

RDI2CluB-project Bioeconomy Action Plan for Central Finland

Introduction

This Bioeconomy Action Plan for Central Finland is a document to describe the development actions of the bioeconomy sector in Central Finland, with the focus on JAMK Bioeconomy Institute in Tarvaala, Saarijärvi and the Bioeconomy Campus as an Innovation Hub.

Bioeconomy is one of the five focus areas of the Regional Program of Central Finland for years 2018-2021. Bioeconomy is also one of the focus areas in region's smart specialisation strategy (S3). Bioeconomy has long traditions in Central Finland, but it also has great importance on present employment and economics of the region. New bioeconomy innovations have a huge potential in the global markets, main driving force is a need to replace fossil-based materials and fuels by renewable options due to climate change. At the same time it is important to develop the sustainability of the biobased materials.

This action plan is elaborated as part of the project "Rural RDI milieus in transition towards smart Bioeconomy Clusters and Innovation Ecosystems" (RDI2CluB) and is connected to a transnational Joint Action Plan developed in a partnership involving Hedmark County (NO) Świętokrzyskie Voivodeship (PL), Vidzeme Region (LV) and Estonian partners in SEI Tallinn.

SWOT

As part of the JAP process in Central Finland a SWOT analysis was conducted on the regional bioeconomy innovation system (Table 1). This SWOT analysis was a background information when studying in more detail the development required for the region and especially on Bioeconomy Campus in Tarvaala, Saarijärvi. Strengths and opportunities identified are mainly related to existing biomass resources, long traditions and educated labour. The threats recognized are mainly related to unfavorable trends in population structure. These are very much in line with the findings of the Regional bioeconomy profile.

Table 1. SWOT analysis of the regional bioeconomy innovation system of Central Finland

Strengths	Weaknesses
Wide range of actors in the field, long, wide and unbroken industrial heritage, much accumulated knowhow in the society	Weak culture of co-operation between companies, and between business and public actors
Lot of (e.g. forest) biomass	Lack of growth seeking middle size companies, lacking capacity to utilize new emerging opportunities
Strong research sector	Scientific research in bioeconomy is missing
Strong political will	No world-class places for sharing innovations
Strong education at all levels	Natural resources education is not attractive enough
Lot of companies in the field covering production, manufacturing and KIBS	No strong co-operation between RDI actors
Opportunities	Threats
Wide use of companies in innovation work and wider use of great innovation potential of students	Benefits of the networking are not recognized and used
Co-operation between different actors	Narrow interpretation of bioeconomy field (not understood what all is bioeconomy)
Public awareness about the threat of climate change (“open social innovations”)	Moving out of rural areas, emptying country-side
Good availability of biomass, use of sideflows in industry	Lack of knowledgeable workforce due to emptying country-side and aging population
Innovations in Äänekoski bioproduct mill	Innovations and innovation models developed in one part of the region (eg. Äänekoski) stay only there
Educated people in different levels	Research centers of the area are not co-operating at sufficient level

Summary of the objectives and actions

This action plan consists of 4 objectives, and actions to achieve these objectives (Table 2). The actions are divided into three timelines: actions conducted 1) within the RDI2CluB project (by 2020) (short-term), 2) during five years after project time (medium-term) and 3) in the future (long-term). The actions will develop the bioeconomy of Central-Finland and are mainly implemented by the project partners.

Table 2. Objectives and actions. Transnational actions with other RDI2CluB project partners are marked with * after action number.

Objective number	Objective	Action number	Action
1	New technologies boost the regional bioeconomy	1.1*	Digitalisation connecting rural entrepreneurs, services and workforce
		1.2*	Digitalisation for sustainability and productivity in agriculture
		1.3	Circular economy in bioeconomy- biogas
		1.4	Innovations in blue bioeconomy
2	Innovation ecosystems boost bioeconomy in rural areas	2.1	Bioeconomy Campus is developed as a well-connected innovation hub that fosters entrepreneurship and innovation in bioeconomy.
		2.2*	Renaissance of the local food
		2.3	5G environment at Bioeconomy campus is utilised to spark innovations related to digitalisation in bioeconomy fields
		2.4	Institute of Bioeconomy is building its expertise on application of new technologies, circular economy models and branding knowhow to development of viable and sustainable bioeconomy business.
3	Education and business development boost bioeconomy	3.1*	Smart lifelong learning paths
		3.2*	Renewing the operations of traditional bio-based SMEs with new business models, branding and marketing skills and co-operation models
4	Co-operation and networks boost bioeconomy	4.1	Bio and circular economy in Central Finland – seminars, workshops etc.
		4.2	Encouraging SMEs for co-operation
		4.3	Boosting development of new forest based innovations

New technologies boost the regional bioeconomy

The first objective of the action plan is focusing to new technologies. The bioeconomy in Central Finland has long traditions and high-level knowledge. At the same time education and research related to bioeconomy and supporting sectors are strongly present in Central Finland. Thus, new technologies are a development path with plenty of potential.

Specific themes identified in this objective are related to digitalisation of bioeconomy, circular bioeconomy (especially biogas) and blue bioeconomy.

Table 3. Objective 1: New technologies boost the regional bioeconomy.

Objective No1:	New technologies boost the regional bioeconomy
Regional policies and/or strategies addressed	Regional strategy 2040, Regional programme 2018-2021, regional action plan 2019-2020.
National policies and/or strategies addressed RIS3 area + KETs if relevant	National bioeconomy strategy 2014 KETs: advanced materials, advanced manufacturing technologies
Sub-objectives of EUBSR Strategy policy area “Bio-economics” addressed https://www.balticsea-region-strategy.eu/action-plan	<ul style="list-style-type: none"> Improved recycling of nutrients in agriculture. Involvement of the business community, increase knowledge on sustainable forest management. Realizing the bioeconomy in the Baltic Sea region: development of a sustainable bioeconomy in the Baltic Sea region. Contributions to the development of the European Bioeconomy: Baltic Sea region participation in wider EU efforts and projects to realise the bioeconomy.
EUBSR sustainability principles addressed:	<ul style="list-style-type: none"> Sustainable bio-resource management and circular bio-economy Inclusive rural economic development

Table 4. Action 1.1: Digitalisation connecting rural entrepreneurs, services and workforce

<i>Title of an Action No 1.1</i>	Digitalisation connecting rural entrepreneurs, services and workforce
<i>Type per implementation period</i>	Short term actions
<i>Results to be achieved</i>	As a local pilot of Central Finland in RDI2CluB project, a mobile application is developed and tested with a farmer group in Northern Saarijärvi. The farmer group is currently co-operating in procurement of products and materials. They have a digital tool for listing their joint

	<p>procurement needs and delivering a joint invitation to bid for sellers. The opportunity to buy in bulk and coordinate logistics has decreased costs of operations for the farmers. However, mobile usability is missing from the current system, which is hindering wider usability. Also, the farmer group has identified a need for a system allowing coordination of services, seasonal help and temporary workers to the farms.</p> <p>To answer the need, a mobile application will be piloted with the farmer group in 2019-2020 with different service and worker needs. The application will have a location-based map feature where the farmers can tag areas where external service or temporary workers are needed. The map allows easy coordination between farms located in the same area to procure a service or hire help jointly. The system also allows the service providers and job seekers to get information on needed services. This matchmaking feature is expected to make the workforce and services more available to farmers as well as promote job creation in the rural region.</p> <p>The pilot case involves design of the mobile application with iterative testing with the farmer group on real-life needs. A part from the farmer group, SSYP, JAMK University of Applied Sciences and a local co-operative, Värkkäys, are involved in the testing to connect service providers, students and job seekers as users of the application, as well as to analyse the results and the scalability potential to new regions and also in BSR level.</p>
<p><i>Indicators for measuring achievements</i></p>	<ul style="list-style-type: none"> • Mobile application operational and in use • Reducing costs of logistics for farms and service providers • Increasing availability of workforce and services to farms as well as increasing job opportunities for rural residents • Number of users of the mobile application; user profiles • User experiences and feedback on perceived benefits and usability • Number of potential new user groups identified
<p><i>Mechanisms, tools to be used for measuring achievements</i></p>	<p>User surveys Test use results analysis Studies of scalability and impact</p>
<p><i>Stakeholders to be involved and their roles and benefits</i></p>	<ul style="list-style-type: none"> • Farmer group (Farmer association of Koskenkylä) • Co-operative, Värkkäys • Agrology students of JAMK University of Applied Sciences • Contractors
<p><i>Potential partners/partnerships (if already identified)</i></p>	<p>Other RDI2CluB regions</p>

<i>Potential funding instruments and mechanisms to be used for implementation</i>	<ul style="list-style-type: none"> • Pilot via RDI2CluB funding • SMEs funding • National funding instruments established for encouragement of RTD activities
<i>Priority bio-economy areas relevant to the Action</i>	<p>PA No 1 Agriculture, forestry and fisheries PA No 2 Food and feed production PA No 7 Bio-based energy, incl. transport</p>
<i>Cross sectoral priorities addressed</i>	Digitalisation, Communication

Table 5. Action 1.2: Digitalisation for sustainability and productivity in agriculture

<i>Title of an Action No 1.2</i>	<p>Digitalisation for sustainability and productivity in agriculture Digitalisation for sustainability and productivity in agriculture - connecting latest digitalization innovations to farming for e.g. improved nutrient management and better input-output ratio.</p> <p>Aim is to build a digital platform that integrates monitoring data based on IoT sensor technology (environmental, weather, or bound to machinery/infrastructure/livestock) and other, open data sources into a workflow of automated or semi-automated data collection, transfer (e.g. LoRA, 5G), analysis and decision making, also allowing for feedback loops.</p> <p>The system is based on a multi-actor approach that allows for different levels of access & usage rights (e.g. researchers, teachers, students, farmers, entrepreneurs & other stakeholders) for different stages in the process. The system will be interoperable with the most common current technologies (and adaptable for future technologies). Bioeconomy Campus (JAMK Institute of Bioeconomy & POKE) offers extensive expertise in agriculture and agricultural education, and harbors an exceptional education ecosystem including arable crops (grass pastures, silage grass, crop fields), wetlands, livestock, stables, machinery and other farming infrastructures as well as research facilities, making it an ideal piloting ground for testing agriculture specific integration platforms.</p>
<i>Type per implementation period</i>	Short and medium term actions
<i>Results to be achieved</i>	<ul style="list-style-type: none"> • Identification of user needs of different actors (Farmers, Stakeholders/Entrepreneurs, Researchers), validation of user acceptance, especially demonstration of viable concepts addressing privacy, security, vulnerability, liability and trust in connected data spaces • Monitoring and data collection of processes relevant to agriculture/agricultural efficiency are continuous and automated and are

	<p>supported by manual monitoring tools (e.g. drones) and auxiliary data (e.g. satellite data)</p> <ul style="list-style-type: none"> • Continuous data collection and transmission to AgriHub happens real-time using newest technology (sensors, IoT, LoRa, 5G) • For all actors involved, there are measurable benefits from intensified monitoring, data collection and analysis • Information on environmental, social and economic performance of technologies, sustainability, decision making tools, management practices and benchmarking is improved, increasing their respective adoption • Opportunity creation for farmers, entrepreneurs and stakeholders is improved by promoting new market openings, providing access to valuable datasets and analysis results and direct interactions with users, expanding local businesses to national and international scale
<i>Indicators for measuring achievements</i>	Data quality and accessibility Added value to farmers
<i>Mechanisms, tools to be used for measuring achievements</i>	RDI and pilot outcomes as per project plans and reporting
<i>Stakeholders to be involved and their roles and benefits</i>	<ul style="list-style-type: none"> • SMEs (including farmers) • RTD performers: universities, research institutes, technology and/or innovation bodies • Regional and local public authorities • Supporting and promotion bodies (agencies, BICs, clusters, etc) • Policy making and legislative stakeholders
<i>Potential partners/partnerships (if already identified)</i>	JAMK ICT Institute Bioeconomy Campus
<i>Potential funding instruments and mechanisms to be used for implementation</i>	European and National funding instruments established for encouragement of RTD activities (H2020)
<i>Priority bio-economy areas relevant to the Action</i>	PA No 1 Agriculture, forestry and fisheries PA No 2 Food and feed production PA No 8 R&D services in biomass
<i>Cross sectoral priorities addressed</i>	Digitalisation, communication, education, sustainable development

Table 6. Action 1.3: Circular economy in bioeconomy - biogas

<i>Title of an Action No 1.3</i>	<p>Circular economy in bioeconomy- biogas</p> <p>Circular economy enables new innovative thinking in traditional business. Especially in rural areas the smart utilization of side and waste streams will increase the profitability of the business. Biogas is an excellent example of circular economy. Production of local energy from wastes not only contribute to climate change mitigation, but also boost the regional economy.</p> <ul style="list-style-type: none"> • Biogas cooperation on regional and inter-regional level (Circwaste Life IP) • Biogas in transport • Biogas production on farms scale
<i>Type per implementation period</i>	Short term actions
<i>Results to be achieved</i>	Increased use of biogas in transport
<i>Indicators for measuring achievements</i>	<p>Amount of biogas cars in the region</p> <p>Amount of traffic fuel biomethane produced and used in the region</p> <p>Number of new biogas plants and biogas traffic fuel stations in the region</p>
<i>Mechanisms, tools to be used for measuring achievements</i>	Statistics
<i>Stakeholders to be involved and their roles and benefits</i>	<p>SMEs</p> <p>RTD performers: universities, research institutes, technology and/or innovation bodies</p> <p>Regional and local public authorities</p> <p>Policy making and legislative stakeholders</p>
<i>Potential partners/partnerships (if already identified)</i>	Regional and national actors in sectors of agriculture and energy
<i>Potential funding instruments and mechanisms to be used for implementation</i>	<p>Ongoing national and international projects</p> <p>Coming projects</p>
<i>Priority bio-economy areas relevant to the Action</i>	<p>PA No 1 Agriculture, forestry and fisheries</p> <p>PA No 7 Bio-based energy, incl. transport</p>
<i>Cross sectoral priorities addressed</i>	communication, sustainable development

Table 7. Action 1.4: Innovations in blue bioeconomy

<i>Title of an Action No 1.4</i>	<p>Innovations in blue bioeconomy</p> <p>Blue bioeconomy is unutilized potential in Central Finland. There are various research institutes present, new technological solutions in fisheries and the implementation of the circular economy in fisheries. Blue bioeconomy has a very close connection to tourism and recreation, lakes and fishing has also recreational business potential.</p> <ul style="list-style-type: none"> • Cooperation in Päijänne-lake (sustainable use of resources) • Tourism potential of Konnevesi – Keitele – Päijänne water course • Fresh habit (Life IP) • High level knowledge on novel fishery techniques (Luke, JYU, JAMK)
<i>Type per implementation period</i>	Short and medium term actions
<i>Results to be achieved</i>	Knowhow about the new technologies and their possibilities
<i>Indicators for measuring achievements</i>	New projects New businesses
<i>Mechanisms, tools to be used for measuring achievements</i>	-
<i>Stakeholders to be involved and their roles and benefits</i>	<ul style="list-style-type: none"> • SMEs: possible business starters • RTD performers: universities, research institutes, technology and/or innovation bodies: studying new technologies • Regional and local public authorities: Sharing information about the possibilities • Supporting and promotion bodies (agencies, BICs, clusters, etc): Sharing information about the possibilities
<i>Potential partners/partnerships (if already identified)</i>	<p>Luke</p> <p>JAMK University of Applied Sciences</p> <p>University of Jyväskylä</p>
<i>Potential funding instruments and mechanisms to be used for implementation</i>	<p>International project funding</p> <p>SME funding</p> <p>Academy funding</p>
<i>Priority bio-economy areas relevant to the Action</i>	<p>PA No 1 Agriculture, forestry and fisheries</p> <p>PA No 2 Food and feed production</p> <p>PA No9 Bio-based services (for example, green-care, eco-tourism etc)</p>
<i>Cross sectoral priorities addressed</i>	Sustainable development

Innovation ecosystems boost bioeconomy in rural areas

The Second objective is the innovation ecosystems in the rural areas. Innovation ecosystems are meeting-points for various stakeholders for joint development.

Specific themes identified in this objective are developing local food sector and developing bioeconomy campus in different ways.

Table 8. Objective 2: Innovation ecosystems boost bioeconomy in rural areas

Objective No2:	Innovation ecosystems boost bioeconomy in rural areas
Regional policies and/or strategies addressed	Regional strategy 2040, Regional programme 2018-2021, regional action plan 2019-2020
National policies and/or strategies addressed RIS3 area + KETs if relevant	National bioeconomy strategy 2014
Sub-objectives of EUBSR Strategy policy area "Bio-economics" addressed https://www.balticsea-region-strategy.eu/action-plan	<ul style="list-style-type: none"> • Added value through cooperation within Baltic fisheries and aquaculture. • Synergies from cooperation between the Rural Development Programmes. • Involvement of the business community, increase knowledge on sustainable forest management. • Realizing the bioeconomy in the Baltic Sea region: development of a sustainable bioeconomy in the Baltic Sea region.
EUBSR sustainability principles addressed:	<ul style="list-style-type: none"> • Sustainable bio-resource management and circular bio-economy • Healthy, nutritious locally-produced food and food security • Resilient and diverse ecosystems (climate proofing, biodiversity...) • Inclusive rural economic development

Table 9. Action 2.1: Bioeconomy Campus is developed as a well-connected innovation hub that fosters entrepreneurship and innovation in bioeconomy

<i>Title of an Action No 2.1</i>	Bioeconomy Campus is developed as a well-connected innovation hub that fosters entrepreneurship and innovation in bioeconomy
<i>Type per implementation period</i>	Medium term actions
<i>Results to be achieved</i>	<ul style="list-style-type: none"> • Testing and establishing a model for supporting private inventors of bioeconomy fields (BIND project)

	<ul style="list-style-type: none"> • Connecting agrolgy students to international and national innovation events and networks (including Demola) • Creating awareness among the rural SMEs on the innovation services of JAMK, such as Demola, Innovate or Die! –competition, Innovation Week and Concept Lab and improving the service path for the rural SMEs to access the services. Awareness-raising and service design is conducted with test cases. • Creating a rural-urban innovation connection with Kangas Living Lab in Jyväskylä and Bioeconomy Campus to explore smart practices as well as brand and marketing strategies to bridge the rural bio-based services and farm products to the urban consumers. • To connect, involve and engage relevant networks and target groups of Bioeconomy Campus to the Open Virtual Biobusiness Hub (Biobord.eu platform) as registered users to be involved in development projects and capacity building groups of the Campus. • To develop the test-bed and innovation services of Bioeconomy Campus, and to market them in BSR via the Biobord.eu platform. • To develop models for connecting bioeconomy students and student groups in higher education with SMEs and the innovation processes of the Biobord.eu platform to help with idea generation, sharing and assessment. • To promote sense of community between innovative individuals, SME's, investors and experts by facilitating joint training, workshops and meetings gathering together different interest groups.
<p><i>Indicators measuring achievements</i> for</p>	<ul style="list-style-type: none"> • Number of agrolgy students involved in national and international innovation events and networks such as Innovate or Die and Demola • Number of student start-ups in bioeconomy sector • Number of SMEs connected to JAMK's innovation services via the Bioeconomy Campus • Number of private inventors supported • Number of commercialised innovations supported by the talent, expertise or networks of Bioeconomy Campus • Number of registered users of Biobord.eu; • Number of connected innovation services and test-beds from Bioeconomy Campus • Feedback from Central Finland user cases on perceived benefits and usability of Biobord.eu.
<p><i>Mechanisms, tools to be used for measuring achievements</i></p>	<p>Study records User feedback collection and analysis JAMK's customer feedback surveys</p>
<p><i>Stakeholders to be involved and their roles and benefits</i></p>	<p>SMEs: possible co-operators with educational institutes, possible funders of research, beneficiaries of Biobord.eu</p>

	<p>RTD performers: universities, research institutes, technology and/or innovation bodies: possible co-operators, beneficiaries and co-operators of Biobord.eu</p> <p>Supporting and promotion bodies (agencies, BICs, clusters, etc.): possible co-operators</p> <p>Students: beneficiaries of Biobord.eu</p>
<i>Potential partners/partnerships (if already identified)</i>	<p>JAMK Institute of Bioeconomy, Bioeconomy Campus actors</p> <p>Business development agencies in Northern Central Finland</p> <p>Yritystehdas (JAMK innovation services)</p> <p>Kangas development project (TBC)</p> <p>RDI2CluB network</p>
<i>Potential funding instruments and mechanisms to be used for implementation</i>	<p>BIND project</p> <p>JAMK strategic funds</p> <p>Potentially European Regional Development Funds and Rural Development Funds</p>
<i>Priority bio-economy areas relevant to the Action</i>	<p>PA No 1 Agriculture, forestry and fisheries</p> <p>PA No 2 Food and feed production</p> <p>PA No 8 R&D services in biomass</p> <p>PA No9 Bio-based services (for example, green-care, eco-tourism etc)</p>
<i>Cross sectoral priorities addressed</i>	<p>communication, education</p>

Table 10. Action 2.2: Renaissance of local food

<i>Title of an Action No 2.2</i>	<p>Renaissance of the local food</p> <p>Further processing of the local products and raw-materials is a necessity for rural food producers. Local products require stronger branding and visibility to compete with the international bulk products. We need to bring local food to the frame and boost the local consumption.</p> <ul style="list-style-type: none"> • Baltic Sea cuisine, a set of high quality food products based on food production in BSR regions • Public procurement and local food • New protein sources • The whole value chain – approach • Branding the local food
<i>Type per implementation period</i>	<p>Short, medium and long term actions</p>
<i>Results to be achieved</i>	<p>Vital and profitable food business based on BSR –based consortium</p>
<i>Indicators for measuring achievements</i>	<p>Sales, turnover, market position</p>

<i>Mechanisms, tools to be used for measuring achievements</i>	
<i>Stakeholders to be involved and their roles and benefits</i>	SMEs: possible exporters RTD performers: universities, research institutes, technology and/or innovation bodies: possible co-operators Regional and local public authorities: Sharing of information about the possibilities Supporting and promotion bodies (agencies, BICs, clusters, etc): Sharing of information about the possibilities
<i>Potential partners/partnerships (if already identified)</i>	RDI2CluB partnership HIDZ – Huaian Industrial Development Zone (China), Huaian Normal University (China)
<i>Potential funding instruments and mechanisms to be used for implementation</i>	H2020 or separate national funding programs under a shared agenda (e.g. Business Finland)
<i>Priority bio-economy areas relevant to the Action</i>	PA No 1 Agriculture, forestry and fisheries PA No 2 Food and feed production PA No9 Bio-based services (for example, green-care, eco-tourism etc)
<i>Cross sectoral priorities addressed</i>	Communication

Table 11. Action 2.3: 5G environment at Bioeconomy campus is utilised to spark innovations related to digitalisation in bioeconomy

<i>Title of an Action No 2.3</i>	5G environment at Bioeconomy campus is utilised to spark innovations related to digitalisation in bioeconomy Bioeconomy Campus is one of the first rural 5G pilot environments. To capitalise the opportunity, SME cooperation, applied research and capacity building & multiplying projects on digitalisation of agriculture are sought after in co-operation with the JAMK ICT Institute and City of Saarijärvi.
<i>Type per implementation period</i>	Medium term actions
<i>Results to be achieved</i>	<ul style="list-style-type: none"> • Co-operation models and events between the ICT institute (incl. ICT students) and Bioeconomy campus are established to encourage creative encounters of ICT talent and bioeconomy entrepreneurs. • Applied research, education and multiplying projects on digitalisation of agriculture e.g. for optimising production processes and growth conditions.

<i>Indicators for measuring achievements</i>	Number and type of new RDI projects, co-operation modes and start-ups created in connection to the 5G testing environment
<i>Mechanisms, tools to be used for measuring achievements</i>	To be determined
<i>Stakeholders to be involved and their roles and benefits</i>	SMEs: potential users of services RTD performers: universities, research institutes, technology and/or innovation bodies: co-operators Regional and local public authorities: co-operators Supporting and promotion bodies (agencies, BICs, clusters, etc): co-operators
<i>Potential partners/partnerships (if already identified)</i>	JAMK Institute of Bioeconomy, Bioeconomy Campus actors JAMK ICT institute City of Saarijärvi Not determined in detail
<i>Potential funding instruments and mechanisms to be used for implementation</i>	5G project JAMK strategic funds Potentially European Regional Development Funds and Rural Development Funds
<i>Priority bio-economy areas relevant to the Action</i>	PA No 1 Agriculture, forestry and fisheries PA No 8 R&D services in biomass
<i>Cross sectoral priorities addressed</i>	Digitalisation, education

Table 12. Action 2.4: Institute of Bioeconomy is building its expertise on application of new technologies, circular economy models and branding knowhow to development of viable and sustainable bioeconomy business

<i>Title of an Action No 2.4</i>	Institute of Bioeconomy is building its expertise on application of new technologies, circular economy models and branding knowhow to development of viable and sustainable bioeconomy business.
<i>Type per implementation period</i>	Medium to long term actions
<i>Results to be achieved</i>	<ul style="list-style-type: none"> Institute of Bioeconomy is developing a test-bed for rural nutrient management including water monitoring capacity, agrihub monitoring platform (sensors, weather station etc.) and a dry toilet showroom.

	<ul style="list-style-type: none"> • Institute of Bioeconomy is developing as a RDI hub for new forest-based products and services. In 2019, scenarios co-designed with stakeholders for the potential and sustainability impact of the new forest-based products and services. Development of wellbeing brands for forest-based products and services. • Institute of Bioeconomy is strengthening the knowledge hub on resource efficient bioenergy system in rural areas with product development and living lab services on efficient and low-carbon decentralised bioenergy systems. Applied research on business opportunities, zero-carbon systems and circular economy solutions for development of energy systems. • Bioeconomy Campus is carrying out applied research on carbon farming as an ecosystem service – sequestration of carbon to soil in forestry and agriculture.
<i>Indicators for measuring achievements</i>	Number and type of new RDI projects, co-operation modes and start-ups created in connection to the Institute of Bioeconomy
<i>Mechanisms, tools to be used for measuring achievements</i>	Strategy indicators and follow-up of the Institute of Bioeconomy
<i>Stakeholders to be involved and their roles and benefits</i>	<ul style="list-style-type: none"> • SMEs: co-operators • RTD performers: universities, research institutes, technology and/or innovation bodies: co-operators • Regional and local public authorities: co-operators in regional development • Supporting and promotion bodies (agencies, BICs, clusters, etc): co-operators
<i>Potential partners/partnerships (if already identified)</i>	JAMK Institute of Bioeconomy Bioeconomy Campus actors Not determined in detail
<i>Potential funding instruments and mechanisms to be used for implementation</i>	JAMK strategic funds Potentially European Regional Development Funds and Rural Development Funds
<i>Priority bio-economy areas relevant to the Action</i>	PA No 1 Agriculture, forestry and fisheries PA No 2 Food and feed production PA No 3 Bio-based construction and building materials PA No 7 Bio-based energy, incl. transport PA No 8 R&D services in biomass PA No9 Bio-based services (for example, green-care, eco-tourism etc)
<i>Cross sectoral priorities addressed</i>	Digitalisation, communication, education, sustainable development

Education and business development boost bioeconomy

The third objective is the education and business development. These ensure the possibilities of the bioeconomy also in the future.

Specific themes identified in this objective are related to lifelong learning paths and developing SMEs.

Table 13. Objective 3: Education and business development boost bioeconomy

Objective No3:	Education and business development boost bioeconomy
Regional policies and/or strategies addressed	Regional strategy 2040, Regional programme 2018-2021, regional action plan 2019-2020
National policies and/or strategies addressed RIS3 area + KETs if relevant	National bioeconomy strategy 2014, EU Bioeconomy strategy
Sub-objectives of EUSBSR Strategy policy area "Bio-economics" addressed https://www.balticsea-region-strategy.eu/action-plan	<ul style="list-style-type: none"> • Involvement of the business community, increase knowledge on sustainable forest management. • Cooperation: increased coordination and synergy in the Baltic Sea region among public sector and NGO cooperation initiatives, projects and stakeholders dealing with bioeconomy. • Realizing the bioeconomy in the Baltic Sea region: development of a sustainable bioeconomy in the Baltic Sea region. • Contributions to the development of the European Bioeconomy: Baltic Sea region participation in wider EU efforts and projects to realise the bioeconomy.
EUSBSR sustainability principles addressed:	<ul style="list-style-type: none"> • Sustainable bio-resource management and circular bio-economy • Healthy, nutritious locally-produced food and food security • Resilient and diverse ecosystems (climate proofing, biodiversity...) • Inclusive rural economic development • Sustainable consumption

Table 14. Action 3.1: Smart lifelong learning paths

<i>Title of an Action No 3.1</i>	Smart lifelong learning paths
<i>Type per implementation period</i>	Medium term actions
<i>Results to be achieved</i>	With the fast pace of digitalisation and the transition to bioeconomy, circular economy and new business models such as platform economy, there is a need for flexible and continuous learning to obtain the needed

	<p>skills for the SMEs to persist and grow. Learning pathways should be oriented with future foresight and aligned with smart specialisation strategies to ensure regional development and competitiveness.</p> <p>In addition, the updated EU bioeconomy strategy acknowledges the need for education, training and skills across the bioeconomy (2.4 action) giving a basis for transnational co-operation in the issue.</p> <p>Results to be achieved:</p> <ul style="list-style-type: none"> • Accessible life long learning paths to support renewal of rural SMEs; best practices developed and shared in BSR. • Availability of skilled workforce for knowledge-based rural SMEs
<i>Indicators for measuring achievements</i>	<ul style="list-style-type: none"> • new cooperation patterns for the tailoring of up-skilling pathways • fore sighting the future skills for education of the present experts to meet the challenges of the future labour markets needs • international development projects funded to address the issue
<i>Mechanisms, tools to be used for measuring achievements</i>	
<i>Stakeholders to be involved and their roles and benefits</i>	<ul style="list-style-type: none"> • SMEs • RTD performers: universities, research institutes, technology and/or innovation bodies • Regional and local public authorities • Supporting and promotion bodies (agencies, BICs, clusters, etc) • Policy making and legislative stakeholders
<i>Potential partners/partnerships (if already identified)</i>	Central Finland: JAMK, Teacher Education College and Institute of Bioeconomy, Regional Council of Central Finland Vidzeme Planning Region
<i>Potential funding instruments and mechanisms to be used for implementation</i>	EU funding (Erasmus + for higher education etc.)
<i>Priority bio-economy areas relevant to the Action</i>	PA No 1 Agriculture, forestry and fisheries PA No 2 Food and feed production PA No 7 Bio-based energy, incl. transport PA No 8 R&D services in biomass PA No9 Bio-based services (for example, green-care, eco-tourism etc)
<i>Cross sectoral priorities addressed</i>	Education

Table 15. Action 3.2: Renewing the operations of traditional bio-based SMEs with new business models, branding and marketing skills and co-operation models

<i>Title of an Action No 3.2</i>	Renewing the operations of traditional bio-based SMEs with new business models, branding and marketing skills and co-operation models
<i>Type per implementation period</i>	Medium term actions
<i>Results to be achieved</i>	<ul style="list-style-type: none"> • Activating farmers to take on new business models and co-operation models, including platform based business models • Capacitating business advisors and business development agencies in the Northern Central Finland on the new business models for farmers
<i>Indicators for measuring achievements</i>	<ul style="list-style-type: none"> • Number of SMEs involved in capacity building projects and trainings • Number of business advisors involved in capacity building projects and trainings • New networks formed • Number of farms with transformed business models
<i>Mechanisms, tools to be used for measuring achievements</i>	Beneficiary feedback collection and analysis
<i>Stakeholders to be involved and their roles and benefits</i>	SMEs: possible co-operators and developers
<i>Potential partners/partnerships (if already identified)</i>	JAMK Institute of Bioeconomy, Bioeconomy Campus actors Business development agencies in Northern Central Finland
<i>Potential funding instruments and mechanisms to be used for implementation</i>	European Regional Development Funds and Rural Development Funds For example: Project called: Päämäärätietoisesti uutta liiketoimintaa Pohjoiseen Keski-Suomeen "PÄMÄ"
<i>Priority bio-economy areas relevant to the Action</i>	PA No 1 Agriculture, forestry and fisheries PA No 2 Food and feed production PA No 7 Bio-based energy, incl. transport PA No 8 R&D services in biomass PA No9 Bio-based services (for example, green-care, eco-tourism etc.)
<i>Cross sectoral priorities addressed</i>	Digitalisation, communication

Co-operation, networks and common will boost bioeconomy

The fourth objective is strengthening the cooperation within the various stakeholders. Cooperation has regional, but also national and international approaches. Via cooperation, we gain new business opportunities.

Specific themes identified in this objective are related to co-operation in different sectors, between different stakeholders and SMEs and by various ways.

Table 16. Objective 4: Co-operation and networks boost bioeconomy

Objective No4:	Co-operation and networks boost bioeconomy
Regional policies and/or strategies addressed	Regional strategy 2040, Regional programme 2018-2021, regional action plan 2019-2020
National policies and/or strategies addressed RIS3 area + KETs if relevant	National bioeconomy strategy 2014, EU Bioeconomy strategy
Sub-objectives of EUBSR Strategy policy area “Bio-economics” addressed https://www.balticsea-region-strategy.eu/action-plan	<ul style="list-style-type: none"> • Involvement of the business community, increase knowledge on sustainable forest management. • Cooperation: increased coordination and synergy in the Baltic Sea region among public sector and NGO cooperation initiatives, projects and stakeholders dealing with bioeconomy. • Realizing the bioeconomy in the Baltic Sea region: development of a sustainable bioeconomy in the Baltic Sea region.
EUBSR sustainability principles addressed:	<ul style="list-style-type: none"> • Sustainable bio-resource management and circular bio-economy • Healthy, nutritious locally-produced food and food security • Resilient and diverse ecosystems (climate proofing, biodiversity...) • Inclusive rural economic development • Sustainable consumption

Table 17. Action 4.1: Bio and circular economy in Central Finland – seminars, workshops etc.

<i>Title of an Action No</i> 4.1	<p>Bio and circular economy in Central Finland – seminars, workshops etc.</p> <p>Seminars, workshops and other happenings about timely topics somehow related to bio and circular economics. The purpose of these events is to offer information of experts from different fields but also to offer a place to meet people and discuss about co-operation possibilities.</p>
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<i>Type per implementation period</i>	Short term actions
<i>Results to be achieved</i>	New co-operation relationships. New project applications. <ul style="list-style-type: none"> Regional dialogue initiated and facilitated on Biobord.eu under regional forum topics for strengthening regional co-operation and co-working between the actors of the Bioeconomy Innovation Ecosystem.
<i>Indicators for measuring achievements</i>	Events held, participants and the event feedback from them Project applications. Activity in regional forum topics
<i>Mechanisms, tools to be used for measuring achievements</i>	Forum statistics on biobord.eu
<i>Stakeholders to be involved and their roles and benefits</i>	SMEs: potential participants and co-operators RTD performers: universities, research institutes, technology and/or innovation bodies: potential participants and co-operators Regional and local public authorities: potential participants and co-operators Supporting and promotion bodies (agencies, BICs, clusters, etc): potential participants and co-operators Policy making and legislative stakeholders: potential participants and co-operators
<i>Potential partners/partnerships (if already identified)</i>	-
<i>Potential funding instruments and mechanisms to be used for implementation</i>	-
<i>Priority bio-economy areas relevant to the Action</i>	<i>Leave appropriate</i> PA No 1 Agriculture, forestry and fisheries PA No 2 Food and feed production PA No 3 Bio-based construction and building materials PA No 4 Bio-based textile and clothing PA No 5 Pulp and paper PA No 6 Bio-based chemical industry PA No 7 Bio-based energy, incl. transport PA No 8 R&D services in biomass PA No9 Bio-based services (for example, green-care, eco-tourism etc)
<i>Cross sectoral priorities addressed</i>	Communication, sustainable development

Table 18. Action 4.2: Encouraging SMEs for co-operation

<i>Title of an Action No 4.2</i>	Encouraging SMEs for co-operation Platform of RDI2CluB project is made to be a platform for bioeconomy co-operations. It can be used to change information or to seek for co-operation partners to name just a few possibilities. SMEs of the region are encouraged to use the possibilities of the platform.
<i>Type per implementation period</i>	Short term actions
<i>Results to be achieved</i>	Discussions and co-operation. Projects. User cases on SME co-operation will be piloted during 2019-2020 to test biobord.eu for peer learning and capacity building co-operation.
<i>Indicators for measuring achievements</i>	Numbers of discussions started. Project applications written.
<i>Mechanisms, tools to be used for measuring achievements</i>	Platform data
<i>Stakeholders to be involved and their roles and benefits</i>	SMEs: users RTD performers: universities, research institutes, technology and/or innovation bodies: users Regional and local public authorities: users Supporting and promotion bodies (agencies, BICs, clusters, etc): users
<i>Potential partners/partnerships (if already identified)</i>	RDI partnership
<i>Potential funding instruments and mechanisms to be used for implementation</i>	No need for extra funding during project time
<i>Priority bio-economy areas relevant to the Action</i>	PA No 1 Agriculture, forestry and fisheries PA No 2 Food and feed production PA No 3 Bio-based construction and building materials PA No 4 Bio-based textile and clothing PA No 5 Pulp and paper PA No 6 Bio-based chemical industry PA No 7 Bio-based energy, incl. transport PA No 8 R&D services in biomass PA No9 Bio-based services (for example, green-care, eco-tourism etc)
<i>Cross sectoral priorities addressed</i>	Communication

Table 19. Action 4.3: Boosting development of new forest-based innovations

<i>Title of an Action No 4.3</i>	Boosting development of new forest-based innovations Platform of RDI2CluB project is made to be a platform for bioeconomy co-operations. It will be used as an environment for implementation of an RDI program for new forest-based innovations.
<i>Type per implementation period</i>	Short, medium and long term actions
<i>Results to be achieved</i>	Program document, commitments of key-stakeholders, new RDI – projects under the program RDI initiatives focusing on forest-based product, service and process innovations include: <ul style="list-style-type: none"> • Promoting additional value for forest owners from new forest-based products and services • Knowledge-building on carbon farming and climate positive forestry practices • Networking, peer learning and empowerment of women forest owners • Design of forest-based services promoting wellbeing and balance (e.g. stress-relieve and recovery)
<i>Indicators for measuring achievements</i>	Approval of the program, number of projects, volume of projects, involvement of companies, new products, start-ups
<i>Mechanisms, tools to be used for measuring achievements</i>	Steering group of the program monitors implementation and results
<i>Stakeholders to be involved and their roles and benefits</i>	SMEs and key-businesses: co-operators, business starters RTD performers: universities, research institutes, technology and/or innovation bodies: co-operators Regional and local public authorities: co-operators Supporting and promotion bodies (agencies, BICs, clusters, etc): co-operators
<i>Potential partners/partnerships (if already identified)</i>	Hedmark region (Tretorget, Innlands University) Institute of Environmental Solutions
<i>Potential funding instruments and mechanisms to be used for implementation</i>	-
<i>Priority bio-economy areas relevant to the Action</i>	PA No 1 Agriculture, forestry and fisheries PA No 3 Bio-based construction and building materials PA No 4 Bio-based textile and clothing PA No 5 Pulp and paper PA No 6 Bio-based chemical industry

	<p>PA No 7 Bio-based energy, incl. transport</p> <p>PA No 8 R&D services in biomass</p> <p>PA No9 Bio-based services (for example, green-care, eco-tourism etc)</p>
<i>Cross sectoral priorities addressed</i>	Communication, sustainable development