



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

Task 3

Case Study Report Lodzkie, Poland

Contract: RTD/F1/PP-03681-2015

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1. Short Regional Bioeconomy Profile

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|--|---|
| Name of the case region/country | Województwo <i>Łódzkie</i> (Lodz Voivodeship) |
| Member State | Poland |
| GDP – Euro per capita (2014)* | No data available |
| Total ESIF Research & Innovation per capita per year* | 57.41 |
| Total H2020 per capita per year* | 0.97 |
| Value Chain Approach to the Bioeconomy** | Biobased products, biomass processing and conversion, Bioeconomy R+I and Tech support |
| Thematic Focus of the Bioeconomy Approach** | Agro–food & food processing, Bio–based fuels and energy & agricultural residues and bio–energy crops, bio–based construction materials |
| Research and Innovation Fields highlighted for the Bioeconomy** | Biology, biotechnology, chemistry, Life Sciences & Nano technologies, Advanced manufacturing, primary production with quality. |
| Bioeconomy Activity Level** | Modest innovator |
| CASE STUDY SUMMARY | |
| Bioeconomy Approach | Biomass production and biotechnology are among the main strengths and opportunities of the Lodzkie region. The biotechnology is identifies as horizontal actions supporting different industries to boost research and development and therewith business development |
| Bioeconomy Ecosystem | Fill in briefly, Twitter style, after elaborating the report |
| Bioeconomy Policy Support | Different sector strategies at national and regional levels |
| Successful initiatives and Good Practices | Initiatives and concrete actions to raise awareness and support cooperation between academics and private sector actor to deploy the bioeconomy, |
| Main Needs, Gaps and Bottlenecks | Further developing the Lodzkie bioeconomy needs more involvement from enterprises therefore awareness on the opportunities and capacities should be increased. |

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

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

2. Regional Bioeconomy Ecosystem

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

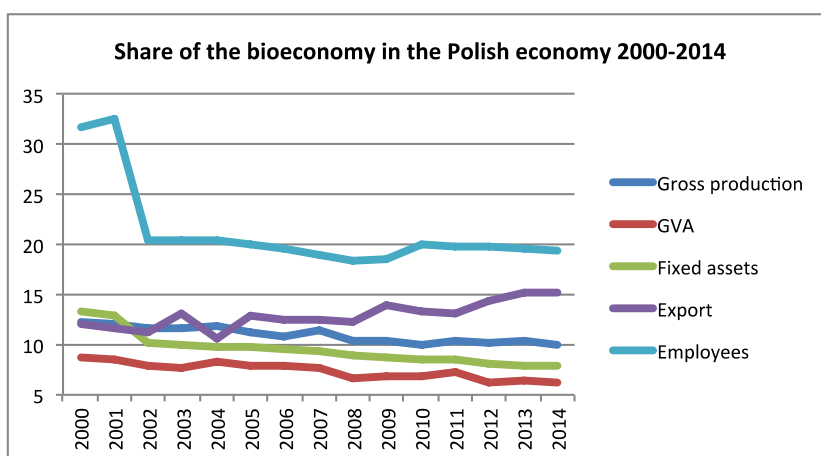
2.1 Origin of Interest of the region in the Bioeconomy

The Polish bioeconomy is understood as rather traditional focusing on agriculture and with innovative areas in early stages of development. Nevertheless, bioeconomy is an important sector for the Polish economy, mainly due to a strong agriculture sector (Bielecki, 2015).

Ludwik & Wicka (2016) estimated that nearly 20% of the total Polish employment can be related to bioeconomy. This is mainly due to the fragmented agricultural sector which employs more than 80% of the workers in bioeconomy. Although the share of employment related to bioeconomy, the estimated added value (GVA) is relatively small (on average 6.5%).

Figure 1 shows the share of the bioeconomy in the total Polish economy based on different indicators between 2000 and 2014. Despite the strong representation of bioeconomy related sectors in Poland, the sector has been declining around 2% per year between 2000 and 2014 (Ludwik & Wicka, 2016).

Figure 1 Share of the bioeconomy in the Polish economy between 2000 and 2014¹

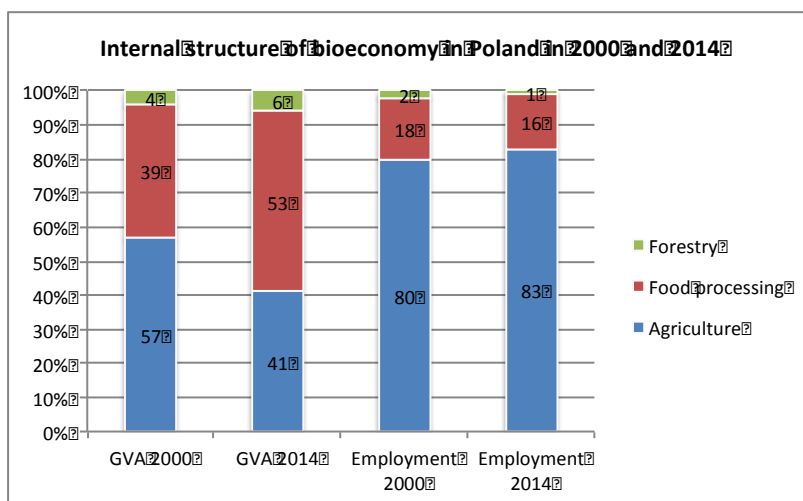


Source: Ludwik & Wicka, 2016

¹ Calculation are based on available data at the national statistical office and via the agricultural agency this implies a rather broad definition of bioeconomy

The Polish bioeconomy sector is developing which is shown by the increase of export value of the sector. From the indicators assessed by Ludwik & Wicka (2016) only the export of bioeconomy products and services increased between 2000 and 2014. This development is also characterised by the changes in the internal structure of the bioeconomy in Poland between 2000 and 2014, which shows less importance of the agricultural sector and more of food processing (Figure 2).

Figure 2 Internal structure of the bioeconomy in Poland in 2000 and 2014



Source: Ludwik & Wicka, 2016

The Polish bioeconomy sector is developing from an agricultural and agri-food dominated sector to a more modern innovation-based sector. This is characterised by a high intellectual potential for researches and many interesting scientific discoveries in Poland. However, Polish inventions are very rarely converted into commercial products (Woźniak & Twardowski, 2016; Bielecki, 2015).

Bringing new technologies to the market and further developing the bioeconomy is supported by various strategies and actions at national and regional levels. Public interventions assume biotechnology as key for developing the bioeconomy. The interventions focus on adding value to biomass, for example by promoting business and research parks and clusters and facilitate spill-over effects between academics and businesses (Woźniak & Twardowski, 2016).

The **Lodzkie region** is one of the most prominent regions in Poland, promoting itself as bioregion and supporting the development of the Polish bioeconomy sector. 27 August 2015 the regional parliament of the Lodzkie region established Lodzkie as **first bioregion in Poland**, meaning the establishment of the plan to transform Lodzkie into one of the most innovative regions in Poland with sustainable bioeconomy as strategic and integrated approach (Stępień, 2016). The recognition of Lodzkie as bioregion has put the region also in the role of coordinator of all Polish Bioregions. This follows a longer tradition of cooperation with other regions and actors from outside the region. Lodzkie is also active in the ERRIN Network,

participates in the group for bioeconomy in the Vanguard initiative and participates in a number of EU projects for example:

- InnProBio a forum for Bio-Based Innovation in Public Procurement lead by the University of Lodz and support by H2020;
- Innovative biotechnological solutions for the production of new bakery functional foods lead by the Lodz University of Technology and support by FP7.

The establishment of Lodzkie as first bioregion in Poland by the regional parliament follows the Lodz University of Technology, which offered the first university courses on bioeconomy in Poland. Furthermore, 2 of the 13 Polish **research institutes in biotechnology** are situated in Lodz (Bielecki, 2015). Nevertheless at EU scale Lodzkie is defined as poor innovator on a modest-medium level. However, with progressive growth dynamics of innovation based on EUROSTAT innovation indicators (LORIS2030).

Apart from Lodzkie's research and knowledge base, the regional strategy defines the following assets in favour of the bioeconomy: area of high concentration of vegetable and fruit production; food industry created on the basis of agriculture with related research institutes, working simultaneously in favour of agriculture; production centres for building materials, ceramic tiles, household equipment and medicines.

The main strengths of the region are summarised in five sectors (industries). These are:

- modern textiles and fashion
- advanced building/construction materials
- medicine, pharmacy, cosmetics
- energy, including generation of energy from renewable sources
- innovative agriculture and food processing (LORIS 2030).

Biotechnology is supposed to contribute to all these industries as key technology for development.

2.2 Bioeconomy Stakeholders

The **Lodz University of Technology** is among the main driving forces for the bioeconomy in Lodzkie, together with other research and knowledge institutes. The technological university seems to be the hub in the Lodzkie bioeconomy network and well represented in projects and events.

Other public actors also mainly support initiatives and action relevant for the development of the bioeconomy, for example the **Marshall's office of the Lodzkie region** and **regional development agency**. The Lodzkie region is among others

coordinator of all Polish bioregions. Besides Lodzkie Dolnośląskie, Małopolskie, Wielkopolskie, Pomorze and Mazowieckie are bioregions in Poland.

In addition some private actors are relevant for the Lodzkie bioeconomy, mostly grouped in clusters at technology parks.

2.3 Bioeconomy – strategies, plans and projects

Although there are no specific documents for the bioeconomy, different strategies and plans from national and regional levels support the bioeconomy in Lodzkie. The strategies are not aligned and objectives and action points mentioned in the different documents overlap.

At national level sector specific strategies as well as research agendas support the bioeconomy. The sector specific strategies define the development goals for Poland until 2020. They focus on increasing the capacity in three areas: competitive and innovative economy, effective and robust state, showing difference in the development of the regions (Woźniak & Twardowski, 2016). Three related and integrated sector strategies frame the bioeconomy in Poland. These are the **strategy for innovation and efficiency of the economy**, **strategy of energy Safety and environment** and the **strategy for sustainable development of agriculture, rural areas and fisheries** (Stępień, 2016; Woźniak & Twardowski, 2016). In addition, several research agendas support bioeconomy in Poland. The overarching strategy is the **Polish Roadmap for Research Infrastructure** (*Polska Mapa Drogowa Infrastruktury Badawczej*) which defines the specific thematic areas of national smart specialisations (*Krajowe Inteligentne Specjalizacje*) (Klincewicz, 2015). Furthermore, bioeconomy / biotechnology is mentioned in the **strategic R&D programme "Environment , agriculture and forestry "- BIOSTRATEG** by the National Centre for Research and Development (NCRD) (Bielecki, 2015). The programme includes five strategic problems areas, arising directly from the National Research Programme. These areas are: Food safety, rational management of natural resources with particular emphasis on water management; prevention and adaptation of climate change with particular emphasis on agriculture; protection of biodiversity and sustainable development of the agricultural production; Forestry and wood industry.

At regional level the regional innovation strategy for the Lodzkie region – LORIS, is the main driving document for bioeconomy. The first regional innovation strategy has been adapted in 2003 and has been frequently updated ever since. The current innovation strategy LORIS 2030 is the RIS3. In addition the region has taken the initiative to develop a strategy for bioeconomy development (Stępień, 2016). This document is still under development.

3. Bioeconomy Policy Support

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

3.1 General support framework

The stairway to excellence project accessed the governance and general support framework for research and innovation in Poland. The Polish system is on the one hand characterised by high absorption rates of EU funding and high ESIF allocations for research innovations in the 2014–2020 period. Furthermore, there is a strong orientation towards the commercialisation research and development results, fast-track funding decision in research and innovation measures and a good research infrastructure developed in the 2007–2013 programming period.

On the other hand, the Polish general support framework is described as complex, with many different strategies and plans, without clear coordination between national and regional government. Also, there is limited interest of private actors (enterprises) in research and innovation (Klincewicz, 2015).

3.2 Bioeconomy Policy Support

Until 2020 R&D activity in Poland in the area of bioeconomy shall be mainly focused on: 1) strengthening innovativeness and increasing competitiveness of food industry 2) developing technologies for conversion of second generation biomass (residues from food industry, household and municipal waste) into biofuels and raw industrial materials (Bielecki 2015).

The RIS LORIS 2030 sets out the main objectives for policy support in the Lodzkie region until 2030 and assumes a pivotal role for bioeconomy. The main objective of the RIS LORSI 2030 is an analysis of the innovative potential of the Lodzkie region identification of strategic directions and thus to lay a path that will allow Lodzkie to achieve a strong position in the creation of innovation and business development until 2030.

The diagnosis of the region identifies the main assets for regional specialisation (as listed in section 1 of this report) and identified key technology areas. These key technology areas cover existing potential in the region to grow. Four key technological areas are identified, functioning as horizontal themes, supporting all major regional specialisations (industries):

- biotechnology;
- nanotechnology and functional materials;
- communication and information technologies;
- mechatronics.

The expected result of the innovation strategy is an increase in the share of innovative companies in the region and widespread cooperation between science and business.

3.3 ESIF and H2020 resources for the Bioeconomy

The bioeconomy in Poland receives primarily support through Horizon2020 and the ERDF. Other EU funds as well as national and regional funding schemes are limited.

H2020 funds are mostly managed at national level, following the trend of national rather than regional research agendas. Comparing Lodzkie to general use of H2020 in Poland shows Lodzkie as an average region in Poland. For example from the 118 FP7 projects with Polish partners in the field of food, agriculture and fisheries and biotechnology, 14 projects included partners from Lodzkie (Klincewicz, 2015).

By far the largest proportion of FP7 beneficiaries for Lodzkie are from the Higher or Secondary Education sector (*Universytet medyczny w Lodzi* in health activities, *Politechnika Lodzka* in Nanotechnologies), both Poland and FP7 generally have the highest EU contribution accruing to this sector but to a lesser extent than is the case with Lodzkie (Klincewicz, 2015).

ESI funds for the bioeconomy are mostly coming from the ERDF. The multifund ERDF–ESF Operational Programme for the Lodzkie region included two specific objectives relevant for the support to research and development.

- SO1: Increased commercialisation of research and development. EUR 50.913.930² is allocated to this SO which will be monitored against the expenditure on research and development in relation to the total GDP in the region (result indicator)
- SO2: Increased activity of research and development in enterprises. EUR 150.705.892 is allocated to this SO which will be monitored against the rate of private sector investment (gross fixed capital formation in the private sector as percentage of GDP and by the expenditure of enterprises on research and development in relation to GDP (result indicators).

² The total ERDF budget is EUR 1.621.433.387 and the total OP budget is 2.654.175.435

In both interventions are only possible in the regional specialisation as identified in the RIS LORIS2030, meaning possible large investments in the bioeconomy and biotechnology as horizontal aspects of the LORIS2030.

The expected impact of the ERDF support is that it will double the R&D spending in relation to the GDP and increase the share of innovative industrial enterprises to more than 14% and the share of service sector enterprise to more than 20%.

4. Successful Initiatives and Good Practices

This chapter highlights successful initiatives and good practices to promote research and innovation in bioeconomy-related fields. Initiatives and projects in Lodzkie focus mainly on awareness-raising of the bioeconomy opportunities and facilitation of knowledge transfer between research and knowledge centres and enterprises.

4.1 Bioeconomy congress and declaration

The Marshall's office of the Lodzkie region organised annually a bioeconomy congress in the city of Lodz.

The purpose of the Congress is to create a friendly atmosphere around the innovative, effective and competitive approach to activities intended to support the development of bioeconomy. The objective of the Congress is to bring its participants up to date on current strategies and initiatives that enable the development of bioeconomy in the European Union, as well as to intensify the collaboration between regions of Central and Eastern Europe.

Representatives from business circles, regional governments, academic communities, business environment organisations and institutions from Poland and from abroad, are present during these congresses.

The Lodzkie region receives inter alia support from the ERDF for the organisation of the congress. Two concrete actions have been executed for the organisation of the 4th Bioeconomy congress held on 6 and 7 October 2016.

- **Internationalisation of businesses and economic promotion of the region.** The Lodz region initiated a project with a value EUR 1.123.321 (of which 954823 from the ERDF) for economic promotion of the region through the organization and participation in the European Economic Forum, the International Congress of the bioeconomy, Lodzkie Innovation Days, training and the creation of a system of communication and counselling for entrepreneurs.
- **Raising innovation and competitiveness of enterprises.** The Lodzkie region received funding to promote a regional brand ŁÓDZKIE through the use of promotional tools: the International Symposium on Ecohydrology, Biotechnology and Engineering, International Congress of the bio-economy and Lodz Transfer Platform Know. The project had a total value of EUR 133.670 of which EUR 113620 from the ERDF 2007-13.

One of the main results of the last Bioeconomy congress was the adoption of the **Lodz declaration of bioregions** (EBCL, 2016). Central and Eastern European Regions

and stakeholders from companies, academia, NGOs and farmers adopted the Lodz Declaration of bioregions. It is a strategic document for development of the Central and Eastern European Bioregions Forum.

The declaration should support mainly areas in central and eastern Europe, as the majority of these areas have selected bioeconomy in one way or the other in their RIS3 resulting in an estimated EUR 30 billion to be allocated to bioeconomy. The strategy supports to exploit potentials and common problems and challenges of these areas.

The strategy focuses to support the development of so-called biocommunities. Biocommunities are dedicated geographical region (subnational, regional, local) that consider sustainable development. The aim is to develop sustainable circular biocommunities of well-educated local societies living in health and in a healthy environment, with greening industries offering good jobs that may become the foundation for development of the global bioeconomy. The declaration proposes an integrated and multidisciplinary approach for the biocommunities in their promotion and networking activities. It suggest the WBSRC approach – the integration of Water and Biodiversity management, Services (agriculture, land, soil), ecosystem Resilience and Cultural heritage actions. Therewith biocommunities have the potential to unleash the bioeconomy potential, increase R&D and technological capacities. This may be deployed on the base of local sustainable circular bioeconomy value chains and provided with training and education measures aimed at the promotion of sustainable bioeconomy ideas. Prerequisite would be that regions optimise the available funds. For this the declaration mentions primarily ESIF and H2020.

4.2 Polish Technology Platform of Bioeconomy

Polish Technology Platform of the Bioeconomy (PTPB) is a cluster established in 2014 bringing together 70 members from Bioeconomy Industry and Research Institutes from Academia units. The cluster has its headquarters at the Lodz University of Technology Foundation, Lodz University of Technology. The main activity of the cluster is concentrated in the following areas: functional foods, biopolymers and bioplastics, biorefineries and biofuels, maritime bioeconomy, forest bioeconomy and wood-based industries, primary production, biotransformations, the impact on climate and new, bio-based materials used to wrap or protect goods. The main mission of PTPB is:

- networking and events in the bioeconomy
- chance of dynamic development of the bioeconomy
- increase the competitiveness of bioeconomy industry
- integration of intellectual and research potential with bioeconomy plants

- intersectoral integration for the development of the bioeconomy in Poland.

Among others the Polish technology platform of bioeconomy supports the bioeconomy congress and other initiatives in the region, inter alia by supporting in funding applications, mainly from FP7 and H2020.

4.3 ICRI-BioM

The teaming for excellent project “International Centre for Innovative Research on BioBased Material” (ICR–BioM) received EUR 494.375 H2020 funding to prepare a business plan for the establishment of a new centre of excellence in Lodz.

The project is coordinated by the Polish National Centre for Research and Development (NCBR) and has the Lodz University of Technology (TUL) and Max Planck Gesellschaft (MPG) as main partners. In addition the following partners support the project:

- The Max Planck Institute for Polymer Research (MPI–P), Mainz, and
- The Max–Planck–Institute for Biophysical Chemistry (MPIbpc), Göttingen
- Max Planck Innovation (MI)
- University of Lodz (UL),
- Medical University in Lodz (MUL) and
- Centre of Molecular and Macromolecular Studies of the Polish Academy of Sciences (CMMS)

The Centre for Research on Innovative Bio–based Materials will focus on design, synthesis, characterization and practical implementations/applications of advanced materials, exemplified by biomaterials, bio–products and multifunctional smart polymer systems.

The expected result of the centre is a long–term investment in people and research, operating for decades. The new research centre, using existing and future human potential, will allow to conduct highest quality basic and applied research, introduce innovation as well as provide services and training and it will play an important role in breaking existing barriers and promote inclusion into the European Research and Innovation landscape, in cooperation between academia and industry not only in Poland. In the long–term the cooperation via ICRI–BioM is expected to produce the following benefits for the region:

- increase scientific capabilities and innovation performance
- improve chances for seeking competitive funding in international fora
- engage in a strategic growth path
- achieve sustainable scientific and technological excellence
- enrich the European Research Era (ERA) landscape.

Therewith, the ICRI-BioM Centre of Excellence matches the Smart Specialisation Strategy of the Lodz Region in the area of the bio-economy, and aims to significantly enhance the impact of the targeted regional and national investments.

4.4 Master in Bioeconomy, Lodz University of Technology

The Master program in Biotechnology is realized at the International Faculty of Engineering in close cooperation with Faculty of Biotechnology and Food Sciences. The Lodz University of Technology (TUL) is located in Lodz, the third largest city in Poland, being in the very centre of country. The education at the Faculty of Biotechnology and Food Sciences is unique among other Polish technical universities. It is characterized by interdisciplinary nature, which assures preparation of specialists who can combine chemical, biological and engineering/technical knowledge. In response to the current needs of changing labour market, the education is developing and new fields of studies that prepare highly specialized engineering staff are being launched. The offer of the Faculty of Biotechnology and Food Sciences includes four modern fields of studies: Biotechnology, Bioeconomy, Environmental Biotechnology, Food Technology and Human Nutrition, Cosmetics Technology and diploma courses at undergraduate and graduate level, including study programs in English. Currently, only Biotechnology is available in English, but Food Technology and Human Nutrition is in the course of preparation. The programme of biotechnology has been awarded by the Ministry of Science and Higher Education in the "Competition for a million" aimed at the Faculties that base their educational programmes on three firm foundations, namely: the latest knowledge, acquisition of social skills and competencies which are sought by employers and necessary for starting out on one's professional or scientific career. The Faculty has been engaged in the SOCRATES and LLP ERASMUS student exchange programmes since 2000. The students of our Faculty were among the first participants, who studied at foreign universities. Since 2014 under the ERASMUS+ programme, the Faculty has signed 13 contracts with European universities on the student and employee exchange in Austria, Belgium, Holland, Finland, France, Italy and Cyprus.

5. Needs, Gaps and Bottlenecks to Deploy the Bioeconomy

This chapter describes the main needs of the area to further deploy the bioeconomy in the near future, as perceived by the regional stakeholders and in the revised documents. In particular, the gaps and bottlenecks that hamper the development of research and innovation for specific bioeconomy-related business areas are described.

The main development needs to further develop the bioeconomy in the Lodzkie region are described in the LORIS2030 and will be addressed through the support of H2020 and ESIF. Investments from these funding schemes should further develop the research and development in bioeconomy and biotechnology and should foster cooperation and spill-over of knowledge from the academic world to private enterprises.

Nevertheless there is room for improvement. ERRIN (2015) identified limited capacity and awareness of the opportunities of the bioeconomy in industry and SME as one of the main obstacles for further developing the bioeconomy. Furthermore, the lack of finance and lack of attractiveness are identified as obstacles holding back the needed development of the bioeconomy.

According to Bielecki (2015) the development of the bioeconomy in Poland and Lodzkie needs:

- 1) widespread and intense increasing of awareness of the need for a comprehensive approach to biological resources, including agriculture and forestry resources
- 2) creation of mechanisms conducive to their rational use. (Bielecki, 2015).

An integrated approach and supportive mechanisms are needed to find a balance between agriculture for food and feed and the production of biomass. In Poland and the Lodzkie region this is challenged by increasing soil degradation and water imbalances. Therefore more investments could be allocated to the use of residual biomass and eco-biotechnology (Bielecki, 2015)

6. Information Sources

Literature and Documents:

Bielecki, S. (2015) "Bioeconomy in Poland – open opportunities" Presentation for the ERRIN/ERIAF Joint Initiative, Brussels, 19–20 March 2015

EBCL (2016) "Lodz Declaration of Bioregions" Outcome of the bioeconomy congress held in Lodz 6 October 2016. Available at: http://bioeconomy.lodzkie.pl/wp-content/uploads/dekl_en.pdf (Accessed on 12 December 2016)

ERRIN (2015) "ERRIN Bioeconomy mapping or regional Smart Specialisation strategies" Available at: <http://www.errin.eu/content/errin-s3-bio-mapping-consensus-document> (accessed on 11 December 2016)

EURIS (2013) "Inventory of good practiced on open innovation – Bioforum: Central European Forum of Biotechnology and innovative bioeconomy" Report for the INTERREG IVC EURIS project available at: <http://www.euris-programme.eu/en/documents> (accessed on 12 December 2016)

Klincewicz, K. (2015) "Stairway to Excellence country report Poland" JRC Science and Policy report. European Commission Joint Research Centre. Luxembourg: Publications Office of the European Union, 2015

Ludwik, W. & A. Wicka (2016) "Bio-economy in Poland and its importance in the economy" *Proceedings of the 2016 international conference Economic Science for rural development* 41 pp. 219–229

Stępień, W. (2016) "Regional ways of stimulating the bioeconomy – Lodzkie case study" *Presentation at the thematic seminar of the Committee of Regions – Bioeconomy challenges for the EU*, Brussels, 29 April 2016

Woźniak, E. & T. Twardowski (2016) "The current state of bioeconomy in Poland" *The Journal of the Polish Biochemical Society and of the Committee of Biochemistry and Biophysics*. 63 (e-publication https://doi.org/10.18388/abp.2016_1365)

Document RIS3. RIS LORIS 2030

Document Operational Programme ERDF–ESF Lodzkie

Relevant websites:

Polish ESIF project database: <http://www.mapadotacji.gov.pl/>

Interviews and Contact details:

| Name | Position | Institution/ Organisation | Phone | Email | Interview Date |
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