Mapping of EU Member States' / regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy

Task 3

Case Study Report Estonia

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1. Short National Bioeconomy Profile

Name of the case region/country	Eesti (Estonia)
Member State	Yes
GDP – Euro per capita (2014)*	15 200
Total ESIF Research & Innovation per capita per year*	100.71
Total H2020 per capita per year*	17.81
Value Chain Approach to the Bioeconomy**	Broad: Biomass supply and waste; Biomass processing and conversion; Bio-based products. Specific: Foods and beverages; Pulp and Paper; Textiles; Bio-based chemicals; Bio-energy and fuel from biomass
Thematic Focus of the Bioeconomy Approach**	Broad: Other bio-based Industries; Agro-Food; Bio-based Fuel and Energy. Specific: Fisheries and aquaculture; Forestry and Wood; Crop Production; Biochemical products; Food Processing
Research and Innovation Fields highlighted for the Bioeconomy**	Broad: Biology, Biotechnology, Chemistry, Life Sciences, Nano Technologies; Advanced Manufacturing, Machineries; Water and Natural Resources Management
Bioeconomy Activity Level**	Middle
CASE STUDY SUMMARY	
Bioeconomy Approach	A top-down steering, driven by the Ministry of Rural Affairs. Lack of a systematic approach and strategic framework.
Bioeconomy Ecosystem	Traditional agricultural and forestry activities dominate. A high potential for increasing value added of bioeconomy sectors through increasing resource efficiency and developing smart and value-adding value chains.
Bioeconomy Policy Support	No specific bioeconomy-related support. Several support measures are available for the growth areas of smart specialisation, which include effective use of resources, and have been relevant for implementing the bioeconomy-related RD&I initiatives.
Successful initiatives and Good Practices	Center of Food and Fermentation Technologies combines fundamental sciences, applied research and product development. Competence Centre for Knowledge-Based Health Goods and Natural Products R&D specialises in the R&D of health goods and natural products.
Main Needs, Gaps and Bottlenecks	Need for a bioeconomy strategy and steering the bioeconomy activities at the national level in a systematic way

* Source of the data: S3 – Regional Viewer: http://s3platform.jrc.ec.europa.eu/synergies-tool

** Data collected by this Study project in Task 1.

2. National Bioeconomy Ecosystem

This chapter describes the general characteristics of the regional bioeconomy ecosystem, its origins, main stakeholders and driving forces. It gives an overview on the recent evolution and trends on bioeconomy-related issues in the area and some of the main activities and initiatives.

2.1 Origin of Interest of the region in the Bioeconomy

Estonian bioeconomy is, on the supply side, based on natural resources. Estonia is seen to have a good potential in bioeconomy because it has twice as much arable land per capita than the EU27 average (2012: 0,96 ha in Estonia, 0,37 ha in EU27 average), and because it has food self-sufficiency and more than half of its mainland covered by forests (Lemetti 2015; Ministry of Rural Affairs 2016a). It is also found that even without steering, already one third of Estonian economy is bioeconomy, which is a good basis for bioeconomy development with higher value added from biomass (Estonian Development Fund 2015).

Bioeconomy development has been promoted in the framework of the "Development Plan on the Promotion of Biomass and Bioenergy Use for 2007-2013", followed up by the "Government Action Programme 2015-2019" where effective use of biomass resources and development of the Bioeconomy strategy are foreseen among the action points (Ministry of Rural Affairs 2016a). Among the important documents for developing a strategic framework for bioeconomy are "Analysis of the Estonian Bioeconomy" (Estonian Development Fund 2015) and "Analysis and propositions for developing the Estonian Bioeconomy Strategy until 2030" (Ministry of Rural Affairs 2016a).

These analysis documents emphasize that the potential for bioeconomy is underutilized in Estonia and the value-chain based approach to the utilization of biomass is lacking. The average value added of bioeconomy per capita in Estonia is about twice lower than the EU average (2013), and there is a need for developing smart, value-adding and sustainable value chains (Lemetti 2015). Thus the main interest in bioeconomy deployment in Estonia lies in increasing resource efficiency and generating higher value added from biomass.

2.2 Bioeconomy Stakeholders

Bioeconomy development is a top-down approach in Estonia, driven primarily by the Ministry of Rural Affairs, the Ministry of the Environment and the Ministry of Economic Affairs and Communications (Ministry of Rural Affairs 2016a). The coordination efforts and knowledge support are provided by the Council of Agriculture and Rural Development, the Council of Fisheries and the Council of

Forestry and the Estonian Development Fund (Winther 2016; Estonian Development Fund 2015).

To learn about the division of tasks and responsibilities between the Ministries for bioeconomy-related issues in Estonia see "State of Play: Bioeconomy strategies and policies in the Baltic Sea Region countries"[1] (page 6).

The Estonian Research Council (ERC) is the main body providing funding for R&D in Estonia. It coordinates the European Research Area (ERA) initiatives and is a network contact point for among other things COST, EU Framework Programmes and Horizon2020.

Estonian Development Fund provides relevant analysis on bioeconomy aspects for the policy makers. For instance, it conducted an analysis on the Estonian bioeconomy potential (2015), and performs a qualitative analysis on smart specialization sectors in Estonia.

Although there are good examples of cluster initiatives and national competence centres in Estonia, the bioeconomy is driven by the national level. Among the educational institutions, the University of Life Sciences is an important stakeholder with a bioeconomy-related research agenda.

2.3 Bioeconomy – strategies, plans and projects

Bioeconomy is a relatively new political topic in Estonia. "Estonian Bioeconomy Strategy until 2030" has been under development by the Ministry of Rural Affairs since 2014 and is not yet published. Estonia does not have a bioeconomy advisory body/panel (Winther 2016). Nevertheless, the interest in bioeconomy at the national level is rising.

Bioeconomy-related issues are currently addressed in a number of national strategies (about 25) (see "State of Play: Bioeconomy strategies and policies in the Baltic Sea Region countries", page 6).

The priority areas in the forthcoming strategy on bioeconomy are ensuring the growth in welfare, more effective and environmentally friendly production and use of biomass, and increasing the added value creation from existing land and water-based biomass resources (Ministry of Rural Affairs 2016a).

The work on the bioeconomy strategy has been impeded due to difficulties to connect and align various strategies, and distribute the responsibilities among different Ministries. Moreover, the change of government in November 2016 has

[1] http://bsrbioeconomy.net/resources/2016_docs/Working_Paper_1_%20BSR_Council.pdf

slowed down the strategy development process. The work on the strategy will be resumed by the new government and the priority areas are expected to remain the same. The Bioeconomy strategy and respective R&D funding schemes along it are expected to be launched before 2020.

Most relevant networks and international cooperation in the field of bioeconomy that Estonia is part of are related to the European Framework Programmes and Horizon2020. There are several H2020 projects (e.g. BIOCOM , DIABOLO, FACCE SURPLUS, PROVIDE) and FP7 projects in the field of bioeconomy with the participation of Estonian actors (Estonian Research Council 2016a).

The Ministry of Rural Affairs provides funding to the international research cooperation networks ERA-Net projects since 2011. The Ministry is the main Estonian representative in the ERA-Nets on bioeconomy (ERA-Net SUSFOOD, ERA-Net CORE Organic, ERA-Net C-IPM, ERA-Net Plus "Climate Smart Agriculture: adaption of agricultural systems in Europe" and ERA-Net Cofund FACCE SURPLUS). It also participates in several JPIs (Ministry of Rural Affairs 2016b).

The Estonian Research Council has participated in several ERA-Nets that are partly financed by the ESIF. Currently, the ERC participates in CoBioTech CoFund only. Occasionally, the bioeconomy-related topics have been addressed in other ERA-Nets like M-ERA.NET 2, e.g. addressing materials research and innovation.

3. Bioeconomy Policy Support

This chapter gives a brief account of the existing policy instruments and action lines to support the bioeconomy in the area. It highlights the most important value chain approaches to promote the bioeconomy, the thematic focus of the Bioeconomy-related research and innovation, as well as some of the research fields that are relevant for further deployment of the bioeconomy.

3.1 General support framework

The "Estonian Research and Development and Innovation Strategy 2014-2020" "Knowledge-based Estonia" has 'more effective use of resources' as one of smart specialization growth areas. The strategy provides an overarching framework and does not define what kind of support will be directed to what exact priority area. It states however that launching field-specific R&D programmes in Estonia has been slow. In the priority area of resource efficiency, the greatest growth potential in Estonia is identified within material science and industry, innovative construction, i.e. "smart house", health-promoting food, and chemical industry (more effective use of oil shale) (Estonian Development Fund 2013).

The Estonian national research funding is based on a bottom-up approach to financing, meaning that the specific research topics of the call are rarely defined and prescribed, allowing for wider interpretation.

The Ministry of Education and Research is the main actor responsible for the implementation of the **Estonian RDI Strategy** together with the Ministry of Economic Affairs and Communications. There is a steering committee formed to promote cross-field management of smart specialisation and it consists of representatives from different ministries and, if necessary, enterprises. In addition, the **Estonian Development Fund** monitors and analyses the development.

Indirect support to the bioeconomy research is also available through **RITA programme** supported by the ERDF launched in 2016. The programme aims to increase the role of the state in strategic management of research and increase its capabilities in planning and conducting socially relevant research. RITA provides support to strategic R&D activities, such as socio-economical interdisciplinary applied research; and support to knowledge-based policy formulation (Estonian Research Council 2015). A **bioeconomy research project** is currently being implemented in the framework of this programme that will provide policy-relevant knowledge and analysis needed for future planning and policy formulation on bioeconomy.

Support to cooperation and innovation activities, product processing and development are available for farmers and local producers under the **Estonian Rural Development Programme**. Increasing resource efficiency and environmentally friendly production have been important cross-cutting themes.

3.2 Bioeconomy Policy Support

There are no specific support measures for bioeconomy-related research and innovation in Estonia today. Several support measures are available for the growth areas of smart specialisation, which include effective use of resources, and have been relevant for implementing the bioeconomy-related RD&I initiatives.

Since 2015 there is a funding scheme intended for companies called **NUTIKAS** to support applied research in smart specialisation growth areas. Resource efficiency is one of three priority areas that the programme supports. The programme aims to contribute to growth in the research-intensity of the Estonian economy, supporting collaboration between R&D institutions and companies in smart specialisation growth areas. The volume of funding in a call for proposals is up to 9 million euros, the maximum amount of the support per project is 2 million euros. The programme is run by the Archimedes Foundation and the Estonian Research Council (Estonian Research Council 2016b). There are currently **two projects on bioeconomy** funded by NUTIKAS:

- Development of biodegradable composite materials for plant growth substrates;
- Development of better lactic acid bacteria by genetic manipulations (Archimedes 2016).

Previously there was a **National Programme on Biotechnology 2009-2012** which partly overlapped with bioeconomy. Both programmes have been financed by ESIF.

The Ministry of Rural Affairs runs a programme on **Applied Agricultural Research and Development 2015-2020** that supports agriculture-related research projects (Ministry of Rural Affairs 2015).

There is special support available to establishing R&D competence centres with a purpose to create new or improve existing materials, products or technology that have higher added value. The investment aid is provided by the ESIF and is managed by **Enterprise Estonia** (EAS 2016). Preference is given to projects that fall within the growth areas of smart specialisation, one of which is a more effective use of resources. There are two competence centres related to bioeconomy:

- Center of Food and Fermentation Technologies (described in 4.1)

- Bio-Competence Centre of Healthy Dairy Products[2]

3.3 ESIF and H2020 resources for the Bioeconomy

The Estonian Partnership Agreement states the following: "In 2014-2020 Estonia is allocated around €3.58 billion for Cohesion Policy (ERDF, ESF, Cohesion Fund). Additional €725.8 million will be devoted to development of the agricultural sector and rural areas from the European Agricultural Fund for Rural Development (EAFRD)". The allocation for European Maritime and Fisheries Fund (EMFF) amounts to some €100.9 million. Details on the allocation are given in a table below. Concentration of funds on limited number of priorities is one of the main principles of the reformed cohesion policy. As regards the investments into individual thematic objectives, the situation is as follows (includes investments from the four Funds listed above): Research & innovation 0.67bn; Transport 0.48bn; ICT 0.08bn; Employment 0.46bn; SME 0.65bn; Social inclusion 0.47bn; Low carbon economy 0.31bn; Education 0.42bn; Climate change 0.17bn; Public administration 0.12bn; Environment 0.38bn; Technical assistance 0.14bn" (European Commission 2014).

Research & innovation	0.67bn	Transport	0.48bn
ICT	0.08bn	Employment	0.46bn
SME	0.65bn	Social inclusion	0.47bn
Low carbon economy	0.31bn	Education	0.42bn
Climate change	0.17bn	Public administration	0.12bn
Environment	0.38bn	Technical assistance	0.14bn

The ERDF allocates EUR 642 313 830 to strengthening research, technological development and innovation, while the EAFRD allocated EUR 23 528 000 to this thematic objective.

The Stairway to Excellence country report states that Estonia is quite good at absorbing SF/ESIF funds with EC contribution being 66,2e/inhabitant compared to the EU28 average of 78,9e/inhabitant. Estonian enterprises and R&D institutions are found to have experience on using EU funds and the funding agencies have good working structures (Rüttas-Kuttim 2015).

During the period 2007-2013, Estonia allocated 23% of its ERDF to research and innovation, which made ERDF the biggest single source of R&I funding in Estonia (Directorate-General for Research and Innovation 2016).

[2] http://tptak.ee/en

As of 2015, there have not been any specific initiatives to support synergies between ESIF and H2020, although no regulations limit synergies either, and the Stairway to Excellence report notes that researchers are nevertheless used to working with several funding sources (Rüttas-Kuttim 2015).

Estonian authorities have to some extent exploited positive synergies between ESIF and Horizon2020 projects through using infrastructure acquired from former projects financed by the ESIF in the Horizon2020 projects. At the same time considering the **competitive tendering system, it is impossible to plan for such synergies in advance**. ESIF and Horizon2020 funding has also been combined through the ERA-Nets: management costs come from Horizon2020 while calls can be financed by the ESIF. This does not apply to the ERA-Nets that are co-financed from the national funds and Horizon2020.

4. Successful Initiatives and Good Practices

This chapter highlights successful initiatives and good practices to promote research and innovation in bioeconomy-related fields.

4.1 Center of Food and Fermentation Technologies

Center of Food and Fermentation Technologies (CFFT) (www.tftak.eu) was founded by Tallinn University of Technology and six partner companies in the framework of the EU programme of Competence Centres in 2004. The center currently employs 55 persons (CFFT 2016).

CFFT is a R&D company that focuses on improving quality, functionality and stability of food, as well as developing and introducing new innovative food and fermentation technologies. Research at CFFT involves development and application of systems biology methods (e.g. optimising microorganisms and biotechnological processes) along with studies of food stability, quality and health benefits and applied research supporting product development in the partner companies (Broekaert et al. 2013). Thus, CFFT provides a strong link between scientific work and entrepreneurship.

CFFT applies modern analytical methods, systems biology and synthetic biology principles in its work. The center has a strong analytical department and a contemporary laboratory and equipment for physical, chemical and biological analysis of food- and bio-products (CFFT 2016). CFFT has an extensive cooperation with research institutions and more than 40 industrial enterprises from different countries (ConnectedHealth 2016).

Since its establishment, CFFT has received funding from FP7 and various measures in the field of infrastructure, R&D, product development etc. from Enterprise Estonia through the ERDF, and through NUTIKAS funding scheme supporting Applied Research in Smart Specialisation Growth Areas (Lumi interview 2016).

CFFT participates in ERASysApp funded project in the framework of ERA-Nets (ERASys App 2016). CFFT is managing a project EU48667 that is supported by the ERDF in the sum of EUR 5 697 954 for the period 2015-2022. The project focuses on development of analytical service platform for bio-food process monitoring and control, and development of food technologies to support the innovative activities in Estonian food- and biochemical companies (CFFT 2016). The center has also participated in one Interreg project in the past and another one is forthcoming. In general, the European Structural Funds have been of great help for local enterprises to be able to carry out product development, R&D and feasibility studies.

4.2 Competence Centre for Knowledge-Based Health Goods and Natural Products

Competence Centre for Knowledge-Based Health Goods and Natural Products (http://www.plantvalor.ee) at the Estonian University of Life Sciences was established in 2011 with support from the Measure of Developing Regional Competence Centres supported by the ERDF.

The Competence Centre was initiated by the Polli Horticultural Research Centre of the Estonian University of Life Sciences together with more than ten co-operation partners, including the University of Tartu, Tartu Biotechnology Park Ltd, TBD-Biodiscovery LLC, Estonian Employers' Confederation, Karksi Rural Municipality, A.Le Coq Ltd, Competence Centre of Food and Fermentation Technology Ltd, Estonian Spa Association, and others.

"The Competence Centre is unique in Estonia as its main field of activity and niche lies in the R&D of health goods and natural products using modern, high-technology methods, including extraction of bioactive ingredients of plant origin that are used in functional foods, eco-cosmetics, household chemicals, pharmaceuticals etc." (PlantValor 2016).

The main goal of the Competence Centre is to strengthen and mobilise sectorial know-how and other resources, raise competitiveness, as well as enhance the visibility of the region. At the core of its activities are international networking, academic R&D and business innovation. The Competence Centre supports the cooperation between research institutes, the public sector and enterprises.

In 2010 – 2014 the total budget of the Competence Centre was EUR 3 765 566, of which EUR 3 143 047 was financing from the ERDF. In the new programming period the Centre continues to receive the ERDF support under the competence centres measure but on a yearly-basis. The Competence Centre has a cooperation with agricultural producers co-funded by the measures from the Estonian Rural Development Plan regarding provision of research input (e.g., on product development) and knowledge transfer activities (e.g. organizing information days) for local producers, thereby combining the EU and national funding (Kaare and Pääso interview 2016).

5. Needs, Gaps and Bottlenecks to Deploy the Bioeconomy

According to the interviewees, lack of a bioeconomy strategy is perceived as the main obstacle to providing funding, as well as to managing and steering the bioeconomy activities in a systematic way. The interviewees expressed frustration about the slow process of "Estonian Bioeconomy Strategy until 2030" development, and emphasized the need for a national coordination and driving the bioeconomy activities. A **need for creating a strategic framework binding the areas of bioeconomy and a comprehensive plan with a long-term perspective** (2030 and 2050) was recognized by many stakeholders.

From the economic point of view, the main challenge for bioeconomy deployment today is a **low added value of the bioeconomy-related sectors in Estonia**. There is a need for more efficient utilization of renewable biomass resources and creating **smart and sustainable value chains**.

Scarce national funding and a tough competition for it are crucial factors limiting bioeconomy development. More substantial national funding together with increasing freedom and flexibility of funding measures would allow for developing and supporting truly innovative ideas and actors (including SMEs) in the bioeconomy.

Creating **synergies between the national programmes and different research communities** is seen crucial for fostering bioeconomy deployment. **Sharing of infrastructure and knowledge**, as well as combining different funding possibilities for applied and fundamental research should be more actively promoted. Such development should not add complexity or increase bureaucracy, however.

State Aid regulations were mentioned as a **bottleneck for companies' involvement** in research and innovation activities in the Stairway to Excellence Country Report (2015) and by the interviewees. State Aid regulations foresee different rules applied for different stakeholders, and often require a **high co-financing** from the applicants, especially the enterprises (50% or even more). The economic gains become too small, which, eventually, **limits the interest of the entrepreneurs to participate in R&D calls funded by SF/ESIF**. Reviewing State Aid rules and allowing certain **flexibility for R&D support** would facilitate the development of research and innovation, including the bioeconomy field (Rüttas-Kuttim 2015).

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Enterprise Estonia http://www.eas.ee/service/investment-aid-to-shared-service-and-research-development-centres/?lang=en

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