

GREEN TRANSFORMATION! A POLICY TOOL FOR REGIONAL SMART SPECIALIZATION

POLICY BRIEF ON GT FOR RIS3 STRATEGIES

PARTNER: LITHUANIAN CENTRE FOR SOCIAL SCIENCES, INSTITUTE OF ECONOMICS AND RURAL
DEVELOPMENT

INTERVENTION AREA: CIRCULAR BIOECONOMY (BIOGAS PRODUCTION FROM AGRO WASTES)

COUNTRY/REGION: LITHUANIA

Date 15.10.2021

Contact information

| Rita Lankauskienė, Lithuanian Centre for Social Sciences, Institute of Economics and Rural Development,
rita.vilke@laei.lt

| Živilė Gedminaitė-Raudonė, Lithuanian Centre for Social Sciences, Institute of Economics and Rural
Development, zivile.gedminaitė@laei.lt

| Vitalija Simonaitytė, Lithuanian Centre for Social Sciences, Institute of Economics and Rural Development,
vitalija.simonaityte@laei.lt

Contents

Summary	3
1. Introduction.....	4
2. The policy context	5
3. Instruments and initiatives targeting the GT	6
4. Challenges and opportunities focusing the GT	8
4.1. The emergence and growth of new activities with potential in innovation focusing on GT	9
4.2. Entrepreneurial discovery bringing environmental and social benefits into existing innovation activities	10
4.3. Critical networks of stakeholders with the potential to develop RIS3 strategies based on the GT.....	10
5. Next steps in policy innovations concerning the GT, RIS3, and RIS4+ strategies.....	11
5.1. Driving forces-based next steps	12
5.2. Pressure-based next steps.....	12
5.3. State-based next steps	13
5.4. Impact-based next steps	13
6. GT and RIS3 prospects: from the GT-driven regions to the European RIS3 and RIS4+ strategies	14
References.....	16

Summary

The selected area of intervention in Lithuania - circular bioeconomy (biogas production from agro wastes), corresponds to the fields of interest in the GRETA project - circular economy, and green energy technology (including green energy production), and emphasize the continuity of examinations done in the LARS project in the field. The circular bioeconomy is part of the currently acting Lithuania's Smart Specialization Strategy. Discussions concerning the vision for Green Transformation in Lithuania started after the regained independence in 1990. Currently, the most relevant strategic document for Green Transformation in Lithuania - National Progress Plan 2021-2030, sets the three key guiding horizontal principles for Lithuania in the coming decade: sustainable development, innovation (creativity), and equal opportunities for all. A new initiative in Lithuania concerning the implementation of the European Green Deal is public consultation. Biogas production from agro wastes in Lithuania faces particular challenges, related to the lack of cooperation, transparency, strategic long-term planning, organizational and financial motivation. To fight the challenges, the following opportunities are proposed for Green Transformation to change the regime: fostering green innovations, developing green products, revitalizing existing green systems of innovations, and considering the public efforts. Concrete measures for Lithuania are proposed to the regime change with expected results for Green Transformation.

1. Introduction

Lithuanian Centre for Social Sciences, Institute of Economics and Rural Development selected the area of intervention - circular bioeconomy (biogas production from agro wastes), which relates to both fields of interest in GRETA project, i.e. circular economy, and green energy technology (including green energy production), and at the same time ensure the continuity of examinations done in the LARS project¹ in the field.

Circular bioeconomy (biogas production from agro wastes) - is part of the currently acting Lithuania's Smart Specialization Strategy in the priority "Agro-innovation and food technologies", with a particular focus on "Processing of Biological Raw Materials (biorefinery)".

The greatest transformative capacity of circular bioeconomy (biogas production from agro wastes) from the point of Green Transformation centers on the already implemented spatial practices in Lithuania in the field of energy (biogas) production from manure and other agricultural wastes. The multiplied practices would accelerate Green Transformation in Lithuania specifically in the agricultural sector. The *key environmental goals to achieve in a long run* in the intervention area in Lithuania are:

- (1) *contribute to climate change* – to reduce CO₂ emissions from agricultural production (livestock and cereal) due to the collected wastes, which goes into the bioenergy production cycle, using bioreactors;
- (2) *accelerate effective use of resources and energy* – to apply the principles of circular bioeconomy throughout the agricultural production process: collected wastes from agricultural production are further used to produce green energy, using bioreactors;
- (3) *change the ways of production, consumption, and distribution* – to collect agro-processing wastes (such as manure, carcass wastes, cereal wastes, etc.) to utilize it for producing green energy by exploiting bioreactors. Produced energy appears in two forms: (1) gas and (2) electricity. Both forms might enter the national gas pipes and electricity grids and thus become green energy for farms, local communities, and other consumers on-demand.

Although EU biogas production from livestock manure has increased over the last decade, it accounts for only a fraction of total biogas production in the EU (7% in 2018). Lithuania has more than 20 years of biogas production practices. In 2011 the first Law on Renewable Energy was issued and put biogas production from wastes into operation to accelerate the bio-economy. The electricity purchase tariff was first fixed in January 2013 with an approved quota of 18 MW (megawatts). However, further biogas production promotion had stopped. In the year 2017 biogas production counted only 4.3% of all energy produced in Lithuania. In 2018 there were 36 operating biogas plants in Lithuania (Statistics Lithuania, 2018). Although the quickly developing biogas sector, Lithuania is remaining in the back among biogas producers in the EU (EBA Statistical Report, 2018). The development of biogas production from agro wastes was placed among the priorities of Lithuania's Smart Specialization strategy. There is a great potential to accelerate Green Transformation in Lithuania in the selected intervention area.

Cooperation between sectors is a vital driving force in achieving significant results in Green Transformation. Particular *challenges* concerning the issue in Lithuania had been observed in interconnection among different stakeholders in biogas production from agro wastes: (1) lack of cooperation; (2) lack of transparency; (3) lack of strategic long-term planning, and (4) lack of

¹ LARS project – "Learning Among Regions on Smart Specialization". <https://www.lars-project.eu/>

organizational and financial motivation. To fight the observed challenges the following *opportunities* are proposed to accelerate Green Transformation in Lithuania: (1) fostering green innovations; (2) developing green products; (3) revitalizing existing green systems of innovations; (4) considering the public efforts.

2. The policy context

The selected intervention area - circular bioeconomy - has been gaining increased recognition in many EU strategic policy documents in the past years as a factor for fostering Green Transformation.

Discussions concerning the vision for Green Transformation in Lithuania started much earlier before the adoption of the European Green Deal. Different strategies, programmes, and various supportive measures were continuously proposed, implemented, monitored, and renewed since the beginning of the 21st century, and even earlier: firstly, concerning climate change, further - sustainability issues, then - smart specialization, and currently - the European Green Deal - accelerated Green Transformation.

After regaining independence in 1990, Lithuania joined the United Nations organization (further - UN) in September 1991. Belonging to the UN greatly accelerated the development of various strategies and measures concerning environmental issues of the country, which are currently discussed under the umbrella title of 'Green Transformation'. The Soviet industry was almost destroyed in a few years after the regained independence, and environmental measures of Lithuania (such as CO₂ emissions and others) sharply decreased; this caused changes in positioning Lithuania's advancement regarding the environmental state.

However, Lithuania, being a young democracy, quickly became an active follower of the great surge of environmental concerns-based development of the end of the 20th century - climate change and sustainable development, institutionalized by the UN via Rio de Janeiro Declaration (1992), Agenda 21 (1992), UN Framework Convention on Climate Change (1994), and other relevant documents. Further, a great job was done by Lithuanian President Valdas Adamkus (presidency years 1998-2009), who was a reputable, well internationally known environmentalist and who took environmental concerns very seriously as a prospective development strategy for a young country in transition.

Lithuanian National Strategy for Sustainable Development, which is the *first* official sustainable (including Green Transformation ideas) *transformation idea-driven strategy in Lithuania*, was developed and approved in 2003. In the Strategy Lithuania has set up itself a long-term priority: to reach the current average of the European Union member states by 2020, according to the economic and social indices as well as the indicators of population health and the efficiency of consumption of natural resources, also ensuring a clean and healthy environment. The updated Lithuanian National Strategy for Sustainable Development (2012) maintained the same goal but more firmly emphasized the importance of science, innovation, social responsibility of the private sector, and broader public involvement.

Further renewal of the Lithuanian National Strategy for Sustainable Development was done on demand in line with annual Strategy implementation and monitoring reports and relevant international and national strategies, i.e. UN 'Transforming our world: the 2030 Agenda for Sustainable Development'

(2015), National Progress Strategy 'Lithuania 2030' (2012), and National Progress Plan 2021-2030 (2020).

Lately, the most relevant strategic document - *National Progress Plan 2021-2030*, sets the three key guiding horizontal principles for Lithuania in the coming decade:

- (1) sustainable development,
- (2) innovation (creativity), and
- (3) equal opportunities for all.

Thus, the Green Transformation in Lithuania at the current and coming period of time will necessarily cover the outlined principles, with sustainability, innovation, and equal opportunities driving forces ahead.

Currently, the above outlines principles guide the Green Transformation policy in Lithuania through the following legal basis:

- Operational programme for the EU structural funds investment for Lithuania for 2014-2020;
- The Common Agricultural Policy (CAP) and The Rural Development Programme for Lithuania 2014-2020;
- The European Green Deal (2019);
- Roadmap for Lithuania's Industrial Transition to a Circular Economy (2021);
- Smart specialization (RIS3) strategy for Lithuania 2014–2020 (concrete statement of the selected area of intervention - *circular bioeconomy*, i.e. biogas production from agro wastes).

At its current state, conflicts and different interests among the key stakeholders, concerning the policy context for Green Transformation, had been eliminated by uniting them into one round table discussion panel, which main concern is the prosperous Green Transformation in general (already ongoing public consultations regarding the European Green Deal implementation strategies), and particularly - in the selected area of intervention, i.e. circular bioeconomy (biogas production from agro wastes).

3. Instruments and initiatives targeting the GT

The European Green Deal is a result of continuous debates on climate change in Europe with the final aim of Green Transformation. A very important role here is played by: (1) social movements and public attitudes towards climate change, and (2) political attitudes, Green political parties, and political ideologies. In Lithuania the discussion on the implementation of Green Transformation, accelerated by the approved European Green Deal and its measures to the member states, is emerging in all sectors – from the environment, economy, transportation, and agriculture to education and many other fields. Thus the attitude that Green Transformation is the sole responsibility of the Ministry of Environment in Lithuania is sharply changing from the overall perspective of the issue in the country.

At the beginning of 2021, a brand new initiative had been organized in a form of *public consultation* regarding the implementation of the European Green Deal in Lithuania. Five ministers of Environment, Agriculture, Transport and Communications, Energy, and Economy and Innovation, and two vice-ministers – vice-minister of Education, Science and Sport, and vice-minister of Energy, organized a national level public consultation on the implementation of the Government Program of the Republic of Lithuania and the Economic Recovery and Resilience Building Plan concerning the European Green

Deal. The event attracted more than 200 stakeholders from NGO's, private and public sectors. Hence, the public consultation elucidated a huge gap of horizontal collaboration among ministries concerning the issue. Each ministry recognizes the importance of the European Green Deal but there is no common vision on the implementation of Green Transformation in Lithuania as a whole, as a coherent picture (See Table 1).

Table 1. Priorities Concerning the European Green Deal emphasized by Lithuanian ministries

Public policy field/Ministry	Priorities
Environment	<ul style="list-style-type: none"> Circular economy until the end of 2024 A climate-neutral economy until 2050 A climate-neutral Government as of 2024 A climate-neutral public sector as of 2027
Agriculture	<ul style="list-style-type: none"> Sustainable production in harmony with nature Greenhouse gas emissions mitigation practices and technologies Restoration of ecosystems Development of short food supply chains Development of innovations and research
Transport and Communications	<ul style="list-style-type: none"> Decrease of greenhouse gas emissions in the transport sector Increasing the number of electric cars Implementation of a sustainable mobility plan
Energy	<ul style="list-style-type: none"> Development of green electricity generation (e.g. offshore wind development) Consistent promotion of the development of energy-producing consumers and communities. Created the basis for hydrogen energy. Development of renewable energy in the transportation sector The installment of a system for energy storage
Economy and Innovation	<ul style="list-style-type: none"> Circular and smart economy Industrial greening Digitization Climate-neutral production At least 10% of all companies would be involved in greening and digitization Setting-up smart jobs Transformation of low and medium value-added industries into higher value-added industries

Source: National level public consultation on the implementation of the Government Program and the Economic Recovery and Resilience Building Plan on the European Green Deal (2021). https://www.youtube.com/watch?v=TML-E_oNIHQ.

The public consultation disclosed a huge interest of NGO, private and public sectors in the field of Green Transformation. At the same time the lack of cooperation between sectors and public authorities in implementing the European Green Deal, accordingly - seeking for a Green Transformation, was observed. The meeting also proved that the demanded driving forces in implementing the Green Transformation in Lithuania are public authorities, not the NGOs or private sector in particular.

One of the most current initiatives on circular economy is the *'Roadmap for Lithuania's Industrial Transition to a Circular Economy'* (2021). It is the first attempt to establish a vision of the Lithuanian industry, based on co-creation, partnership, and systematic dialogue. The project aims to prepare a roadmap for Lithuania's transition to a circular economy. This is achieved by analyzing the extent to

which Lithuanian industry is circular, what breakthrough areas or topics are most relevant, as well as involving parallel initiatives, stakeholders in the Roadmap, enabling and defining the role of public authorities and creating real capacity to make the transition to a circular economy real and acting. 'Roadmap for Lithuania's industrial transition to a circular economy' (2021) project objectives:

- circularity analysis of Lithuanian industry;
- policy proposals to support industrial transition to a circular economy;
- creation of the Roadmap schedule;
- formal adoption of the Roadmap, business briefing, and international exchange.

The creation of 'Roadmap for Lithuania's industrial transition to a Circular Economy' (2021) is an innovation that attracts all kinds of stakeholders from the circular economy field of interest. At the same time, the project puts together public institutions, scientists, consultants, and the industrial sector to work together towards the Green Transformation.

4. Challenges and opportunities focusing the GT

The EU regulation on the Green Transformation plays an important role in Lithuania due to the principle of supremacy of the EU law, and the EU support. The EU regulations are appropriate, leaving less room for debate on whether or not to accept the green course. The EU regulations in Lithuania are implemented by preparing relevant orders of the ministers of different ministries, thus ensuring the provision of plans, their implementation measures, and, accordingly, responsible persons to ensure the monitoring of the process. The regulations are then transposed into national law. In some cases, interinstitutional cooperation takes place. In the last 5 years, Lithuanian national institutions and policies were all more or less focused on Green Transformation, and any conflicts between EU policies and sectors had not been observed.

Specifically, the field of biogas production from agro wastes face particular *challenges*, identified by stakeholders:

- (1) *lack of cooperation* between science-policy-business in promoting and implementing Green Transformation; stakeholders are more focused on internal communication or daily matters;
- (2) *lack of transparency* in making and implementing decisions; sometimes public organizations try to avoid cooperation with other types of stakeholders;
- (3) *lack of strategic long-term planning* - public institutions are the drivers in implementing Green Transformation in the field of biogas production from agro wastes; their role in setting the long-term planning is most demanded from stakeholders;
- (4) *lack of organizational and financial motivation* - the business sector considers potential risk in a form of skepticism (especially in primary production) to implement Green Transformation practices.

To fight the observed challenges further *opportunities* are proposed to accelerate Green Transformation in Lithuania:

- (1) *fostering green innovations* - to revitalize the already built but fully unexploited biogas plants for green innovation, i.e. energy production from agro wastes (manure, carcass, cereals, etc.) and collaborate for spreading the know-how of implemented green innovation good practices and success stories in innovation networks in the field;

(2) *developing green products* - to accelerate the use of green energy, produced from agro wastes for the development of green products;

(3) *revitalizing existing green systems of innovations* - to revitalize and improve the already created innovation system in the field of energy production from agro wastes at the national level via networking among stakeholders to reach the expected effect of Green Transformation;

(4) *considering the public efforts* - to reach the public effort for the public funds spent for building biogas plants in Lithuania during the past 20 year period of biogas plant building support scheme.

4.1. The emergence and growth of new activities with potential in innovation focusing on GT

The renewed EU bioeconomy strategy (2018) emphasizes that in the countries of Central and Eastern Europe, including Lithuania, the bioeconomy can create more added value, as these countries have a high potential for biomass and low exploitation of biomass compared to other European regions. Accordingly, these countries are encouraged to develop strategies that will lead to the more sustainable and rational use of their biological resources, i. y. the processing of biomass and bio-waste into high value-added products, building on modern research and development. According to the OECD, by 2055 the bioeconomy will be a key driver of European economic development.

So far there is no common green innovation or environmental strategy in Lithuania for all economic sectors with the complementary involvement of all Ministries, which is vitally important to reach the effect of Green Transformation. Currently, there is no strategy for the bioeconomy due to the lack of political will and/or capacity.

Many documents were discussed and analyzed at various public institutions in Lithuania, including the Paris Agreement on Climate Change and many other documents on climate change, before the European Green Deal was adopted. The European Green Deal put all ideas together in one place. During the preparation of the questionnaire for the Council of Ministers on green ideas, there were organized inter-institutional discussions in Lithuania, which did not lead to any additional activities between public organizations. The systematic approach towards the green course is missing in society both from a conceptual understanding of the issue to the actual involvement in discussion and concrete action. The dominant understanding is that Lithuania is small, so far it does not pollute. This would cause a big challenge for society to absorb Green taxes shortly.

National laws on Green Transformation are in most cases unknown, usually known to those who need to apply particular regulations in their activities. This is due to the lack of overall education concerning the essence of sustainability, ecology, waste management, consumer behavior, circular and bioeconomy, the overall conception of Green Transformation, its aims and tools, core initiatives, etc. Therefore, education in all senses and all levels, as well as communication to society concerning the Green Transformation, play a vitally important role in solving the above-outlined challenges. This would help foster green innovations, accelerate green products and practices, therefore – add to the green innovation systems and finally – contribute to the public efforts. Currently, the bottom-up demand for Green Transformation is too low, therefore the processes are vague and initiatives are fragmented.

4.2. Entrepreneurial discovery bringing environmental and social benefits into existing innovation activities

There are different entrepreneurial discovery experiences in promoting Green Transformation in Lithuania. It mostly depends on the economic sector or specific field of activity.

For the engineering industry in Lithuania, the engine of Green Transformation is the market. Companies are involved in the Green Transformation because the market demands it. In the engineering industry, the Green Transformation started nearly a decade ago. Motivation to support Green Transformation use to be understood as a 'must' to play the role in the international market. Contribution to the Green Transformation is reached in a very simple way: by reducing energy costs, reducing raw material waste, reducing logistics (for example, using trains instead of trucks, planes, etc.), reducing CO₂ figures, using renewable energy sources. According to statistics, the engineering industry recycles all waste in Lithuania. However, there is still much to be done in agriculture and food industry.

At the enterprise level in the agricultural sector, there are no significant potential breakthroughs in Green Transformation, unless the inspiration from foreign investors. Agricultural sector companies had not accepted yet, that the role of Green Transformation will increase significantly shortly. Exports will be based on green criteria (CO₂ emissions, use of certain materials in the production process, etc.), so the survival of agricultural companies will depend on new regulations adapted concerning the Green Transformation, as well as changes in market demand.

The role of niches and entrepreneurs in promoting Green Transformation is also evident in Lithuania as the reflection of agribusiness social responsibility (Vilke et. al., 2021) and corresponds to the understanding of Green Transformation in the agricultural sector in general. The profit maximization stopped appearing as the sole responsibility of organizations (including the agricultural sector), and environmental and social issues occupied their place in management standards, tools, and practices, which foster green innovations, the development of new product in a more responsible way, and contributes to overall revitalization of existing green systems of innovations, finally – adds to the overall public efforts. Niches and agribusiness entrepreneurs in promoting Green Transformation in Lithuania are neatly related to farmer's attitudes towards environmental responsibility, which vary by farm size (both physical and economic): bigger farms tend to attach greater importance to environmental responsibility. Indeed, bigger farms give more attention to ecological efficiency and cleaner production as they operate more successfully and they must adhere to the requirements of the EU agricultural support schemes. The small farms face difficulties in accessing public support due to transaction costs and mostly focus on profitability.

4.3. Critical networks of stakeholders with the potential to develop RIS3 strategies based on the GT

The relationships between different levels - EU, national, regional, micro level actors are vitally important in implementing and promoting Green Transformation. These interactions, however, are very vertical in Lithuania. The main accelerator towards the implementation of European Green Deal and overall Green Transformation is the EU level, which sets certain rules and requirements for member states. Even Lithuania, as any other member state, has the right of discretion and power of negotiations, these tools are not usually used by the national government. So the second – national –

level is a level which sets rules and requirements for all national stakeholders. Here the relationship is very vertical again. Even though there is a certain amount of discussions and consultations between different policies (and ministries) and with private and NGO sectors, the relationship is very vertical. During the interviews respondents from NGO spotlighted that it does take a lot of time and effort to be included into round table discussions with decision makers and to be heard. Because of this reason it is quite difficult to determine the relationships between national level and micro level actors, as the latter are seen as someone to discuss but not to decide together.

Different stakeholders operate at different levels for niche, regime and landscape level and this gives a significant influence on establishing networking for green transformation. Transition towards Green Transformation in Lithuania are foreseen for all 4 types of stakeholders with different intentions.

Public authorities are active in Green Transformation aiming to implement the EU and national regulations for Green Transformations. Stakeholders in this group are important actors at the national scene and have networks with other national stakeholders. The Ministry of Agriculture and Ministry of Environment already have experience in the issue starting from 5 years ago, now and in coming 5 years. The role of the Ministry of Economics and Innovation, and the Ministry of Energy are planned to increase for Green Transformation in the coming 5 years.

Universities and research institutions also are important players for Green Transformation in Lithuania with different levels of influence depending on the niche, regime, or landscape level. It is also planned that the role from the last 5 years, now and in coming 5 years will remain similar.

The role of private organizations in Green Transformation also differs on niche, regime, or landscape level. They have more influence on the niche level. Companies from the biogas sector have a good experience on the adaptation of their activities for Green Transformation but they are not acting as producers of goods/products for a wider scale.

The proposed tool to mobilize different stakeholders for Green Transformation is to (1) encourage cooperation, (2) participate in various platforms and networks. It is very important also to increase the will to investigate and employ Lithuanian and foreign experience, and to participate in such networks.

A good example of networking and horizontal cooperation is the 'Roadmap for Lithuania's industrial transition to a Circular Economy'. This Roadmap is innovative and attracts all kinds of stakeholders who are relevant in the field of a circular economy. The main strength in creating the Roadmap for a circular economy is cooperation, co-working, co-creation, and horizontal networking on the creation of the Roadmap, where all stakeholders are heard and can influence the process. Each event attracts 100-300 relevant stakeholders and the finalized Roadmap might be a huge step in enabling a circular economy in Lithuania.

5. Next steps in policy innovations concerning the GT, RIS3, and RIS4+ strategies

From overall GRETA activities, carried out in Lithuania, particular next steps in policy innovations concerning the Green Transformation, RIS3, and RIS4+ strategies had been identified.

5.1. Driving forces-based next steps

The vital driving role in Green Transformation in Lithuania is firstly given to *institutional and political drivers* due to their responsibility to set up new Green Transformation-based strategic long-term planning. Further, *economic drivers* should be taken into account due to the identified need for organizational and financial motivation for Green Transformation in Lithuania. And finally, *social drivers* will further act for Green Transformation in the selected intervention area for increased cooperation and transparency. The identified driving forces-based next steps should be centered at:

- (1) macroeconomic policy measures,
- (2) EU and national policies.

The proposed Lithuania-specific *next steps* concerning *regulation* are:

- New/updated regulations encourage companies to change and create eco-innovations;
- Tax policy related to business support or business restriction.

This would lead to the three-fold *results*: first, more actors are involved in the Green Transformation; second, more green innovations; and third, accelerated green growth.

The proposed Lithuania-specific *next steps* concerning state-level measures for *research and systemic thinking*:

- a quantitative survey of companies;
- clear definition of Green Transformation;
- research on the potential of Green Transformation.

The *result* of the above-proposed awareness-raising on the state-level in the field of research and systemic thinking – the creation of innovation ecosystem for ecological activities and for all societal actors and regional practices.

5.2. Pressure-based next steps

Human activities exert 'pressures' on the environment, as a result of production or consumption processes, which are normally divided into three main types: (i) excessive use of environmental resources, (ii) changes in land use, and (iii) emissions (of chemicals, waste, radiation, noise) to air, water and soil. In the Lithuanian case, the most important observed pressures are the following: an expansion of environmental footprint; the increasing amount of waste; control of smells, and the use of old technology not in line with Green Transformation technology. The identified pressure-based next steps should be centered at:

- (1) setting environmental-specific policies,
- (2) setting sector-specific policies.

The proposed Lithuania-specific *next steps* concerning *strategic measures* are the following:

- Green Transformation is seen as a process;
- sectors must have long-term strategic goals for the Green Transformation.

This would lead to the following *results*: first, Green Transformation should be a key goal in decision making; and second, expanding experimental culture.

The proposed Lithuania-specific *next steps* concerning *experimentation* are the following:

- development of an experimental culture - large pilot projects as a way to test new technologies and collaboration;
- developing a testing system to demonstrate the potential for innovation and enabling companies to test new products and methods.

The *result* of the above-proposed experimentation measures - companies would get information on new solutions and evaluate them.

5.3. State-based next steps

The 'state' of the environment is a combination of physical, chemical, and biological conditions. Lithuania-specific states to be considered for Green Transformation are the following: air quality, soil quality, life quality, soil use, increased generation of waste flows, lack of circular economy. The identified state-based next steps should be centered at:

- (1) setting targets for Green Transformation,
- (2) setting priorities for Green Transformation.

The proposed Lithuania-specific *next steps* concerning *incentives and motivational measures*:

- Economic motivation;
- Research and development.

The *results* of the above-proposed incentives and regulation measures - more actors choose the direction of Green Transformation.

The proposed Lithuania-specific *next steps* concerning *measures in the field of public administration*:

- requirements for procurements meet the criteria of the circular economy;
- partnership with leading companies;
- "soft" measures to encourage a faster transition to more resource-efficient technologies or products.

The proposed Lithuania-specific *next steps* concerning *measures for companies*:

- public support for the technological solutions supporting "green transition";
- measures for assessment and improvement of the company's activities;
- services and audits to help identify processes or technologies that can be renewed;
- enabling participation in the Green Transformation to improve their risk-taking capacity.

5.4. Impact-based next steps

Impacts that change in environmental functions affecting social, economic, and environmental dimensions, which are caused by changes in the state of the Lithuanian system are the following: decreased quality of water, soil and air; deteriorated public health; increased amount of waste;

increased CO₂ emissions; increased consumption of non-renewable energy. The identified impact-based next steps should be centered at:

- (1) education,
- (2) cooperation,
- (3) public awareness-raising.

The proposed Lithuania-specific *next steps* concerning education and public awareness-raising – *education and learning*:

- teaching, knowledge transfer at all levels, from school to higher education;
- public education and training through various projects.

Expected *results of education and learning* - new generation open to the Green Transformation.

The proposed Lithuania-specific *next steps* concerning *education and public awareness-raising* – application of *benchmarking*:

- examples of best practice;
- clear and motivating examples.

Expected *results* from benchmarking are: first, learning from others; and second, developing/improving one's innovation system, taking into account examples of good practice.

The proposed Lithuania-specific *next steps* concerning *mobilization, cooperation*:

- encourage collaboration, participation in various platforms and networks;
- to promote the importance of dominant stakeholders, the extent of their empowerment;
- build networks to increase transformation capacity;

Expected *results* of mobilization and cooperation are: first, collaboration helps to adapt to new rules and helps to find new business opportunities, and second, simplified communication, fast exchange of information.

The proposed Lithuania-specific *next steps* concerning *information and communication*:

- examples from the daily lives of stakeholders;
- dissemination of specific achievements of the Green Transformation;
- targeted and reliable information for specific target groups.
- joint Green Transformation events.

Expected *results* of proposed information and communication measures - better communication, cooperation, better opportunities for stakeholders to work for Green Transformation.

6. GT and RIS3 prospects: from the GT-driven regions to the European RIS3 and RIS4+ strategies

The future of Green Transformation in Lithuania firstly depends on education, on a similar understanding of the phenomenon of Green Transformation and related concepts. A crucial role in Lithuania concerning the issue is to be played by the younger generation, children, whose education

entails elements and systems of Green Transformation aiming to create common grounded understanding and overall support.

The key actor in fostering Green Transformation is public organizations. Their core responsibility is to prepare strategic long-term planning towards a Green Transformation that would lead to flexible enough implementation for companies, NGO's and other related actors. Initiatives based on a bottom-up approach should take a leading position to speed up this process in Lithuania. The Green Transformation will not stop in Lithuania, everything is already twisted. Hence, in Lithuania, it might not take the same speed as in other countries. Lithuania can speed up this process with a properly set long-term vision of the overall country's Green Transformation alongside the strategic goals covering all sectors, policies, and public institutions, and accordingly allocated investment.

Green Transformation is not a threat in Lithuania. It is a new reality where we live, i.e. all stakeholders and the society as a whole need to learn how to live in harmony with nature and to be a climate-neutral society because there is no planet B. The transformation of the existing regime should be necessarily initiated. The potential threat is skepticism (especially in primary production). There is also a risk that innovative solutions may not be implemented, especially in small and medium-sized farms.

The opportunity should be used to develop demonstration models as a tool for the implementation of Green Transformation in their business/activities. The actors should be grouped according to appropriate criteria (small, medium, large, type of business, etc.), aiming to meet the needs of each group. There is a need to draw attention and motivate those who do not know how to implement Green Transformation and to demonstrate good practice examples.

The two pathways for Green Transformation are possible with the help of young people and the older generation. Young people are more intelligent, require less effort to do changes in Green Transformation. More information and awareness-raising tools need to be used for the involvement of the older generation in Green Transformation.

The overall main tool for Green Transformation in education. There is a huge need to educate younger and older, the private and the public sectors. The Green Transformation has to become 'new normal' not only to those who are working on the issue or are directly related to that but to the whole society.

References

1. Agenda 21 (1992). <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>.
2. EBA Statistical Report (2018). European Biogas Association. https://www.europeanbiogas.eu/wp-content/uploads/2019/11/EBA_report2018_abridged_A4_vers12_220519_RZweb.pdf.
3. European Commission. (2014). National/regional innovation strategies for smart specialisation (RIS3). Cohesion policy 2014–2020 [online], Available from Internet: http://ec.europa.eu/regional_policy/sources/docgener/informat/2014/smart_specialisation_en.pdf.
4. Lithuanian National Strategy for Sustainable Development (2003). https://am.lrv.lt/uploads/am/documents/files/ES_ir_tarptautinis_bendradarbiavimas/Darnaus%20vystymosi%20tikslai/NDVS/NDVS.pdf.
5. Lithuanian National Strategy for United Nations Framework Convention on Climate Change Implementation (1996). <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.32150?jfwid=-15hio1iayv>.
6. National level public consultation on the implementation of the Government Program and the Economic Recovery and Resilience Building Plan on the European Green Deal. 25/02/2021. https://www.youtube.com/watch?v=TML-E_oNIHQ.
7. National Progress Plan 2021-2030 [in Lithuanian] (2020). <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/c1259440f7dd11eab72ddb4a109da1b5?jfwid=-15hio1hglv>.
8. National Progress Strategy 'Lithuania 2030' [in Lithuanian] (2012). <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.425517>.
9. Rio de Janeiro Declaration (1992). https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_CONF.151_26_Vol.I_Declaration.pdf.
10. Roadmap for Lithuania's Industrial Transition to a Circular Economy (2021). Agency of Science, Innovation and Technology. <https://mita.lrv.lt/lt/veiklos-sritys/mita-vykdomi-projektai/ze-kelrodis-pramonei>.
11. Statistics Lithuania (2018). Energy Balance 2017. <https://osp.stat.gov.lt/services-portlet/pub-edition-file?id=30340>.
12. The First National Communication of the Republic of Lithuania on Climate Change (1998). <https://unfccc.int/sites/default/files/resource/litnc1%20Lithuania.pdf>.
13. Transforming our world: the 2030 Agenda for Sustainable Development (2015). United Nations. https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E.
14. United Nations Framework Convention on Climate Change (1994). <https://unfccc.int/sites/default/files/conveng.pdf>.
15. Vilkė, R., Gedminaitė-Raudonė, Ž., Baležentis, T., & Štreimikienė, D. (2021). Farmers' awareness of eco-efficiency and cleaner production as environmental responsibility: Lithuanian case. *Corporate Social Responsibility and Environmental Management*, 28(1), 288-298.