Potential of Smart Specialisation in Bioeconomy in Świętokrzyskie Voivodeship

RDI2CluB team visited Świętokrzyskie Voivodeship, Poland, to study the potential of the bioeconomy development in the region as part of the regional innovation system. The potential of developing the forest-based bioeconomy, the triple helix co-operation for bioeconomy innovation and a bioeconomy innovation hub were explored. Furthermore, the team identified potential areas for co-operation in the Baltic Sea Region network of bioeconomy hubs.

This report accounts for the findings and reflections of the team after the benchmarking visit on June 3 – 6, 2019.

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Content

Disclaimer: The information presented in this report in relation to Świętokrzyskie Voivodeship and their actors may include inconsistencies and misunderstandings because of the collective data collection method, and potential mistaken conceptions due to language and culture differences. If looking for information on organisations from Świętokrzyskie Voivodeship, it is recommended to fact-check from other sources.

Foreword

Dear partners and external experts,

First of all, we would like to thank you for the time and effort you devoted into creation of the following document. This report is a sort of compendium of knowledge about the potential which lies in the bioeconomy of the Świętokrzyskie Voivodeship. It offers information which is well-known, but also presents possibilities of the region in the field of the bioeconomy from a completely different perspective.

Speaking of the bioeconomy on the Świętokrzyskie land, one thinks of such concepts as low-emission wood construction and food processing. Our goal was to create a programme, which would show the strength lying in these two sectors in a comprehensive manner. Study visits in several places and facilities had a key role in it. We wanted to present as much as possible in a relatively short period of time. That is why we created two simultaneous programmes of the benchmarking visit; low-emission wood construction programme and food processing programme, dedicated to a specified target group.

Through the first one, we wanted to show that low-emission wood construction had been known in our region for years and that noticeable forestry potential can only strengthen this sector. The programme provided visits in such places as Museum of the Kielce Countryside - Ethnographic Park in Tokarnia, Seed-Nursery Gardening Farm in Suków-Papiernia – the State Forests Inspectorate in Daleszyce, as well as DEFRO Spółka z o.o. sp. k.

The food-processing programme was a sort of a journey presenting cuisine of the Świętokrzyskie land. This time, we presented the agricultural potential of the region and traditions of food production and processing. The visits in the District Dairy Cooperative in Opatów, AG FOOD Fruit & Vegetables Producers' Group in Jasienica and Dreher Poland showed that the sector is successfully operating in the region. The presentation of the Świętokrzyskie Culinary Heritage Network, which promotes traditional and regional products, completed the programme.

A crucial element of the benchmarking visit was the presentation of the Świętokrzyskie Innovation System, as well as visits to Regional Science and Technology Center – Center for Knowledge and Bioeconomy Development, Kielce University of Technology, Plastinvest Ltd and Municipal waste Landfill in Promnik. All of these places allow us to discuss the Świętokrzyskie Voivodeship in the bioeconomy context.

Finally, we would like to thank warmly all the people and institutions involved in organization of the visit, for their hospitality and for taking the participants on an exceptional, though short, bio-journey through the region.

On behalf of the Świętokrzyskie Voivodeship (Poland):

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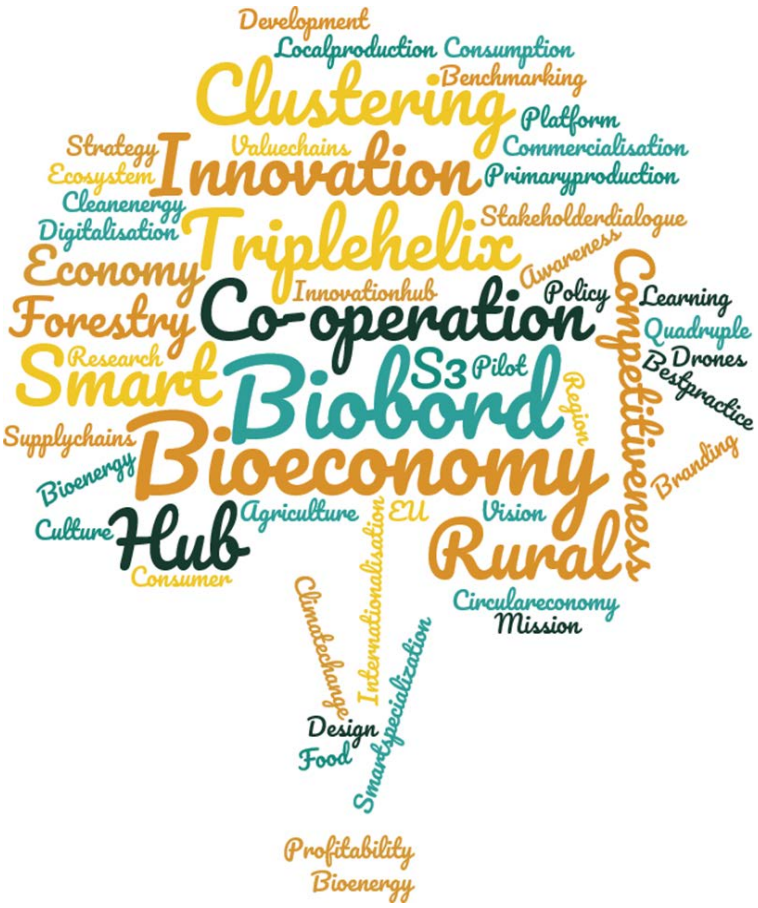
Benchmarking Method

In RDI2CluB project, we embark on four benchmarking visits during 2018-2020 in order to explore the bioeconomy innovation ecosystems of European best practice bioeconomy regions (Biobased Delta and Värmland) as well as our partner regions. The purpose of these benchmarking visits is to support the transnational learning process and to gain ideas and good practices for development of regional innovation systems (bioeconomy clusters and bioeconomy innovation ecosystems). Moreover, the benchmarking visits add value to the project outputs. They enable the discovery of joint action plans and understanding of the innovation capacity of regional hubs involved in the network.

The benchmarking visit to Świętokrzyskie Voivodeship, Poland, was organized on June 3-6, 2019. The purpose of benchmarking was to study the potential of bioeconomy development in the region as part of the regional innovation system. The potential of developing the forest-based bioeconomy, the triple helix co-operation for bioeconomy innovation and a bioeconomy innovation hub were explored. Furthermore, the team identified potential areas for co-operation in the Baltic Sea Region network of bioeconomy hubs.

The benchmarking team consisted of around 40 experts from 12 RDI2CluB partners with external stakeholders and multiplier group members from Central Finland, Hedmark and Vidzeme. The reviewer team participated in workshops, presentations, networking sessions and site visits included in the visit programme. The programme is attached in annex 1 along with descriptions of the visited organizations and sites.



Each of the benchmarking team members documented their findings to a benchmarking survey that contained sections for lessons learned, potential joint action with benchmarked region as well as thematic questionnaire. The responses and reflections are collected to this report as an overview of the impressions with particular recommendations from the team.

Świętokrzyskie Voivodeship's Bioeconomy Profile

Świętokrzyskie Voivodeship has abundant natural resources. The quality of agricultural land is above the national average and the region is the leading national producer of fruit, including stone fruit, and open-field vegetables. Furthermore, the forest cover (331 thousand ha, i.e. 28.3% of area) offers a backbone to the regional construction industry. There is a strong tradition of use of forest berries, mushrooms and game in food and paramedical industries (incl. food & cosmetics) that raises the potential of the forest-based bioeconomy development.

Figure 1. Bioeconomy readiness for Świętokrzyskie Voivodeship in 2016 compared to Poland

Source: *Towards a bioeconomy cluster in Świętokrzyskie Voivodeship. 2018. Regional Bioeconomy Profile of Świętokrzyskie Voivodeship*
https://berst.databank.nl/dashboard/Dashboard/Swietokrzyskie--Poland-/

Although no specific regional bioeconomy strategy exists, the bioeconomy is recognized as an important element of the regional development in the Świętokrzyskie Voivodeship. Four out of seven smart specialization areas of the region (resource-efficient construction industry, modern agriculture and food processing, sustainable energy development, health and health promoting tourism) relate to bioeconomy. Number of companies and employment in the bioeconomy sector are high in the region compared to national averages (Figure 1). This provides a solid basis for the development of bioeconomy clusters and innovation ecosystem. Figure 2 highlights some of the hotspots of the bioeconomy innovation ecosystem in Świętokrzyskie Voivodeship. For more information on the region and its actors, see detailed baseline information provided in annex 1.

1. Regional Municipal Waste Installation “Promnik” for RDF production, Promnik
2. Green Energy Block in Połaniec Power Station
3. Defro, Production and R&D on 5th generation furnaces for gasification of pellets, Strawczyn
4. Sawmill Olczyk, Krasocin
5. Seed-Arboretum Farm, Sukowo-Papiernia
6. Kielce Trade Fairs, Kielce
7. Arabian horse breeding, Michałów
8. Regional Science and Technology Center, Chęciny
9. Solar Power Plant Tuczępy 1 and 2, Dobrów

Figure 2: Bioeconomy Hotspots of Świętokrzyskie Voivodeship (illustration by Diana Pitkänen)

Bioeconomy Innovation Ecosystem Development

The reviewers were requested to assess the Świętokrzyskie Innovation System, especially the level of co-operation in the triple helix of Świętokrzyskie Voivodeship. In addition, they were asked to provide ideas for improvement and examples of good practices that they would recommend for Świętokrzyskie Voivodeship to strengthen the co-operation within the triple helix and the bioeconomy innovation ecosystem. Finally, the reviewers were looking into the concept of the Bioeconomy Knowledge and Development Centre and provided their recommendations on the development of the operations of the innovation hub.

Triple Helix Co-operation

Drivers & Challenges

The reviewers noted that the Regional Innovation System in Świętokrzyskie Voivodeship had a very clear and systematic organization with defined consortiums leading each of the smart specialization areas. Many reviewers found that they could learn from the consortium model and the active role of the regional authority and adapt the lessons to their region.

Still, the reviewers identified also some risks related to the strong leadership role of the regional authority. It was noted that such a largely policy-driven approach can be hierarchic and exclusive. It was also questioned whether the private sector, civil society and business, played a sufficiently prominent role in the process. At the moment, the impact of the Regional Innovation System was not clearly communicated, especially in relation to SMEs.

It was also stated that since the regional authority plays such an important role in leading the system, they should also look into developing a monitoring and evaluation system to ensure the impact on the business sector as well. Monitoring the impact of the Regional Smart Specialization Strategy should be a long-term process with a consistent long-term aim. It should be utilized as an opportunity to involve the business and other stakeholders to provide feedback on actual needs as well as a chance to re-activate the Entrepreneurial Discovery Process.

Although, the bioeconomy is not defined as a smart specialization area, several of the specialization areas relate (totally or partially) to the sphere of bioeconomy. There is an interest to strengthen the role of bioeconomy in the regional innovation system, potentially as a cross-cutting focus. This is largely driven by the anticipation of the coming EU programme term 2021-2027, and the increasing focus on sustainability, circular economy and bioeconomy as well as climate change mitigation.

Overall, it was observed that the availability and capitalization of EU funding is emphasized a lot in the communication about the regional innovation system, whereas the needs of the business sector are not so clearly stated or defined. Ideally, the location-based innovation management should stem from the regional strengths and entrepreneurial discovery process. The emphasis of EU mechanisms may be less appealing to the business sector and civil society, thus hindering their involvement to the process.

As it often is, the smart specialization areas of Świętokrzyskie Voivodeship are quite wide and numerous. It is challenging to leave out some business sectors from regional strategies – and surely the political interest and lobbying do play a role in the development of such strategies. However, in the interest of gaining greater innovation impact and true competitive advantage in the global market, the focusing of resources to truly 'smart' specialization areas would be called for. Looking at the example of Biobased Delta, they have managed to narrow down their mission to one statement for the whole regional innovation system with a great impact on the innovation capacity and competitiveness ('Biobased Delta – where agro meets chemistry and markets').

The observations of business clustering in the bioeconomy where non-conclusive. It seems that e.g. in food production and processing, there are success stories of business networking and co-operation as well as the impact of smart specialization process. Such sectoral clustering can also be encountered in e.g. construction. However, looking at cross-sectoral or value chain based bioeconomy clustering, the business co-operation seems nonexistent. The key challenges of the bioeconomy business development in Świętokrzyskie Voivodeship have been stated in the regional bioeconomy profile.

"*Despite the longstanding traditions in the bioeconomy, it is based mainly on microenterprises, SMEs and fragmented farms, which create jobs based mostly on self-employment and searching for resources needed for development. A big regional potential in agricultural and biomass production is dependent on limited water resources and fertility/acidity of the soil, which will undergo desertification if no appropriate actions are introduced. Although there are companies important at the EU and national levels specialized in, e.g. boiler production or wood processing, they don't aspire to becoming regional bioeconomy leaders.*"

There seems to be a level of fragmentation and lack of co-operation between the smart specialization consortiums. This is a common issue tackled by many of the partner regions. Fragmentation is also a communication challenge as it hinders the creation of a clear common agenda for the region.

As a final point, the reviewers were stating that there was a lack of evidence of how SMEs or local business were benefitting from co-operation with research institutes or academy. The companies visited seemed to rely on in-house research and development, rather than academy co-operation. Some of the companies also utilized RDI developed in other EU countries. Connections with the regional academy and business were not observed during the visit.

Apparently, the co-operation between business and academy has formerly been scarce. However, due to recent policy changes affecting funding, the academy is now looking to co-operate with the business sector. As this is a recent development, the academy-business co-operations is not still well-established and the organizations are not aware of all the possibilities. The opportunities of co-operation with the academy should be promoted to SMEs. Furthermore, it would be necessary to engage the SMEs and business sector into the dialogue on what co-operation needs there are. This arising co-operation has a potential to greatly enhance the impact of the regional innovation system.

Recommendations

One of the main recommendations from the reviewers has been strengthening the role of the business in the regional innovation system. Secondly, the reviewers found it important to enhance the business-academy connection and co-operation. Finally, raising awareness on bioeconomy possibilities in the innovation system and creating a common agenda for bioeconomy development are seen essential. Overall, increasing co-operation and dialogue is the key.

Based on the Interreg Baltic Sea Region Project EmpInno –"S3-Empowering for Innovation and Growth in medium-sized Cities and Regions", recommendations for regional innovation systems on getting Regional Smart Specialization Strategies closer to business have been published in 2019. These recommendations provide guidance on how to strengthen the role of business in the triple helix.

EmpInno encourages policy makers to understand the Regional Smart Specialization Strategy (RIS3) approach as a game changer instead of a technocratic duty. One of the first steps is taking the communication and dialogue away from the smart specialization or funding, but to focus on what creates value in your region. During our visit, a lot of the communication was focusing on EU – funding, rather than regional priories, which makes the strategy work seem detached from the regional interests. Leading the dialogue with innovation actors, politicians and citizens about what creates value in your region can encourage political support for the Regional Smart Specialization Strategy.

The reviewers recommend Świętokrzyskie Voivodeship to increase the involvement of business in the regional smart specialization strategy work. It is important to listen to what SMEs need. To reach the businesses, intermediaries have an important role. Dialogue with the business is more effective when the intermediaries go to the business, not just attempt to invite the business to the arenas of the policy makers. These 'field workers' should have business experience, so that they share the language and understand the realities of SMEs. They should also know the R&D system and funding sources to be able to connect SMEs with external resources (competence and money).

Like our reviewers, the EmpInno findings suggest that to bridge the gap between the strategy and companies, the implementation should be optimized with well-equipped innovation intermediaries – i.e. innovation brokers, bridge builders. For the intermediaries, EmpInno gives specific guidance for motivating SMEs to work with academia on the basis of concrete benefits. Proven approaches and tools include communication of success stories, defining common interest for research with commercial applicability as well as enabling access to human resources, facilities, innovation services, international state-of-art knowledge. Furthermore, recommendations are given to assure SME engagement and building communication and interaction relevant for SMEs. Good practices on SME empowerment, matchmaking and R&D transfer have been presented at http://empinno.eu/good-practices.

One approach to utilizing the intermediaries is to develop clusters and connect the cluster managers as intermediaries. It is expected that EU will link the RIS3 strategy and the cluster strategy together more closely. Establishing different bioeconomy clusters could, therefore, be an option to consider. For example, the Latvian High Added Value and Healthy Food Cluster has been considered one of the most vivid examples of triple helix co-operation in Vidzeme region that works as a strong driver for innovation and boosts business in the bioeconomy.

Based on their experience, the reviewers also felt that a joint agenda for the bioeconomy should be clarified for the regional triple helix. Creating a culture of co-operation is a slow process, so patience is needed. As we heard e.g. in Biobased Delta, the academy and business need to first talk the same language, before the breakthroughs can occur. It is therefore necessary to engage in a systematic and continuous open dialogue on needs and aspirations to establish joint agendas for the research and business to work together successfully. This will help to build trust. Involve people and organizations that are motivated, share the success stories and as the results become apparent, the rest will follow.

One potential mission could be related to health and biobased business, in other words, health-related nature-based services and added-value products – e.g. 'Better Health with Bioeconomy'. Clean energy, wood construction, fruits and juices, spa experiences, Da Vinci –Centre and Biobank would all connect to the aspiration of healthier living. This topic could bridge together smart specialization areas of health tourism and modern agriculture and food processing as well as introduce the clean energy, low-emission wood construction and forest-based value-added products and wellbeing services. Also, with the public health context, it would connect Biobank, Da Vinci Centre to bioeconomy and network different regional strongholds together.

As a best practice example on how to build a joint agenda for the triple-helix collaboration, the reviewers encourage to look back to the example from Värmland region (Sweden) which we benchmarked previously. They as a public administration show a high-class example on integrating smart specialization in academic programs and support tools for entrepreneurs. They have also defined the smart specialization areas in relation to very detailed niches backed with research excellence and strong networks.

As another example of creating a joint message on regional strongholds, the reviewers present City of Lahti, Finland. Lahti has a strong triple helix co-operation with a clear joint agenda that builds on the advanced waste management as a basis for regional competitive advantage in the circular economy and green economy development (Figure 3). In Lahti, 96 per cent of municipal solid waste is utilized with half recycled as material creating a basis for many business ventures, whilst the other half is used in energy production. As an evidence of a successful communication strategy, Lahti just won the European Green Capital Award (EGCA) in 2019. Read more: https://www.smartlahti.fi/smart-city-long-intro/

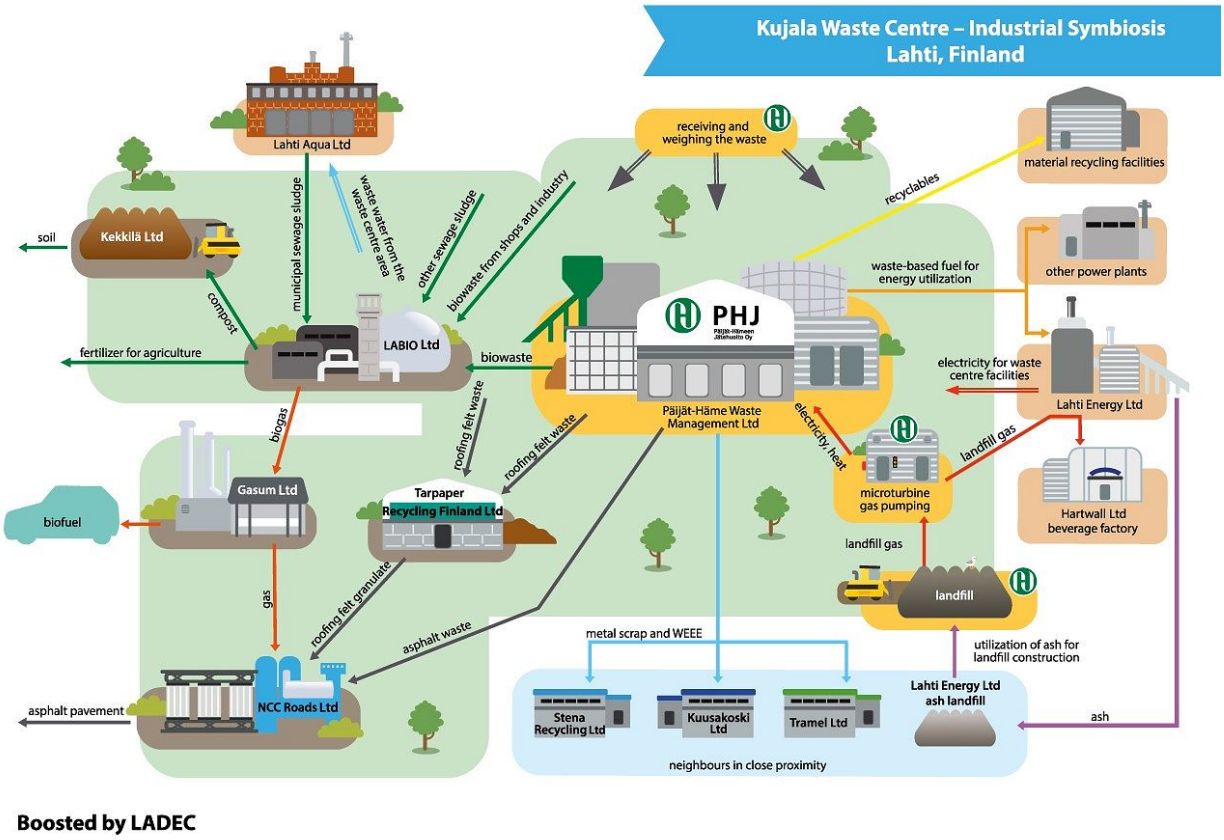


Figure 3: Kujala Waste Centre Business Ecosystem in City of Lahti, Finland

In Świętokrzyskie Voivodeship, the modern Municipal Waste Management Centre, Promnik, is an interesting best-case example. The Center and its operations provides an impressive starting point for building an industrial symbiosis and circular economy business ecosystem as in the example of Lahti. Providing a comprehensive view of regional waste material flows can show the tangible opportunities for business co-operation through utilization of side streams and recycled waste fractions. Joint research agendas connecting business and academy can also arise from the development of such industrial symbiosis.

For more information on the Municipal Waste Management Centre, Promnik, please review the Annex 1.

Innovation Hub - Centre for Knowledge and Bioeconomy Development

Progress and Potential

Centre for Knowledge and Bioeconomy Development was recently established as an operation under the Regional Science and Technology Centre. The main task of the Centre is active lobbying for establishing a new bioeconomy smart specialization area of the Świętokrzyskie Region for the new EU financial perspective 2021-2027. The Centre has an organizational structure, premises and a steering committee; however, it is currently lacking a budget, a clear action plan or dedicated staff. The Centre is a part of the network of innovation hubs around the Baltic Sea connected by the Biobord platform. This network can provide the Centre a good start for developing the action plan with the support of examples and connections.

The aim is to build the Centre as an animator of bio-business development activities and a place where business entities from production, services, consulting sectors can exchange their experience, know-how or establish direct co-operation between themselves. As also stated in the regional bioeconomy profile, it is expected that the Centre would support the processes of creation and commercialization of bio-based products and services and serve as a platform for knowledge and information exchange with national and foreign partners.

The role of the Centre is seen as a coordinator, a support unit, a consultant for the implementation of various projects. The Centre would promote the bioeconomy for the smart specialization consortiums and enhance co-operation between them. In order to fulfill its duty, the Centre should have a clear role in the Regional Innovation System for the coming years.

As the bioeconomy is a novel concept to many players and the academy and business do not have an established co-operation culture, the bridge builder role is vital. In addition, it is necessary to raise interest in the bioeconomy, which is also proposed to be a key role of the Centre. All in all, the Centre can play a key role in raising awareness of the opportunities in the bioeconomy, bridging international best practices and experts to support the development process and finally sharing the success stories and business cases to engage wider participation in the region.

Development Needs and Recommendations

Based on the theory and practice of innovation hubs, the hub is a meeting place and an experimentation platform that brings together people from different backgrounds that are unified by a joint agenda to make an impact to the surrounding society. Typical elements are entrepreneurial individuals with ideas they want to share and develop further in co-operation with other enthusiastic individuals. Support from specialists for experimentation, business development and incubation services are commonly available in the innovation hub, but the driving force for innovation in the hub are the developers (researchers, students, entrepreneurs, start-ups, SMEs etc.).

Looking into this framework, the hub should identify a joint agenda that would unify the developers and motivate them to come together. On the current development stage, the aims of the Bioeconomy Knowledge and Development Centre seem to be administrational – not actually focused on the bioeconomy development. In other words, the aims of the Centre are stated in policy language targeted towards the policy makers. They are not very motivating agendas for the private sector, start-ups, students or researchers.

Based on the innovation hub theory and practice, a hub should be built on the interaction of motivated individuals from various backgrounds coming together unified by a joint agenda. At present, the mission of the Centre is not appealing to the variety of the actors that should be crossing paths at an innovation hub. The driving force should be more the impact on business or society, i.e. the changes that the actors of the hub want to see in the surrounding society and environment, or what opportunities they want to cease.

Of course, the work is in the beginning, and enhancing regional co-operation is not a fast process. Therefore, a gradual roadmap with the identified first critical steps to confirm feasibility could be elaborated. This roadmap could be a user case of the Biobord as an open development process assisted by international expertise and best practices. The use of digital platform in general could help to tight together the network of triple helix, as the Centre itself is a bit remote from e.g. the academy actors.

An inclusive and open planning process is needed to determine the joint agenda of the hub as well as to deliberate practical questions concerning the operational model, for example, is the hub research driven or business driven? What are the resources, competences and services of the Hub? Who the target groups are and what is offered to them? Essentially, the process is similar to the Biobord service design process. The user profiles and service paths need to be clarified to start with. These issues can only be identified in co-operation with the developers themselves, so motivating researchers, students, start-ups and SMEs to a joint dialogue will be a key factor.

Building the potential of the Centre to operate in the field and go actively to the companies to bring their messages to the smart specialization process and consortiums are essential steps towards development of the regional innovation strategy approach in the bioeconomy. Field work is vital in reaching out to the companies. It is not enough to provide a venue to have the people come together – the gravity should come e.g. from the start-up or innovation services, connections and networks, co-working areas and inspirational environment. It would be advisable to emphasize the field work and also to look at where the encounters are happening at the moment. Communication should highlight the business potential and economic benefits to the region when investing in the bioeconomy development.

Key Messages for Regional Triple Helix

Key messages from the benchmarking visit summarize the responses of the participants to three questions.

1. Identified Strengths in the Regional Bioeconomy
2. Recommendations for the Regional Triple Helix on how to build capacity for innovation in bioeconomy
3. Propose one easy step to start with in order to strengthen co-operation within the regional triple helix

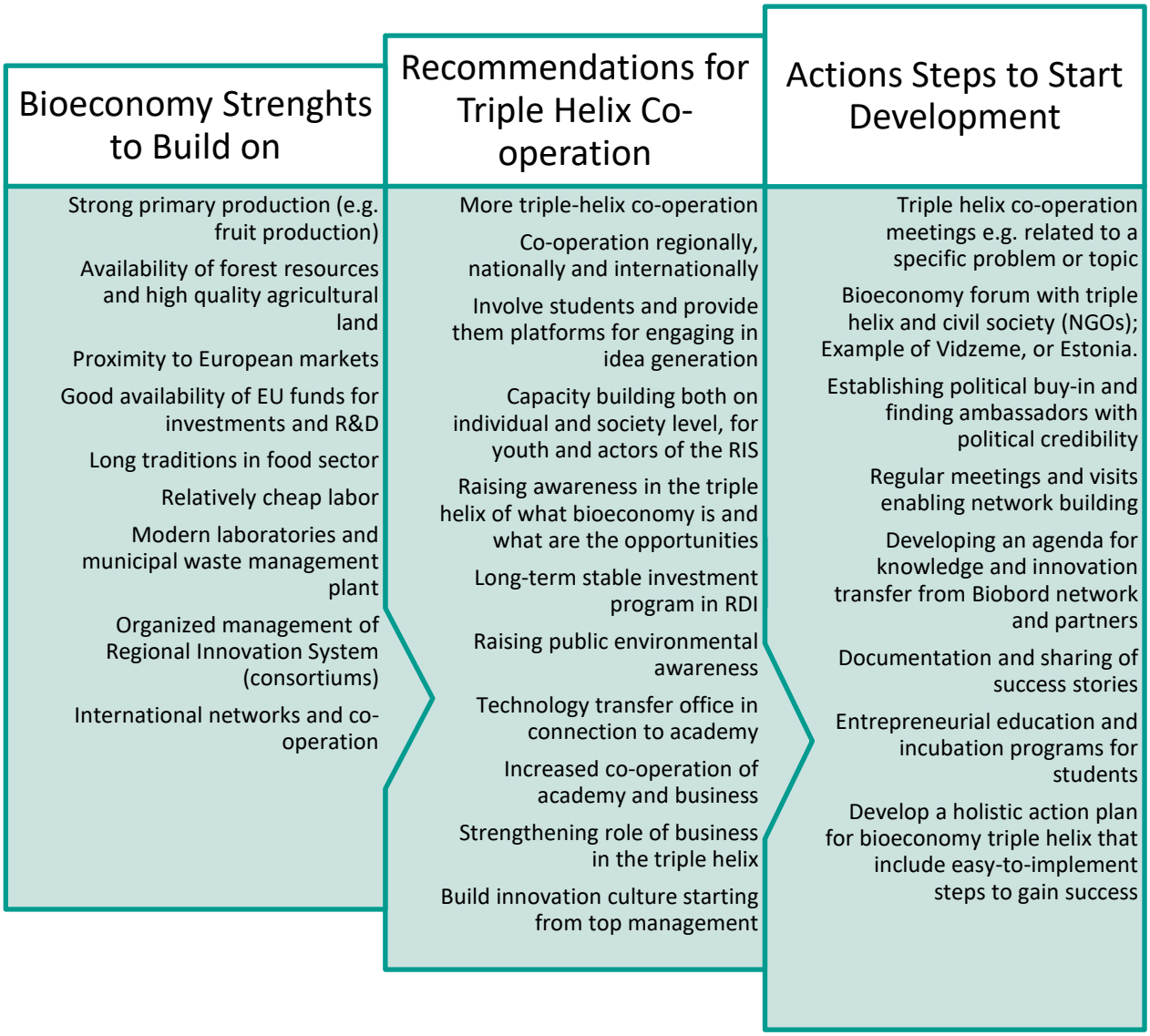


Figure 4. Key messages for Triple Helix (adapted and summarized from reviewers notes)

Potential of Bioeconomy Sectors

The reviewers were asked to analyze how the specific features of the Polish forestry sector affect the possibility of developing the forest-based bioeconomy in Świętokrzyskie Voivodeship. In particular, the reviewers were looking into availability of forest biomass and the potential of growing the wood-construction business sector in Świętokrzyskie Voivodeship.

Moreover, the reviewers were requested to evaluate the market potential of the 5th generation coal heaters compared to pellet heaters on household level solutions. Finally, the team assessed the potential of the Świętokrzyskie Culinary Heritage Network involvement in the transnational joint actions of the partnership.

Forest-Based Bioeconomy

Forest Management

A special feature of Polish forestry is the high share of State-owned forestland. The State Forests National Forest Holding manages 77.4 per cent of forests in Poland, while 18.7 per cent is privately-owned, 2 per cent are national parks and 0.9 per cent is commune owned. The State Forests units operate on nationwide, regional and local levels employing over 25 500 people.

In Świętokrzyskie Voivodeship, the State Forests manages 225 055 ha of forest. Hence, 68 per cent of the forest area belongs to the state, while 29 per cent is privately owned. The remaining forest area is owned by municipalities or comprises of national parks. The privately owned forest land is fragmented into small holdings. Average age of forest in the region is 64 years. 71 per cent of the forest is pine, but there is a variety of species and habitats in the region. There are 350 facilities of wood or timber processing in Świętokrzyskie Voivodeship.

Compared to Finland and Norway, the level of State ownership in Poland is high and the private sector forest owners are not very organized which diminishes their level of influence in the forest industry. Based on observations and discourse, the state managed forestry has a lesser focus on the economic values and optimization of value streams from forestry. The level of co-operation with academia also seems low, although State Forest does in-house research for sustainable management of forest resources.

The Latvian and Polish forest cover and structure seem overall comparable. Differences arise from the low emphasis of the forest value streams and a business approach in the Polish side. There is a lack of overall picture of the economic use of the forest resources for depicting the development potential of forest-based bioeconomy in Świętokrzyskie Voivodeship. The reviewers gained an impression that there is a need to raise awareness on the value streams and potential of high value-added forest-based products and services, including use of wood in construction.

Overall, the reviewers noted that the State Forest seems to lack motivation for driving business development and innovation. This may be a challenge for the forest-based bioeconomy

development as the State Forests controls majority of the forest resources. The reviewers speculated that this dominating position of the State Forest may cause reluctance to establish business based on forest-based biomass, because SMEs' can feel their position subordinate and vulnerable being too dependent on one raw-material source.

The focus on sustainable forest-resource management was identified as a common feature for Poland, Norway and Finland. The balance between sustainability and economic value seems to be a common discussion in all our regions. Nevertheless, optimizing the value chains and business driven forest bioeconomy is more advanced in Scandinavia with a drive from strong investment in RDI on new forest based materials and products. Also, there was lack of evidence of how the sustainable management is promoted in the private sector forestry in Poland.

State run forestry has great capacity for data-based forest resource management in their own forests. The research basis of the state forest management is strong and as long as the principles of sustainability are leading the operations of the forest resource management, there is a good potential to develop a sustainable forest-based bioeconomy sector in Świętokrzyskie Voivodeship – as well as in Poland. The progress made in sustainable forest management is apparent from the growing forest areas as well as the investments to protection and sustainable forest management. Same data-based approach could be mobilized to drive the business value-chain development and optimization for regional prosperity along with the environmental sustainability.

The high level of centralization can however also hinder the development of diverse and innovative forest-based bioeconomy business. For example, the various forest based high-added value products and service sectors may not be in the interest of the State Forests, and the low level of private ownership can hinder the development of these sectors. The problems experienced with the illegal use of the forests and the high expectations from State Forests can also be indicators of a lack of access to forest resources by the private sector actors – or a lack of forest-based services that people are looking for.

Reviewers identified development potential also in the forest-based service sector. As the region has many nature parks, they can be developed as touristic attractions. The potential of diverse species and a wider variety of forest types can offer more business opportunities. The co-operation with academy could facilitate State Forest in exploring the value streams of forest in a more comprehensive manner.

The Norwegian partners recommend focusing on the private forest owners. Currently, the use of private forests seems to be lacking from the statistics and there is not much information available. This points to a lack of attention to the private forest resources. A level of growth and introduction of new business models could be introduced via the private sector engagement. However, as the ownership is fragmented, development of forest owner co-operatives and associations is recommended to unlock the potential. Information sharing and education for forest owners is necessary to introduce the opportunities. The partner regions have many workable concepts for guidance and co-operation of forest owners as well as advanced planning tools for private forest owners to optimize the sustainable usage of their forests.

Finally, the reviewers also noted that there is a need to develop an effective monitoring and action plan for fighting pests (ips typhografus) mechanically, with fast removal of timber in attacked areas, in order to abandon the use of pesticides in forest management. Avoiding the use of pesticides protects the biodiversity of the forests. Tree species mixtures could help to avoid fast outbreaks of insects. Furthermore, climate change is a concern, not only for the increased need for the control of pests, but for fight against forest fires.

Regarding the pest control, good practices and methods should be continuously developed, and transnational co-operation would add value to the learning process. Due to e.g. climate change, concerns about similar development are growing in Scandinavia, too. There is a common interest to exchange knowledge and develop better practices to combat against increasing forest damages.

Availability of Forest Resources for Wood Construction Sector

The forest area in Poland has been expanding as a result of the National Program of raising forest affluence adopted in 1995 after joining the EU. According to the programme, State Forests is not allowed to cut more than 60 per cent of annual growth to ensure the increase in forest coverage and sustainability.

Concerning forest-based product development, the availability of local wood material is highly dependent on the supply from State Forests. As the level of centralization is high, attention should be paid to optimization of the forest-based value chains to focus on high-added value products and full utilization of the side streams. Wood processing industry usually represents many-sided circular economy and cascading use of materials. It is not enough to develop just one sector of wood processing, but the uses of the side and joint products should be developed parallel.

At the moment, the forest resource is adequate for growing the forest-based bioeconomy. However, the main question is what type of forest-based bioeconomy is promoted. High-added value knowledge-based business or service sectors do not necessarily demand such a large amount of wood resources. Looking to the wood-construction, the value of the business is also influenced by e.g. branding, design and architecture, not only the volume of wood resources used. Identifying and targeting the right market niches can be a better strategy than mass-production. As stated by the reviewers, the whole innovation ecosystem plays a role, not only the biomass availability.

The forest management should be planned with a long-term perspective as the areas planted today will be harvested in 80-120 years. The forest management need to optimize nature protection and biodiversity, while foreseeing the needs of the forest industry and regional service sector. The transitioning to the bioeconomy can create an increasing demand for the forest resources, so optimizing the forest biomass growth will play an important role in future competitiveness. The reviewers noted that there is also potential for re-forestation of e.g. agricultural lands that are not cultivated. Based on Scandinavian experience, some reviewers also highly recommend that Poland continues privatization of forest land.

Promoting Low-Emission Wood Construction

In the Polish markets, wood houses are mainly occupying the following niches: highlander house, summer house, country house and ecological house. The ecological houses are typically passive houses build of wood as contemporary wooden family houses; the concept of eco-house is largely focused on the energy aspects. There are 700 companies dealing with wooden construction in Poland. There is no CLT production in Poland, and wood is currently taken abroad for CLT production.

Looking at the consumer perceptions on family homes, price and quality are the main factors determining the purchase decision for majority. Environment is not currently high on the agenda of typical home buyers. The Youth are often more eco-conscious, but in Poland 60 per cent of 24-35 year-olds still live with their partners due to lack of creditworthiness.

Considering this market, it is necessary to clarify the arguments for the wood construction to address a variety of benefits involved. Climate and sustainability have not yet become a driving force in the market. Therefore, it seems reasonable to concentrate on other gains for using wood in buildings (health, air quality, speed in construction and the possibility to design circular solutions).

In addition, there is a need to develop the design process and optimize the building process to lower the price point for wooden houses. When the use of wood is central in the design and planning process, the price can typically be lowered significantly compared to situations where wood is introduced to traditional design and building process. Cost optimizing also calls for co-operation and clustering of companies along the supply and value chains.

In Świętokrzyskie Voivodeship, the promotion of wood construction is challenged by slow changing standards and perceptions of construction sector. Based on the assessment of reviewers, the key success factors for promoting wooden construction in Świętokrzyskie Voivodeship are co-operation, piloting and awareness-raising. Building industry is rather conservative and stick to solutions that are well-known. Wood construction pilots are needed for changing perceptions and enhancing learning of the construction process. The pilots can be supported with best practice examples from Scandinavian partners.

In Norway, the whole value chain from forest owners to house suppliers is engaged in a wood cluster to manage and improve the supply chains for wood construction. Public procurement is also mobilized to build showcases for wood construction. Based on the example of Norway, the Świętokrzyskie Voivodeship could initiate program for public authorities to consider wood in all public construction projects. Raising awareness of the decision makers with group seminars and study tours on the success cases of wood construction is recommended. The program creates demand for wood construction forcing contractors to learn new techniques and processes to construct with wood. It is important to support the forerunners and share information on these pilots to convince stakeholders.

Heating Technology

The reviewers visited Defro, a manufacturer of household heating boilers. Defro produces 30,000 heating boilers annually. It is one of the largest manufacturers of solid fuel boilers in Poland (50% market share). 60 per cent of the production is wood pellet boilers and 30 per cent coal boilers. Defro has an in-house RDI programme to develop and test the boilers to decrease emissions and meet e.g. the eco-design criteria. The EU eco-design act will place strict requirements on the emissions of boilers that can be met only with the so-called '5th generation' coal boilers making former coal boiler models outdated.

Looking at household heating solutions, the coal boiler is still the prevalent one in Poland. However, according to Defro, the pellet boilers are getting more popular in domestic markets and their share is greater in exported boilers. The pellet boiler is more developed in terms of automation and process control which makes it an attractive option for smart houses. Pellet boilers are thus preferred in new houses with e.g. remote controller heating.

Meanwhile old coal boilers are typically replaced with new coal boilers in older houses in Poland. This can be explained e.g. by price and convention. Coal is a local energy source in Poland and as such its use can be argued with economic benefits and energy security. The price of a high-quality pellet boiler can be up to 40 per cent higher than the coal boiler. In addition, the pellets cost currently more than the use of coal in Poland. Some subsidies for households to purchase pellet boilers have been available via the clean air programme.

Although the 5th generation coal boilers are an advancement to older models, the choice of coal as the fuel source is going against the general market trends in Europe. Energy demand of the future will have to be met with a wide variety of renewable sources of energy. Bioenergy will be part of the mix, although mainly derived from the biobased waste and side streams, in line with the optimization of added value from biomass and application of circular business models. Meanwhile coal, along with other fossil fuels, is being phased out in the coming decades. On household level heater systems, coal is not utilized anymore in Norway, Finland or Latvia.

From eco-design point of view, the pellet boilers are preferred by reviewers due to the fact that using coal increases emissions. Wood pellets are also produced in Finland (from side products of mechanical wood processing industry) and used in small and middle sized heating plants. VTT and University of Eastern Finland have conducted research about small diameter particle emissions from pellet combustion in Finland. Beside small diameter particles in flue gases, pellet combustion is quite clean and environmentally friendly way of production of heat.

Looking at the pellet boiler, there are multiple environmental benefits in addition to the lower emissions. First of all, the pellets are produced in the region from the side streams of the saw mills and wood processing facilities. Currently, the pellets produced in Poland are going largely to export markets. Secondly, the pellet boilers produce very little ash, which can be used as a fertilizer e.g. for forest land with no particular challenges. However, the logistics of collecting the ash are not developed to utilize this opportunity. Finally, the better applicability for automation and remote control means more optimized heating with potential energy savings.

For the coal boiler to achieve lower impacts to environment, RDI and alternative fuel are needed. Boiler technology and efficiency can be enhanced many ways from the environmental perspective e.g. combustion air staging, fuel gas recycling, automation, insulation, utilizing measurements, flue gas purification techniques, integrating hybrid systems (thermal collectors), heat accumulators for low heat load periods etc. Furthermore, the end-use opportunities of coal ash can be looked into; although the logistics remains a challenge in the case of decentralized small-scale heating systems.

All in all, the key issue will be the transition of the fuel. The coal is inevitably phasing out from markets and any attempt to promote coal boilers as environmentally conscious choices are doomed to be seen as 'green washing' in the wider European context. Hence, there is a definite need to look at alternative fuel sources. Biobased, waste derived biochar could be the answer and fit to the convention of households in Poland. The possibilities for production of biochar and replacement of coal with biochar in Defro boilers could be researched further. Such pilot could be one of the flagships of the bioeconomy development in Świętokrzyskie Voivodeship as it plays to regional strengths and solves societal challenges related to poor air quality.

Culinary Heritage Network

The Regional Culinary Heritage Europe network, of which the Świętokrzyskie Network is a part, associates 46 regions from all-over Europe, including Vidzeme region as well as regions from Estonia and Norway. As the Regional Culinary Heritage Europe has been operating since 1995, it is an example of successful network co-operation aimed at needs of local entrepreneurs and based on local traditions and products.

The reviewers were asked if the Culinary Heritage Network would be a potential area for transnational co-operation under the RDI2CluB project. Suggestions from the reviewers include the following practical proposals:

- Network companies could create a culinary heritage path, a tourism product that would inspire tourists to travel through the path in different countries enjoying local specialities.
- Creating a catalogue focusing on "regional tastes" including all project regions.
- Continuing the exploration of the Baltic Sea Cuisine proposal.

As the network is not focusing on new product or process development, the innovative nature of the activities of Culinary Heritage Network were questioned in some responses. Still, as a model for local food branding, networking or food tourism promotion, co-operation inspired by the Culinary Heritage Network would be a relevant subject under the Joint Action Plans. A business-driven approach to planning was recommended to identify the practical aim and content of transnational co-operation on the level of companies. It would be advisable to enable the business representatives to meet each other and establish networks across the regions.

It was understood that Polish companies are interested in exporting possibilities. As noted by reviewers, this may be a challenging topic to start the co-operation as there is a greater element

of competition. To build trust, it might be easier to start with exchange of competence and transfer of technology. When the trust is established, mutual efforts to increase the total market can be introduced to the discussion. The reviewers wondered whether the Polish members of the Culinary Heritage Network had expressed interest to international joint development actions.

Nevertheless, the transnational co-operation could involve exchange of best practices and knowledge. For example, the partners of Central Finland expressed interest of introducing the network as a best practice case for the food sector developers and companies in Central Finland. The Culinary Heritage Network provides a lesson on regional networking and co-operation in developing local food brands to assists food sector SMEs to export markets and to facilitate the synergies between food and tourism. Another added value of such co-operation, as the reviewers commented, would be continuous exploration of the Baltic Sea Cuisine, as there is nothing more universal to all nations as music and … delicious cuisine.

Lessons Learned

Partners reported to have benefitted from the example of the organization of the regional innovation system in Świętokrzyskie Voivodeship, the consortium model and the role of the regional authority as a strong driver in the regional development. Moreover, plans and potential for co-operation between the regions were identified.

Transnational Joint Action Plans provide one tangible indicator of the level of co-operation between the regions. Due to recent changes in the region's political leadership and the subsequent uncertainties in strategic direction, the engagement of Polish partners in the Joint Action Plan identification and development process has been limited. This is unfortunately reflected also in the scope of co-operation ideas and initiatives raising from the benchmarking visit and workshops.

Nevertheless, there are few practical joint action areas in progress and these topics, and their potential were further defined in the course of the visit. First of all, the topic of low-emission wood construction was explored as a benchmarking topic and as one of the Joint Action Plans in the workshop. Secondly, co-operation potential is seen in awareness-raising on the bioeconomy potential.

On the topic of low-emission wood construction, the partners propose for example:

- Transfer of experience, co-operation models and knowhow from Norway, Sweden and Finland to establish a hub for sustainable wood construction in Świętokrzyskie Voivodeship. Benchmarking e.g. the Norwegian strategy with regional hubs for promoting increased use of wood in construction.
- Establishing industrial production of wood-houses in Świętokrzyskie region with support from Norwegian expertise to establish a business plan/document for decision of investment (and exploit the interest for Polish/Norwegian partnership for investment).
- Organise a study tour to Norwegian eco-villages (Hurdal and Gaia) to benchmark Zero emission Landscape including waste-water and energy supply. The study visits could be subprojects funded by EEA/Norway grants that could support building a consortium and planning further co-operation and projects.

Through the piloting of Biobord and its operating model, the RDI2CluB partnership will also have the opportunity to deepen the transnational co-operation on business level which was identified as a potential co-operation area. Several of the company visits raised ideas for transnational co-operation and business connections. For example, partners from Central Finland and Hedmark saw co-operation potential with Defro.

Furthermore, the food sector benchmarking visit was of great interest especially to Latvian partners representing the Latvian High Added Value and Healthy Food Cluster. The co-operation and sharing models among entrepreneurs/farmers, experiences with packaging materials, criteria for exporting products as well as use of technology in fruit growing, processing and selling were important take-home lessons. In addition, the Culinary Heritage Network was a

good practice example of how networking and co-operation in food brand development to boost local food SMEs and improve their potential for export markets.

Across the partnership, there is an interest for forming connections with academia. For example, co-operation with Kielce University of Technology could be in the interest of the research institutes involved in the partnership and also student co-operation was proposed. Among others, there could be possibilities to research co-operation and education between JAMK University of Applied Sciences (H. Honkanen) and Kielce University of Technology. This co-operation could focus on renewable energy in heating, solid biofuels in energy production (e.g. research in potential, production and use of waste derived biochar), source separation in waste management, recycling or waste-to-energy.

From the Latvian delegation, potential research co-operation areas were identified in bioeconomics, technology use in horticulture (especially orchards), cereal technological processing process and use of drones in agriculture. Institute of Environmental Solutions will look into potential of internship with PhD students from Poland. The Da Vinci Science Centre was also seen as an interesting benchmarking target for Vidzeme, as Cēsis municipality in Latvia is also building a new science Centre and could benefit from learning about the business model of the Polish science center.

As a final message, the reviewers also stated to have learned a lot from the organisation of such a study visit with great attention to detail and provision of cultural experience. On behalf of the whole review team, I wish to express our gratitude for the organizers on the well-balanced and plentiful programme. We hope a number of our recommendations and co-operation proposals for development of bioeconomy in Świętokrzyskie Voivodeship will bear fruit.

– Anna Aalto, Project Manager RDI2CluB

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Annex 1: Benchmarking programme on June 3-6, 2019.

Interreg Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

RDI2CluB

EU STRATEGY FOR THE BALTIC SEA REGION FLAGSHIP

Benchmarking visit in the Świętokrzyskie Voivodeship, Poland

3rd – 6th June, 2019

Świętokrzyskie Voivodeship
Regional Science and Technology Centre
Foundation for Education and Social Dialogue Pro Civis

Kielce, 2019

REGIONAL SCIENCE AND TECHNOLOGY CENTER

ŚWIĘTOKRZYSKIE VOIVODESHIP

Pro Civis Foundation for Education and Social Dialogue

Contents

1. Some facts and figures on the region

The Świętokrzyskie Voivodeship covers an area of 11,710 km^2, that is 3.7% of total Poland's area. Świętokrzyskie is situated in the south-eastern part of the country and borders the largest urban agglomerations: Warsaw, Cracow, Katowice, Lublin and Łódź. In the region there are the "Starachowice" Special Economic Zone and the Tarnobrzeg Special Economic Zone, as well as the Kielce Technology Park and the Regional Science and Technology Centre. The capital of the Świętokrzyskie region, Kielce city, is situated at the crossroads of important Polish transport routes. Kielce is located close to major Polish industrial and cultural centres: Warsaw - 180 km, Cracow - 120 km, Katowice - 160 km, Łódź - 140 km, Rzeszów - 180 km, Lublin - 180 km.

Świętokrzyskie is one of the ecologically cleanest areas in Poland. Forests, covering an area of 328.1 thousand ha, constitute a leading part of the natural structure of the voivodeship. Forest areas have multiple and useful functions such as protective (provide protection to other elements of nature) and economic (they constitute a source of raw materials for lots of industrial branches), social and cultural, which is manifested by a growing interest of the public in leisure in forests. Forestation of the voivodeship is currently 27.5% and is slightly lower than total for Poland (28.7%). It clearly differs from the European average (33%), and even more from the adopted in the EU countries guidance rate (42%).

Numerous qualified staff for the needs of industry and other economy sectors, developed economic infrastructure, including financial institutions in Kielce and other major cities of the region, a developed educational base, great opportunities for the development of agricultural and food production, rich sources of curative mineral waters, or the growing number of organic food producers are the advantages of the Region.
In 2017, according to the statistical data, there were 78 vocational secondary schools (including technical secondary schools) in the Świętokrzyskie Voivodeship. In addition, junior secondary school graduates were able to choose from among 76 vocational and first degree branch schools or vocational training schools (Statistics Poland, 2017). There are also 13 universities in the Region. Kielce is the largest academic centre with two public universities: Jan Kochanowski University and Kielce University of Technology as well as 6 non-public high schools.
The region has a population of 1,247,700 inhabitants and the unemployment rate according to the data provided by Statistics Poland in December 2018 was at 8.3%. GDP per person in the Świętokrzyskie region is EUR 8,102, with average earnings of EUR 966.74 (Statistics Poland, January 2019). The total number of enterprises is 112,296, of which 1,058 in the food and food processing industry. There are 1,688 active businesses in agriculture, hunting, forestry and fishing and 27,505 in construction sector.

2. Świętokrzyskie Innovation System

Świętokrzyskie Innovation System consists of the Świętokrzyskie Innovation Council and 7 thematic consortia corresponding to selected smart specialisations of the Świętokrzyskie Region.

The Świętokrzyskie Innovation Council is an advisory body for the Board of the Świętokrzyskie Region, in the field of regional innovation policy and acts as a consultation forum in the process of development of Świętokrzyskie Innovation System. The Council is chaired by the Presidium consisting of 2 people: President – Marshal of the Świętokrzyskie Voivodeship, Mr. Andrzej Bętkowski and Vice-President – Deputy Marshal of the Świętokrzyskie Voivodeship, Ms. Renata Janik. The council consists of 39 members, representing the following sectors:

1) local and cross-regional clusters;
2) business and business support institutions;
3) government and local self-government administration;
4) education - universities;
5) research and development institutions and scientific centres;
6) business environment institutions.

Moreover, the Council acts as an advisory and consultation body in matters related to implementation of the regional development policy in the areas of innovation and entrepreneurship as well as key projects and initiatives supported or implemented by the Świętokrzyskie Region. The Council indicates the areas and directions of activities that may form the basis for implementation of specific projects of initiatives, including those financed from available sources at the regional level. The Council meetings are organised and financed by the Marshal Office.

The second pillar of Świętokrzyskie Innovation System includes also Consortia (innovation ecosystems) for the development of smart specialisations of the Świętokrzyskie Region. The Consortia cooperate with the regional self-government on the basis of an agreement concluded on 15th June, 2015. The agreement was extended for another 3 years on 28th June, 2018 till 31st December,2020. The key task of the Consortium is to implement the concept of smart specialisations development and forum for experience and knowledge exchange in particular fields.

There were 7 Consotria's Coordinators selected – one for each of the smart specialisations. These are:

for:

1) Environment friendly and cost effective construction - Consortium Coordinator is Staropolska Chamber of Industry and Commerce

   Consortium Members are:

   - Kielce University of Technology
   - Regional Centre for Innovation and Technology Transfer Ltd.
   - "Lewiatan" Świętokrzyskie Association of Private Employers
   - Targi Kielce. Exhibition and Congress Centre
   - Dorbud joint-stock company
   - Fabet joint-stock company

2) Metallurgy and metal industry - Consortium Coordinator is: Staropolska Chamber of Industry and Commerce

Consortium Members are:

- Kielce University of Technology
- Regional Centre for Innovation and Technology Transfer Ltd.
- Regional Development Agency – Foundation in Starachowice
- National Association for Entrepreneurship Support
- „Odlewnie Polskie" joint-stock Co.
- PERFOPOL Company
- FANSULD Iron Foundry
- „Starachowice" Special Economic Zone
- Świętokrzyskie Cluster of Metal and Foundry Industries „METAL-CAST
- Targi Kielce. Exhibition and Congress Centre

3) Modern agriculture and food processing industry - Consortium Coordinator is: Centre for Business Promotion and Entrepreneurship in Sandomierz

Consortium members are:

- Świętokrzyskie Agricultural Advisory Centre in Modliszewice
- Świętokrzyska Chamber of Agriculture
- EPRD Regional Development and Economy Policy Office
- „POLKON" Fruit and Vegetables Processing Plant Ltd.
- SAN-EXPORT-GROUP Ltd
- WIR Meat Processing Plant Ltd
- Jan Kochanowski University in Kielce
- Regional Centre for Innovation and Technology Transfer Ltd
- Targi Kielce. Exhibition and Congress Centre

4) Health and Pro-Health Tourism -Consortium Coordinator is: Health Resort Busko-Zdrój Joint-stock Co.

Consortium members are:

- Jan Kochanowski University in Kielce
- School of Economics, Law and Medical Sciences in Kielce
- Świętokrzyskie Health Resorts in Kielce
- Economic Chamber of the Health Tourism Centre
- "Bałt" Association for the Development of Bałtów Commune
- Regional Centre for Innovation and Technology Transfer Ltd
- "Lewiatan" Świętokrzyskie Association of Private Employers
- Regional Science and Technology Center
- Centre for Business Promotion and Entrepreneurship in Sandomierz
- Targi Kielce. Exhibition and Congress Centre
- FONTIA Ltd

5) ICT - Consortium Coordinator: Kielce Technology Park

Consortium members are:

- Jan Kochanowski University in Kielce

- Kielce University of Technology
- Regional Centre for Innovation and Technology Transfer Ltd
- FutureHub ICT Cluster Association
- EPRD Regional Development and Economy Policy Office
- InnoTech Central Economic Chamber
- Targi Kielce. Exhibition and Congress Centre

6) Congress and exhibition industry - Consortium Coordinator is : „Grono Targowe Kielce" Economic Chamber

Consortium members are:

- Jan Kochanowski University in Kielce
- Kielce University of Technology
- Targi Kielce. Exhibition and Congress Centre
- EPRD Regional Development and Economy Policy Office
- Regional Tourist Organisation of the Świętokrzyskie Voivodeship
- Regional Centre for Innovation and Technology Transfer Ltd.
- ZETO Center of Computer Systems Joint-stock Co.

7) Sustainable development of energy - Consortium Coordinator: Regional Centre for Innovation and Technology Transfer Ltd

Consortium members are:

- Jan Kochanowski University in Kielce
- Kielce University of Technology
- "Staropolska" Chamber of Industry and Commerce
- Kielce Municipality/Kielce Technology Park
- Lewiatan Świętokrzyskie Association of Private Employers
- „Świętokrzyskie Effective Energy Use" Association
- Targi Kielce. Exhibition and Congress Centre
- RES Institute
- DOTO Polska

3. General programme

Regional Science and Technology Centre (RSTC)

http://rcnt.pl/

Regional Science and Technology Center as a budget unit of regional self-government of the Świętokrzyskie Region was established in 2009. At the current moment, it is one of the most promising and rapidly developing business environment institutions. As part of its business activity, through the implementation of many EU projects, RSTC is an important link in the implementation of the development goals of the Region established by the Świętokrzyskie Regional Self-government. Any investment made in the framework of the Center activity, results directly from the objectives of both of the Świętokrzyskie Regional Development Strategy and Świętokrzyskie Strategy for Research and Innovation. Through the implementation of activities, such as development of infrastructure in the investment areas equipment for the Conference and Training Center, creating the Świętokrzyskie Biobank along with a complex of research and implementation laboratories, ending on the Leonardo da Vinci Science Center, one can say that Regional Science and Technology Center is one of the most important institutions of the Świętokrzyskie Region.

Centre for Knowledge and Bioeconomy Development (Centre)

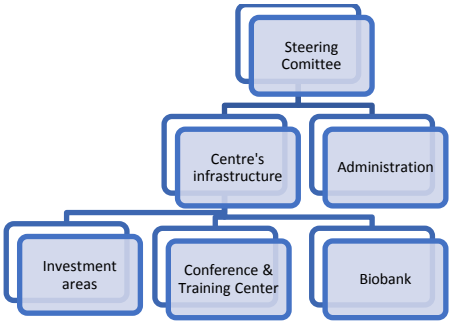
http://rcnt.pl/index.php/biznes-park/centrum-wiedzy-i-rozwoju-biogospodarki/

Centre for Knowledge and Bioeconomy Development, operating in the Regional Science and Technology Centre, is the animator of bio-business development activities. It is a place where business entities form production, services, consulting sectors can exchange their experience, know-how or establish direct cooperation between themselves. The main task of the Centre is active lobbying for establishing bioeconomy new smart specialisation of the Świętokrzyskie Region for the new EU financial perspective 2021-2027. Representatives of the following sectors are invited to join the Centre: R&D, business, local self-government, science, education and media.

The Steering Comittee is the managing body of the Centre and consists of:

- R&D (RSTC);
- business (Reslab Ltd.);
- regional self-government authority (Świętokrzyskie Region);
- media (Telewizja Polska S.A., Kielce branch);
- science (PhD Anna Rabajczyk);

The Centre organisation chart:



Kielce University of Technology (PŚk)

https://international.tu.kielce.pl/

Polish state technical university based in Kielce, founded in 1965. It provides high-quality education and student development, including integrated scientific research and cooperation with domestic and international research centres, the economic and local government environment. The academic community of Kielce University of Technology consists of approximately 500 academic staff and 10 thousand students per year who have the opportunity to study at the first, second and third cycle studies. The university offers full-time and part-time studies. The structure of PŚk comprises also numerous scientific circles and student organisations. It is a university of numerous opportunities, educating specialist staff in the following Faculties:

- Faculty of Construction and Architecture,
- Faculty of Electrical Engineering, Automatics and Computer Science,
- Faculty of Mechatronics and Mechanical Engineering,
- Faculty of Management and Computer Modelling,
- Faculty of Environmental Engineering, Geomatics and Energy.

The Faculty of Environmental Engineering, Geomatics and Energy offers three fields of study: environmental engineering, geodesy and cartography and renewable energy sources. The Faculty is best renowned for its headquarters. It is located in an intelligent, energy-saving educational and laboratory building called ENERGIS. The whole object is powered by renewable energy sources. It combines didactic, research and scientific functions. It is equipped with photovoltaic and solar panels and heat pumps, ventilation units, and the recovered heat heats the water. There is also a biomass boiler room. Those installations have got also didactic functions.

Municipal Waste Landfill in Promnik

http://www.zuo.pgo.kielce.pl/

Waste Management Company Ltd. was established in 2001 in the Świętokrzyskie Voivodeship as a commercial law company. The company's actions mainly include:

- running the regional mechanical and biological installation for municipal waste treatment,
- management of waste landfills,
- disposal of waste through landfilling of non-hazardous and neutral waste,
- selective collection and sorting of packaging waste,
- production of electricity and heat from renewable energy sources.

The project aims at system and comprehensive management of urban waste collected from the city of Kielce (the region's capital) and 17 municipalities and communes surrounding it. The Regional Waste Treatment Plant is an important part of the company, thanks to which it was possible to limit the amount of waste going to the landfill. The plant was established in the area neighbouring the existing landfill site in Promnik, about 15 km from the centre of Kielce city. Its task is to get rid of mixed urban waste and waste collected in a selective way in a highly efficient process of their multi-stage, mechanical-biological processing. Urban waste is deposited in a sectoral manner and consists in laying horizontal waste layers

together with an insulating and heavy duty layer. The waste is compacted using compactors (2 compactors Ł 34, with pressure of 24 tonnes each). The sorting line in Kielce has 4 work stations with a total capacity of 15,000 m^3/year (i.e. 60 m^3/shift) and deals with sorting waste collected selectively (PET bottles and glass). Additionally, in 2004, a Small Biogas Power Plant (MEB) was built at Promnik landfill which has the *Green Energy* Certificate. Part of the electricity produced in the MEB is used for current needs at the landfill and its surplus is entered into the power grid network in accordance with the provisions of energy law. In addition, for heating purposes of the social-storage facilities of the landfill, waste heat from generator engines was used. It made it possible to completely abandon heating buildings from traditional energy sources.

It is managed by the Waste Management Company Ltd., belonging to the city of Kielce, the capital of the Świętokrzyskie Voivodeship. Although, the cooperation between the company and other municipalities and entities (e.g. providing waste recovery and recycling) is not a cluster system, the efficient flow of waste in region 4 for municipal waste management, comprising 18 municipalities of the Świętokrzyskie Voivodeship, is provided. The efficient flow is guaranteed by the abiding rules of the law, including the local law, as well as contracts and agreements. As a result of sorting mixed municipal waste on a high-quality sorting line equipped in numerous separators, calorific waste (not suitable for recycling) is obtained. It is used for alternative fuel production on the premises of the Centre. The produced alternative fuel is directed to cement plants located in Świętokrzyskie (3 out of 11 Polish plants), where it is used in cement production (it replaces about 70 percent of conventional fuel, such as coal). The bio-degradable fraction from mixed waste is directed to composting and oxygen-free fermentation installation operating within the Centre. In the process of fermentation, one obtains methane which is used for production of ecological heat and electric energy used in the Centre's operation. The stabilized compost produced in the process is neutralized at the Centre's waste landfill.

The Center plays also a major role in processing waste from selective waste collection, as it provides secondary waste segregation, according to the needs of recipients (e.g. metals are sent, among others, to Celsa Huta Ostrowiec in Ostrowiec Świętokrzyski, glass to glassworks, e.g. "Sława" Glassworks in Kielce). The wastewater is purified in the biggest Wastewater Treatment Plant in the region, situated in Sitkówka in the Sitkówka-Nowiny Municipality.

Plastinvest Ltd

http://www.plastinvest.com.pl/eng/home

Plastinvest company was established in 2011 and is a manufacturer of EKOply boards. EKOply is a product made entirely in recycling technology. Company decided to invest in a processing line that complements the philosophy of processing plastic waste and creating entirely new products. The company uses very carefully selected raw material but the final components of the mixture are the result of many experiments and trials of the company's engineers. All boards are highly resistant to moisture and water as well as most chemicals available at the market. They have increased resistance to UV radiation. Boards are used in construction, furniture and agriculture industries, both indoor and outdoor. All the company's products are available in three colours: red, green and blue.

Ekoply may be used as:

- alternative to plywood – it is durable, lighter than standard plywood and weathertight,
- furniture surface, e.g. tops, which can be a perfect alternative to MDF or plywood,
- flooring, e.g. in lorries as protection for metal floor and improvement in noise dampening,
- in a garden: houses, fences, kennels, simple furniture and toolboxes,
- a safety precaution: protection from wind and rain, on construction sites, concerts, festivals and other events.

4. Wood construction programme

Ethnographic Park in Tokarnia, Museum of Kielce Countryside

http://mwk.com.pl/pl/sg/nasze_obiekty/park_etnograficzny_w_tokarni/

The Museum of Kielce Countryside - Ethnographic Park in Tokarnia, since 1977, presents the tradition of wooden folk architecture from various sub-regions of the Kielce Region: the Świętokrzyskie Mountains, Kraków-Częstochowa Upland, Sandomierz Upland and the Nida Basin. Looking at Polish architecture, few people realise that until the beginning of the 20th century, wood was basic building material in Polish villages. Since the middle of the 20th century, wooden buildings have begun to give way to bricklaying, until disappearance of wood. At present, wood is slowly coming back into favour thanks to growing pro-ecological awareness and technological progress. That is why the Ethnographic Park in Tokarnia is an ideal place for conducting transnational workshops devoted to joint activities of the RDI2CluB partnership, including those related to low-emission wooden construction. In this way, we combine business with pleasure: by presenting Polish and Świętokrzyskie traditions and potential for development of wooden construction, we encourage you to common innovative return to tradition!

Daleszyce State Forest Administration, Seed-Nursery Gardening Farm in Suków-Papiernia

A modern seed-forest container nursery built by Daleszyce State Forest Administration in Suków-Papiernia covers 6 ha of land and is one of the most modern centres of the type in this part of Europe.

The nursery produces mainly oak and beech seedlings that will be used to renew the forest and afforestation of land for recultivation in the entire Świętokrzyskie region. The adopted production technology and applied innovations and logistic solutions make the facility a comprehensive response to the needs of the region in the field of seeding and nursing.

The most impressive object is a six-walled foil tent, almost 100 m long, 60 m wide and over 40,000 m^3. Another object is the sowing hall – it is where polystyrene or styrofoam containers (so called cassettes) are filled. The whole process is largely automatic. It mainly produces deciduous species (English oak and beech) and coniferous (Scots pine). The target production of seedlings will amount to app. 3 million pieces. In the nursery, there are also production fields, that is where the seedlings will reach maturity after leaving the tent, and two storerooms. They house about 2 million seedlings that can safely grow there in winter. An important place in nurseries is seed storage sites. In the one in Daleszyce State Forest Administration, about 20 tonnes of acorns and 6 tonnes of furrows will be safely stored with the possibility of increasing the numbers.

The construction of the nursery was nearly PLN 18.2 million. The whole project was financed from the forest fund, that is, from the State Forests own funds.

DEFRO Spółka z o.o. sp. k.

http://www.en.defro.pl

Tradition of DEFRO sp. z o.o. sp. k. goes back to 1973. Currently it is the largest manufacturer of boilers for solid fuels in Poland and one of the largest in Europe. Annually, the company produces app. 40 thousand boilers, i.e. about 200 boilers a day. A modern production plant has an area of over 30,000 m^2 and employs app. 630 people. It also cooperates with 2,000 installers and over 1,000 distributors.

DEFRO is a company focusing on continuous development. It has fully up-to-date machinery, constantly modernised production line consisting of several technological blocks. The company has also got its own

research laboratory where it can conduct its own research and development projects in the field of clean solid fuel technologies for units up to 1 MW and test boilers at all stages of their design. DEFRO has its own design office where a product creation process can lead from the concept stage to the multi-series production.

Since 2012, when the PN-EN 303-5: 2012 standard was updated, the greatest emphasis has been put on 5^{th} class boilers. A boiler of 5^{th} class is a guarantee of the lowest emission of CO, dust and organic carbon to the atmosphere and high efficiency which means lower fuel consumption. Devices of this class are often subsidised by different programmes for the purchase price of a boiler. Devices for biomass burning are supreme in this class: boilers with pellet burners and wood gasification boilers.

5. Food programme

Świętokrzyskie Culinary Heritage Network

https://www.culinary-heritage.com/regions.asp

The Świętokrzyskie Culinary Heritage Network is a part of the European Network of Regional Culinary Heritage (ENRCH), which has been carrying out activities aimed at developing a market for high quality food and culinary tourism by supporting local natural, safe and tasty food since 1995. The Świętokrzyskie Voivodeship joined the ENRCH in 2009 - becoming the owner of the license for the use of the guarantee trademark Świętokrzyskie Culinary Heritage Network. Currently, the Network brings together 82 entities from the Świętokrzyskie Region: producers of raw materials, processors, restaurateurs, owners of catering and hotel facilities, wholesale and retail sellers of agricultural and food products. Many of the members of the Network are winners of Our Culinary Heritage+ Tastes of Regions competitions. The competition promotes traditional products and shows the rich potential hidden in the Polish countryside. It underlines the culinary tradition, is its showcase and tourist attraction. It also serves to build the region's brand and is a form of a region's promotion.

District Dairy Cooperative in Opatów

http://www.krowkaopatowska.pl/

District Dairy Cooperative (OSM) in Opatów has existed for over 100 years and its history reflects the turbulent history of Poland in 20th century. In 1992, the company took over the production of sweets "Krówka Opatowska" from the cooperative called Spółdzielnia Pracy Przemysłu Spożywczego Zakład Cukierniczy in Opatów which was then going bankrupt. Fudges are made by hand, according to a traditional recipe, only from natural ingredients such as milk, sugar, potato syrup, vegetable fat without colouring agents. After cooling, the fudge is hand-cut into cubes and packed into special paper. One employee is able to pack 100 kg of fudge in 8 hours a day which equals about 6000 pieces!

Since 2007, when most Polish small dairies ceased production of dairy products, OSM in Opatów has concentrated on the production of *Krówka Opatowska* (Fudge). Its taste is known not only in Poland, but also in Slovakia, Hungary, the Czech Republic, Germany, France and Canada.

OSM Opatów, as a producer of *Krówka Opatowska*, also joined the Świętokrzyskie Culinary Heritage Network in 2010. In 2011 *Krówka Opatowska* was entered on the List of Traditional Products of the Polish Ministry of Agriculture and Rural Development in the category of bakery and confectionery products. In 2015, it was awarded the title of "Quality Tradition".

In 2015, in the unused part of the Diary, the Krówka Opatowska café called "Krówkarenka" was opened, where workshops on manual production of Krówka Opatowska are conducted. This project was co-financed from the funds of the "Świętokrzyskie Mountains, Our Future" programme - a Swiss cooperation programme with new EU member states.

"AG FOOD" Fruit&Vegetables Producers' Group in Jasienica

http://www.agfood-polska.pl/index.php/pl/

"AG FOOD" Fruit&Vegetables Producers' Group started its trade and production activity in 2012. The seat of the company is Jasienica – in Łoniów Commune. This picturesque place is famous for its fruit growing tradition for centuries in the Sandomierz Basin. The seat of the Company is in one of the biggest fruit growing regions in Poland. It is characterized by, perfect production of fruit microclimate as well as

environmental and soil conditions. The group consists of 46 fruit producers who manage over 285 ha. The Group fulfils its strategic aims thanks to modern investments. Building the storeroom was one of basic achievements of the Group. It consists of 42 chambers equipped with the newest generation devices and devices for KA/ULO (Controlled Atmosphere/Ultra Low Oxygen). An innovative system of dynamic atmosphere supervision was applied in some chambers. The Group has got fully automated sorting line of 8t/h efficiency. It also owns a pre-sorting system with hydro-loading and systems of automatic palletizing. The Company has a possibility of selling apples in different packages, card-boards or poly-bags – everything according to customers' expectations and requirements. There are apples of different types: Jonagored, Champion, Eliza, Ligol, Gala, Mutsu, Idared and some vegetables on offer. An important achievement of the Company is introducing and functioning of GLOBALG.A.P. and HACCP systems. In the future, the Company is going to develop its trade and production activity by increasing acreage and undertaking cooperation with new customers. An increase of sold products by packaged vegetables is also planned.

Dreher Poland

https://www.spirit-of-fruits.de/home-polski/dreher-poland/

The production plant of Dreher is based in Koprzywnica nearby the city of Sandomierz in the Świętokrzyskie Voivodeship, in the very centre of the fruit production basin. Short distances between the grower and factory are the basis for optimizing the production processes. The highest quality apple juice (NFC) has been produced in the state-of-the-art technique since 2017. Dreher produces fruit juices (NFC), concentrates (FC) and purees which are delivered to customers and their partners across Europe. During the last few years the factory has undergone significant technological development, thanks to which the production uses the latest equipment. The facility is located on a plot of over 60,000 m^2. In the first stage of expansion, the production buildings will take up 6,000 m^2. As the company employs Polish staff, there will be many new jobs created in the region.

The new production plant is situated 200 km to the south of Warsaw and benefits in several ways from the closeness to enormous fruit growing areas, which provides advantages for the raw material logistic as well as a very good starting position for deliveries to customers in the north and south of the current supply areas. Beside the support of the production, logistic and component suppliers, the new location benefits especially from the know-how of the main plant in Stockach. This is also the place, where trained many employees for the high "Dreher-Standard". This standard will be used likewise in Poland.

6. Annexes

Programme of the visit in the Świętokrzyskie Voivodeship

MONDAY, 3RD JUNE 2019 (DAY 1)

09.45 Bus transfer from Warsaw Chopin Airport https://www.lotnisko-chopina.pl/

13.00 – 15.00 Benchmarking visit to Seed-Nursery Gardening Farm in Suków-Papiernia near Kielce
http://www.daleszyce.radom.lasy.gov.pl/nadlesnictwo
Presentation of the Świętokrzyskie Forests - representative of the State Forests
Potential of low-emission construction in the Świętokrzyskie Voivodeship

15.00 – 16.00 Lunch in Suków-Papiernia

16.00 – 17.00 Transfer to the hotel in Kielce city, accommodation

17.30-19.00

- **Welcome meeting and presentation of the benchmarking objective at Best Western Grand Hotel** http://grandhotelkielce.pl/
- **Transnational workshops: Session on local pilots , facilitator – PP10**

20.00- 21.30 Dinner at Best Western Grand Hotel

TUESDAY, 4 TH JUNE 2019 (DAY 2)
7.00-8.00 Breakfast

Bio-construction Programme	Food Programme (12 persons)
8.00-9.00 Transfer to Benchmarking visit to the the Municipal Waste Landfill in Promnik	**8.00-9.00** Transfer to Opatów
9.00 – 11.45 Benchmarking visit to the Municipal Waste Landfill in Promnik http://www.pgo.kielce.pl/strona_glowna.html	**9.00 – 10.30 Benchmarking visit to the District Dairy Cooperative in Opatów** http://www.krowkaopatowska.pl/
	10.30 – 11.00 Transfer to Jasienica
	11.00 – 12.00 Benchmarking visit to "AG FOOD" Fruit & Vegetables Producers' Group in Jasienica http://www.agfood-polska.pl/index.php/pl/
12.00 – 14.00 Benchmarking visit to DEFRO; production of 5th generation boilers for pellets http://www.en.defro.pl	**12.00 – 12.30 Transfer to Koprzywnica**
	12.30 – 13.30 Benchmarking visit to Dreher Poland https://www.spirit-of-fruits.de/home-polski/dreher-poland/
14.30-15.30 Lunch at Antresola Restaurant in Snochowice https://zajazdantresola.pl/kontakt/	**14.00-15.30 Lunch at Karczma Świętokrzyska in Staszów** https://karczmaswietokrzyska.pl/kontakt/

15.30 – 17.00 Transfer to Ethnographic Park in Tokarnia

17.00 – 19.00 Visit to Ethnographic Park in Tokarnia, Museum of Kielce Countryside, Granary from Rogów http://mwk.com.pl/

- **Quick Sightseeing of** Ethnographic Park in Tokarnia
- **Transnational workshops: Session on the JAP progress , facilitator – PP11**

19.00 – 21.00 Dinner and presentation of the Świętokrzyskie Culinary Heritage Network,
a part of the European Culinary Heritage Network https://www.culinary-heritage.com/regions.asp

22.00 Return to the hotel in Kielce

WEDNESDAY, 5TH JUNE 2019 (DAY 3)
7.00-8.00 Breakfast

8.15-8.45 Transfer to Regional Science and Technology Center (PP7)

9.00 – 10.00 Regional Science and Technology Centre – sightseeing http://rcnt.pl/
10.00-10.30 Presentation of the Świętokrzyskie Innovation System, regional cluster policy and instruments of its support – present and future (Department for Investment and Development, Marshal Office of the Świętokrzyskie Voivodeship)

10.30 – 11.00 Presentation of Regional Science and Technology Center (PP7) **and Centre for Knowledge and Bioeconomy Development**, newly created by PP7 – bio-hub

11.00 – 11.15 Coffee break

11.20 - 12.45 Seminar: Launch of the Bioboard.eu platform, part 1 – facilitators PP1 & PP6

12.45-13.00 Coffee break

13.00 - 14.00 Seminar: Launch of the Bioboard.eu platform, part 2 – facilitators PP1 & PP6

14.00 – 15.15 Lunch

15.15 - 16.00 Seminar: Launch of the Bioboard.eu platform, part 3 – facilitators PP1 & PP6

16.00 – 18.00 Transnational workshops: Session on first pilot interaction of OMIM and OVBH, facilitator – PP9

18.00 – 20.00 Dinner

20.00-20.30 Return to the hotel in Kielce

THURSDAY, 6TH JUNE 2019 (DAY 4)
7.00-8.00 Breakfast
8.30-9.00 Transfer to Kielce University of Technology

9.15 – 10.00 Visit to Kielce University of Technology https://international.tu.kielce.pl/

10.00-10.45 Transfer to Suchedniów

11.00-12.00 Visit in Plastinvest Ltd - manufacture of products entirely in recycling technology
http://www.plastinvest.com.pl/eng/home

12.00 – 12.30 Transfer to the restaurant - **Mobile Transnational workshop: Closing Session**

13.00 -14.00 Lunch at Promień Hotel and Restaurant in Skarżysko-Kamienna https://www.facebook.com/hotelpromien/

14.00-16.30 Bus transfer to Warsaw Chopin Airport https://www.lotnisko-chopina.pl/