

Informative Report

Latvian Bioeconomy Strategy 2030

Abbreviations Used

UN	United Nations Organization
CO ₂	Carbon dioxide
CSB	Central Statistical Bureau
EC	European Commission
MoE	Ministry of Economics
EU	European Union
Eurostat	European Statistical Office
FSC	Forest Stewardship Council
RDP	Rural Development Programme
Latvia 2030	Sustainable Development Strategy of Latvia until 2030
LIBRA	Latvian Bioeconomy Strategy 2030
LUA	Land utilised for agriculture
LULST	Latvia University of Life Sciences and Technologies
LSFRI <i>Silava</i>	Latvian State Forest Research Institute <i>Silava</i>
NACE	Statistical classification of economic activities in the European Community
NDP	National Development Plan
OPEC	Organization of the Petroleum Exporting Countries
OSB	Oriented strand boards
PEC	Polyethylene furanoate material
PEFC	Programme for the Endorsement of Forest Certification
PET	Polyethylene terephthalate material
VAT	Value added tax
SBP	Sustainable Biomass Partnership
GHG	Greenhouse gases
SAP	Single area payment
MoA	Ministry of Agriculture

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Abstract

Latvian Bioeconomy Strategy 2030 (LIBRA) has been developed on the basis of the Measure 5.1 of the Cabinet Order No. 275 of 3 May 2016, On the Government Action Plan for the Implementation of the Declaration of the Intended Activities of the Cabinet led by Māris Kučinskis, which provided for the necessity of preparing such document.

The Ministry of Agriculture is responsible for the preparation of LIBRA. The Latvia University of Life Sciences and Technologies is responsible for the technical preparation of the document.

Associations of related sectors, scientific institutions, as well as representatives of the interministerial steering group led by the Ministry of Agriculture from the Ministry of Economics, Ministry of Environmental Protection and Regional Development, Ministry of Education and Science, Ministry of Welfare, and the Interdepartmental Coordination Centre were involved in the preparation of LIBRA.

The development of LIBRA is marked by the Sustainable Development Strategy of Latvia 2030 (Latvia 2030)¹ which mentions that the natural capital of Latvia is in comparatively good condition, however, it is insufficiently efficiently used and managed. In order to achieve the objective of Latvia 2030 – *to become the EU leader in the preservation, increase and sustainable use of natural capital* – it is necessary to raise the awareness of the significance of bioeconomy in Latvia and to determine the potential directions for development until 2030. LIBRA recognises the statements specified in Latvia 2030, i.e., in order to efficiently manage the natural capital, it is necessary to determine both the critical natural capital, reduction of which is not admissible, and the objectives and indicators of the preservation and restoration of the natural capital.

Why is the time period until 2030 chosen for the implementation of LIBRA? It was decided to develop LIBRA for the time period until 2030 because the external context of political planning has changed, and it provides for transition to the development of low-carbon economy until 2050².

LIBRA is planned to be used for the achievement of those objectives which have been set in the flagship initiatives “Innovation Union” and “Resource efficient Europe” of the Europe 2020 strategy (Europe 2020)³, as well as in the Europe’s Bioeconomy Strategy and the priorities laid down in its Action Plan⁴:

- investments in research, innovations, and skills;
- reinforced policy interaction and stakeholder engagement;
- enhancement of markets and competitiveness in bioeconomy;
- stimulation of sustainable, efficient, and “green” economy.

LIBRA vision: bioeconomy sectors⁵ of Latvia are the innovation leaders in the preservation, increase, and also efficient and sustainable use of the natural capital value in the Baltic States.

¹ <http://www.pkc.gov.lv/lv/valsts-attistibas-planosana/latvijas-ilgtspejigas-attistibas-strategija>

² https://ec.europa.eu/clima/policies/strategies/2050_en

³ EUROPE 2020 – A strategy for smart, sustainable and inclusive growth (2010) http://ec.europa.eu/eu2020/pdf/1_LV_ACT_part1_v1.pdf

⁴ Innovating for Sustainable Growth: A Bioeconomy for Europe http://ec.europa.eu/research/bioeconomy/pdf/201202_innovating_sustainable_growth_lv.pdf

⁵ Bioeconomy includes agriculture, forestry, fisheries, aquaculture, production of food, cellulose, and paper, as well as partly the chemical, biotechnology, and energy sector.

LIBRA is a long-term strategy for one of the priority directions of economic development of Latvia “Strategies for Smart Specialisation” (RIS3 direction “Knowledge-intensive bioeconomy”). This strategy outlines the development objectives, directions, and conceptual measures of bioeconomy. The directions of the bioeconomy strategy should be taken into account in the future development of the planning documents of Latvia.

The objectives of LIBRA are to be implemented within three main fields:

- 1) promotion and preservation of employment in bioeconomy sectors to up to 128 thous. employees;**
- 2) increasing the added value of bioeconomy products to at least 3.8 billion EUR in 2030;**
- 3) increasing the value of bioeconomy export production to at least 9 billion EUR in 2030.**

Research excellence of the traditional bioeconomy sectors and efficient transfer of knowledge are preconditions for the achievement of the strategic objectives for the development of bioeconomy.

The development of bioeconomy sectors is influenced by targeted promotion of the use of biomass in national economy as a whole, including in construction, manufacturing industry (textile industry, chemical industry, etc.), as well as in energy industry⁶.

Conclusions from the guidelines of the policy area “Bioeconomy – agriculture, forestry, and fisheries” of the EU Strategy for the Baltic Sea Region⁷, as well as the conclusions included in the EC Circular Economy Package (2015)⁸ and the climate policy planning documents have been used as the basis for the development of LIBRA.

LIBRA has been prepared in conformity with the indicators presented in the National Development Plan of Latvia for 2014–2020 (NDP 2020)⁹ and the evaluation of the development of bioeconomy sectors in the Rural Development Programme of Latvia for 2014–2020¹⁰, the Action Plan for the Development of Fisheries¹¹, and in the Guidelines for the Development of Forest and Related Sectors for 2015–2020¹². Furthermore, such policy documents as the Informative Report on the Development of the Smart Development Strategy¹³, Guidelines for the Scientific and Technology Development and Innovation for 2014–2020¹⁴,

⁶ Video funded by the European Commission which in less than two minutes explains what is bioeconomy: <https://youtu.be/2xvXkOMRTs4>

⁷ <http://www.balticsea-region-strategy.eu/action-plan?task=document.viewdoc&id=17>

⁸ Closing the loop – An EU action plan for the Circular Economy, <http://ec.europa.eu/transparency/regdoc/rep/1/2015/EN/1-2015-614-EN-F1-1.PDF>

⁹ <http://www.pkc.gov.lv/par-nap2020>

¹⁰

https://www.zm.gov.lv/public/files/CMS_Static_Page_Doc/00/00/00/88/06/Programme_2014LV06RDNP001_3_3_lv.pdf

¹¹

https://www.zm.gov.lv/public/files/CMS_Static_Page_Doc/00/00/00/49/90/ZRP_2014_2020_1.versijaarLVtekstuvicsaurRP.pdf

¹² <https://www.zm.gov.lv/mezi/statiskas-lapas/meza-un-saistito-nozaru-attistibas-pamatnostadnes-2015-2020-gadam?id=6501#jump>

¹³ <http://tap.mk.gov.lv/mk/tap/?pid=40291636>

¹⁴ <http://polsis.mk.gov.lv/documents/4608>

the EU Biological Diversity Strategy 2020¹⁵, and the Environmental Policy Guidelines for 2014–2020¹⁶ have been taken into account.

LIBRA has been developed according to the LULST study Forecasting of Agricultural Development and Development of Policy Scenarios until 2050 (2016)¹⁷ which includes the long-term forecasts for the development of agricultural sector until 2050. Results of other studies were also used in preparation of LIBRA.

A separate analysis of the impact of LIBRA 2030 on the target for reducing the potential GHG emissions within the time period from 2020 to 2030 has not been carried out within the scope of the Informative Report. On the basis of Article 9 of the Protocol No. 65, Paragraph 9 of the Cabinet meeting of 1 December 2015, the assessment of the impact on the achievement of the targets of the measures for reducing GHG emissions of agricultural and LULUCF sectors has been included in the Informative Report of the Ministry of Environmental Protection and Regional Development Ensuring of Meeting the Potential Goal for Reduction of GHG Emissions of Latvia for the Time Period from 2020 to 2030¹⁸. As the aforementioned policy planning documents provide a comprehensive analysis of statistical data and visualisation of results, then an individual section on statistical analysis is not included in LIBRA.

¹⁵ <http://eur-lex.europa.eu/legal-content/LV/TXT/?uri=LEGISSUM:ev00>

¹⁶ <http://polsis.mk.gov.lv/documents/4711>

¹⁷ <https://www.zm.gov.lv/public/ck/files/Lauksaimniecibas%20attistibas%20prognozes%202050.pdf>

¹⁸ Informative Report of the Ministry of Environmental Protection and Regional Development Ensuring of Meeting the Potential Target for the Reduction of GHG Emissions of Latvia within the Time Period from 2020 to 2030 has been sent for harmonisation to the State Chancellery on 9 November of this year.

1. Bioeconomy and Its Topicality

Bioeconomy is a part of national economy where renewable natural resources (plants, animals, micro-organisms, etc.) are used in the production process in a sustainable and well-considered way in order to produce food and fodder, industrial products, and energy¹⁹.

Bioeconomy is one of the oldest national economy sectors of civilization whose life sciences and biotechnologies can be turned into one of the most modern sectors of national economy.

Sectors of bioeconomy are agriculture, fisheries, food industry, forestry, woodworking industry, cellulose and paper industry, as well as individual sectors of chemical industry, biotechnologies, and energy fields.

Bioproducts are products which have been completely or partially produced from materials of biological origin, except for materials that are contained in geological formations and (or) have fossilised.

The base of bioeconomy is life, agronomy, ecology, food, engineering sciences, and social sciences, as well as horizontal technologies – biotechnologies, nanotechnologies, information and communication technologies, insofar as they are related to the research of bioproducts, creation and use of new products or technologies.

1.1. Topicality of Bioeconomy

The UN predicts that the number of inhabitants in the world will increase from the current 7.4 billion to 8.5 billion in 2030 and 9.7 billion in 2050. Furthermore the purchasing power of inhabitants and the proportion of those inhabitants whose income will be above the poverty threshold will increase, and thus the demand for different goods will increase more rapidly than the number of inhabitants²⁰.

At the same time the satisfaction of the current global consumption is not sustainable as the resource consumption of civilization exceeds the one that can be sustainably renewed by the Earth. Economic activity of a human being causes significant climate change, reduces availability of fresh water, deteriorates quality of air and water, depletes ecosystems. The risks caused by the climate change increase, and they affect both agriculture and forestry.

One of the most important causes of problems is the global dependence on fossil resources – they are extensively used not only in the energy industry and transport, but also in the chemical industry, including manufacturing of plastic materials, pharmacy, and cosmetics, textile industry, and manufacturing of wearing apparel, electronics, and construction. More extensive use of renewable bioresources²¹ can reduce the dependence on fossil resources, particularly in those fields where the use of other alternatives is problematic or impossible.

It is also true that the possibilities of bioeconomy are not based only on the replacement of fossil resources. The use of renewable bioresources provides opportunities for manufacturing new products. First of all, it enables the replacement of the products the manufacture of which

¹⁹ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions “Innovating for Sustainable Growth: A Bioeconomy for Europe”

²⁰ *UN (2015) World Population Prospects*,
https://esa.un.org/unpd/wpp/Publications/Files/Key_Findings_WPP_2015.pdf

²¹ Bioresources – resources of biological origin

depends on fossil resources with resources that are more environmentally-friendly and can be sustainably used, and depending on the type of their use they can be more durable, with a longer period of use, greater stability, lesser toxicity, shorter life cycle, and processing possibilities, etc. Second of all, it provides basis for the manufacture of completely new and unique products which do not have analogues on the market yet. Already at the moment there are many examples of how the development of bioeconomy allows for a better satisfaction of human needs²² (see Annex).

The development of bioeconomy allows to avoid the undesirable effects caused by the use of fossil resources and to achieve a reduction in the quantity of dangerous waste, and replacement of chemical substances with safe alternatives. However, upon using fossil resources in the energy sector, the use of clean technologies should be facilitated to ensure appropriate air quality.

In the future, the global demand for bioresources will increase²³ – it will be affected by the increase in the number of world inhabitants and their purchasing power, replacement of fossil resources with renewable resources in the energy industry, manufacturing of materials, and chemical industry, as well as the replacement of greenhouse gas (GHG) emission-intensive²⁴ raw materials with bioresources (Figure 1).

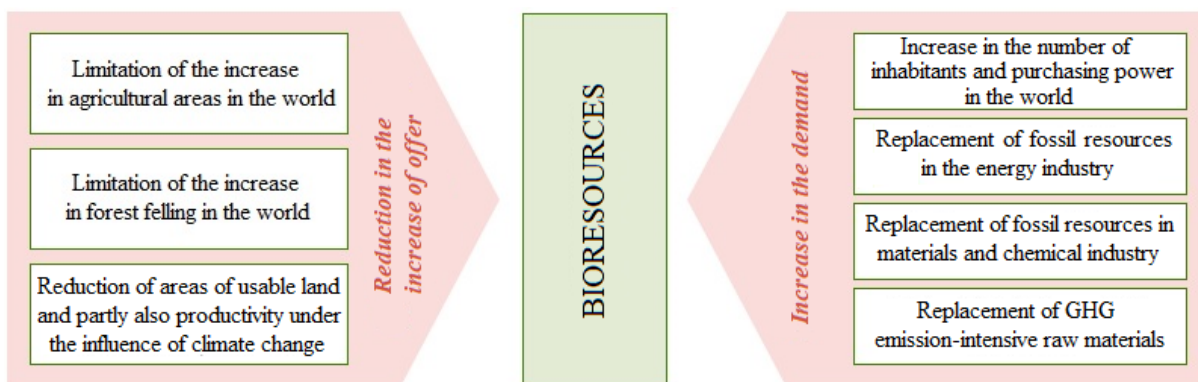


Figure 1. Factors affecting the offer of and demand for bioresources in the future

Concurrently the fight against climate change and other global environmental initiatives will foster the limitation of deforestation²⁵ and increase in the agricultural area. As a result of climate change, the availability of fresh water will be reduced and soil degradation processes decreasing the area of agricultural land will take place in several regions.

Acknowledging the importance of the development of bioeconomy, more than 50 countries of the world support and promote, to a larger or lesser extent, the development of bioeconomy with different programmes, strategies, action plans, and other policy documents. The majority of these countries are EU Member States. It should be noted that in the EU the bioeconomy

²² Examples: https://ec.europa.eu/research/bioeconomy/pdf/eu_bioecnomoy_apartment_katalog.pdf

²³ http://www.globalbioenergy.org/uploads/media/0701_FAO_Mueller_-_Some_insights_in_the_effect_of_growing_bioenergy_demand_on_global_food_security_and_natural_resources_01.pdf

²⁴ GHG emission-intensive raw materials – the raw materials in the production process of which large quantity of GHG emissions is forming

²⁵ Deforestation – transformation of forest land for other use, for example, agriculture or building.

strategy “Innovating for Sustainable Growth: A Bioeconomy for Europe”²⁶ was developed in 2012, and the development of this sector is being actively promoted.

The UN Agenda for Sustainable Development 2030 was approved in 2015. The majority of the total 17 sustainable development goals²⁷ are closely related to the development of bioeconomy. Bioeconomy is of particular importance to the implementation of seven sustainable development goals, which are:

- Goal 2: eradicate hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- Goal 7: ensure universal access to affordable, reliable, sustainable and modern energy services;
- Goal 8: promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- Goal 12: ensure sustainable consumption and production patterns;
- Goal 13: take urgent action to combat climate change and its impact;
- Goal 14: preserve and sustainably use the oceans, seas and marine resources to ensure sustainable development;
- Goal 15: protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

1.2. Bioeconomy in Latvia

Bioeconomy in Latvia includes many sectors of national economy, and it may be relatively divided into several groups (Figure 2):

- primary production of bioresources (mainly consists of the sectors of agriculture, forestry, fisheries);
- processing sectors of bioresources where operation is completely or mainly dependent on bioresources (mainly production of food and fodder, woodworking industry, manufacturing of leather products);
- processing sectors of bioresources where bioresources compete with other raw materials or are an alternative for them (mainly chemical industry, textile industry, energy industry, pharmacy sector);
- service sectors using bioresources (mainly construction, as well as catering and accommodation sectors).

The first two of the abovementioned groups are considered to be the traditional sectors of bioeconomy.

²⁶ EC Strategy Innovating for Sustainable Growth: A Bioeconomy for Europe http://ec.europa.eu/research/bioeconomy/pdf/201202_innovating_sustainable_growth_lv.pdf

²⁷ <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

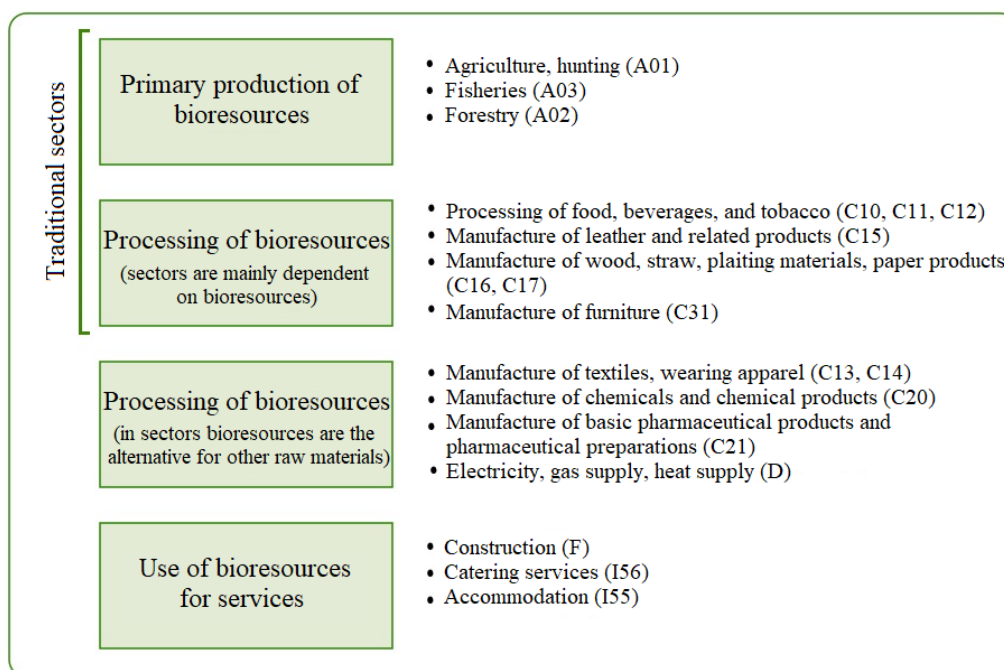


Figure 2. Sectoral groups of bioeconomy and NACE sectors

Contribution of the traditional sectors of bioeconomy – agriculture, forestry, fisheries, food industry, as well as woodworking industry – to the manufacturing sector²⁸ in Latvia in 2015 amounted to 54 % of the added value of all manufacturing sectors, and it is almost six times more than that to the next largest sector – manufacture of metals and their products. In absolute figures, the added value of traditional sectors of bioeconomy in 2015 was 1.99 billion EUR (see Figure 3).

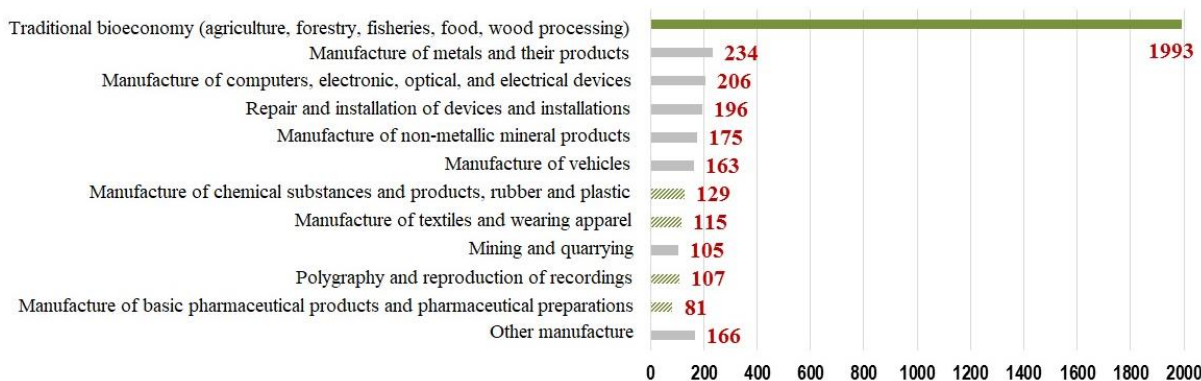


Figure 3. Added value in manufacturing sectors in Latvia in 2015, mill. EUR (in green – sectors completely dependent on bioresources, green underlined – partly dependent)²⁹

In addition to the traditional sectors of bioeconomy part of the added value produced in chemical industry, textile industry, pharmaceutical industry, and construction may also be attributed to bioeconomy. For example, in 2012 approximately 40 % of intermediate consumption of chemical industry in Latvia was constituted by bioresources³⁰.

²⁸ In this case the manufacturing sectors are the main sectors manufacturing goods (NACE 2.0; sections A, B, and C).

²⁹ Source: Eurostat National Accounts aggregates by industry (up to NACE A*64) [nama_10_a64]

³⁰ Estimates of the LULST, using GDP offer-utilisation tables of the CSB for 2012

Sectors of bioeconomy constitute to approximately 55–60 % of the total national export³¹ of goods, and the sector is of critical importance to ensuring balanced development of the State. In absolute figures, in 2016 export in the bioeconomy sector amounted to 4.26 billion EUR, and the total positive export-import balance of the sector was +1.28 billion EUR. Greater contribution is provided by wood products, as well as products of cereals, oil plants, and milk. A large proportion of these food products are exported as raw materials.

The role of traditional sectors of bioeconomy is of equal significance on the social level – in 2015 128 thous. people or 2/3 of the persons employed in the manufacturing sector and 14 % of the total number of persons employed in the State were employed in these sectors. Also approximately 108 thousand of private forest owners³² who gain irregular income from the forest, as well as more than 30 thousand farmers who grow production only for self-consumption should be added to this number.

2. Opportunities for the Development of Bioeconomy in Latvia

2.1. Opportunities for the Development of Bioeconomy in Latvia

Assessing from different viewpoints, one of the development opportunities for Latvia is the use of natural resources in a more sustainable and efficient manner. Bioeconomy provides an integrated approach for the inclusion of knowledge-based economic growth, social welfare, and environmental protection in agriculture, forestry, and fisheries in conformity with the fundamental principles of circular economy.

Economic development and employment

There is a critical lack of well-paid jobs in Latvia. It is the main reason why the number of inhabitants in Latvia has decreased in the time period from 2000 to 2016 by 270 thous. due to migration (the majority of them are young people), introducing significant changes in the age structure of the society. Essentially, the age structure³³ that has emerged in Latvia is not compatible with sustainable development of the State, and a crisis is to be expected already in the time period until 2030 when the inhabitants who currently are in the age group from 50–59 will attain the age of retirement, while the children in the age group from 10-19 will attain the working age.

For well-paid jobs to start emerging in national economy and for this process to be sustainable, it is important to increase the production of export-oriented (and import-competing) goods and provision of such services. In this respect, bioeconomy sectors of Latvia have a great potential – the competitive advantages of the sector prove that production of internationally marketable goods already clearly dominate the bioeconomy sector.

Spatial development of Latvia

Rural development is closely related to the use of land as the main production resource determining the competitiveness of rural territories. Development of bioeconomy is related to the use of land for the production of bioresources, therefore, the *long-term policy for the use of land of Latvia* should promote implementation of LIBRA 2030. Currently the main employers

³¹ Estimates of the LULST, considering the export-import statistics and evaluating re-export in different groups of goods

³² Research financed by the Forest Development Fund “Monitoring of Management of Private Forests and Consolidation and Cooperation Process of Forest Properties”, LSFRI Silava, 2016, page 51

³³ Source: Database of the CSB (IBG01. Long-term Migration of Inhabitants)

in rural areas are the undertakings of agriculture and forestry sectors and State institutions³⁴. Processing of bioresources, compared to other sectors, is also less prominently concentrated around Riga – this is due to the location of places where bioresources are extracted.

The objective included in the NDP 2020 – to achieve the proportion of 20 % of manufacturing industry in economy – is already reality in some regions of Latvia. As shown by the latest data currently available on 2014, the contribution of industry to the gross product of Vidzeme region is 19.0 %, Zemgale – 20.0 %, Kurzeme – 20.5 %, and Latgale – 14.9 %. Sectors of bioeconomy are the very sectors that can ensure even and balanced development of the territories of the State.

The number of inhabitants in Latvia is rapidly decreasing. Outside Riga and in regions around Riga the decrease is particularly rapid. Between 2010 and 2017 the number of inhabitants in Riga and in regions around Riga has decreased by 4.8 % and 2.4 % accordingly, while in other regions the decrease exceeded 10 %. Decrease in the number of inhabitants in rural territory in this time period was 9.4 %.³⁵ Trends in the changes in the number of inhabitants has been mainly determined by the income-gaining opportunities.

The income at the disposal of inhabitants in rural territories per member of the household in 2015 was by 22 % lower than in cities³⁶. This difference is not substantially greater because rural inhabitants gain income from agriculture, forestry, and fisheries: 21 % of inhabitants of rural areas are employed in this sector³⁷. Moreover, rural inhabitants have regular and irregular income as land and forest owners.

The development of bioeconomy is mainly related to the production and efficient processing of bioresources. In term of this, rural territories and regions have great development potential. The development of bioeconomy will facilitate the development of rural territories and regions of Latvia.

Surrounding environment

Non-sustainable use of fossil resources is one of the main influencing factors for many environmental problems in the world which may cause additional threats to safety in the future in relation to the potential conflicts in the world and refugee flows under the influence of climate change.

Although in the nearest future, the world economy will depend on the use of fossil resources, their use to a lesser extent should be facilitated. Some of the potential directions for the development of bioeconomy is reducing the amount of waste in processing and replacement of fossil resources with bioresources, also the use of biodegradable materials.

Economy of Latvia depends, to a large extent, on non-renewable fossil resources, and it affects not only the economic, but also environmental and national security aspect. Due to this reason, one of the objectives of the bioeconomy strategy is to reduce the use of fossil resources in Latvia, including their replacement with bioresources.

³⁴ Research of the LULST “Socio-economic Assessment of Different Models for Management of Land: Determination of Factors Promoting the Development of Territories”, 2015.

³⁵ Source: database of the CSB (ISG02).

³⁶ Source: database of the CSB (IIG04)

³⁷ Database of the CSB (NBG083)

The services provided by ecosystems are the basis for our existence and welfare. The development of bioeconomy should be based on farsighted decision-making as it is the only way of promoting balanced economic development and use of natural resources.

Scientific potential of bioeconomy sectors

Scientific institutions of bioeconomy sectors, by evaluating their potential and addressing the conclusions made in the international evaluation for the improvement of their performance and management, as well acknowledging that the challenges posed by the environment of international competition to the industry of Latvia and the necessity of introducing new and innovative products and production systems in manufacturing, have implemented several important activities that promote the development of bioeconomy sectors in the last years.

The backbone of these activities is the institutionalised coordination of the activity of research institutions within the scope of the Strategic Association for Bioeconomy Research (hereinafter – the Association). On 24 September 2014, 14 scientific institutions of agriculture, food, forest sectors (forestry, woodworking, and wood chemistry) signed an agreement on the establishment of the Strategic Association for Bioeconomy Research.

The objective of the Association: to increase the innovation performance and competitiveness of bioeconomy sectors (agriculture, food production, forest sector, fisheries) at regional and international scale and the contribution of Latvia to the achievement of the common objectives of the EU, and, in cooperation with sectoral undertakings, to develop and introduce new internationally competitive products and innovative manufacturing techniques in manufacturing, and also to develop the intellectual potential of sectors.

The common research programme of the Association provides for the focusing of scientific studies and knowledge transfer in the research directions that are a priority for the development of bioeconomy sectors within the bioeconomy specialisation areas defined in RIS3. The **strategic research objective of the Association:** to provide knowledge for sustainable growth of national economy and public welfare of Latvia by promoting the competitiveness and innovation performance of agriculture, food production, forest sector, fisheries, and aquaculture.

In 2015, the consolidation of scientific institutions took place, and in 2017 the Association consisted of 8 scientific institutions carrying out research in the fields of bioeconomy – Latvia University of Life Sciences and Technologies and its derived public persons – the Institute of Horticulture and the Institute of Agricultural Resources and Economics, as well as the Scientific Institute of Food Safety, Animal Health and Environment BIOR, the Latvian State Forest Research Institute Silava, the Latvian State Institute of Wood Chemistry, the *Forest and Wood Products Research and Development Institute, SIA (MeKA)*, and the *Latvian Plant Protection Research Centre, SIA* of the LULST.

Studies in bioeconomy are also conducted by the University of Latvia, Riga Technical University, Riga Stradins University, University of Daugavpils, and the Latvian Institute of Aquatic Ecology, and other scientific institutions.

The Association, based on the positive experience of the Competence Centres in the previous planning period, investments in scientific infrastructure and cooperation and specialisation in its use, common cooperation platform with sectoral entrepreneurs for the introduction of knowledge transfer, research results, and innovations, cooperation in the preparation and implementation of local and international research projects, cooperation with bioeconomy

organisations of the Baltic Region and EU States, has shown a significant progress (see Table 1).

Table 1. The Scientific Potential and Main Indicators Characterising the Activity of the Strategic Association for Bioeconomy Research for 2013–2016

Indicators	2013	2014	2015	2016
Scientific personnel (full-time equivalent – FTE)	242	270	298	359
Financing of the framework programme and international projects, thous. EUR	1325.4	1170.4	2577.2	1795.9
Financing obtained through the tendering procedure of the SB, thous. EUR	3958.9	11029.6	12407.9	7495.1
Contracted works and revenue from the financing of the transfer of intellectual property rights, thous. EUR	4384.9	4021.0	4654.3	4177.9
Publications on WOS or Scopus, patents maintained abroad (within the last three years)	572	781	1095	1300
Scientific works in international databases, LV patents (within the last three years)	486	881	1258	1664
Doctorate thesis defended by the scientific personnel	17	28	10	12
Master thesis defended by the persons employed in the field of science	14	21	18	30

2.2. Production of Bioresources

Agriculture

In terms of land utilised for agriculture (LUA) per one inhabitant, Latvia holds the second place in the EU (after Lithuania). Latvia does not have any problems with the availability of fresh water, and the climatic conditions of the country are favourable for the production of agricultural goods. At the same time the value of the primary production produced per one hectare of LUA in Latvia is one of the lowest in the EU, therefore, there is a significant potential of increase in the production of bioresources.

According to the long-term forecasts of the development of the agricultural sector of Latvia for 2050³⁸, Latvia can expand the production of agricultural goods because there is a possibility of:

- increasing the efficiency of land use by acquiring a higher added value from 1 ha of agricultural land, for example, by facilitating more extensive production of such crops which have a higher added value per 1 ha;
- involving in production approximately 400 thous. ha of LUA currently not used;
- obtaining a higher added value by using the area of grassland which is currently maintained in good agricultural condition, but is not used for the production of natural

³⁸ LULST (2016). Project report of the scientific research Development Forecast of Agriculture and Development of Policy Scenarios until 2050. <https://www.zm.gov.lv/public/ck/files/Lauksaimniecibas%20attistibas%20prognozes%202050.pdf>

produce of high quality, more efficiently (for example, by developing the production of extensive agricultural products, the sector of apiculture).

Growth of the agriculture sector should be primarily promoted by increasing the efficiency of resources (this is possible by developing innovations and introducing the principles of circular economy), concurrently preserving areas of perennial grassland and biologically valuable grassland.

Forestry

Latvia is a country rich in forest resources. In terms of forest area per one inhabitant, Latvia ranks in the fourth place in the EU (after Finland, Sweden, and Estonia). In comparison with the first half of the previous century, the forest area in Latvia has doubled, and the total growing stock in the forest has almost tripled³⁹. Forest with its products and services is a significant source of the public welfare. Forest offers timber for construction and furniture, and wood biomass for energy generation, space for living, and food. Forest fulfils many ecological, economic, and social functions of public significance (protects water resources and improves soil, is the habitat for significant part of biological diversity, including many rare species, offers recreational possibilities, and reduces climate change, etc.). Forest stores cultural and historical marks and is a significant element of the landscape. Forest management and use of forest products provides a significant contribution to the implementation of the overall climate policy of Latvia and fulfilment of the international GHG emission reduction commitments of Latvia.

Currently the wood increment in forest exceeds the amount of harvested wood, and there is a potential, in long-term, of increasing the amount of harvesting wood by 6–8 mill. m³ because there are large “stocks” in forests where the age of felling has already been attained and the annual amount of harvesting wood is smaller than the annual increase in the growing stock of wood, forming approximately 63 % of the total annual increase in forest areas available for wood harvesting.

In conformity with the agreement documents for global climate change mitigation (Kyoto Protocol⁴⁰, Paris Agreement⁴¹), a specific objective, the so called forest management reference level, is specified for forest management. Technical corrections will be applied to the reference level which has been specified until 2020 in order to ensure the coherence of methods. Between 2021 and 2030 the task of each EU Member State will be to specify the forest reference level at national level in accordance with the methodology previously specified by the European Commission (proposal for LULUCF Regulation⁴²). It is planned that the first deadline for the preparation of reference level will be 31 December 2018, therefore, it is of the essence to commence work without delay in order to prevent the lack of local knowledge and to implement the necessary research, thus ensuring specification of the forest reference level corresponding to the situation of Latvia for 2020–2030. There is a risk that, if it is not done, then not only the development of forestry of Latvia, but also keeping of the current level of activity of forest management until 2030 will be significantly threatened.

³⁹ Guidelines for the Development of Forest and Related Sectors 2015–2020, 8 pp.

⁴⁰ <https://likumi.lv/ta/en/starptautiskie-ligumi/id/1422-kyoto-protocol-to-the-united-nations-framework-convention-on-climate-change>

⁴¹ <https://likumi.lv/ta/en/starptautiskie-ligumi/id/1730-paris-agreement>

⁴² Proposal for the Regulation of the European Parliament and of the Council on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry into the 2030 climate and energy framework and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change.

There is a high potential to increase the economic value of forest by building and restoring nature-friendly forest amelioration systems and forest roads, purposefully planting and growing (local) tree species that have a greater economic value and are more ecologically suitable for the climate of Latvia, as well as fulfilling the objectives brought forward in the Guidelines for the Development of Forest and Related Sectors, including without reducing the areas available for wood growing and harvesting.

Also there is possibility to transform agricultural land overgrown by low-value tree species into economically valuable forest in such areas which are not planned to be used in agricultural production by the land owner or for other purposes of land use not related to forest management.

Fisheries

Resources of the fish species that have the most significance for fisheries are limited in the sea, however, at the same there are such species which are not being fully exploited, including invasive alien species. The situation is similar also in internal waters where separate stocks of the most valuable fish species are intensively exploited, whereas many other species and their use in food or for other purposes has not been completely researched and is not happening. More attention should also be paid to the management of public internal waters, promoting the development of these water reservoirs.

One of the opportunities is also provided by the sea biopotential that has not been used in Latvia so far, including seaweed, mussels, and algae which may be used, for example, in chemical and pharmaceutical industry.

However, the aquaculture has the greatest opportunities for growth in fisheries as it allows to relieve the resource of fish species used in fishing until now. Contrary to the global trends, aquaculture is not sufficiently developed in the Baltic Sea Region. Diversification of the grown species should be facilitated in aquaculture, mainly in the development of closed aquaculture systems.

2.3. Food Industry

Currently the majority of bioresources used for the production of food and fodder in Latvia, particularly grain and milk, are being exported as a raw material. This is produce for which value is not added in Latvia.

The ability of Latvia to produce bioresources is the main competitive advantage of the food industry. Moreover, increase in demand for food and fodder in other countries of the world can promote the attractiveness of the development of food production of Latvia even more. Therefore, it is important to concentrate resources for the use of the potential in food production industry of Latvia.

The development possibilities of the food industry by adding more value to a raw material manufactured in Latvia are:

- 1) in manufacturing products of good quality;
- 2) in extraction and production of functional food⁴³;
- 3) in development and manufacturing of innovative products.

⁴³ The term “functional” is used to describe food products and beverages to which vitamins, mineral substances, biologically active substances or other substances which may have a positive effect on health have been added.

It is equally important to use the raw materials and produced food more rationally, reducing and using more thoughtfully the waste resulting from raw materials and food.

2.4. Wood Processing and Furniture Industry

According to the UN assessment⁴⁴ a rapid increase is expected in manufacturing of wood products of primary processing in Latvia until 2030 (by 54 %). It is the most rapid forecasted increase among the EU States, and it is mainly related to the competitive advantages of Latvia in the wood processing and furniture industry sector. Also a rapid increase in local consumption is forecasted, however, it is more likely not due to the final consumption, but because the demand of local reprocessing for wood materials will increase.

The wood processing and furniture industry sector has extensive development possibilities:

- by increasing the offer of local forestry, the amount of primary processing manufacturing can be boosted, and thus also the employment can be increased;
- the export of the by-products of forestry and woodworking industry (woodchip, firewood, pulpwood) can be replaced with goods manufactured in Latvia, for example, manufacture of fibreboards, cellulose industry;
- such development of reprocessing can be promoted where the sawn wood and boards, that are currently exported, are being used as the raw material, for example, manufacture of solid wood boards, manufacture of prefabricated wood buildings, furniture industry, carpentry.

As the majority of buyers in the international market perceive the Baltic States as a single region, Latvia has an opportunity to use the credibility of manufacturers of this region achieved by the undertakings of neighbouring countries until 2030 and to rapidly develop the furniture industry (strength of Lithuania) and the manufacture of prefabricated wood buildings (strength of Estonia).

2.5. Manufacture of Chemical Processing Products

The Centre of Industrial Biotechnology Research and Innovation Platform⁴⁵ predicts an increase in the EU market of industrial biotechnology products from 28 bill. EUR in 2013 to 50 bill. EUR in 2030. Five groups of products were identified as the potentially promising, considering their future market perspectives, potential of intersectoral technological solutions, and ability to respond to the needs of the society and consumers. They are as follows:

- 1) modern biofuels – improved bioethanol and jet fuel derived from bioresources for aviation. Demand for ethanol produced from cellulose will significantly increase, and in 2020 it is estimated to amount to 2.7 bill. tonnes with the total value of 2.2 bill. EUR, reaching 14.4 bill. EUR in 2030. Technologies for the production of aviation fuel and demand for it currently is not completely clear, however, it is likely that the demand for it will increase⁴⁶;

⁴⁴ FAO study “European Forest Sector Outlook Study II”, <https://www.unece.org/efsos2.html>

⁴⁵ Overcoming hurdles for innovation in industrial biotechnology in Europe <http://mig.www.industrialbiotech-europe.eu/new/wp-content/uploads/2015/02/D5.3-Final-RD-Roadmap-website.pdf>, Overcoming hurdles for innovation in industrial biotechnology <http://www.industrialbiotech-europe.eu/new/wp-content/uploads/2015/09/Non-technological-Roadmap.pdf>

⁴⁶ http://cfapp.icao.int/tools/38thAssyKit/story_content/external_files/Flyer_US-Letter_ENV_Basket-Measures_2013-08-28.pdf

- 2) biochemical basic elements which can be used to manufacture a wide range of products by replacing similar products or offering new products with improved functionality in contrast to the products of fossil resources. The EU market might reach 9.2 bill. EUR until 2030;
- 3) bioplastics. In 2030 both bioplastic which is biodegradable, and plastic in manufacturing of which raw materials replacing petroleum products have been used, but which is not biodegradable, will be available on the market. Technologies for obtaining raw materials of both first and second generation will be used in manufacturing. Consumers will be aware of the environmental benefits provided by the use of bioplastics, and a common EU labelling will be used. In monetary terms, the size of the market might reach 5.2 bill. EUR in 2030;
- 4) very different biosurfactants used in detergents. However, surfactants, unlike conventional substances, will still be a niche product in 2030 due to their high costs. Biosurfactants will be produced from a wide range of raw materials, using plant oil, fat, sugar biomass, as well as algae and waste. Their market value is anticipated to be 1.3 bill. EUR.

2.6. Energy Sector

In the energy sector of Latvia, bioresources are mainly used for the production of heat energy by incinerating them. Although production of heat energy is an important field of energy generation and market conditions are favourable for such produce, it is none the less a produce with low added value. In future, creation of higher added value from bioresources should be promoted.

Production of biofuel is mainly considered to be a transitional resource, while the electrification of vehicles is developing. At the same time, in the future biofuel might be applied in such cases when the introduction of electrification is complicated⁴⁷.

The proportion of renewable energy resources in gross final energy consumption in Latvia in 2015/2016 was 37.6 % (target in 2020 – 40 %, and the target of EU-28 20 %). The largest contribution to the structure of the RES target of Latvia in 2015 with 76.49 % (47.76 PJ) was formed by the solid or wood biomass which is provided by the use of biomass in energy generation (amount to 28.73 % in the State gross final energy consumption)⁴⁸. It is followed by hydroenergy with 16.87 % (10.53 PJ), biogas with 4.27 % (2.67 PJ), and biofuel with 1.53 % (0.95 PJ). Thus, in 2015 bioenergy in total with 51.38 PJ formed 82.29 % of contributions (mainly solid biomass in heating supply) in the indicator of the current RES target⁴⁹.

In accordance with the Long-term Energy Strategy of Latvia 2030, the nationally specified indicative target of the part of renewable energy is 50 % in 2030⁵⁰.

⁴⁷ EC (2015) “Sustainable Agriculture, Forestry and Fisheries in the Bioeconomy. A Challenge for Europe”, 4th SCAR Foresight Exercise, page 17

⁴⁸ Approximately 68 % of wood biomass are used in heating supply and 9 % in electricity generation.

⁴⁹ Position No. 2 of the Ministry of Economics, Proposal for the Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast).

⁵⁰ Commission Staff Working Document. Country Factsheet Latvia. State of the Energy Union: https://ec.europa.eu/commission/sites/beta-political/files/latvia-benefits_of_the_energy_union_en.pdf

3. Objectives for Strategic Development of Bioeconomy and Preconditions for their Achievement

The **vision of the development strategy of bioeconomy of Latvia** – bioeconomy sectors of Latvia are the innovation leaders in the preservation, increase, and also efficient and sustainable use of the natural capital value in the Baltic States. Innovative approaches for efficient and sustainable use of natural resources are being developed and introduced in bioeconomy sectors of Latvia in order to develop national economy by providing high added value, promoting export and employment, as well as concurrently balancing economic interests with ensuring of environmental quality, climate change mitigation, evaluation of climate change risks, adaptation to climate changes, and preservation and increase of biological diversity.

Long-term employment in the bioeconomy sector has a descending trend. It is mainly related to structural changes in the sector of agriculture as many small farms are leaving the market. Concurrently all bioeconomy sectors are going through rapid improvement of manufacturing efficiency, and manufacturing of the traditional produce requires less and less people every year. **This strategy aims to ensure that employment in the traditional sectors of bioeconomy in 2030 would remain at the level of 2015, i.e., 128 thous. people** (Figure 4).

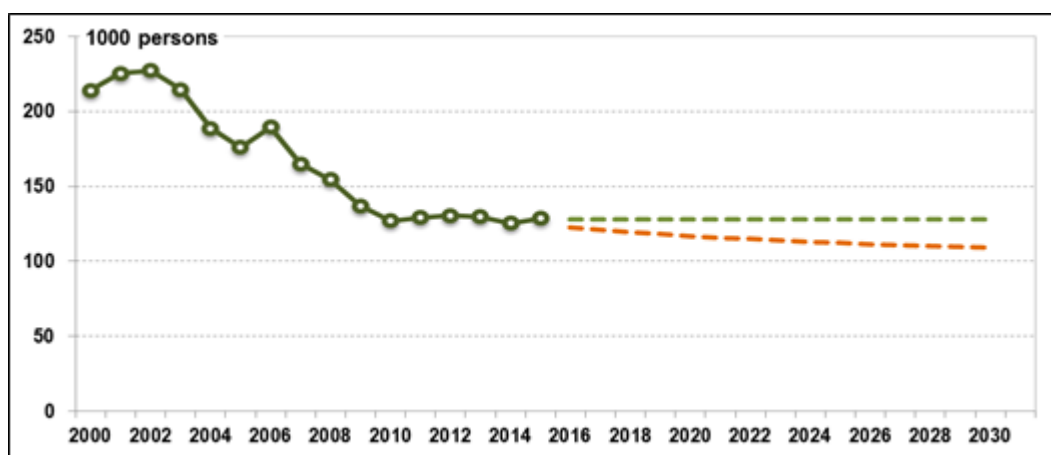


Figure 4. Employment in Latvia in 2000–2015, forecast of the development trend (orange line) and employment objective (green line) in traditional bioeconomy sectors until 2030, persons

In order to achieve the employment objective in 2030, considering the improvement of the manufacturing efficiency, the amount of the added value produced in the bioeconomy sector should be rapidly increased. Assuming that the added value per employee will increase from 17.3 thous. EUR in 2015 to 30 thous. EUR in 2030 or by 1.7 times, **the objective for the increase in added value in traditional bioeconomy sectors would be an increase from 2.33 billion EUR in 2016 to 3.8 billion EUR in 2030** (Figure 5).

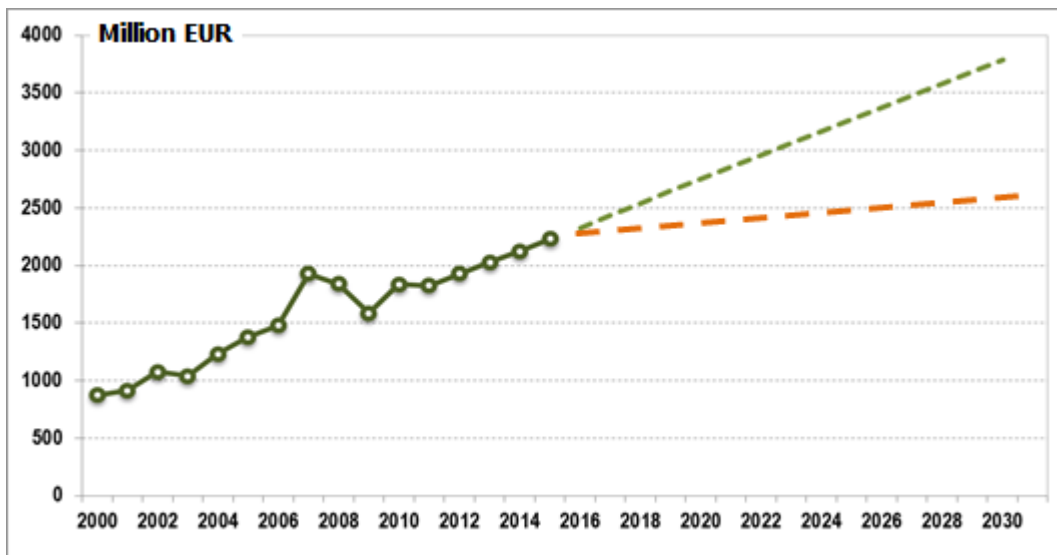


Figure 5. Added value in Latvia in 2000–2016, forecast of the trend (orange line) and added value objective (green line) in traditional bioeconomy sectors until 2030, million EUR

It will not be possible to increase the produced added value without increasing the export volume. **The objective for the export of bioeconomy sectors in Latvia is to increase the value of exported goods from 4.26 billion EUR in 2016 to at least 9 billion EUR in 2030 (Figure 6).**

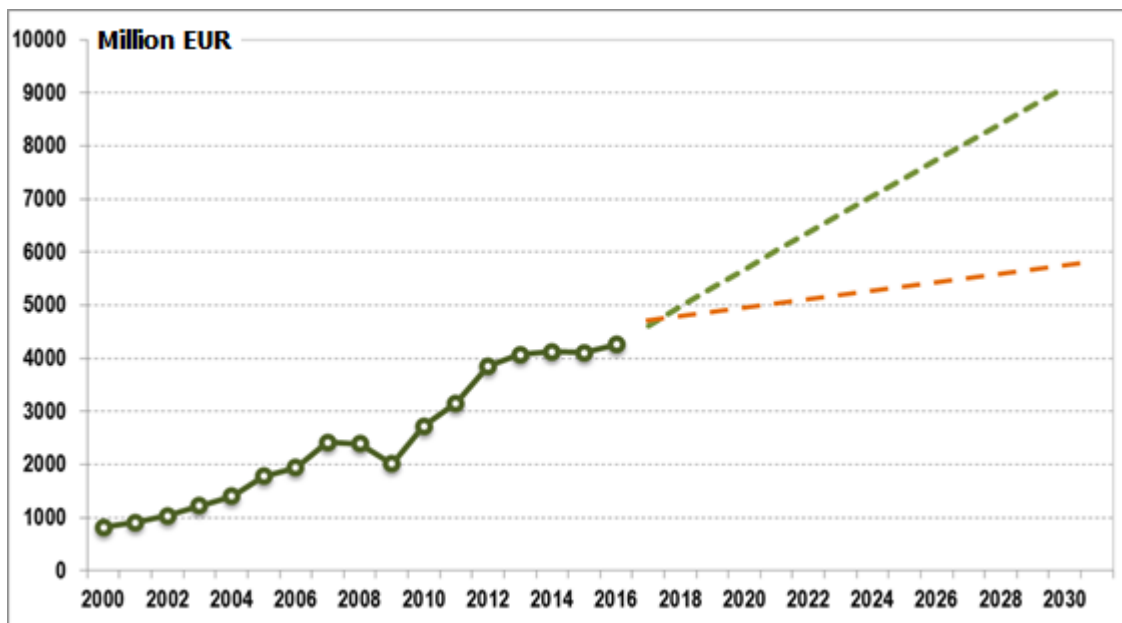


Figure 6. Export in Latvia in 2000–2016, trend forecast (orange line) and export target (green line) in traditional bioeconomy sectors until 2030, mill. EUR

Increase in export in 2030 would allow significant improvement of the national trade balance in order to promote the positive effect of the “second wave” in national economy, upon the emergence of work places and produced produce also in sectors of services oriented towards the internal market.

Research excellence of the traditional bioeconomy sectors and efficient transfer of knowledge are preconditions for the achievement of the strategic objectives for the development of bioeconomy. The success of cooperation of the scientific institutions of the Strategic Association for Bioeconomy Research and the entrepreneurs of bioeconomy sector (also farmers or forest owners) are the factors that will determine the achievement of the objectives of this strategy.

4. Risk Factors for the Development of Bioeconomy in Latvia

Both international and national progress and policy is required for the development of bioeconomy.

Transition from non-sustainable economy mainly based on fossil resources to sustainable development based on renewable bioresources cannot be made by following only the market principles, if the price of goods does not include the costs of future generations for addressing those problems which arise from non-sustainable economic activity.

Currently the extraction and production of many products and other processes, installations, and infrastructure are oriented towards the use of fossil resources. Transition to bioresources cannot be made only by replacing raw materials – it demands significant financial and intellectual resources for the development and acquisition of new products, installations, and technologies, introduction of changes in the manufacturing processes and infrastructure.

Transition from fossil economics to economics of renewable bioresources requires a complex approach. If the demand for bioresources is to increase more rapidly than for fossil resources, prices can be affected, making the products that are based on bioresources less attractive in terms of prices, and thus hinder the development of bioeconomy. Instruments not related to the market which are directed towards reduction of the consumption of fossil resources, including replacement with renewable resources, are needed.

Internationally the development risk of bioeconomy is mitigated by the fact that many countries within the EU and world have developed their national bioeconomy strategies, providing for a significant State aid and investments in knowledge, development of new products and innovative technologies.

The main risk factors for the development of bioeconomy are as follows:

- 1) many strong undertakings that have found a successful business model are operating in the bioeconomy sector in Latvia. This business model, although, is not always related to the creation of a higher added value in Latvia and maximally efficient use of land resources from the socio-economic point of view. However, the strong market participants might be interested in the preservation of the existing situation. Also larger competition for bioresources is not always advantageous for the current market participants, although it is important in terms of the development of national economy;
- 2) insufficient funding for research and development, including investments of the private sector, prevents from addressing the development needs of the national economy and society of Latvia, including in bioeconomy sectors;
- 3) the slow and fragmented development of technology transfer and innovation system hinders the growth of productivity, and production and export of products with high added value in bioeconomy sectors;
- 4) insufficient intersectoral cooperation hinders the development of bioeconomy;

- 5) climate policy should not become a factor that restricts the development of bioeconomy in Latvia, preventing from responding to the global increase in demand and thus stimulating the consumption of fossil resources. The limitation of GHG emissions in bioeconomy sectors may adversely affect the total GHG emissions of national economy;
- 6) depletion and non-sustainable use of natural resources by focusing on short-term income, instead of a well-considered and sensible management in long-term;
- 7) the adverse effects and risks of climate change (of many different climatic extremes that may cause substantial socio-economic losses, particularly in agriculture and forestry);
- 8) failure to take into account the conclusions of LIBRA in the development of policy planning documents (low-carbon development, energy, and climate policies, circular economy, land policy, etc.) may henceforth preclude the achievement of the determined objectives.

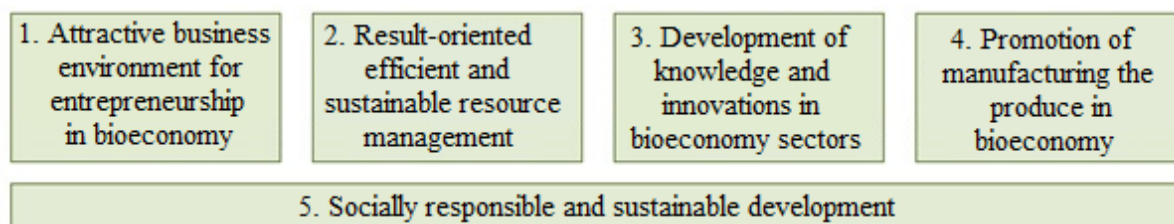
5. Action Directions and Measures

Although there are favourable preconditions for the development of bioeconomy in Latvia, the current trend indicates towards stagnation. The development of bioeconomy in Latvia requires a set of measures that would facilitate a more efficient use of the bioresource potential of Latvia. This is topical for both the traditional sectors of bioeconomy which already are the supporting pillar of the economy of Latvia and have a great development potential, and for the new sectors of bioeconomy.

Replacement of fossil resources with bioresources does not mean only the replacement of raw materials – it requires cardinal changes in the production chains and processes, significant investments and innovations both in the development of new products and modernisation of production, as well as the ability to integrate oneself in the global production and trade chains. One should be aware that this requires major investments in both tangible resources and human resources.

The change in the public consumption models from goods and materials based on fossil resources to goods and resources based on bioresources is also of critical importance.

Five main interconnected and complementary action directions have been brought forward for the achievement of the objective of the bioeconomy strategy:



Each action direction consists of a set of measures. The developed measures are oriented towards the objectives of this strategy. However, the measures are not grouped under each of the objectives as often the measures have an influence on several objectives at the same time. The Informative Report at the current stage does not provide for the identification of specific measures and the time period for their introduction, the responsible implementers, and sources of financing.

5.1. Attractive Entrepreneurial Environment

5.1.1. Predictable and stable tax policy in the bioeconomy sector

The competitiveness and predictability of the tax and duty policy is of a very great importance. Any last moment changes adversely affect the motivation of undertakings to grow and develop in Latvia. It is important to provide a stable and predictable tax policy so that it would be competitive in the Baltic States.

5.1.2. Creation of an investment-friendly environment

Environment should be shaped so that it would be attractive for investments (raising capital) in the bioeconomy development projects, particularly if investments for further processing of biomass in products with higher added value are provided for, following the principle of cascading⁵¹.

Political stability, minimum administrative burden in entrepreneurship, availability of financing, quality labour force, development of infrastructure (roads, ports, warehouses, offices, etc.) and other factors are equally important. Business parks and industrial centres should be developed for the promotion of entrepreneurship.

5.1.3. Ensuring reduction of the prices to be regulated administratively

All policy makers must find a way to reduce the prices of energy resources, particularly the price of electricity for the manufacturing sector in Latvia to at least the level existing in the nearest neighbouring countries⁵². It is an important issue of competition for the development of bioeconomy⁵³.

5.1.4. Extending the possibilities of selling the produce for small producers in the agro-food sector

Successful development of small producers in the agro-food sector requires a possibility to sell the produce. During the last 15 years, retail in the food sector went through rapid changes as the possibilities for the produce of small producers to reach shop shelves significantly declined. Thus, the possibilities for the produce of small producers to reach a retail network need to be expanded.

5.1.5. Addressing the problems of unfair competition in the field of bioeconomy

Unfair competition is a serious problem which hinders the development of any sector by distorting the prices. Currently pronounced risk of price distortion exists in the segment of unprocessed food, particularly fruits and vegetables, as well as meat. Many small traders operate in these segments (trade on markets, fairs, street vending) who need not to register themselves as VAT payers and who may, with comparative ease, avoid complete accounting of the sold produce, selling goods without receipts. Furthermore, many small suppliers of produce (from Latvia, Poland, Lithuania, etc.) are operating in these segments and the control of the

⁵¹ The principle of cascading provides for increase in the added value for bioresources through repeated use and recycling of products and raw materials. Energy generation should be supported only when no other type of use is feasible.

⁵² According to the Eurostat data, the average price of electricity in Latvia for manufacturers in 2015 was 0.118 EUR/kWh. In comparison, the price of electricity in Estonia was 0.096 EUR/kWh, in Poland – 0.086 EUR/kWh, in Finland – 0.071 EUR/kWh, in Sweden – 0.059 EUR/kWh.

⁵³ LULST (2013), Comparative Analysis of the Competitiveness Indicators of the Food Sector of Latvia, https://www.zm.gov.lv/public/ck/files/ZM/TP%20petijumi/pet_partikas_konkuretsp.pdf

quantity of their produced and sold produce is hindered. The abovementioned market participants are interested in receiving unaccounted revenue, and it is comparatively easy for them to do this, for example, to evade the control mechanisms specified in the State.

Cooperation of different law enforcement authorities and joint action for the eradication of unfair entrepreneurship in sectors in which it endangers the manufacturers of the traditional sectors of bioeconomy is required.

5.1.6. Replacement of non-renewable resources with sustainable bioresources in public procurements

Public procurements are potentially of great significance to the development of bioeconomy sectors. Public procurements must be directed not only towards lower prices, but also towards the priority directions for the development of the State and towards the latest, most efficient and most sustainable solutions.

For example, the use of wood structures in comparison to the use of steel or concrete structures in construction of public buildings, thus promoting the development of manufacturing in Latvia, increasing the knowledge and financial capacity of undertakings for work in foreign markets, enabling the development of innovative technologies and concurrently helping Latvia to contribute to reduction of GHG emissions and transition to low-carbon economy.

It is necessary to develop the concept of “green procurement” in order to promote good practices by emphasising biologically certified products and products which have obtained internationally recognised certificates of other types, environmentally friendly packaging, produce which has been grown close to the place of sale, etc.

5.2. Result-oriented Efficient and Sustainable Resource Management

5.2.1. Targeting of aid to agriculture and rural development to higher added value and employment per 1 ha

For the achievement of the objective, priority subsectors of agriculture need to be determined. During the last 15 years, agriculture of Latvia experienced rapid structural changes due to which the competitiveness of the agriculture sector significantly increased, particularly in cereal, but the number of persons employed in agriculture also decreased significantly. With the current trends continuing, the number of persons living in the countryside will continue to decline. Therefore, structural changes must be made in agriculture. It might be related to more rapid development of production in the sectors of agriculture with lower capacity of land, for example, by increasing the production of such produce for the production of which smaller area of land, but greater work contribution is necessary. Going forward, it will be important to prioritise the production of such agricultural produce that can generate revenue of at least 1500 EUR from a hectare and would accumulate at least 40 working hours per 1 ha per year.

5.2.2. Forestry

The normative regulation hindering the rational and sustainable use of commercial forests should be changed in order to:

- specify the minimum necessary number of growing trees in forest regeneration and afforestation depending on the dominating species of trees;

- specify the average value of the final felling diameter based on the numerical value of the dominating species of trees.

With appropriate amendments to the regulatory framework of the main felling the capital value of the forest can be increased by 440 mill. EUR and the annual net potential of earning income – by 12 mill. EUR, unless the forest is purposefully renewed with economically valuable species of trees and the forest management is intensified⁵⁴.

The regulatory framework and other activities should also be changed to concurrently balance two goals to be achieved, i.e., “Biological diversity of the forest preserved at the current level” and “Areas available for tree growing and harvesting do not diminish”:

- the proportion of especially protected species, forest, and protected areas of biotopes associated with the forest should be evaluated and identified;
- mapping of the especially protected forest and biotopes associated with the forest should be completed.

The processes associated with the following should be significantly expedited:

- the replacement of non-productive areas of forest stands with productive stands;
- the use of a planting material that is genetically improved and suitable for climate change in forest regeneration and afforestation;
- the thinning of young forest stands;
- the reconstruction and construction of forest roads;
- the reconstruction and construction of forest amelioration systems;
- the range and intensity of the ecosystem services provided by commercial forests, as well as the achievement of the objectives for the preservation and renewal of biological diversity.

5.2.3. Result-oriented motivation system for local governments

To encourage local governments to promote the development of private entrepreneurship within their territory and to facilitate the emergence of new undertakings and business ideas in the State at large⁵⁵, including in the field of bioeconomy, the creation of new instruments for aid to entrepreneurship and the improvement of the existing instruments, which the local governments, upon voluntary principle, may use based on their needs and possibilities, have an important role.

The role of entrepreneurship within the context of a local government is important, considering that an undertaking provides work places, and thus the welfare level of inhabitants of a specific territory is related to the activity of local entrepreneurs – the financial needs of local governments are satisfied with the help of taxes received in the budget of local governments⁵⁶.

⁵⁴ Presentation of D. Dubrovskis, Dr. silv., Specification of Parameters of the Main Felling, at the meeting of the working group organised by the Ministry of Agriculture on 18 April 2017

⁵⁵ From the protocol to the agreement entered into on 9 August 2016 between the Cabinet, the Latvian Chamber of Commerce and Industry, the Employers’ Confederation of Latvia, the Latvian Association of Local and Regional Governments, the Latvian Academy of Sciences.

⁵⁶ Conceptual Report of the MoEPRD on the Expanding the Possibilities of Local Governments in Relation to the Use of Instruments for Aid to Entrepreneurship

5.2.4. Spatial development planning, including economically profitable (viable) use of land and natural resources

The necessity for the use of land should be emphasised in the spatial development planning. The main competitive advantage of rural territories is the land resources. It has been demonstrated that both in agriculture and forestry each unused hectare is related to reduction in the number of inhabitants in the countryside⁵⁷. In order to promote the population (reduction of depopulation) and employment in rural territories, it is preferable to set the maximum effectiveness of the use of land in commercial activity as a priority of the State policy.

The principles of sustainable bioeconomy laid down by the EU need to be relied upon in land use by using and targeting aid instruments: 1) food first, moreover, it should be safe; 2) sustainable yields – when the harvested yield is sustainable and does not reduce the soil fertility; 3) cascading approach – when biomass is used sequentially several times, thus ensuring efficient use of resources; 4) following the principles of circular economy – when by-products of any production are used in the next production cycle; 5) diversity – production should be diverse in order to use the resources available as best as possible⁵⁸.

5.2.5. Assessment of the Impact on Bioeconomy in all strategic documents of the State

The development of bioeconomy should be a horizontal priority, including the assessment of the impact on the development of bioeconomy in other planning documents, also in relation to the environmental protection.

5.3. Knowledge and Innovations

5.3.1. To promote research excellence and efficient knowledge transfer within traditional bioeconomy sectors

Companies in countries where the scientific capacity is weak generally have higher costs of innovations. In order to promote innovations, it is recommended to substantially and purposefully strengthen the capacity of national scientific institutions in the production of bioeconomy products and in the fields associated therewith (technologies, packaging, design, localisation of products, market researches, etc.), as well as in the creation of intangible added (including artistic, functional, social) value for bioeconomy products. This is particularly topical due to the fact that one of the five priority areas of smart specialisation (RIS3) of Latvia is “Knowledge-intensive bioeconomy” which requires the development of research for the development of bioeconomy sectors in priority research directions within the bioeconomy specialisation areas defined in RIS3:

growing

- innovative, risk mitigating technologies for growing plants and breeding animals, using the available resources in efficient and sustainable manner;
- sustainable and productive growing under the conditions of climate change;
- development of innovative niche products with high added value from traditional and non-traditional raw materials of plant and animal origin;

⁵⁷ LULST (2015) “Socio-economic Assessment of Different Models for Management of Land: Determination of Factors Promoting the Development of Territories”, http://www.lvm.lv/images/lvm/Petijumi_un_publicacijas/Petijumi/Zemes_apsaimniekosanas_modeli_%20gala%20atskaite.pdf

⁵⁸ European Commission (2015). Sustainable Agriculture, Forestry and Fisheries in the Bioeconomy – A Challenge for Europe. 4th SCAR Foresight Exercise, edited by Barna Kovacs, p. 141

- technological solutions for the use of by-products of growing plants and breeding animals, and their processing, for obtaining products with high added value.

Therefore, the establishment of a long-lasting and successive national research programme in the bioeconomy specialisation areas defined in RIS3 and infrastructure investments in the development of research are important.

The main principle – interest and cooperation of the private and public sector – should be ensured in research. The focus of studies should be chosen based on the demand of national economy and directed towards the specific development directions necessary for sectors by paying special attention to interdisciplinarity, additionality, and multidisciplinary. Interdisciplinary approach ensures the development of knowledge-intensive bioeconomy.

Considering the specific nature of its sectors, bioeconomy requires stable and long-term (of more than five years) financing of research projects, including in the form of national research programmes, for the development of the infrastructure and the skills of scientists. These programmes must be successive.

Predictable aid instruments for the knowledge transfer and commercialisation are necessary (knowledge – innovations – entrepreneur), promoting productive cooperation of scientific institutions and entrepreneurs of bioeconomy sectors, including farmers and forest owners.

5.3.2. Provision of excellent education services for the needs of bioeconomy sectors

One of the most important factors in the development of bioeconomy is the human resources. Modern, qualitative knowledge is of significance to the development of human resources. The ability to attract better, motivated teachers, to create a training infrastructure that is appropriate for the modern age has a crucial role in the preparation of highly qualified specialists – both technological management specialists of international level and production management specialists, as well as qualified employees.

Qualitative knowledge which conforms to the demand of bioeconomy sectors should be formed in three levels – professional, higher education, and lifelong education. In vocational education, a list of the professions necessary for the sector should be created together with entrepreneurs of bioeconomy sectors, and an opportunity should be provided for young people to get competitive and work-based vocational education so that people would acquire skills which would help them to find work and conform to the needs of employers. Excellence should be achieved in higher education by supplementing the knowledge acquired in the particular speciality with the skills and knowledge of entrepreneurship. To satisfy the demand of sectors for specific knowledge directly, it is essential to continue the development of the specific higher education programmes and science in the institutional structure of the ministry, ensuring the optimal level of the State financing specified in laws and regulations for studies and science. The Latvia University of Life Sciences and Technologies should make investments in the development of education quality and capacity of science, strengthening its positions as the leading centre of higher education and science in bioeconomy in Latvia, and should increase the recognisability and competitiveness at European scale, particularly in the Baltic and Nordic Region. Such measures are needed to be created in the field of lifelong education that would facilitate the involvement of employees in the course of lifelong education, and entrepreneurs must determine the priority learning needs of employees.

5.3.3. To use new research opportunities upon addressing social, environmental, climate change, and economic problems

As regards the natural resources, agriculture requires research work on the improvement of soil fertility, improvement of crop varieties for adaptation and tolerance to different factors affecting harvest and its quality due to climate change, as well as development of multi-functional, sustainable, competitive agricultural production systems in all their diversity, including in biological farming, plant health, animal health and welfare in order to prevent outbreaks of infectious diseases caused by climate change in animals.

5.4. Promotion of Manufacturing the Produce in Bioeconomy

5.4.1. Promotion and attraction of investments

Investments in the amount of approximately 20 bill. EUR are necessary for the achievement of the objective of the bioeconomy strategy until 2030⁵⁹ – both in innovations and the development of new products, expansion and modernisation of manufacturing, establishment of new undertakings, both in the development of the infrastructure and branding and marketing measures.

Both the development of the existing undertakings and the establishment of new undertakings, attraction of both foreign and State investments, including in infrastructure, pilot projects, demonstration projects, risk capital, etc. should be promoted for the achievement of the objective. A complex approach is necessary for the promotion and attraction of investments which depends on both the bioeconomy sector and product group, and the size of the undertaking and target markets.

An expanded plan on promoting and attracting investments for the development of bioeconomy in Latvia should be developed.

5.4.2. Increasing the efficiency and work productivity in all sectors of bioeconomy

The private sector in agriculture and forestry is characterised by fragmented structure of undertakings and inefficient production which significantly lags behind the average level achieved in the EU Member States. In order to change it, it is necessary: 1) to change the structure of traditional production by focusing on products with higher added value; 2) to produce functional and niche products; 3) to replace import with local products; 4) to have energy performance measures; 5) to have balanced development and succession of all sections of the value chain, including promotion of attraction of private investments for the processing of biomass.

Sustainable maximisation of primary production of biomass should be ensured by achieving a stable flow of raw materials for further processing. Considering the long growing cycle of trees, long-term investments are necessary in the forest sector to increase the productivity of forest, particularly in private forests.

⁵⁹ Estimates and investments of the Latvia University of Life Sciences and Technologies includes private funding, financing from the EU funds, different EU and State aid programmes.

5.4.3. Development of a long-term policy for the use of land

The type of land use and functions provided by soil are the determinant factors in the development of bioeconomy⁶⁰. The types of land use may be different – arable land, grassland, forest, fishery, nature protection, etc. In turn, depending on the type of soil different functions are provided – primary production, regulation of water regimes, carbon attraction, ensuring of biological diversity and habitats, circulation of nutritional substances. To ensure efficient use of land and soil resources, the coherence between the types of land use and the functions provided by soil should be taken into account in planning. Functional land use is a comparatively new framework of analysis and management which helps to plan the use of land and the management of soil based on the functions provided by soil.

In order to promote the development of those bioeconomy sectors where the production is based on land resources, such land use policy should be introduced in Latvia which is based on the principles of functional land use, by specifying the proportion of the area of land necessary for production, ensuring sustainable management of land, as well as promoting balance between production and environment, including mitigation of climate change (currently a study is taking place in Latvia on the use of organic soil in agriculture⁶¹).

According to the decision of the Sustainable Development Commission of the *Saeima* of 10 June 2016⁶², a medium-term land policy must be developed which would promote the diversion of unused land for productive, economically advantageous, and sustainable use by promoting scientifically-based economical use of local resources, creating new competitive products for which there is a demand on the market and which have been produced, using innovative and modern biotechnologies, concurrently providing a positive contribution to the fulfilment of the liabilities of Latvia in relation to reduction of greenhouse gas emissions and also, henceforth, ensuring preservation of the image of Latvia as a “green” country.

5.4.4. Inclusion of bioeconomy in the brand of Latvia

It is necessary to create and promote the brand of Latvia, emphasising the significance of bioeconomy. The sectors of Latvia as the country of origin and the quality of their production should be promoted in export markets, earning the trust of consumers. This is of particular importance to the agro-food sector as conservative behaviour and greater cautiousness regarding the choice of food products is characteristic to human beings.

5.4.5. Measures for the promotion of export

Purposeful measures for the promotion of export are necessary – export credit guarantees, measures for the promotion of external market acquisition, development of e-commerce, certification according to internationally recognised certification systems in demand, etc.

⁶⁰ Schulte, R. P. O., Creamer, R. E., Donnellan, T., Farrelly, N., Fealy, R., O'Donoghue, C., et al. (2014). Functional land management: a framework for managing soil-based ecosystem services for the sustainable intensification of agriculture. *Environ. Sci. Policy* 38, 45–58

⁶⁰ Haygarth, P.M., Ritz, K. (2009) The future of soils and land use in the UK: soil systems for the provision of land-based ecosystem services, *Land Use Policy*, 26 (2009), pp. 187–197

⁶¹ The study is taking place within the project BIO4ECO of Interreg Europe. More information: <https://www.zm.gov.lv/zemkopibas-ministrija/statiskas-lapas/interreg-europe-projekts-ilgtspejiga-regionala-bioenergijas-politika-n?id=12493#jump>

⁶² Report of the Sustainable Development Commission of the Saeima of the Republic of Latvia: http://titania.saeima.lv/LIVS12/saeimalivs_lmp.nsf/0/882163FEF3CCD233C2257FD30048B082?OpenDocument

The highest increase in demand for bioresources and products based in bioresources should be expected from Asian and African countries. Entering into trade contracts favourable to the undertakings of the bioeconomy sector of Latvia with Asian and African countries is of great importance.

5.4.6. Development of a risk management system

Bioeconomy sectors are subject to the impact of climatic conditions, the risk of diseases and price fluctuations, and also politically economical risk. In order to reduce the impact of different risk factors and to promote the stability in bioeconomy sectors, a risk management system which is based on both the interest and joint responsibility of the private and public sector should be established.

5.4.7. Promotion of cooperation between small producers

The primary production sectors of bioeconomy have a fragmented structure which diminishes the competitiveness of such sectors on the market. The fragmentation may be reduced by developing and promoting the horizontal and vertical cooperation in different stages and levels of the value chain, as well as by developing the short food chains. For this purpose it is necessary to improve the regulatory framework and to establish a purposeful aid system for the development of cooperation, as well as to educate producers on the advantages of cooperation.

5.4.8. Use of biomass for energy generation, using the principle of cascading as much as possible

By-products and waste products of agricultural and forestry produce which cannot be used in food production and wood processing or in production of other products with high added value may be used for energy generation, thus replacing the fossil energy resources. At the same time efficient technologies which reduce air pollution should be used.

5.4.9. More extensive use of bioresources in construction and other non-traditional sectors of bioeconomy

A complex approach to more extensive development of wood construction is necessary, by promoting not only cooperation with builders, but also the knowledge and cooperation with architects to ensure architectonic solutions for structures, fire safety of buildings and durability of wood (wood preservation), construction physics solutions of buildings, granularity of structure hubs, industrial manufacturing and assembly of construction elements, etc.

The use of bioresources has a great potential in many non-traditional sectors of bioeconomy – manufacture of chemical substances and products, manufacture of pharmacy and cosmetics, manufacture of textile products and wearing apparel, and other sectors where bioresources are the alternative for other raw materials acquired from non-renewable resources.

Aid instruments for promoting the intersectoral cooperation are necessary.

5.4.10. Facilitation of forest owner certification

Certification of the wood and supply-production chain in accordance with such internationally recognised standards as FSC, PEFC, and SBP plays a significant role in the growth of forestry and increase of the competitiveness of wood products on international markets. Certification of

forest owners should be facilitated and stimulated in accordance with the PEFC and (or) FSC standards.

5.5. Socially Responsible and Sustainable Development

5.5.1. Reduction of GHG emissions in bioeconomy sectors

One of the biggest challenges the world is facing in the 21st century is global climate change. Latvia must participate in limiting climate change, and the impact and risks of climate change having a significant influence on agriculture and forestry should be taken into account in sectoral development. One of the principles in the development of bioeconomy sectors is the expansion of production and decoupling of GHG emissions in the long term (GHG emissions per unit of produce diminish).

Therefore, it is necessary to develop an action plan for the reduction of GHG emissions per unit of produce both in agriculture and food processing by setting realistic long-term goals. The development of a long-term plan for the future optimisation and increase of the removal of GHG emissions is essential to forest management.

5.5.3. Cultural or intangible services of ecosystems as the development of public goods

The diversity of natural resources of Latvia satisfies the needs of the society for intangible values by promoting the preservation of mental and physical health, educating people on the significance of biological diversity, and serving as the source of inspiration in art, culture, and science⁶³. Biological diversity, ecosystems, and natural landscapes give an opportunity to provide ecosystem services and implement activities of creative industries and tourism which can have a positive impact on the commercialisation of intangible values of the nature capital of Latvia. In order to use these opportunities, measures for the attraction of foreign consumers are necessary.

5.5.4. Popularisation of bioeconomy and involvement of the society

The challenge of the future in the world economy is to reduce the dependence on non-renewable resources, in turn, it is an opportunity for Latvia to use its advantages. In order to do so, public understanding and support is necessary – the choice of consumers in favour of goods and services based in bioresources, reducing the emissions caused by transportation of goods. The society should be informed of the advantages which are given by goods and materials made of renewable resources, for example, wood, particularly of local origin, for example, such advantages as healthiness, the possibilities to mitigate climate changes, to improve the living environment, and to promote the use of local products and services. Therefore, an in-depth understanding of the offer and possibilities of bioeconomy should be formed in the society.

5.5.5. Introduction of the principles of rational use of bioresources in habits of inhabitants

As a result of the increase in the number of inhabitants in the world and their income, increase in the demand for food and changes in the eating habits of inhabitants is foreseeable, also leading to an increase in the consumption of products of animal origin and processed products. Each year households waste and dispose of a significant part of their food. Therefore, the society needs to be educated so as to promote a more responsible food consumption and

⁶³ Nature Conservation Agency (2016). Ecosystem Service Approach to Strategic Management, <http://ekosistemas.daba.gov.lv/public/>

facilitate changes in the habits of inhabitants, including to reduce the occurrence of food surplus.

The conditions for donating food products to socially more vulnerable population groups after the expiry of their “best before” time period should be evaluated.

Minister for Agriculture

Jānis Dūklavs