GREEN TRANSFORMATION! A POLICY TOOL FOR REGIONAL SMART SPECIALIZATION

Evidence-Based Pathway towards Green Transformation in the Baltic Sea Region

POLICY RECOMMENDATIONS

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Contents

Evidence-Based Pathway towards Green Transformation in the Baltic Sea Region 1
Contact information 1
1. Introduction to GRETA Policy Recommendations 3
2. Policy recommendations from GRETA project partner regions 4
2.1. Policy recommendations from the Klaipėda region (Lithuania) 4
2.2. Policy recommendations from the Latgale region (Latvia) 6
2.3. Policy recommendations from the Västerbotten region (Sweeden) 8
2.4. Policy recommendations from Ostrobothnia (Finland) 9
2.5. Policy recommendations from the Päijät-Häme region (Finland) 11
2.6. Policy recommendations from the biogas sector (Lithuania) 12
3. Concluding remarks 14
References 15
Annex 1. GRETA Policy Recommendations in Brief 16

1. Introduction to GRETA Policy Recommendations

The policy recommendations present policy tools developed and tested during the GRETA project and their evaluation. Based on the results of DPSIR model and round table discussions, each project partner prepared policy recommendations concerning the GT principles for policymakers at the EU level.

Taking into account the previously implemented analysis, policy recommendations, and proposed concrete actions concerning overall GRETA project activities are summarized in Table 1, putting in line the selected policy pathway to GT and the expected key role players in every case. Public organizations are clearly in an active role, as GRETA partners from different research and analyses came to an almost common result - to enhance GT on a regime level. In such a scenario, public organizations are the most fluent operators. They also have legitimacy, which is missing by many companies.

Table 1. **Policy recommendations on the next steps for Green Transformation in the Baltic Sea Region**.

Regions	**Main policy pathway**	**The expected key role players** (definite and dominant stakeholders)	**Proposed concrete actions for the selected intervention area**
Klaipėda (LT) food and beverage	Regime transformation	Companies – Definite and dominant stakeholders; Public organizations – dominant stakeholder.	- Support for technological renewal; - targeted research promotion; - the strengthening of CE competencies and knowledge; - incentives on internationalization; - demand stimulation.
Latgale (LV) metal and mechanical engineering	Regime transformation	Public organizations – definite and dominant stakeholder; Companies – dominant stakeholder.	- Spread of examples about practical gains of GT; - creation of regional industrial waste collection and recycling point; - EU support programs for equipment replacement or modernization; - the need to start with basics (specifically in Latgale region) – change old equipment; - cooperation to move towards GT; - broader application to Horizon 2020 as an instrument for companies.
Västerbotten (SE) (hydrogen)	Regime transformation	Public organizations – definite stakeholder; Companies – dominant stakeholder.	- Building up test system/making test system available for companies; - system thinking from policy to financing, innovation potential, and pilots; - accelerating spread of knowledge and information; - building networks for enhancing capacity for transformation; - a regional strategy that focuses on the GT.
Ostrobothnia (FI), energy technology, circular economy	Technological substitution, Regime transformation	Public organizations – definite and dominant stakeholder; Companies – dominant stakeholder.	- Application of different kinds of protocols and certificates; - GHG Measurements; - re-clarification/re-formulation of the definition of the circular economy; - regulations: innovations rising from the landscape level and the niche level; - spread of knowledge of the circular economy; - the circular economy mindset in the product design phase; - 3D-printing.
Päijät-Häme (FI) grain cluster	Regime transformation, Regime reconfiguration	Public organizations – definite and dominant stakeholder;	- Political guidance from the EU and national level; - sustainable development and climate change goals considered in strategies and actions; - creating flexible enough conditions to support business investment and RDI projects;

		Companies and universities – dominant stakeholders.	- setting the national-level environmental policies and regulations for the industry; - setting sectoral roadmaps, goals, and cooperation between the agriculture industry and research (preserving biodiversity); - financial support (tax reliefs) and enabled risk funding for pilot actions; - bridging the cooperation gaps between academia and companies; - support for universities to strengthen their role in GT; - increasing skills; - linking individuals and retail in raising the awareness of the GT.
Biogas-sector (LT)	Regime transformation	Public organizations – definite and dominant stakeholders; Universities and NGOs – definite stakeholders.	- New/updated regulations for eco-innovations and tax policy; - awareness-raising on the state-level in the field of research and systemic thinking; - setting new long-term strategic measures for GT; - developing experimental culture; - creating incentives and motivational measures; - defining GT measures in the field of public administration; - defining GT measures for companies; - awareness-raising through education and learning; - education and public awareness-raising through benchmarking; - mobilization and cooperation for GT; - expanded information and communication concerning the GT.

Sources: Policy Briefs on GT for RIS3 Strategies, following the order –Klaipėda (LT) food and beverage, Latgale (LV) metal and mechanical engineering, Västerbotten (SE) (hydrogen), Ostrobothnia (FI) energy technology and circular economy, Päijät-Häme (FI) grain cluster, Biogas sector (LT).

Hence, in the two sole cases of advanced innovators in Finland, two more policy pathways are possible: technological substitution (Ostrobothnia) and Regime reconfiguration (Päijät-Häme). In all pathways, public organizations are most likely sought after by companies in the nearest future of GT, only the level of cooperation with companies and universities might slightly differ due to the key role player's activeness, taken during the process.

2. Policy recommendations from GRETA project partner regions

Further policy recommendations are summarized after every GRETA project partner region, highlighting the next steps in policy scenarios for GT, elaborated from responses to drivers, pressures, states and impacts after DPSIR analysis. Concrete actions and policy intervensions are proposed by partners after verification of elaborated propositions during the round table discussions (focus groups).

2.1. Policy recommendations from the Klaipėda region (Lithuania)

Policy recommendations from the Klaipėda region (Lithuania) focus on the transition of the food and beverages sector in the region towards a circular economy[1]. Based on inclusive analyses with regional representatives, the main challenges and opportunities transitioning towards a more sustainable economic model were identified, including both socio-economic and environmental concerns. It is considered, that the Klaipėda region needs to *transform the regime* with policy actors ahead. The next steps to implement are based on Responses, identified during the DPSIR analysis (see Table 3) and are precisely explored in elaborated Policy Briefs from the Klaipėda region.

[1] for details, please see: *Policy Briefs on GT for RIS3 Strategies. Klaipeda Region (2021). Intervention Area: The Food And Beverage Industry Transition To Circular Economy In Klaipeda Region. Lithuanian Innovation Centre.*

The main intervention area's findings suggest that physical distance of food and beverages' value chains will be relevant during the upcoming advancement of GT – whenever it will be emphasized in the light of reducing carbon footprint from transportation, empowering local producers and ecologic farming, or fostering sustainable technological and non-technological innovation diffusion in the form of foreign direct investment. Even though the local dimension is essential to achieve greater levels of sustainability (such as short and transparent supply chains), the role of the BSR region is also being seen as a prominent way to mainstream the green agenda, especially when it comes to market-driven strategies.

Lithuanian food and beverages sector is almost in half dependent on foreign markets with export share reaching 45% (the same trend for the Klaipeda region) what makes regional presence and cooperation even more relevant for it. With the forthcoming Carbon Border Adjustment Mechanism in the EU, long-term transformation in the sector should take place in alignment with sustainability-prone regions inside the Union, and in this case, Baltic Sea Region can be seen as a strategically convenient location for further GT development. Further investigation in the relations among BSR countries in the food and beverages sector has led to an important observation – Nordic countries (Sweden, Norway, Denmark, and Finland) set major GT/sustainability trends for Lithuanian producers that are operating in those markets, and to some extent, those values (or trends) gradually shift to the local context. Therefore, the role of the *BSR region* in GT *has a solid foundation* based on the GT value perception *and necessary technological and non-technological innovations* for sustainability that are backed by diffusion from the Nordic countries.

The usage of renewable and sustainable bio-resources together with the avoidance of raw materials and energy-intensive processes that *are linked to transportation* are a few examples of the major GT and circular economy areas that could be tackled in the Baltic Sea Region. As the circularity of bio-products is based on biological restoration rather than technical production and usage cycles, yet favorable climate and weather conditions should also be taken advantage of to stipulate sustainability in food and beverages chains. On the other hand, current technologies and innovations that are in place allow thinking that the BSR region could be further developed into green technology domain as well. However, both of these scenarios will not be possible without more robust dialogue and cooperation among both public and private sectors with BSR countries.

These proposals and concerns should be addressed on the EU level with a strong emphasis on the *role of regional cooperation and its ability to implement sustainable bottom-up driven initiatives*. Currently, GT is being seen as a strong political agenda from the European Union institutions, however, when it comes to the implementation level, more support for the empowerment (both financial and skillful) of local and regional communities should be put in place.

The proposed **actions and policy interventions** are introduced taking into consideration the peculiarities of the regional ecosystem and its relation to the transition towards a circular economy:

- *support for technological renewal* - with internal resources, demanded transformations are too expensive and the interest in renewal becomes neglected; financial support measures for technological renewal to reduce the environmental impact of production should be in place.
- *targeted research promotion* - the implementation of circular economy principles can be both knowledge and capital-intensive and the payoff time is obscure; the support for it could come in a form of R&D&I projects between science and business.
- *the strengthening of CE competencies and knowledge* - the "train the trainee" approach could be applied to diffuse CE innovations and adjust the existing knowledge gaps; the strengthening of CE competencies and knowledge could bring diverse impacts on GT.
- *incentives on internationalization* - the support for finding clients and target markets would become handy for SMEs that would be willing to implement necessary actions for the transition towards a circular economy; the importance of FDI attraction is indicated in the regional specialization strategy and additional sustainability criteria in these activities could positively impact the progress of the GT.

- *demand stimulation* - Due to current expensive technologies and value chain inefficiencies, this type of production is more expensive and the demand for it is insignificant in comparison to conventional alternatives; regional and national policies should include appropriate measures to reduce this gap and stimulate local demand for sustainable production. A few examples could include promotional campaigns, tax reductions (for services), green public procurement, and others.

These actions include necessary instruments to strengthen the innovation and knowledge agenda in the region together with a strong emphasis on different types of internationalization and regional cooperation incentives keeping the transition towards a circular economy as the main goal.

2.2. Policy recommendations from the Latgale region (Latvia)

Policy recommendations from the Latgale region (Latvia)[2] focuses on mechanical engineering and metal industry (manufacturing) in the less developed region in Latvia – Latgale region. The selected intervention area is considered with high energy consumption and with low added value (including low productivity). It is considered, that the Latgale region needs to *transform the regime* with policy actors ahead. The next steps to implement are based on Responses, identified during the DPSIR analysis (see Table 3) and are precisely explored in elaborated Policy Briefs from the Latgale region.

Two important aspects must consider moving towards GT – networking and innovations. Every EU member state is assigned funds for activities to reach climate neutrality by 2050. Learning from project GRETA partners and discussing the process of GT with Latvian stakeholders, we see that there will not be enough just with financing. No doubt, it is a critical condition for every objective, but to ensure that process is handled in an effective way networking is a key for successful transformation.

Networking can be seen as cooperation activities, joint projects, the creation of clusters, or knowledge platforms to exchange and share information and new ideas. As it was acknowledged during expert interviews and focus group meeting targeted information and examples of good practice is important to know for every stakeholder who is involved in the GT. There still are existing challenges in Latgale region regarding the networking aspect. Universities and research institutions work with individual companies in the framework of contract work, universities are involved in international projects, but it is difficult to persuade companies to involve, Latgale planning region is providing seminars and consultations on different topics for companies, but sometimes it is not the most effective way how to involve companies. The same is with municipalities that involve companies in infrastructure development projects and provide consultations for companies if it is needed. But network which could bring together key stakeholders of Latgale region is still missing. If there are available funds for hard activities, there should be also some support for soft ones for joint networking activities in Latgale region.

In Latgale region during the focus group meeting was identified the need for a pilot to involve companies of special economic zones of Latgale region in a joint network that could involve research institutions, associations that represent companies, and public institutions responsible for GT. This could be a more effective way to reach companies since they already are using several benefic and tax reliefs. This could be considered as the next step to closer cooperation between all sides to move towards GT.

The second aspect which is also important for GT is innovations. We could say that GT by itself is a process where are involved environmental, economic, and social dimensions. If the previously mentioned aspect of networking

[2] for details, please see: *Policy Briefs on GT for RIS3 Strategies. Latgale Region. (2021). Intervention Area: Mechanical Engineering And Metal Industry. Latvia, Latgale Region. Ministry of Environmental Protection and Regional Development.*

is more linked to the social dimension, then innovations are more linked to the economic dimension. But anyway, they all are connected.

In the project, analysis was stated that mechanical engineering and metal industry in Latgale is with high energy consumption and with low added value (including low productivity). And to make changes in this proportion and do it in a fast manner, there is a consensus between stakeholders that innovations will be one of the most effective solutions. In Latgale region can see also challenges in introducing innovations – they are expensive and there is not enough experience for companies to innovate or introduce innovative solutions.

In the EU funding period for 2021-2022 for innovations, there are several activities planned, they are targeted towards all helices – private, public, academic sector. In addition to already implemented activities in the previous planning period, a new approach will be implemented for innovation promotion. MoEPRD is developing new support activities for local municipalities and planning regions to introduce innovations in service provision and the performance of their functions. Local municipalities will develop projects of regional scale where they will make cooperate with academia or realize innovation procurement to introduce innovations. With this new activity, it is desired that local municipalities will be innovation users and customers and it will promote innovation development.

Therefore, the above-mentioned intention for a new pilot activity for networking is also important for innovation promotion for all stakeholders. As it was discussed between project GRETA partners to change the mindset, we need to implement activities with high intensity. And such networking with many possible cooperation activities could be a good exercise for all stakeholders to learn to innovate and understand the importance of cooperation.

Particular **actions and policy interventions** are introduced taking into consideration the specifics of Latgale region and its pathway towards GT:

- *spread of examples about practical gains of GT* – there is a need to show how a company can save and improve the process of production. If a company will see it clearly, it will motivate them for changes. Therefore, while there will not be practical suggestions for companies, involvement in GT will be limited or at the best scenario as a side effect;
- *creation of regional industrial waste collection and recycling point* - all companies from metal industry in Latgale region transport their industrial waste to Riga – this is large size waste products;
- *EU support programs for equipment replacement or modernization* - they must be understandable for companies. At this moment bureaucracy and administrative burden are too high. If a new company want to fulfill all requirements, it will not do it without an outsourced consultant;
- *the need to start with basics (specifically in Latgale region)* – replacement of old equipment with a new one, robotization in the production process because of labor shortage. If the company has an old worktable with old equipment, it will use it until the end. Or if a company will see another more attractive opportunity, like financial or practical support, new market opportunity, then it will make GT;
- *cooperation to move towards GT* - Latvia should make its national industry using innovation procurements; creating national industry many things in GT is only in its initial phase; there is a great need to find financing, experts, engineers who will do the work;
- *broader application to Horizon 2020 as an instrument for companies* – for pilots and testing some new solutions in the framework of projects; companies need to be ready to devote their time, resources and understand that in project involved companies cannot be the only ones who can use project results; project results must be available to the broad public, at least - nationally.

2.3. Policy recommendations from the Västerbotten region (Sweeden)

Policy recommendations from the Västerbotten region (Sweeden)[3] center on sustainable energy in general with a particular focus on hydrogen. It is a relatively new area that has grown stronger at the national and EU level due to its potential to contribute to CO2 reduction and sustainable development. It's a great paradigm shift in the energy sector that is pushing for the" green industry". The momentum for hydrogen and to find new energy solutions in North Sweden is high on the agenda for stakeholders and politicians. It is considered, that the Västerbotten region needs to *transform the regime* with policy actors ahead. The next steps to implement are based on Responses, identified during the DPSIR analysis (see Table 3) and are precisely explored in elaborated Policy Briefs from the Västerbotten region.

Västerbotten has a *strong energy value chain* with many different players in most sustainable types of energy such as water, wind, bioenergy, etc. Hydrogen is therefore seen as important to strengthen the energy mix through the development that takes place where large investments are planned.

The key driving force for GT is the general is to ensure a sustainable future for the next generations. The awareness of climate change by citizens makes it essential for the politicians/policymakers that can influence the development more sustainably. As natural resources are essential for the industry and a big employer in Västerbotten, sustainable development is crucial for our survival. *Västerbotten needs actions to reduce CO2* emission and SDGs and the European Green Deal have been supporting this development. Some of the responses have been *pilot projects* that *include the universities, public sector, and the industries driving the GT* (such as Northvolt, Hybrit, etc). Companies need more experimental projects, faster administrations, legislation, funding processes to support the GT to ensure their development processes. *The need for more investments in R&D processes* was observed that include both industry and SMEs to explore new solutions.

Key long-term pressures relate to the manufacturing process in the industry, the need for metal, and more electricity for diminishing fossil fuel for the GT. If we can find new and smarter energy solutions and services it can reduce emissions drastically. *Hydrogen as one of the solutions for sustainable energy use has become important to reduce CO2.* This has been promoted by the EU as well as the nations themselves. Battery factories, Hydrogen, electric flights, and boat are seen as a response to the changing markets. Companies have seen that high national and regional environmental goals help them in leading the markets, as they have to work ahead of others and can have a competitive head start. *Just transition Fund* transforming the metal and steel industry together with the investments for sustainable energy *is an opportunity* for a new project of scale to involve the value chain transition and hydrogen development. There is still work to do, but the stakeholders and the politicians are well aware of the challenges, and there are actions that aim to enhance the situation.

Impact-based responses are aligned with the responses on drivers, pressures and state, mostly. New partnerships in the innovation system are driving new projects and solutions are developed to respond to the green economy and policy. Regional politicians together with companies are also active in EU level lobbying regarding the legislation, to ensure effects on drivers that open up for diversification for energy solutions (wind, forest, hydrogen, etc). Stakeholders have been engaging in a quadruple helix network to learn and analyze the need for development in the region. *Public-private (quadruple-helix) cooperation is seen to increase legitimacy* and new funding opportunities and further long-term cooperation and development are needed.

Concerning other opportunities for growth and investment for energy actors, it is also important to state *the support the social dimension*, such as workers needing new training to be able to transform their businesses/industries to the GT, or SMEs in the supply chains that need to adapt to new technologies. GT in general is seen as an opportunity to diversify the solutions for the energy sector. Many interesting projects are aiming to develop the hydrogen sector that includes the regional public and private sector, one example is a

[3] for details, please see *Policy Briefs on GT for RIS3 Strategies. Västerbotten. (2021). Intervention Area: Sustainable energy with a focus on hydrogen in Västerbotten, Sweden.*

collaboration with Hybrit net LKAB, Boliden AB, Vattenfall, and the University/RISE, etc. They focus more on drivers and pressures in the region with the big investments and are aligned with the national/EU level. The projects tend to focus on impacts, as they either seek solutions to the impacts of the GT or the opportunity.

A few **actions and policy interventions** are introduced taking into consideration the new area of hydrogen and its contribution to sustainable energy, with the main focus - to better mobilize stakeholders in the paths towards GT:

- *building up test system/making test system available for companies* to start testing new products and methods;
- *system thinking from policy to financing* - integrating the system thinking and long-term planning to create a flexible system that can adapt to the *innovation potential and make pilots*;
- *accelerating spread of knowledge and information* - through information and knowledge-raising initiatives, by forming networks and by supporting projects and investments;
- *building networks for enhancing capacity for transformation* - actors in the same sector apply for funding so that not all actors court individually and build cooperation with other regions/countries; contact person for the Universities;
- *a regional strategy that focuses on the GT*: a common approach for the GT that has a top-down and bottom-up approach. A clear "green" RIS with a focus on conversion and fossil-free energy production responsibility; fossil-free transport system.

Transnational learning is considered as important in Västerbotten region to fight identified challenges and find new opportunities as well as partnerships to build investments of scale.

2.4. Policy recommendations from Ostrobothnia (Finland)

Policy recommendations from Ostrobothnia (Finland)[4] are focused on energy technology and circular economy since Ostrobothnia had two intervention areas: (1) energy technology and (2) circular economy (CE).

Inspection of the two intervention areas shows that when one of the intervention areas i.e. *energy technology* is working on products, which *reduce CO2 emissions*, *GT comes through* general development of *the innovation ecosystem* and export activities since the “product” is going to help in the battle against climate change. The more the energy technology cluster can produce and sell the product, the better the environmental benefits will be.

Circular economy in Ostrobothnia´s case was related to *reducing and re-using waste flows* to create “green cash”, i.e. additional profits from reduced material costs and through the selling of recyclable waste as raw material for other industries. In CE public support is needed more, since material flows need to be on a certain level in order to enable new business opportunities. *Public support is required to establish a globally potent circular economy ecosystem within the region*. One solution is to either increase awareness and thus, material flows, or look for new actors (such as sustainable battery industry) and use that upcoming development to increase CE activities.

The entrepreneurial discovery process remains mostly the same in both cases since the region has already established it as a forum for regional development discussion. This forum can be seen as one way in increasing sustainable value and can turn out to be a useful addition for spreading GT knowledge for different actors, as

[4] for details, please see *Policy Briefs on GT for RIS3 Strategies. Ostrobothnia. (2021). Intervention Area: Green energy and Circular economy. Ostrobothnia, Finland. University of Vaasa.*

well as for hearing stakeholders' thoughts and initiatives on solutions for GT. Public organizations should be experimental and offer both clear directions as well as guidance on GT.

Nature needs actions to retain balance and *UN SDGs (sustainable development goals)* have been developed to help in achieving the driving forces-based next steps. Some of the responses have been pilot projects, like GRETA, RIPEET, and FAIR. SDGs are followed by almost every organization to some extent. They *can be seen in Universities' plans* as well as within *companies' websites* and are of course guiding European Green Deal, which will add to their relevancy in the following programming period. Companies also lobby for legislation that ensures their development processes and participate in R&D processes (sometimes with or without universities) and look for solutions.

Energy transformation to renewable energy sources is providing the big picture and regional companies as well as pilots should address and aid in this transition. Sustainable energy use has become an important part of the battle against climate change. This has been promoted by the EU as well as the nations themselves. Battery factory and Aurora Bothnia -ship are seen as regional responses to the changing markets.

Support has been given *to turf producers* to close down their production in a more structured manner so that *environmental issues are minimal*. Otherwise, the companies have seen that tight national and regional environmental goals help them in leading the markets, as they have to work ahead of others. Power to x -the project is one example where short-term development may open doors to new hydrogen solutions.

New solutions are developed to appease the need *for green innovation markets*. Regional companies are also active in the EU level lobbying regarding the legislation, to ensure effects on drivers.

Particular **actions and policy interventions** are introduced taking into consideration the contribution of Ostrobothnia to energy technology and circular economy:

- *Application of different kinds of protocols and certificates* - external pressure will be high and it might be able to pressure the markets to work towards GT. Different kinds of protocols and certificates might be able to solve many problems in the subcontracting networks.
- *GHG Measurements* are a good addition to companies, particularly to SMEs, but it takes time before it begins and these calculations made by a Finnish consult company are also costly for SMEs.
- *Re-clarification of circular economy definition* - circular economy (CE) definition is too broad; there should be a focus on life-cycle planning and sector and product life cycle-specific measures.
- *Regulations: innovations rising from the landscape level and the niche level* will be key questions for GT. Development projects should be able to expand beyond the borders of administrative regions.
- *Spread of knowledge of the circular economy - k*nowledge of the circular economy should be spread more to the entrepreneurs and different levels of actors. One thing that might be useful would be the possibility to get a permit of exception to try out different products or services. Nowadays officials are afraid to give these kinds of permissions because they are afraid of mistakes and they are afraid of losing their jobs. It would need a change in the system and bureaucracy.
- *The circular economy mindset in the product design phase* – the mindset for a circular economy should be taken into consideration already when the product is being designed. Tax reliefs are one solution for recycling. For example, you could get some amount of tax relief if you renovate your house instead of building a new one. Too little innovation is used when recycling buildings is considered.
- *3D-printing* - in energy technology, 3D printing could be one of the solutions, it reduces the shipping of products around the world. It can also be used to print spare parts; reducing the need to throw things away. It also would open more possibilities for co-operation between universities and companies.

2.5. Policy recommendations from the Päijät-Häme region (Finland)

Policy recommendations from the Päijät-Häme region (Finland)[5] are focused on a *circular economy* and more precisely beverage and food industry (the grain cluster) concerning the green transition. The perspectives were the bio-circular economy, side stream innovations, and sustainable and clean local food.

The pressure of green transition has raised public discussion about *the need for more close cooperation between companies, universities, and public actors*. Also, the *participation of individuals and consumers has become more important*. Overall, the amount of research funding has decreased in Finland and also in Päijät-Häme. These were the main findings and concerns in Greta -project's interviews, DPSIR-analysis, and Round Table discussions. In the public debate too, improving cooperation has come to the topic. However, the green transition is seen as giving a lot of business opportunities.

Regional actors, especially companies, *have to take into consideration SDG's and climate goals in their strategies and actions* with business to business partners and customers. Individuals and retail must be linked in this process closely. Retail trade plays a major role in raising awareness in the consumer interface. Public awareness about GD and climate issues must be increased more. Policy-based EU and national strategies and guidance for implementation, support for building new cooperation and ecosystems, support and funding for RDI actions are needed. RIS strategies can be one combining tool in this process. RIS is already bringing together regional 4 helix actors and GT is seen as a common challenge that needs more advanced cooperation.

The need for industrial and agricultural renewal is absolute, and plenty of measures are already done. The national level must set environmental policies and regulations for industry and follow that regulations are followed.

Sectoral roadmaps with clear goals, cooperation between the agriculture industry, and research (preserving biodiversity) are needed and *policy actions should encourage actors* towards these actions. There is a lot of pressure and a need for understandable communication and ways to increase awareness about GT widely.

There should be *supportive actions from the EU and national level for regions* to help all helix actors in building new sustainable ecosystems, projects, financial support (tax reliefs), and enabling risk funding for pilot actions. Regional disparities should be taken into account when developing support measures at the EU level. RIS strategy work in practice provides information for this.

Grain Cluster companies (plus academia, developers, and farmers) are updating now their internationalization strategy. Green sustainable innovation and developing new ecosystems can now get *easily financial support from different funders*. Joint projects with academia and companies will now be supported strongly and it gives huge potential for innovations. *The public actors' role is to ensure that the operational environment enables this*. Companies even feel that regulation is a good driver for reforming the business to be sustainable and resource-efficient.

Particular **actions and policy interventions** are introduced with the main focus - to better mobilize stakeholders in the paths towards GT:

- *political guidance from the EU and national level* - support and tools for boosting interdisciplinary cooperation and ecosystem building should be prepared and offered from the EU and national level. Support to encourage cooperation between different actors is especially needed for smaller SMEs that are locked into old production methods.

[5] for details, please see *Policy Briefs on GT for RIS3 Strategies. Päijät-Häme. (2021). Intervention Area: Bio-Circular Economy – Sidestreams - Food And Beverage Industry. Finland. Päijät-Häme.*

- *sustainable development and climate change goals considered in strategies and actions* - regional actors, especially companies have to take consideration of sustainable development goals (SDG's) and climate goals in their strategies and actions with business to business partners and customers;
- *creating flexible enough conditions to support business investment and RDI projects* - policy-based strategies and guidance for implementation, support for building new cooperation and ecosystems, support and funding for RDI actions is needed to foster GT; the question is open on how to interpret regulations so that businesses are not in an unequal position in a region;
- *setting the national-level environmental policies and regulations for the industry* - industrial and agricultural renewal is absolute and many measures are already done. The national level must set environmental policies and regulations for industry and follow that regulations are followed. That should be done in cooperation with businesses; it is first necessary to set a uniform calculation of how emission reductions are calculated is needed;
- *setting sectoral roadmaps, goals, and cooperation between the agriculture industry and research (preserving biodiversity)* - measures must be taken concerning the entire food chain, from producer to consumer, to work towards more profitable and sustainable food production;
- *financial support (tax reliefs) and enabled risk funding for pilot actions* - building new sustainable ecosystems and projects; legislation, regulations, internationalization, and market demands are pushing a change towards GT; the EU regulations, sector-based politics, and funding raises some resistance. Climate and carbon issues are a common challenge and funding and support is needed for GT;
- *bridging the cooperation gaps between academia and companies* - pilot projects, new and coming ecosystems are the best way and actions to close the gaps. Ecosystems are also the best way for transnational learning and finding new business opportunities; they connect widely the 4 helix actors and through each actor's contacts international cooperation will strengthen;
- *support for universities to strengthen their role in GT* - universities would need more support to promote the transition. There is will and tools, but there are not enough resources for business cooperation, because teaching takes all time;
- *increasing skills* - the endurance transition requires new skills and the ability of individuals to re-orient them in a changing operating environment; continuous learning in the future is even more important than it is now;
- *linking individuals and retail in raising the awareness of GT* - there is a need for understandable communication and ways to increase awareness widely; the green transition requires broad involvement of citizens in innovation processes; it is very important to communicate the transition understandably. Retail trade plays a major role in raising awareness in the consumer interface.

2.6. Policy recommendations from the biogas sector (Lithuania)

Policy recommendations from the biogas sector (Lithuania)[6] concerns circular economy (biogas production from agricultural wastes) and green energy technology (including green energy production).

The *future of GT in Lithuania* firstly *depends on education, on a similar understanding of the phenomenon of GT 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 GT aiming to create common grounded understanding and overall support.

[6] for details, please see *Policy Briefs on GT for RIS3 Strategies. Biogas Sector. (2021). Intervention Area: Circular Bioeconomy (Biogas Production from Agro Wastes). Lithuania, Lithuanian Centre for Social Sciences, Institute of Economics and Rural Development.*

The *key actor* in fostering GT *in Lithuania are public organizations*. Their core responsibility is to prepare strategic long-term planning towards a GT 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 GT 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 GT* alongside the strategic goals covering all sectors, policies, and public institutions, and accordingly allocated investment.

GT 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 GT* 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 GT and to demonstrate good practice examples.

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

The overall *main tool for GT is education*. There is a huge need to educate younger and older, the private and the public sectors. The GT 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.

Particular **actions and policy interventions** are introduced taking into consideration the biogas production from agricultural wastes as an opportunity for circular economy and sustainable energy for GT:

- *New/updated regulations for eco-innovations and tax policy* - to encourage companies to change and create eco-innovations, and improved tax policy, related to business support or business restriction. This would lead to the three-fold results: first, more actors are involved in the GT; second, more green innovations; and third, accelerated green growth;
- *awareness-raising on the state-level in the field of research and systemic thinking* – particular research actions should be done to foster systemic thinking of a change for GT: a quantitative survey of companies; a clear definition of GT; research on the potential of GT. The result will be the creation of an innovation ecosystem for ecological activities and all societal actors and regional practices;
- *setting new long-term strategic measures* – to see the GT as a process; sectors must have long-term strategic goals for the GT. This would lead to the folowing results: first, GT should be a key goal in decision making; and second, expanding experimental culture;
- *developing experimental culture* - development of experimental culture in a form of 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. Thus companies would get information on new solutions, try and evaluate them;
- *creating of incentives and motivational measures* - economic motivation; research and development. Thus more actors will choose the direction of GT;
- *defining GT measures in the field of public administration* - requirements for public procurements to 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;
- *defining GT 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 GT to improve their risk-taking capacity;

- *awareness-raising through 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 GT;
- *education and public awareness-raising through 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;
- *mobilization and cooperation for GT – to* encourage collaboration, participation in various platforms and networks; to promote the importance of dominant stakeholders, the extent of their empowerment; to 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;
- *expanded information and communication* - examples from the daily lives of stakeholders; dissemination of specific achievements of the GT; targeted and reliable information for specific target groups; joint GT events. Expected *results* of proposed information and communication measures - better communication, cooperation, better opportunities for stakeholders to work for GT.

The key actors that need to prepare strategic long-term planning towards GT in Lithuania are public organizations. They are responsible to create such a system that would lead to easy implementation for companies, NGO's and other related actors. Then initiatives based on a „bottom-up" approach can take a leading position to speed up this process in Lithuania. The GT will not stop in Lithuania, everything is already twisted. In Lithuania, GT may not take the same speed as in other countries. Lithuania can speed up this process if the investment would be focused properly and correspond to strategic goals covering different sectors, policies, and public institutions.

3. Concluding remarks

Summing up the policy recommendations from different GRETA intervention areas in the BSR region, it might be considered, that different practices elucidate the non-existence of a single 'right' pathway towards the GT. Particular common insights are possible to summarize from all researched BSR countries (see Annex 1. GRETA Policy Recommendations in Brief), concerning the main focus of the EU, national and regional policy context, long-term and short-term perspectives, and expected impacts. The specifics of regions (the niches) at the same time call for common policy actions on the national (regime) and supranational (landscape) levels in accelerating GT. It becomes evident that sharp restrictions applied to follow the single path, moreover, forceful decisions on a regulatory basis by one or even several national government institutions would not work for GT. Enough flexibility should be given to all sectors and activities to choose their best way towards the GT. The selection of the path to a particular stakeholder might be guided by arranged supportive principles, tools, measures, but not the enormous restrictions and fines, moreover, the transition period is necessary.

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Annex 1.

GRETA Policy Recommendations in Brief

The concept of Smart Specialization developed in the previous decade entails a new approach for increasing the efficiency of investment in entrepreneurship, research and innovation. The European Union (EU) has adopted Smart Specialization as a flagship policy to become a smart, sustainable and inclusive economy by 2020, which diffused at surprisingly rapid pace among European regions and became an important tool in regional policy. All EU members were obligated to formulate Research and Innovation Strategies for Smart Specialization which will guide further R&D and innovation system development in every member state.

The GRETA project developed policy tools for sustainable Smart Specialization innovation strategies in the Baltic Sea Region (BSR), supporting green transformation (GT) in ways that are aligned with the European Green Deal (EGD), issued by the European Commission. The European Green Deal is an attempt to build on the emerging Green Growth strategy aiming at NZE (net-zero emissions) at the global level in 2050. However, GT can be seen as a complex, multi-level, cross-sector, and long-term process of transformation, guided by scenarios produced by different stakeholders, with a 30-year perspective, that is ***why*** the new and innovative approaches have to be proposed.

GRETA is concerned with the contribution of regional innovation strategies, better known as Smart Specialization towards GT. Smart Specialization teams up with entrepreneurs, specialists, and other actors, who take the lead. At the core of GRETA is a method of stakeholder analysis applied to one of the ideas of Smart Specialisation, to generate a nuanced picture, where regional specialists and planners teach us *how* we can improve the world. Thus GRETA results with policy recommendations on ***how*** to accelerate the GT in BSR, outlining the specific objectives to be implemented at different levels in long-term and short-term perspectives.

How the **EU, national and regional policy** formation bodies may accelerate the GT?

- To develop demanded strategic GT policy-focused 'soft' infrastructure: complementary cross-sectoral collaborative strategies for GT, cluster strategies, supportive guidance, and consultations for implementation.
- To establish GT support measures and mechanisms for building new cooperation models for GT and GT-capable ecosystems.
- To raise funding opportunities for RDI projects, by setting the priority to GT and sustainability-oriented firms.

How to deal with GT from a **long-term perspective**?

- To set motivational environmental policies, sector-specific policies, and regulations for greening the industries, products, and services;
- To develop cluster strategies alongside the support mechanisms to promote innovative solutions for greening industries, products, and services;
- To accelerate short supply chains and symbiosis for green innovations;
- To support more experimental projects, platforms for developing multiple partnerships, international cooperation;
- To support green-focused innovators in the product design phase and accelerate marketing innovations.

How to accelerate GT today, in a **short-term perspective**?

- To set the short-term targets and priorities and develop sectoral roadmaps with clearly defined GT sectoral goals.
- To support industrial symbiosis, with a special focus on R&D activities, firstly concerning waste management and reusability, waste treatment infrastructure.

- To support experimental projects, platforms for ensuring the quick spread of "know-how" and awareness-raising in the multiple fields of GT.

Based on overall project findings, GRETA team identified ***how*** to accelerate the GT ***at different policy levels***:

At supranational (EU) level:

- To (re)arrange clear *political guidance*, regulations, and restrictions concerning:
  (1) the (re)definitions of circular economy, green innovations, compulsory applications of system thinking for GT legislation development and implementation at the EU and national levels;
  (2) setting the concrete complementary GT targets, measures, and responsibilities from the EU-level to the sectoral national levels;
  (3) establish overall compulsory GHG measurements, protocols, and certificates.
- To establish clear GT-targeted financial *funding schemes*:
  (1) compulsory criteria in all 'hard' and 'soft' support programmes: 'green' technological renewal, equipment replacement, personnel awareness raising, etc.;
  (2) special instruments, firstly: R&D through the Horizon 2020 by enabling companies (next to academia) to add to the GT, and Just Transition Fund;
- To raise *experimental culture* from the EU level by creating small-scale RDI projects support scheme with flexible conditions to business investment in green pilots.

At the national level:

- To establish a clear system of *national strategic political guidance*, regulations and restrictions:
  (1) to define new long-term durable strategic measures for GT, create durable sectoral roadmaps, goals, and organize continuous cooperation between sectors for GT;
  (2) to set clear and fair national-level restrictions for environmental issues to all – small, medium, and large businesses;
  (3) to introduce new incentives, motivational measures, flexible support conditions (risk and other funding/tax reliefs) for green innovations and other GT-focused RDI projects, rising from the companies.
- To push forward to the GT by *stimulating the demand through small simple* but multiple real nation-wide *actions* in the whole country:
  (1) to define GT measures as the only way for implementing public procurement both for public administrations and for companies;
  (2) to develop state-level experimental culture through national small-scale simple GT-focused R&D projects funding scheme;
  (3) to establish a nation-wide network for mobilization and cooperation for GT, uniting existing networks for enhancing capacity for transformation;
  (4) to accelerate the circular economy mindset in the product design phase, were applicable use only prototyping in a form of 3D printing.
- To *raise the awareness of GT* and accelerate the change in the mindset at the national level through:
  (1) to expand information flow and communication concerning the GT via multiple mass media channels;
  (2) to arrange new GT-focused curriculums at different education levels, including life-long-learning to strengthen the role of universities in developing GT competencies and knowledge concerning circular economy, energy technology and sustainability;
  (3) to spread actively the examples about practical gains of GT via different national and international marketing events.

At regional level:

- To *renew regional strategic plans* by giving a special focus on the GT, namely:
  (1) to stimulate local demand through short supply chains;
  (2) to organize an effective GT-focused regional waste management system.
- To accelerate *knowledge and awareness* of the GT at the local level:
  (1) to expand information flow and communication concerning the circular economy, sustainability, GT via popular newspapers, newsletters, local media, and social networks;
  (2) to organize open sessions during different regional and local events, and/or organize separate events to show examples about different practices with live (physical or online) actual implementers from local and foreign communities, showing practical gains of implemented green, circular, sustainable activities.

So what are the **expected GT impacts** that might be **reached** through suggested policy interventions?

- Aligned complementary overall *strategic vision* to guide the GT at the EU, national and regional levels;
- Allocated *financial support* (tax reliefs) and risk funding for particularly GT-focused initiatives;
- Established *new public-private-(society) partnerships*, new products, services, and projects for GT;
- Strengthened existing and built *new ecosystems* for *long-term* greener innovation development;
- Accelerated change of the *mindset* of society and companies through education, local and transnational cooperation, awareness-raising.

GRETA Policy Recommendations are fulfilled with a set of methods and policy tools for GT:

- Stakeholder analysis method and Guidance for stakeholder analysis;
- Gap analysis, good practices from GRETA partner regions and Report on Smart multi-level coordination towards green transformation;
- DPSIR method and Guidelines for regional DPSIR model;
- Report on Evidence-Based Pathway towards Green Transformation in the Baltic Sea Region;
- Extended version of GRETA Policy Recommendations.

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Region-Specific Policy Recommendations on concrete policy actions are elaborated in a form of *Policy Briefs on GT for RIS3 Strategies* from GRETA partner regions:

- Policy Briefs on GT for RIS3 Strategies: Klaipėda (LT) food and beverage,
- Policy Briefs on GT for RIS3 Strategies: Latgale (LV) metal and mechanical engineering,
- Policy Briefs on GT for RIS3 Strategies: Västerbotten (SE) (hydrogen),
- Policy Briefs on GT for RIS3 Strategies: Ostrobothnia (FI) energy technology and circular economy,
- Policy Briefs on GT for RIS3 Strategies: Päijät-Häme (FI) grain cluster,
- Policy Briefs on GT for RIS3 Strategies: Biogas sector (LT).

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For more information on the GRETA project, please visit the websites:

https://projects.interreg-baltic.eu/projects/greta-249.html.

https://www.lars-project.eu/.