 mln PLN
Challenge	– solid fuels,		Long term	2021-2030	25 mln PLN
Challenge	– conventional and high-tech biofuels,		Long term	2021-2030	25 mln PLN
Opportunity	– biogas,		Long term	2021-2030	25 mln PLN
Challenge	Application of innovative technologies for the generation of electricity from wind energy, both onshore and offshore, aimed at increasing the efficiency of the conversion process (e.g. vertical axis wind turbines) and reducing investment costs,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for application of innovative technologies for the generation of electricity from wind energy, both onshore and offshore, aimed at increasing the efficiency of the conversion process (e.g. vertical axis wind turbines) and reducing investment costs	Long term	2021-2030	25 mln PLN
Challenge	Research, development and implementation of photovoltaic cells to improve the efficiency of power generation and other performance characteristics,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for photovoltaic cells to improve the efficiency of power generation and other performance characteristics,	Long term	2021-2030	25 mln PLN
Opportunity	Efficient and eco-friendly energy production based on geothermal heat,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for efficient and eco-friendly energy production based on geothermal heat,	Long term	2021-2030	25 mln PLN
Opportunity	Use of groundwater and surface water heat to generate thermal energy using high-power heat pumps (> 1 MW),	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for use of groundwater and surface water heat to generate thermal energy using high-power heat pumps (> 1 MW)	Long term	2021-2030	25 mln PLN

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Challenge	Use of innovative technological solutions in micro-sources: photovoltaic (including new materials for photovoltaic applications), fuel cells, biological and microbiological cells, using thermoelectric, piezoelectric and other phenomena to produce electricity and heat,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for use of innovative technological solutions in micro-sources: photovoltaic (including new materials for photovoltaic applications), fuel cells, biological and microbiological cells, using thermoelectric, piezoelectric and other phenomena to produce electricity and heat,	Long term	2021-2030	25 mln PLN
Challenge	Use of energy storage devices, including mobile devices, to support energy management and to provide auxiliary services related to the improvement of power quality,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for use of energy storage devices, including mobile devices, to support energy management and to provide auxiliary services related to the improvement of power quality,	Long term	2021-2030	25 mln PLN
Opportunity	Development of energy technology for waste management in WTE processes (including the combined system),	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for energy technology for waste management in WTE processes (including the combined system),	Long term	2021-2030	25 mln PLN
Challenge	Research on and implementation of technologies for the conversion of biomass or waste to fuels with parameters enabling safe use in currently produced production units,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for technologies for the conversion of biomass or waste to fuels with parameters enabling safe use in currently produced production units	Long term	2021-2030	25 mln PLN
Challenge	Creating local power islands,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for creating local power islands	Long term	2021-2030	25 mln PLN
Opportunity	Works on the storage of energy in the form of green hydrogen,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for storage of energy in the form of green hydrogen	Long term	2021-2030	25 mln PLN
Challenge	Increasing the capacity of power networks,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for increasing the capacity of power networks,	Long term	2021-2030	25 mln PLN
Opportunity	Increasing the number of charging places for electric vehicles.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for increasing the number of charging places for electric vehicles. Increasing the number of charging places for electric vehicles.	Long term	2021-2030	25 mln PLN
8.4 Strengthening the research potential of scientific entities and development of the cooperation in the relation between business, science and environment					
Activities					
Opportunity	Integration of the activities of the science, education and development sector (including, among others, research institutes, universities and scientific units),	Taking measures for Strategic Agendas and Roadmaps coordination between different units	Long term	2021-2030	1,5 mln PLN
Challenge	Intercollegiate integration, working groups consisting of experts with experience in implementation and business understanding,	Creation of working groups for intercollegiate integration	Long term	2021-2030	1,5 mln PLN
Challenge	Consolidation of research issues relevant to bioeconomy priorities,	Intercollegiate groups creation together with business and administration	Long term	2021-2030	2,5 mln PLN
Opportunity	Encouraging cooperation between the science sector and business and creating strategic business partnerships (including greater use of the potential of KIS, EIP, Smart Labs and National Key Clusters Working Groups),	Establishing constant cooperation between the science sector and business and creating strategic business partnerships	Long term	2021-2030	2,5 mln PLN
Challenge	Implementation of research programmes for innovation (including through the EU Framework Programmes),	Preparation of projects, applications or investments for implementation of research programmes	Long term	2021-2030	2,5 mln PLN
Challenge	Transfer of knowledge from the science sector on innovative solutions to reduce the negative environmental impact of bioeconomy sectors,	Creation of virtual teams, virtual laboratories, outsourcing of R&D tasks to science sector, innovative start-ups creation	Long term	2021-2030	25 mln PLN
Opportunity	Preferences for public, EU and national support for development investments in enterprises and farms, including the smart specialisation instrument,	Elaboration and dissemination of materials about preferences for public, EU and national support for development investments in enterprises and farms, including the smart specialisation instrument,	Long term	2021-2030	1,5 mln PLN
Challenge	Reducing uncertainty in the implementation of innovations and high risk innovative projects, support for SMEs,	Knowledge dissemination about reducing uncertainty in the implementation of innovations and high risk innovative projects, support for SMEs	Long term	2021-2030	2,5 mln PLN
Opportunity	Equipping rural and fishing areas with hazard warning systems and developing technical infrastructure to limit the effects of weather events.	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for equipping rural and fishing areas with hazard warning systems and developing technical infrastructure to limit the effects of weather events.	Long term	2021-2030	25 mln PLN
8.5 Shaping and promoting pro-environmental and pro-healthy consumer behaviour					
Activities					
Opportunity	Disseminating knowledge about the principles of nutrition, food traditions of the country and the region and the quality of agri-food products among the society and promoting healthy consumption patterns,	Marketing activities about the principles of nutrition, food traditions of the country and the region and the quality of agri-food products among the society and promoting healthy consumption patterns,	Long term	2021-2030	1,5 mln PLN
Challenge	Creating innovative communication and education tools to help consumers make informed dietary choices,	Marketing activities in Social Media (groups creation on FB, video preparation and publication on Youtube, infographic preparation and publication on Instagram, etc.)	Long term	2021-2030	1,5 mln PLN
Challenge	Use of innovative technologies to create tools for better nutrition planning and assessment of nutrition at the individual and the collective level,	Marketing activities in Social Media (groups creation on FB, video preparation and publication on Youtube, infographic preparation and publication on Instagram, etc.)	Long term	2021-2030	1,5 mln PLN
Opportunity	Introducing innovative ways to increase the recognition of food of high quality,	Get influencers to display food of high quality, use branded packaging, use Google's AdSense (advertisement in Google)	Long term	2021-2030	2,5 mln PLN

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Challenge	Creating innovative tools to detect food adulteration,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for detection of food adulteration	<i>Long term</i>	<i>2021-2030</i>	<i>25 mln PLN</i>
Challenge	Developing tools and modern research techniques and food quality markers (including bioavailability of ingredients) for assessing the impact of food products on human health,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for food quality markers (including bioavailability of ingredients) for assessing the impact of food products on human health,	<i>Long term</i>	<i>2021-2030</i>	<i>25 mln PLN</i>
Opportunity	Developing methods of analysis and selection of dedicated food at population and individual level,	Elaboration, implementation and dissemination of technologies, devices, machinery or organisational solutions for analysis and selection of dedicated food at population and individual level,	<i>Long term</i>	<i>2021-2030</i>	<i>25 mln PLN</i>
Challenge	Increasing the use of bioproducts in society, including in the public sphere,	Marketing activities in Social Media (groups creation on FB, video preparation and publication on Youtube, infographic preparation and publication on Instagram, etc.)	<i>Long term</i>	<i>2021-2030</i>	<i>1,5 mln PLN</i>
Opportunity	Campaigns concerning circular economy, bio-economy, biogas plants etc.	Marketing activities in Social Media (groups creation on FB, video preparation and publication on Youtube, infographic preparation and publication on Instagram, etc.)	<i>Long term</i>	<i>2021-2030</i>	<i>1,5 mln PLN</i>

Technologies from Mazovia

Fermentation of sugars and other organic substances from agri-waste and unsold fruits and vegetables into gelatin-like cellulose material (Scoby) Poland

<https://www.makegrowlab.com/scobypackaging>

SCOBY Packaging is weaved through a biological process that turns bio-waste into bio-material. This form of pure cellulose has unique features that does not need an addition of fossil-fuels and other nonbiodegradable and toxic substances. Free from PLA. The material features: 100% plastic-free, barrier for oxygen, home compostable, 40 times stronger than paper, self-adhesive, heat-press, customizable, not soluble in water. Figure 1 presents the material examples implemented in practice.



Shampo bar packaging



Bags for coffe



Cosmetic bars

Figure 1. Examples of implementation the ScobyPackaging material.

Source: <https://www.makegrowlab.com/scoby-packaging>

Biodegradable disposable tableware based on bran Poland

<http://biotrem.pl/pl/>

Biotrem's wheat bran tableware production process was invented by Mr. Jerzy Wysocki, whose family's milling traditions date back to the beginning of the twentieth century. Biotrem's modern and booming production facility offers a wide range of fully biodegradable tableware and cutlery produced from natural and edible wheat bran. Clean, environmentally friendly technological process of manufacturing of disposable wheat bran tableware is based on natural raw materials – wheat bran and small amounts of water. The rest is done by high pressure and high temperature. Biotrem's disposable products, made from wheat bran, are an excellent alternative to any disposable tableware, i.e. made from paper or plastic, which production is burdensome to the environment. The production process does not require significant amounts of water, or mineral resources, or chemical compounds. From 1 ton of pure, edible wheat bran it can produced up to 10.000 units of plates or bowls. What's more important, our products are fully biodegradable – through composting – in just 30 days.

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Biotrem's disposable wheat bran tableware is suitable for serving hot and cold meals. It can be used in classic ovens or microwave ovens. All products are robust and stable – they can be comfortably and safely use at home, on a picnic, in the bar, during the open-air even or in the restaurant. Since plates and bowls are made from clean edible wheat bran, a consumer could safely give them a bite. Biotrem's current production line's performance is estimated at approx. 15 million pieces of biodegradable disposable plates or bowls a year. Standardization and reproducibility of the production process guarantees an easy and rapid reaction to the growing market demands. Figure 2 presents bowls and cutlery made from wheat bran.



Figure 2. Bowls and cutlery made from wheat bran.

Source: <http://biotrem.pl/pl/>

Pastas, flour and cereals based on new varieties of cereals Poland

<https://biobabalscy.pl/>



Figure 3. Old species of cereals

Source: <https://biobabalscy.pl/dawne-gatunki-zboz-orkisz-plaskurka-samopsza/>

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Figure 3 presents old species of cereals: from the left einkorn, spelled, emmer. A few years ago, the word “Spelled” was not associated with anything by Polish consumers. Today it is completely different, you can even talk about a fashion for products made of this grain. Meanwhile, even older types of wheat are equally attractive in terms of health and taste: einkorn and emmer. Why is it worth being interested in products from old species and varieties of cereals? Contemporary varieties of cereals are the result of many works of breeders and scientists. Over the years, efforts have been made to produce grains that are perfectly prepared for harvesting, transport and baking. Unfortunately, many valuable nutritional (micronutrients, vitamins and organic compounds) and taste properties have been lost in the pursuit of parameters related to usability and efficiency. They are the greatest advantage of the old wheat. From the point of view of efficiency, logistics and the principles of modern trade, their cultivation seems to be pointless. They are less efficient and their collection is much more difficult because the grain hidden in thick chaff cannot be extracted with a combine, which requires further work. But paradoxically, these “disadvantages” are also the greatest advantages of the old varieties. They are more resistant, adapted to organic farming, environment and full of health properties. Pastas, flour and cereals based on these species are available in commerce.

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Summary of the Roadmap

Mazovia Region is in the World's lead of bioeconomy according to main goal of the Bioeconomy Strategy for Mazovia Region. More detailed activities are written in the Strategy and the Roadmap. Some the most important activities are presented in Table 2 as Summary.

Table 2. Summary of Roadmap

Challenge/Weakness/ Opportunity	Action planned in the Roadmap	Implementation time – span (short-medium-long term)
Opportunity	Efficient management of resources in accordance with the principles of sustainable development	Long term
Opportunity	Increasing the use of renewable biological resources in sectors creating high added value	Medium term
Challenge	Contribution to the implementation of climate policy	Medium term
Challenge	Strengthening the research potential of scientific units and development of cooperation in business - science - environment relations	Long term
Challenge	Shaping and promoting pro-environmental and pro-health behaviour of consumers	Long term