Eco-innovation in Poland

EIO Country Profile
2018-2019
Eco-Innovation Observatory

The Eco-Innovation Observatory functions as a platform for the structured collection and analysis of an extensive range of eco-innovation and circular economy information, gathered from across the European Union and key economic regions around the globe, providing a much-needed integrated information source on eco-innovation for companies and innovation service providers, as well as providing a solid decision-making basis for policy development.

The Observatory approaches eco-innovation as a persuasive phenomenon present in all economic sectors and therefore relevant for all types of innovation, defining eco-innovation as:

“Eco-innovation is any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole life-cycle”.

To find out more, visit [www.eco-innovation.eu](http://www.eco-innovation.eu) and [ec.europa.eu/environment/ecoap](http://ec.europa.eu/environment/ecoap)

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Eco-Innovation Observatory

Country Profile 2018-2019: Poland

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**Summary**

Eco-innovation, leading to cost savings and higher productivity in both production and service-delivery, emerges as one of the key strategic options for the business and policy makers. This opportunity remains largely untapped but increased investments from national and EU sources as well as developing legislative framework should encourage eco-innovation and circular economy initiatives in coming years.

Poland is among countries that have scored persistently low in the European Eco-Innovation Scoreboard since 2010. In the 2019 edition, it came fifth last of the EU eco-innovation ranking with a score significantly below the EU average (59 out of 100). The country underperforms in four out of five scoreboard components, being particularly weak in R&D and innovation investments and early stage investments in green technologies as well as in economic activities related to eco-innovation. Development of eco-innovation in Poland has been slow as the businesses have not been fully able yet to use the potential of the public funding (mostly from EU structural funds) to develop environmental technologies. The potential of eco-innovations is still underestimated. Many companies do not consider eco-innovations as a source of competitive advantage and do not perceive economic benefits of introducing eco-innovative solutions.

The most significant barriers to eco-innovation in Poland are mainly of economic nature, including high cost of implementation, difficult access to capital, uncertain return on investment and the weak system of economic and fiscal incentives encouraging eco-innovation resulting in reluctance of companies to develop eco-innovative technologies. Other problems include insufficient knowledge on potential economic benefits from the implementation of an eco-innovation. Several opportunities were also identified, the most important being significant investment from EU and national sources in form of Operational Programmes and national priority programmes. Other opportunities include recently adopted and expected national regulations as well as an expected increase in market demand for environmental innovations.

In recent years, Poland started to develop a more comprehensive policy approach to support the development and implementation of eco-innovative technologies and circular economy models. This includes a project of the Roadmap of Transformation towards Circular Economy adopted by the Council of Ministers on September 19th, 2019 which proposes numerous actions to foster the development of circular economy in Poland, in particular addressing the areas of sustainable industrial production, sustainable consumption, bio-economy, and new business models. In this framework, current legislation will be analysed and modifications will be proposed to increase the implementation of circular economy in Poland. Other significant instruments which were recently adopted include the National Action Plan for Sustainable Public Procurement 2017-2020, an act on support to innovation followed by two laws on innovation that increase the public R&D funding effort, as well as a set of regulations and programmes to support development of electromobility in Poland.

The development and implementation of eco-innovative technologies are supported by the objectives of key national and regional strategy documents related both to the environment as well as innovation. In addition, environmental technologies and innovations in this field are largely supported in the framework of the national and regional smart specialisations introduced in 2014. They include topics relevant for eco-innovation and circular economy, such as waste reduction, preparation for re-use and recycling, sustainable transport, energy-efficient construction, energy production technologies based on renewable energy sources,
water efficiency technologies, cleaner production processes, biotechnologies and bio-based products as well as material substitution.

While Poland may expect improvements in eco-innovation investments and activities in the coming years, the overall shift towards a more resource-efficient economy will require lasting systemic innovation efforts. Implementing eco-innovation should be seen as an economic opportunity rather than a cost. With its considerable cost savings and market creation potential, eco-innovation can add new vigour to the process of socio-economic transformation in Poland.
Introduction

The Polish economy is still among the least resource-efficient economies in the EU. Poland had one of the highest economic growth rates among the EU countries (in 2006-2017, the average annual growth was 3.9% which is significantly above the average of 1.2% in the EU). Yet, Poland ranks relatively poorly in energy- and carbon-efficiency. One of the factors explaining this performance is the significant dependence on coal in electricity production. The share of industry in GDP is higher than the average in the EU (23.4% vs. 17.4%, 2016). In 2004-2016, the average annual growth rate of industrial production was 5.3% in Poland and 0.5% in average in the EU (Circular economy Roadmap 2018).

Poland considers the pressing need to adapt to climate change, with the development of appropriate adaptation plans for sectors and areas sensitive to climate change and implementation of adaptation actions at national and local level. In recent years Poland elaborated the National Adaptation Strategy 2020 in response to global and European frameworks (such as the Conference of Parties, EU White Paper\(^1\)). In addition, in 2017 the Ministry of Environment launched the development of Urban Adaptation Plans for 44 largest Polish cities.

Waste management plans have been updated and reconsidered to include waste management hierarchy principles and plan the necessary investments. Poland has introduced several laws related to waste in order to transpose different EU directives, with latest amendments in 2018 and 2019. Moreover, the organisation of the new system of waste management is being gradually set up; in 2019 a new Regulation Act against food wastage was adopted.

In addition, water and wastewater management are being addressed as particular challenges are emerging with the new Law on Water entered into force in 2018, which introduces the principle of recovery of the costs of water services, in accordance with the Water Framework Directive.

The management of raw materials reserves is being addressed by the development of an effective policy to secure supply of raw materials and manage available resources; in this regard, the inter-ministerial team issued a project of the State’s Raw Materials Policy\(^2\) and Productivity Strategy which aims to ensure sustainable management of raw materials and outline directions that the investment policies in this field should take.

Although the R&D intensity is relatively low, the EU and foreign funds remain an important source of funding and complement the domestic expenditure on R&D. Since 2007, Poland has also improved its excellence in science and technology, while focusing on key technologies relevant to industry. Some of them include eco-innovative solutions, particularly in the area of energy efficiency and waste management.

Concentrating public intervention on improving both labour and resource productivity could offer the Polish economy both a competitive advantage and environmental benefits in the medium and long term. Eco-innovation should be thus considered among the major societal, economic and technological innovations, rather than being associated mostly with the curative environmental technologies.

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\(^1\) “White Paper: Adapting to climate change: Towards a European framework for action” published by the European Commission on 1 April 2009

Although the overall picture is still rather challenging, the trends indicate a considerable economic opportunity in modernising the production processes across various economic sectors, notably in most energy- and resource-intensive sectors in Poland. Eco-innovation, leading to considerable cost savings and higher resource productivity in both production and service-delivery, emerges as one of the key strategic policy options for the country.
1 | Eco-innovation performance

The analysis in this section is based on the EU 28 Eco-innovation Index (EcoI Index) for the year 2019. The Eco-innovation index demonstrates the eco-innovation performance of a country compared with the EU average and with the EU top performers. EcoI Index is a composite index that is based on 16 indicators which are aggregated into five components: eco-innovation inputs, eco-innovation activities and eco-innovation outputs as well as environmental outcomes and socio-economic outcomes.

Poland is among the countries scoring persistently low in the European Eco-innovation Scoreboard since 2010. In the 2019 edition, Poland ranked 24th among the EU countries with a score of 59, significantly below the EU average of 100. The overall low score in the index, especially in terms of eco-innovation inputs and activities, reflects the low innovativeness of the country in general.

![Figure 1 EU28 Eco-innovation Index 2019, composite index](image)

It should be highlighted that Poland’s low score in the eco-innovation index as presented below may be underestimated and not always objective mainly due to availability of data as it can be difficult to measure the level of eco-innovation in the country.

Poland performs significantly below the EU average in four out of five scoreboard components. The country performs particularly weak in terms of eco-innovation activities and inputs, including R&D personnel and the early stage investments in green technologies. The private early stage green investments have been among the lowest in the EU, with levels similar to the countries in Central and Eastern Europe. The strongest area of innovation is the field of socio-economic outcomes with the score largely exceeding the EU average and placing Poland first in the ranking, mainly due to relatively high percentage of employment in eco-industries and circular economy (in total employment across all companies).
Figure 2 Five components of the Eco-innovation index for Poland, 2019

Source: EIO, 2019
Figure 3 All indicators of the Eco-innovation index for Poland, 2019

- **Eco-innovation input**
  
  Government environmental and energy R&D appropriation and outlays in 2018 amounted to 0.02% of the total GDP. In addition, 1.01% of the total employment in Poland in 2018 is related to research and development, while the EU average is 1.48%.

  This score is mainly deteriorated by a very low value of green investments reported during the period 2014-2017.

- **Eco-innovation activities**
  
  The Eco-innovation activities index has a score of 60, showing a net increase to the 2017’s score of 17. The low score of Poland is due to the relatively low value of SMEs registered with the ISO 14001 norm. In fact, Poland counts 77 organizations with the ISO 14001 registrations per mln pop, while the EU average is at 172.

  Regarding firm’s involvement in eco-innovation, 0.17% of small and medium enterprises have implemented sustainable products in 2017, when the EU average is 0.25%.

- **Eco-innovation output**
  
  Poland has an average score of 70 in terms of eco-innovation output. The value increased from the last period by 17 points. Poland performs below the EU average in eco-innovation related patents with 10.48 patents per million inhabitants produced in 2016, which is comparable to the result achieved by Slovenia. It should be noted that the process of patenting is considered too expensive and time consuming by many companies.

  In terms of eco-innovation related publications, Poland performs poorly with only 5.58 publications per million inhabitants in 2018, having decreased from 8.48 in 2016. The low score might be due fact that this indicator considers only academic publications, while the...
number of articles, not strictly academic, related to eco-innovation published in Poland should be much higher.

The media interest for eco-innovation in 2019 is not high compared to the top 10 EU performers, however it is still much higher than in more than half of the EU countries, with 58,07 hits per million population.

- **Resource efficiency outcomes**

  The resource efficiency outcomes index is based on combined national statistics on domestic material productivity, domestic water productivity, inland energy productivity, and GHG emissions intensity. With 32 points for this component, Poland is very low in the ranking.

  It is explained in particular by a persistently low material productivity, expressed in GDP per domestic material consumption, with 1,14 €/kg compared to the EU average of 2,28 €/kg, and low water footprint performance with a water productivity of 69€/m³. In terms of energy productivity (GDP generated by domestic energy use), Poland ranks not far from the EU average with 7,93 €/tonne in 2018, showing a decrease compared to the 9,66€/tonne of oil equivalent in 2015.

  Finally, GHG emissions intensity amounts to 0.50 tonnes of CO₂ per GDP in 2017, ranking among the countries with the highest GHG emissions generated per unit of GDP, similarly to the situation in 2015.

- **Socio-economic outcomes**

  Poland has a socio-economic outcome index of 95, showing a decrease compared to 2016 (Index of 145). The score is particularly high for the size of the eco-industry and circular economy sectors as it accounts for 2,02% of total revenue across all companies in 2017, which is higher than the EU average that stands at 1,74%.

  Employment in eco-industries and circular economy indicates that 1,02% of total employment is represented by these sectors in 2017. In addition, the eco-industry exports from Poland amounted to 1346 million EUR and represented 0,60% of all exports, but still below the EU average where eco-industry exports accounts for 0,70% of all exports.

  While improvements in eco-innovation inputs and activities can be expected in the coming years, the improvement of resource efficiency outcomes would require lasting systemic innovation efforts before any substantial improvements become visible in statistics. The relatively poor performance is caused by many structural factors rarely associated with the natural environment (e.g. science-industry collaboration, absorption capacity of SMEs, insufficient economic and fiscal incentives, etc.).
2 | Selected circular economy and eco-innovation areas and new trends

2.1 Digitalization and circular economy

The circular economy of Poland has been strongly enhanced by the digitalization of the economy. In fact, by modernizing communication tools and sharing knowledge on sustainability on digital platforms, eco-innovation trends have emerged in a dynamic and interactive way. An example of a digital initiative developed by the Polish company Seedia is provided in the box below.

Seedia

Seedia provides smart ecological furniture that is powered by renewable energy. This polish start-up implements electric plugs in public urban places such as benches, trash, kiosk, bus shelters, etc. Their mission is to design for Smart Cities modern and innovative usable objects of small architecture powered by solar energy. Their initiative received the recognition of many awards, including the Orange Fab Best Startup 2018 and was a finalist in the Urban Environment no 8 contest Smart City Expo in Barcelona.

Keywords: Solar energy, digital connection, urban
Website: https://seedia.city/
Contact: artur@seedia.city

2.2 Resource efficiency

Poland is the largest consumer of fossil fuels for energy generation and transport purposes in Europe, with as much as 90% of the country’s energy demand being met with fossil fuel sources. In 2017, the total primary energy consumption was 103.9 Mtoe and was higher in relation to the previous year. Among primary energy carriers in 2017, hard coal and lignite held a dominating position (51.9% of total consumption).

Poland’s economy is still more than twice as energy intensive as the EU average, with a low share of energy from renewable sources. In 2017, the share of renewable energy in gross final energy consumption was 10.9%, which is indicative of a decrease in relation to the previous year by 0.4% and growth in comparison with the year 2004 by 4 percentage points.

However, some businesses have started to enhance a green energy transition. The above-mentioned strategic research programme implemented by the National Centre for Research and Development in the last 10 years included eco-innovation in clean energy technologies especially referred to the European Union targets (clean coal technologies, energy efficiency
in buildings, smart grids, renewable energy, energy storage etc.). Moreover, Poland is one of the leading EU countries in developing clean public transport. The share of low and zero emission buses in Polish buses depots has been gradually increasing. The world known low and zero-emission Solaris was established by local investors (but was sold to foreign investors in 2018). The success of Solaris attracted other foreign investors on the manufacturing of foreign investors that set up factories in Poland, like Volvo and Man. The National Centre for Research and Development has started setting out a strategic programme “New energy technologies” as one of the elements of the National Research Programme.

Moreover, different technologies are used: hybrids, electric hybrids (with plug-in battery), full electric buses, trolleybuses, and also buses on gas fuel (Compressed Natural Gas and Liquefied Natural Gas). Hydrogen buses are not yet in use in all Polish cities.

- **Prognosis**: Based at Science and Technology Park Poland-East in Suwalki, Prognosis has developed state-of-the-art software able to accurately forecast electricity consumption and costs to select the most favourable tariffs for public institutions and private companies of all sizes.

**Digital innovation for energy efficiency**

Prognosis's remote energy meter reading system uses wireless technology to provide customers with up-to-date, exhaustive data from their meters in the form of easy-to-read charts and reports. They can view these reports and monitor their energy consumption 24 hours a day via an online application accessible from any web browser and portable devices.

The system sends customers immediate e-mail or SMS alerts regarding optimal tariffs and enables them to adjust their contracted electricity capacity to avoid fines for exceeding it. Prognosis offers comprehensive energy management diagnostics and audits and can quickly pinpoint the most energy-intensive aspects of an organisation’s activity. This can support customers in making upgrades to their electricity infrastructure, leading to further savings of up to 15%.

Finally, as well as benefiting customers, the technology has allowed Prognosis to achieve sales revenues of over approximately EUR 330 000 (PLN 1.4 million) and create seven full-time equivalent jobs.

EU funding supported its creation and helped prognosis implement a business model to commercialise the product and related services on domestic and international markets.

**Keywords**: Digitalization, energy efficiency, cost reduction


### 2.3 Waste management

Poland ranks third in the EU in terms of material consumption, but its material efficiency is 3,5 times lower than the EU average. The country generates different amounts of waste, but compared with the EU average a smaller fraction is recycled.

However, while the level of waste recovery (including recycling and energetic use) in Poland and Europe is still low, Poland’s waste management performance is gradually improving. One year after the adoption of the Circular Economy Action Plan, the European Commission reports on the implementation of key initiatives and progress made in this area in Poland. For example the following eco-innovation initiatives have been implemented.
Selena Labs has experience in implementing projects based on products of biological origin (BIOMOTIVE project) [https://www.bbi-europe.eu/projects/biomotive](https://www.bbi-europe.eu/projects/biomotive).

The West Pomeranian Chemical Cluster Green Chemistry (Poland) has implemented the BIOPEN project [https://bbi-europe.eu/projects/biopen](https://bbi-europe.eu/projects/biopen).

Other initiatives such as the clothing industry LPP undertake concrete action for the transition.

A sustainable and circular fashion industry

LPP is a Polish clothing manufacturer that has been adapting to the environmental challenge of the clothing industry. The philosophy of LPP is local thinking and global action in an eco-innovative manner.

Since 2017, they have been implementing the Sustainable Development Strategy LPP based on 4 pillars:

- Product, employees, environment and principles.

The Polish clothing manufacturer has committed itself by 2025 to using plastic packaging that meets one of the following criteria: 100% reusable, recyclable or compostable.

“Joining the global agreement for rational plastic management and elimination of plastic waste means taking radical actions in a relatively short time. At the same time, it is a signal of upcoming changes in all LPP brands. New commitments to environmental protection will become the foundation of our development strategy for the coming years” - Marek Piechocki, President of LPP.

Keywords: Circular fashion industry, responsibility, modernization


2.4 Bioeconomy

Bioeconomy is one of the 4 areas of focus of the Polish Circular Economy Roadmap³ (the other 3 being waste, education and promotion and business models). The bioeconomy refers to all sectors of the economy which produce, and process biological resources derived from plants, animals and microorganisms. Poland’s bioeconomic potential is enormous, with 14.6 million hectares of agricultural land and 9.2 million hectares of forests covering over 76% of the country’s territory. Besides, according to the Central Statistical Office in Poland, the potential

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of the bioeconomy is estimated at about PLN500 billion (around EUR 125 billion) and over 3 million jobs. Poland ranks third in the EU in terms of its biomass production volume, but its bioeconomy sector is characterized by low productivity, with related industries still at nascent stages.

To this end, a number of strategic initiatives to support innovation on bioeconomy in the country have been established. These include the regional Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy (BIOEAST). It offers a shared strategic research and innovation framework for working towards sustainable bioeconomies in the Central and Eastern European (CEE) countries. BioEastSUp is a H2020 project anchored on BIOEAST bioeconomy by 2030. BIOEASTSUp brings together different government stakeholders with the 11 CEE countries accenting their respective national government agendas, the agri-food sector and support for the national bioeconomic strategies. Specifically, the project aims to trigger strategic thinking at governmental level and transnational peer-to-peer development of national circular bioeconomy strategies in BIOEAST countries. It also encourages multi-stakeholder and multi-actor approaches to develop new value chains to support bioeconomies. Eventually, the project will facilitate evidence-based policy making.

2.5 Circularity

Circularity in the EU is measured as the ratio of recovered materials to domestic material consumption (Chart 14). The Material Circularity Index for Poland was 12.5% in 2014, i.e. 1 percentage point above the EU average. Despite Poland’s relatively high position compared with other European countries, it still lags far behind the leaders (e.g. the Netherlands). Factors contributing to a low degree of circularity include a high share of fossil fuels (used as energy sources) in domestic consumption (recoverable resources being far smaller than those used as process inputs), and high consumption of non-metallic minerals to accumulate infrastructural stocks (such as buildings or other durable goods, which remain ‘frozen’ for a long time).

In 2019 Polish Government launched a “oto-GOZ project” which will develop a set of measurement indicators (the so-called CE indexes), enabling the assessment of the progress in the transformation towards a circular economy (CE) and the assessment of the impact of a circular economy on the social and economic development on the regional and national level. The project is implemented by the Consortium led by the Ministry of Economic Development and the other partners are: the Institute of Mineral Resources and Energy Economy of the Polish Academy of Sciences, the Central Statistical Office and the Cracow University of Economics.

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3 | Barriers and drivers to circular economy and eco-innovation in Poland

3.1 Drivers for eco-innovation

Societal:
- Consumer demand is drastically shifting towards more sustainable products putting pressure on the producers to transition towards a greener economy.

Economic:
- Willingness to reduce operating costs, such as cost of energy including charges under the EU GHG emission trade scheme, water and materials
- Incentives generated by existing and prospective environmental regulations, environmental taxes, charges or fees, as well as voluntary initiatives for environmental good practice within the sector
- Government grants, subsidies or other public financial incentives for introducing innovations with environmental benefits

Business competitiveness:
- Willingness of companies to access new markets and increase of competitiveness and through reduced operating costs and improved company reputation
- Current or expected market demand for environmental innovations, even if for the majority of companies their customers do not perceive yet the environmental benefits of their purchasing decisions
- Need to meet requirements for public procurement contracts

Political incentives:
- Eco-innovation and circular economy policy measures are to a great extent financed through the EU Cohesion Fund and the Regional Development Fund: Operational Programme Smart Growth 2014 – 2020\(^5\), Operational Programme Infrastructure and Environment 2014 – 2020\(^6\) and priority programmes of the National Fund for Environmental Protection and Water Management.
- Planned increase in overall R&D budgetary expenses – expected 2% GDP by 2020 as part of the National Plan for Sustainable Development.
- Change of the public procurement law creating more favourable environment for innovation, with the price criterion attributed only 60% in the total score of the bid.
- Encouraging the entrepreneurs to change their business models by providing adjustable tools (financial, advisory, etc.) and ensuring a good environment for investments.

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• Support the decrease of environmental footprint in the production sector by supporting financially the R&D and uptake of innovative solutions.

Capacity building:
• Initiatives that aim to educate, train, inform and transfer knowledge on eco-innovation in all sectors (e.g. the Innovation Network in Agriculture and Rural Areas enhance agriculture innovation).

3.2 Barriers for eco-innovation

Consumer side
• Prioritizing other aspects of life over the environment: If the environmental impacts of waste are of secondary importance to some people, they are not likely to sort waste given that they do not consider the benefits of sorting worth the time required.
• Limited access to reliable information and lack of trust between the seller and buyer. When buying consumer goods, we need information about the origin and entire life cycle of a product, hence influencing our consumption choices.

Business side
• Lack of knowledge about sustainable solutions and missing qualified specialists to advise business on access to sustainable investment, the relatively high cost of eco-innovative technologies, including testing the technologies. The most significant barriers faced by companies that implement eco-innovation were of economic nature.
• Insufficient research effort, weak industry-science links, as well as insufficient participation of the higher education system in enhancing innovation and eco-innovation.
• The greatest challenge for improving the innovation level of the Polish economy is to improve cooperation between universities and business, in particular SMEs. While large companies are more willing to cooperate with universities and are thus more likely to innovate, SMEs are reluctant to do so and to co-operate among themselves due to a lack of trust, as well as a lack of incentives to innovate.
• Insufficient awareness of companies about benefits (including financial benefits) from implementing eco-innovative solutions and reluctance to take the risk of adopting eco-innovations.
• Insufficient awareness of customers about benefits from eco-innovative technologies. Companies would be interested in implementing eco-innovations; however, the demand is limited, and customers often do not consider environmental benefits when making purchasing decisions.
• Public procurement law and practices in Poland do not prioritise innovation in the selection criteria. The requirements set in the new National Action Plan for sustainable public procurement 2017-2020 published in 20177 are not binding.
• The business sector in Poland is increasingly driven by SMEs that cannot afford significant R&D expenditures, but they can be very flexible in terms of market offer. Increasing innovation and competitiveness in sectors with low added value requires intensive cross-sector cooperation between the companies and a promotion of an

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environment conducive to the diffusion of knowledge at the national level. An important element would be the implementation of the innovation support program, based largely on EU funds, targeting SMEs in particular as they often lack resources to cope with the submission of applications for co-financing.

Polish Ministry of Climate recognised the need to remove regulatory barriers and to provide incentives to support innovative business models in the area of circular economy.
4 | Policy landscape in Poland

4.1 Strategic policy framework

Poland has already made the first steps on its way towards implementing the circular economy concept. Developed between 2015 and 2018, the Roadmap toward circular economy sets out a strategy to reach the goal. The proposed roadmap is an attempt to set key action areas for Poland and identify projects that would involve a wide range of stakeholders facilitating Poland’s transition from the linear to the circular economy. It identifies five priority areas along with respective sub-areas and proposes actions within each of them.

For example, a pilot program of the Ministry of the Environment and the National Fund for Environmental Protection and Water Management has been implemented in three regions of Poland. Municipalities, as well as business owners and individuals operating within a given municipality, could apply for as much as 45 million zloty in non-refundable grants or preferential loans to be used for investment projects involving:

- Local waste recycling facilities
- Circular economy in households
- Environmentally friendly transport, with a particular focus on public transport
- Circular economy in agriculture or agricultural product processing
- Energy efficiency

Educational efforts aimed at building knowledge and shaping social attitudes, building formal and informal leadership, as well as experience and good practice sharing, are also obligatory elements of the programme.

Earlier in May 2016, the Council of Ministers established the position of Government Representative for The State’s Raw Materials Policy, which aims to develop the concept of the country’s raw materials policy and provide instruments for its implementation.

Engaged in an international collaboration for climate action, Poland has hosted some high-level events surrounding environmental issues and circular economics, for example:

- Poland hosted the UNFCC COP24 EU Side-Event on “Circular economics and resource efficiency” in 2018.
- In June 2018, in Kraków, the Ministry of Science and Higher Education, in cooperation with the OECD, organized a workshop entitled "The role of the Ministry of Science and Higher Education in the development of the Polish economy". It was organized as part of the participation of the Ministry of Science and Higher Education in the work of the Working Group on Biotechnology, Nanotechnology and Converging Technologies (OECD BNCT).

2.6 Policy instruments, measures, programmes

Waste management:

EU member states agreed that in order to reuse and recycle municipal waste, 55% of the waste should be processed by 2025, 60% by 2030 and 65% by 2035. Poland’s waste management system introduced fees for waste management and building new installations for waste treatment. As a result, the amount of collected municipal waste rose by 7.3% in 2016 over the previous year, according to the state statistics office, and 27.8% of the collected communal waste was recycled.
Research and Development

Research and development activity (R&D) play an important role not only in economic growth but also in the economy greening process. This is because, apart from driving innovation and economy competitiveness forward, it can encourage, among others, activities aiming at improving efficiency of resource use in the economy or reducing a negative impact of human activity on the environment. In 2018, gross domestic expenditures on R&D activity amounted to 25.6 billion PLN and increased by 24.6% in relation to 2017 and more than five times compared to 2000.

Activities to protect the environment so as to restore or maintain environmental sustainability require financial means. In 2018, within expenditures on fixed assets for environmental protection it was spent as much as 7.9 million PLN on research and development activity in Poland. They were 56.1% lower than in the previous year and constituted 0.1% of total expenditures on fixed assets for environmental protection.

In 2018, the European Patent Office granted 30 patents in environment-related technologies to Polish residents, i.e. it was the highest score since 2000. These patents constituted 9.8% of the total number of patents granted to Polish residents. In relation to the previous year and 2000, their share increased by 1.7 and 0.2 percentage points, respectively.

Research to support eco-innovation is conducted by various universities. Notably, the Centre for Anthropogenic Minerals Engineering, a unit of the Warsaw University of Technology’s Institute for Applied Research, has conducted research into waste and by-product anthropogenic minerals. The study focused on efficient and comprehensive use of natural raw materials, including potential methods of their processing as part of waste-free coal-fired power generation, the coal combustion technology used by power plants, and its impact on the physical and chemical properties of anthropogenic minerals.

Green technology

Green Technology Accelerator (GreenEvo) is an innovative project of the Ministry of Climate financed by the National Fund for Environmental Protection and Water Management. The aim of the project is both to promote the development of green technologies offered by Polish entrepreneurs and to stimulate the transfer of these technologies within Poland and abroad.

In 2018, the Ministry of Climate, after a 2-year break, resumed the implementation of the GreenEvo program—Green Technology Accelerator. In accordance with the rules and regulations, the subject of the 7th edition of the program was to select active winners of the previous six editions of the GreenEvo competition. The objective was to use the potential of proven innovative Polish environmental technologies and provide them with substantial preparation in the field of foreign technology transfer and the opportunity to present the winning technological solutions at international promotional events. Thirty-four participants took part in the 7th edition of the competition and thirty-three laureates were selected from six areas of green technologies covered by the program, such as: renewable energy sources, solutions supporting energy saving, technologies conducive to climate protection and air quality, waste management, water and sewage technologies as well as technologies supporting biodiversity conservation. In 2019, the laureates took part in trainings for the international expansion, and they also took part in trade missions to India and China, promoting their technologies globally.

Political regulation

EMAS – Eco-Management and Audit Scheme is a European Union environmental protection management system integrated with ISO 14001 – the environmental quality management. Organisations that are willing to achieve best results in improving natural environment
protection can participate in the scheme voluntarily. In the years 2007–2016 their number was constantly growing. In 2017, the number decreased by 7.1% compared to the previous year. In 2018, according to the data of the General Directorate for Environmental Protection, 69 organisations were registered in the EMAS register, which means an increase by 6.2% in comparison to 2017. Organisations in the EMAS system in Poland constituted 1.8% of their total number in the EU Member States, and their sites 2.8% of total number of the sites in the EU.

Green public procurement is an important instrument to encourage entrepreneurs to produce new, greener products and to deliver services that take into account environmental aspects. According to the data provided by contracting authorities to the Public Procurement Office, in 2018, 1.4 thousand green public procurement contracts, i.e. taking into account environmental aspects, were awarded. Their share in the total number of public procurements was 1% (chart 37). The total value of green public procurement (excluding value added tax) amounted to 9.3 billion PLN, i.e. 4.6% of the total value of public procurement awarded.

Financial regulations

In 2017, outlays on fixed assets for environmental protection amounted to 6.8 billion PLN, which is an increase in relation to 2016 and 2000 by 4.7% and 3.9%, respectively. In 2017, their share in relation to GDP equalled 0.3%.

In the same year, economic entity own funds were prevailing in the financing structure and amounted to 63.9% of the total outlays on fixed assets for environmental protection. The next financing sources were, among others, funds from abroad (12.1%), ecological funds (9.7%), domestic credits and loans (7%). The majority of financial means were allocated to wastewater management and protection of water (39.8%), protection of air and climate (33.9%) as well as waste management (12.7%).

Households also incur expenditures on environmental protection. They are not subsidised and as a whole constitute a burden on a household budget. In 2017, the expenditures amounted to 19.2 billion PLN. Calculated per capita they equalled 500.1 PLN and were higher than in 2016 and 2000 (by 2.6% and 23.4%, respectively).

In 2017, revenues from environmental taxes amounted to 53.4 billion PLN and constituted 7.7% of total revenue from taxes and social contributions (chart 29). They were lower in relation to the previous year (by 0.2 percentage points), but higher than in the year 2000 (by 1.3 percentage points). In 2017, the ratio of environmental taxes to GDP was 2.7% and did not change compared to the previous year but increased in relation to 2000 (by 0.5 percentage points). Among environmental taxes, the major fiscal impact exerted energy taxes, which contributed 86.9% of revenue from environmental taxes, and transport taxes which contributes 8.5% of the revenue.
The ING group is strongly committed to financing green projects and is one of the European leaders in such financing.

Keywords: Green financing, shaping the circular market, incentives for businesses

Link: https://www.ing.pl/
REFERENCES


## ANNEX: Policy strategies and instruments

### Table A1: National Policy strategies

<table>
<thead>
<tr>
<th>Name of the policy document (strategy, action plan, roadmap)</th>
<th>Relevance for eco-innovation</th>
<th>Relevance for Circular Economy</th>
<th>Relevance for the innovation chain</th>
<th>Input and process targets</th>
<th>Outcome and impact targets</th>
<th>Relevant implementation or governance system</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Roadmap toward circular economy</td>
<td>Cross-cutting</td>
<td>Cross-cutting</td>
<td>Five priority areas along with respective sub-areas with actions within each of them.</td>
<td>Reaching Poland’s objective to transition from linear to circular economy.</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>2 Government Representative for The State’s Raw Materials Policy</td>
<td>Cross-cutting</td>
<td>Cross-cutting</td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

### Table A2: Policy instruments and measures

<table>
<thead>
<tr>
<th>Category</th>
<th>Name of instrument</th>
<th>Overall relevance for eco-innovation</th>
<th>Relevance for CE</th>
<th>Relevance for the innovation chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct financial support for eco-innovation</td>
<td>Pilot Program of the Ministry of the Environment and the National Fund for environmental protection and Water Management</td>
<td>Municipalities, as well as business owners and individuals operating within a given municipality, could apply for as much as 45 million zloty in non-refundable grants or preferential loans to be used for investment projects</td>
<td>Project will have to involve local waste recycling facilities, circular economy in households, environmentally friendly transport, circular economy in agriculture or agricultural product processing. 45 million zloty in non-refundable grants or preferential loans</td>
<td>Local waste recycling facilities, Circular economy in households, Environmentally friendly transport, with a particular focus on public transport, Circular economy in agriculture or agricultural product processing, Energy efficiency</td>
</tr>
<tr>
<td>Category</td>
<td>Name of instrument</td>
<td>Overall relevance for eco-innovation</td>
<td>Relevance for CE</td>
<td>Relevance for the innovation chain</td>
</tr>
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<td>-------------------------------------------------------------------------</td>
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<tr>
<td>Innovation vouchers</td>
<td></td>
<td></td>
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<tr>
<td>Loans and credits</td>
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<tr>
<td>Publicly co-funded venture capital funds (e.g. start-ups)</td>
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<tr>
<td>Fellowships and postgraduate loans and scholarships</td>
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<tr>
<td>Equity financing from public banks</td>
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<td></td>
</tr>
<tr>
<td>Other (indicate)</td>
<td>Gross Domestic Expenditures on R&amp;D activity amounted to 25.6 billion PLN in 2018 and increased by 2.5% in relation to 2017 and more than five times compared to 2000.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Indirect support for eco-innovation**

<p>| Tax incentives/relieves for eco-innovation (businesses, R&amp;D activity)    |                                                                                     |                                     |                 |                                   |
| Tax relief for consumers adopting/ purchasing green technology/products  |                                                                                     |                                     |                 |                                   |
| Taxation of environmentally harmful technologies                         |                                                                                     |                                     |                 |                                   |
| Regulations, targets                                                    |                                                                                     |                                     |                 |                                   |
| Green public procurement                                                | Polish Green Public Procurement                                                      | Instrument to encourage entrepreneurs to produce new, greener products and to | Cross-cutting  | Cross-cutting                      |</p>
<table>
<thead>
<tr>
<th>Category</th>
<th>Name of instrument</th>
<th>Overall relevance for eco-innovation</th>
<th>Relevance for CE</th>
<th>Relevance for the innovation chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand subsidies (e.g. eco-vouchers/subsidies for green products)</td>
<td></td>
<td>deliver services that take into account environmental aspects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labeling, certification, standards</td>
<td>Eco-Management and Audit Scheme is a European Union environmental protection management system</td>
<td>Organisations that are willing to achieve best results in improving natural environment protection can participate in the scheme voluntarily</td>
<td>Cross-cutting</td>
<td>Anything related to environmental quality management (ISO 14 001)</td>
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<tr>
<td>Debt guarantees and risk sharing schemes</td>
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<tr>
<td>Training, advisory, information support, awareness raising</td>
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<tr>
<td>Technology transfer and business advisory services</td>
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<tr>
<td>Business incubation/accelerations</td>
<td>Green Technology Accelerator (GreenEvo)</td>
<td>The aim of the project is both to promote the development of green technologies offered by Polish entrepreneurs and to stimulate the transfer of these technologies within Poland and abroad.</td>
<td>Cross-cutting</td>
<td>Cross-cutting</td>
</tr>
<tr>
<td>Eco-innovation challenges, prizes, awards</td>
<td>GreenEvo</td>
<td>Competition to use the potential of proven innovative Polish environmental technologies and provide them with substantial preparation in the field of foreign technology transfer and the opportunity to present the winning technological solutions at international promotional events</td>
<td>Cross-cutting</td>
<td>Renewable energy sources, solutions supporting energy saving, technologies conducive to climate protection and air quality, waste management, water and sewage technologies as well as technologies supporting the biodiversity conservation</td>
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<tr>
<td>Training for companies, consumers,</td>
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<tr>
<td>Public awareness campaigns, platforms, and outreach activities</td>
<td>UNFCC COP24 EU Side-Event on &quot;Circular economics and Resource efficiency&quot; (2018)</td>
<td>Share knowledge and issues related to eco-innovation in an international perspective</td>
<td>Cross-cutting</td>
<td>Cross-cutting</td>
</tr>
<tr>
<td>Category</td>
<td>Name of instrument</td>
<td>Overall relevance for eco-innovation</td>
<td>Relevance for CE</td>
<td>Relevance for the innovation chain</td>
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<tr>
<td>other</td>
<td>Workshop organized by the ministry of Science and Higher Education in cooperation with the OECD (2018)</td>
<td>Topic on &quot;Building a biomass innovation ecosystem in a circular bioeconomy in Poland&quot;</td>
<td>Cross-cutting</td>
<td>Cross-cutting</td>
</tr>
<tr>
<td>Collaborative platforms and infrastructure</td>
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<tr>
<td>Clusters, networks, platforms (e.g. industrial symbiosis platforms)</td>
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<tr>
<td>Dedicated support to new research infrastructure (piloting facilities)</td>
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<tr>
<td>other</td>
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</tbody>
</table>
About the Eco-Innovation Observatory (EIO)

The Eco-Innovation Observatory (EIO) is the initiative financed by the European Commission’s Directorate-General for the Environment. The Observatory is developing an integrated information source and a series of analyses on eco-innovation trends and markets, targeting business, innovation service providers, policy makers as well as researchers and analysts.

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