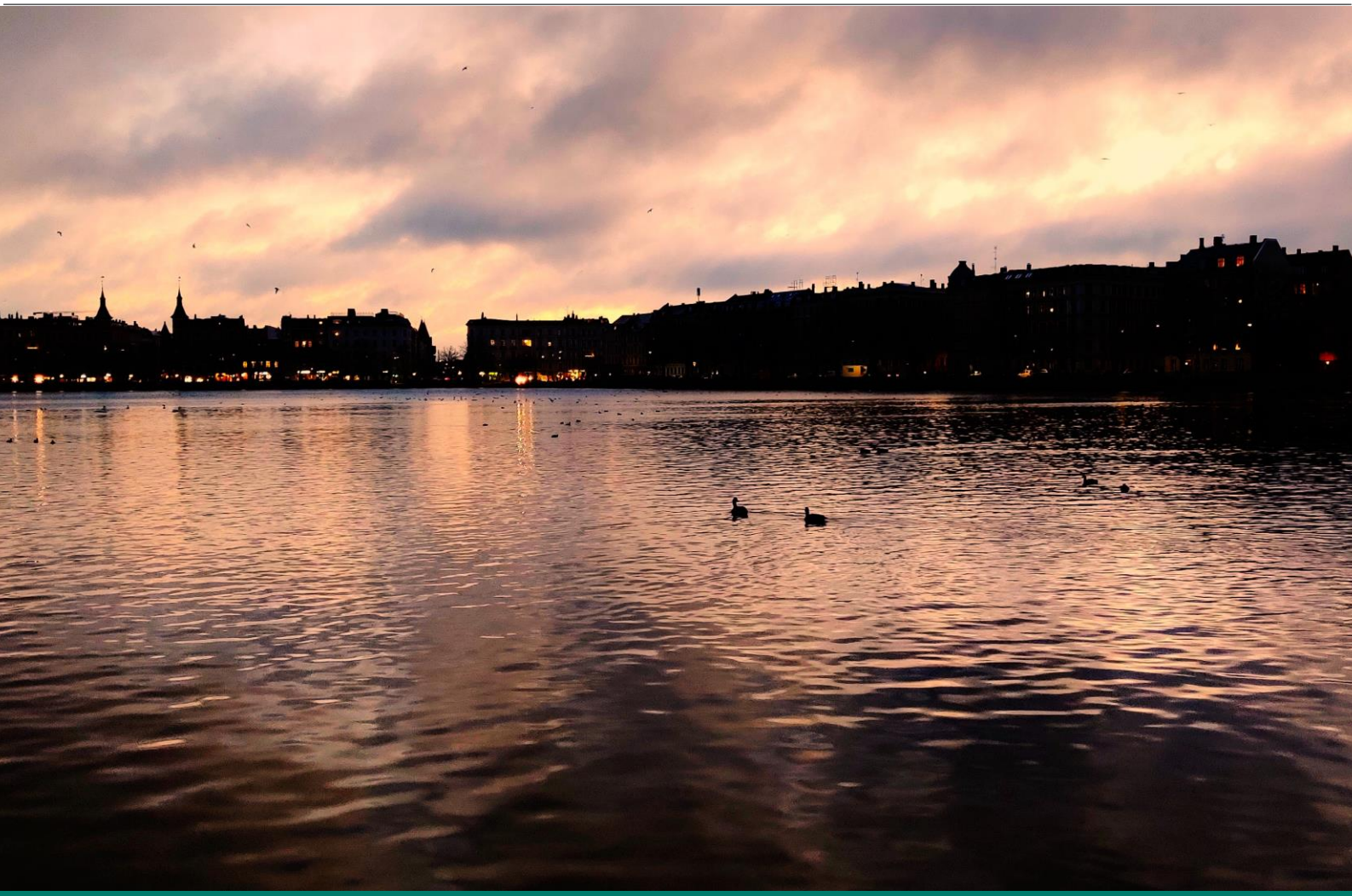
Circular economy country profile – Poland



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European Topic Centre on
Circular economy and resource use
https://www.eionet.europa.eu/etcs/etc-ce

Contents

Introduction

The European Commission requested the EEA to produce EU country profiles that offer an updated view of the following elements:

- circular economy policies being implemented at a national level with a particular focus on elements that go beyond EU mandatory elements; and
- best practice with a focus on policy innovation.

While implementing the EU Circular Economy Action Plan (CEAP 2020), Member States are encouraged to advance circularity at a national level by adopting policies and initiatives that go beyond EU regulations, while preserving the Single Market.

This circular economy country profile is based on information provided within the Eionet network by the Ministry of Economic Development and Technology, Ministry of Climate and Environment and Chief Inspectorate for Environmental Protection in the second quarter of 2022 (Coordination: Małgorzata Bednarek, EEA/EIONET National Focal Point, CIEP). The information was reviewed and edited by the European Topic Centre on Circular economy and resource use (ETC CE). A selection of Eurostat data was made to further complement this country profile.

The information is current as of 6 October 2022 (final review), when members of Eionet verified the content of this profile.

Poland – facts and figures

GDP: EUR 526.4 billion (3.9 % of EU27 total in 2020)

GDP per person: EUR 13 730 (purchasing power standard) (76.0 % of EU27 average per person figure in 2020)

Use of materials (domestic material consumption (DMC))
644.8 million tonnes DMC (10.7 % of EU27 total in 2020)
17.0 tonnes DMC per person (126.4 % of EU27 average per person in 2020)

Structure of the economy:
Agriculture: 2.8 %
Industry: 31.5 %
Services: 65.7 %

Employment in circular sectors:
358 362 people are employed in circular economy (CE) sectors (10.1 % of EU total in 2018)
People employed expressed as a percentage of total employment: 2.2 % (EU average 1.7 %)

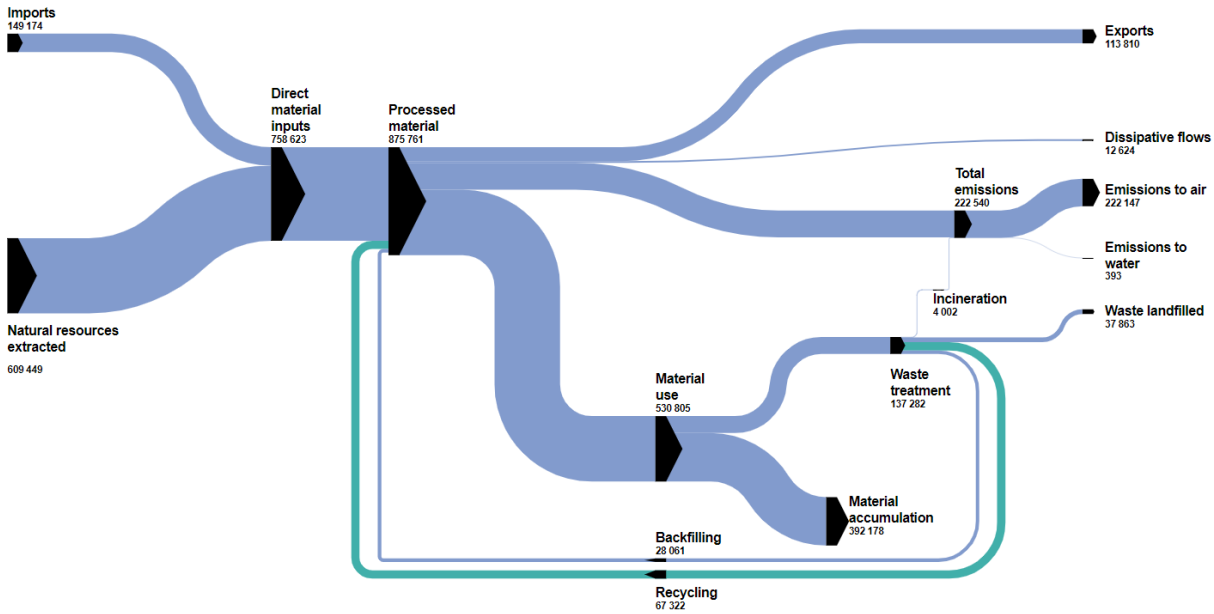
Surface area: 312 679 square kilometres (7.0 % of EU27 total)

Population: 37 958 138 (8.5 % of EU27 total in 2020)

Note: all definitions and metadata used in this profile are taken, as shown, from Eurostat

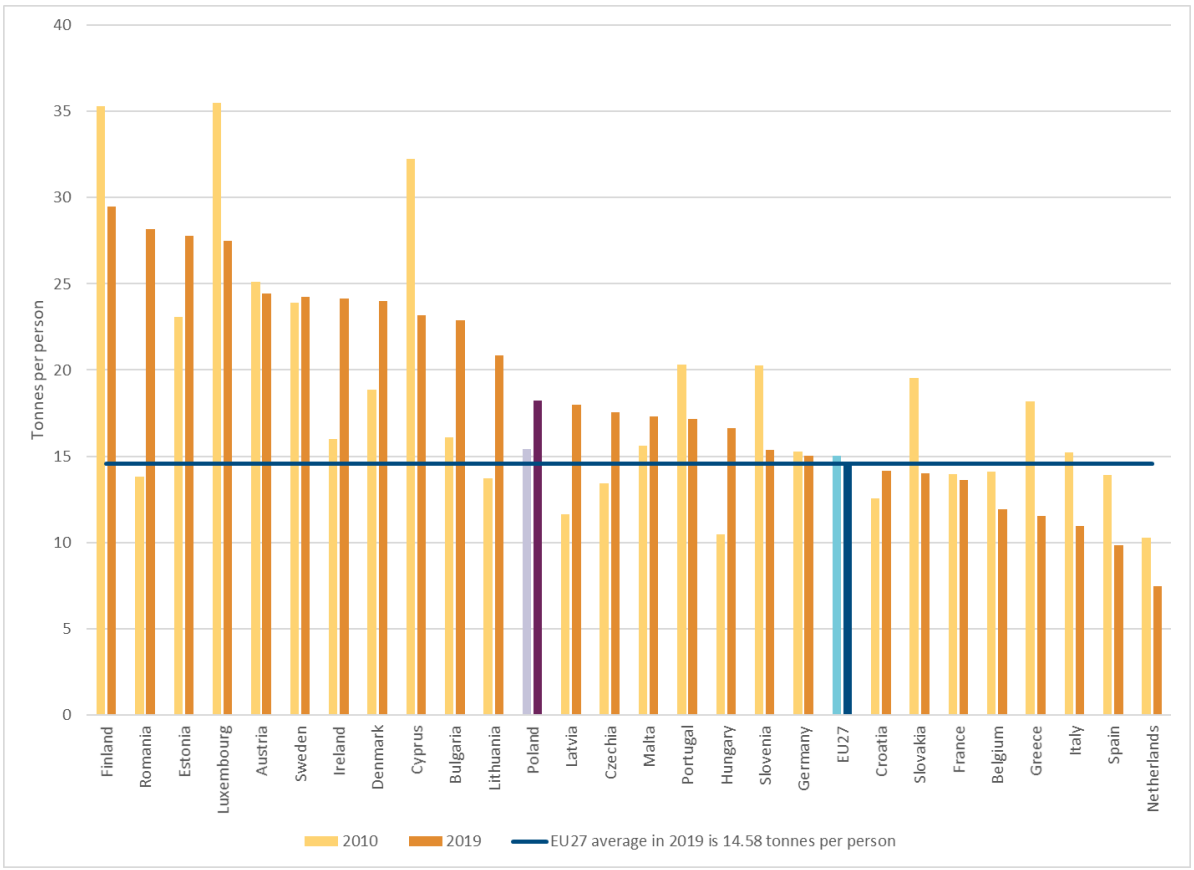
Source: Eurostat datasets, EU27 2020 (accessed 20 June 2022)

Figure 1 Material flow diagram for Poland in 2020, '000 tonnes



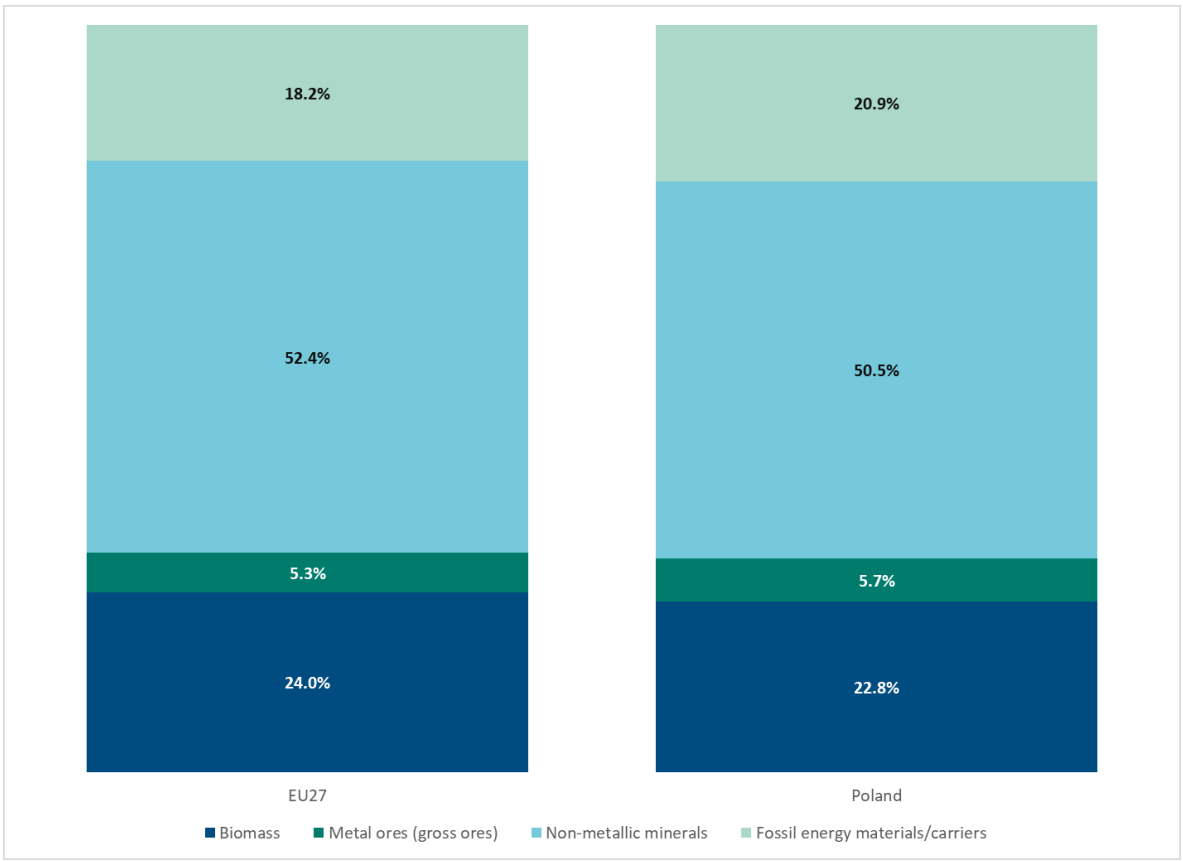
Source: Eurostat (2022) [env_ac_mfa], [en_ac_sd], [env_wassd] (accessed 20 June 2022)

Figure 2 Material footprint (raw material consumption), EU27, 2010 and 2019, tonnes per person



Source: Eurostat (2020) [env_ac_rme] (accessed 4 July 2020)

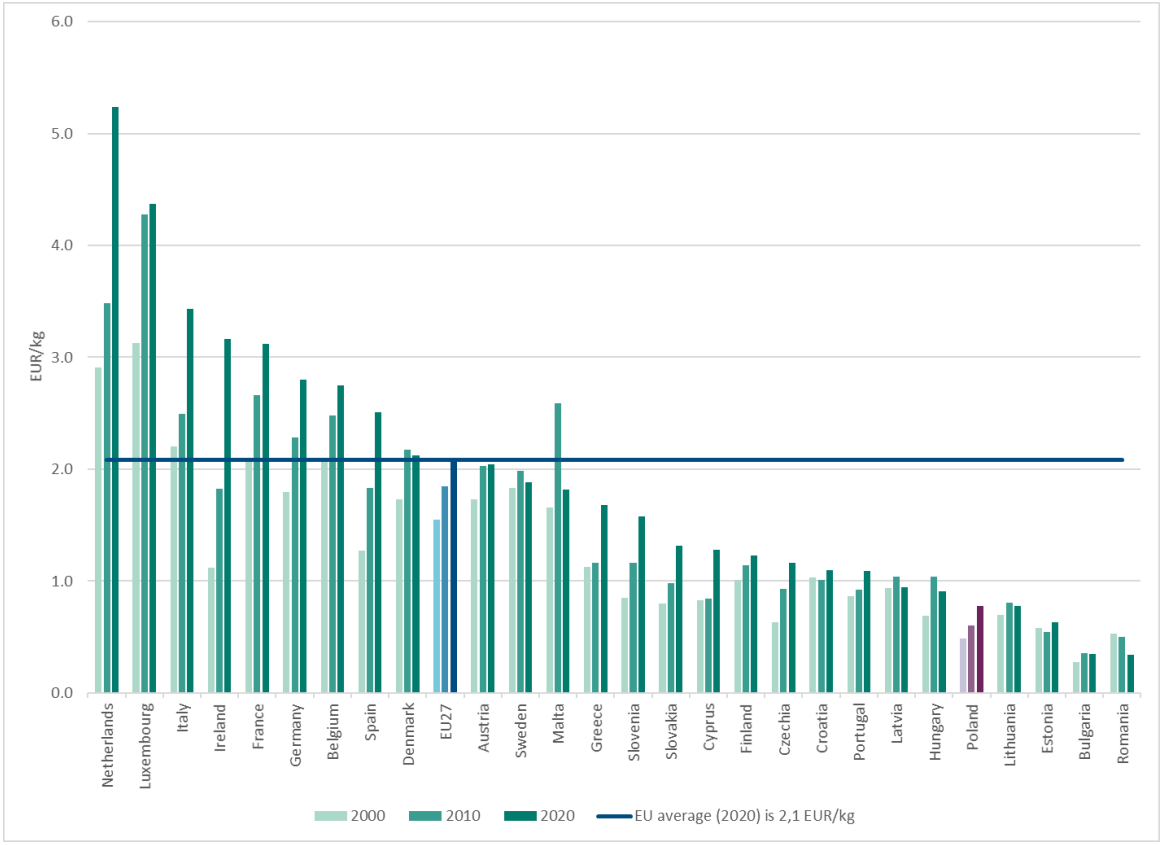
Figure 3 Domestic material consumption by selected material category, EU27 and Poland, 2020, per cent



Note: totals may not sum to 100 % due to rounding

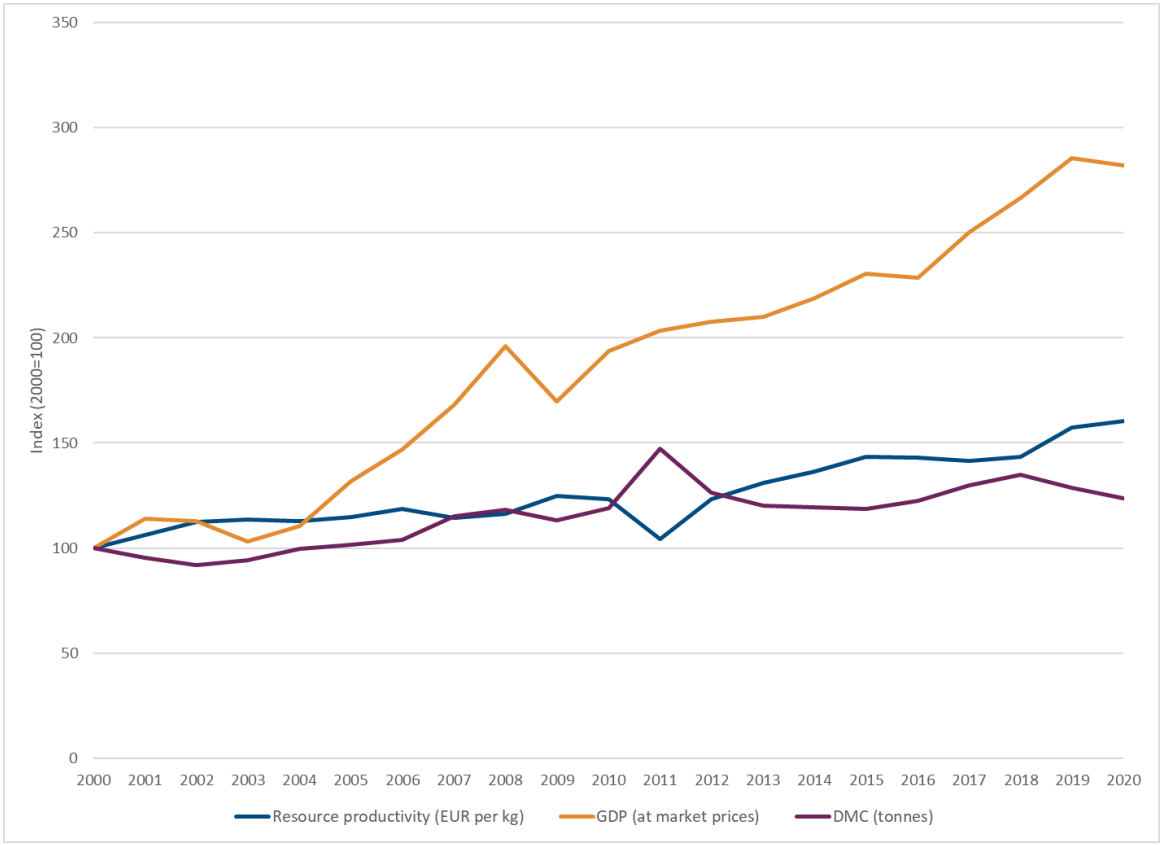
Source: Eurostat (2022) [env_ac_mfa] (accessed 20 June 2022)

Figure 4 Resource productivity (gross domestic product/domestic material consumption), EU27, 2000, 2010 and 2020, EUR per kilogram



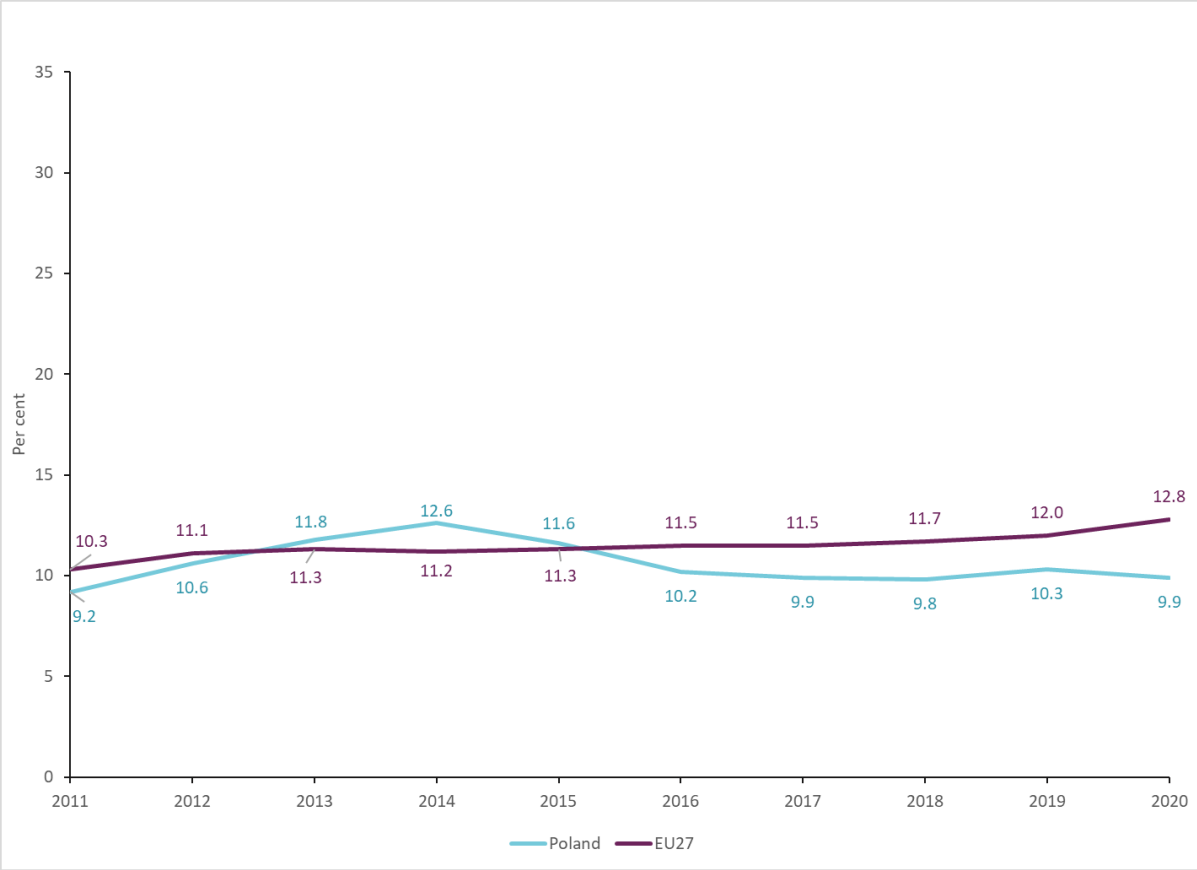
Source: Eurostat (2022) [env_ac_rp] (accessed 20 June 2022)

Figure 5 Gross domestic product, domestic material consumption and resource productivity trends, Poland, 2000–2020, index (2000=100)



Source: Eurostat [env_ac_mfa], [env_ac_rp] & [nama_10_gdp] (accessed 4 July 2022)

Figure 6 Circular material use rate in Poland, 2011–2020, per cent



Source: Eurostat (2022) [env_ac_cur] (accessed 20 June 2022)

Existing policy framework

Dedicated strategy, roadmap or action plan for circular economy

In 2019 the Council of Ministers adopted the Roadmap for the Transition to Circular Economy (**CE Roadmap)** ([1]), developed by the Ministry of Economic Development and Technology. The CE Roadmap contains a set of tools, not only legislative ones, which aim to create conditions for implementing a new economic model in Poland. The proposed action mainly concerns analytical and conceptual work, information and promotion, as well as coordination in areas within the competence of individual ministries.

Chapter I **Sustainable industrial production** aims to draw attention to the important role of industry in the Polish economy and to new opportunities for its development. Chapter II **Sustainable Consumption** shows how much potential exists in this so far often neglected stage of the lifecycle. Chapter III **Bioeconomy** deals with the management of renewable raw materials (the biological CE cycle), which have a great potential in Poland. Chapter IV **New business models** shows the possibilities of reorganising the way various market participants operate, based on the CE concept. Chapter V deals with the implementation and **monitoring of the CE**.

The CE Roadmap has been implemented since 2019 and the time horizon for the action specified in it has been set to four years, i.e., until 2023. Individual tasks, there are more than 40 of them, have been assigned to specific ministries responsible for their implementation. The implementation of the CE Roadmap brings measurable benefits, as indicated by the information collected from responsible ministries. In general, all activities included in the Roadmap serve the development of the CE. As an example, some of the tasks of the Ministry of Economic Development and Technology are listed below.

- **Feasibility study on creating a dedicated platform for secondary raw materials**: a feasibility study will be carried out on creating a dedicated platform to serve market participants for information on supply and demand, and trading purposes – the activity is carried out in cooperation with the Working Group on National Smart Specialisation no 7: Circular Economy (WG NSS 7 CE).
- **Developing the concept of a government information platform on CE**: the platform will enable the exchange of information between the government, business and local government. The platform should contain CE guidelines, information about incentives for entrepreneurs and current support programmes, as well as educational brochures – the activity completed on time in cooperation with WG NSS 7 CE.
- **Developing a concept of a support ecosystem for enterprises based on CE business models**, including finance, education and promotion at the development and commercialisation phase of green technologies – the GreenInn project ([2]) – the activity is being implemented in cooperation with WG NSS 7 CE. A legal analysis was carried out through public procurement in 2021.
- **Establishment of the National Smart Specialisation for the CE:** this funding programme focussed on the development of research, development and innovation (R&D&I) in the area of technologies related to the CE, particularly in the areas of water, non-renewable raw materials and waste, in cooperation with entrepreneurs, scientists and public institutions. WG NSS 7 CE is active and supports action by the Ministry of Economic Development and Technology (MD&T); its custodian is a representative of the MD&T.
- **Implementation of the This-is-CE** (***oto-GOZ***) **project (the Gospostrateg programme):** the aim of the ***oto-GOZ*** project ([3]) is to develop two methodologies which would allow an evaluation of (i) the progress of transition to a CE in Poland; and (ii) the impact of the CE on social and economic development at the meso-economic (regional) and macro-economic (national) levels.

1 https://www.gov.pl/attachment/e9c53c81-61f7-4ccd-b918-af40cd57cb7c
2 https://evaluation.pl/projekty/greeninn-program-wspierajacy-rozwoj-zielonych-technologii/ (in Polish)
3 https://www.gov.pl/web/rozwoj-technologia/gospodarka-o-obiegu-zamknietym (in Polish).

Circular economy policy elements included in other policies

Circular economy policy element	Included in policy
Green public procurement (GPP) as one of the measures needed to ensure a more efficient and effective use of resources.	State purchasing policy (in Polish)
Development directions/strategic objectives/CE-compliant measures	Development strategies of voivodships ([4]) in Poland (in Polish)
One of the directions of interventions of the National Environmental Policy 2030 (NEP2030) is **waste management towards a CE**. NEP2030 contains tasks for specific institutions, for example: • financial support for the execution of investments related to the prevention of waste, proper waste management including waste recycling; • updating The National Waste Management Plan 2022; • evaluation of the municipal waste management system and introduction of necessary corrections; • transposition of EU legislation under the Waste Framework Directive	The 2030 National Environmental Policy (NEP2030)
One of the specific objectives of Energy Policy of Poland to 2040 (EPP 2040) is the optimal use of the country's own energy resources. According to EPP2040 efforts will be made to increase the role of **biomass in the energy sector.** The aim is to increase the role of waste-based biomass, including biodegradable municipal waste, waste from wastewater treatment, residues from forestry and from the agri-food or processing industry – furniture, paper, etc. – so as not to lead to competition with other sectors.	Energy Policy of Poland to 2040 (EPP2040)
One of the areas having impact on the achievement of the strategy's objectives of responsible sustainable development is the environment. Regarding the environment, the following activities, with a time horizon of 2030, within **waste management** are mentioned: • waste management according to the waste hierarchy; • developing waste recycling; • striving to maximise the use of waste as raw materials.	The Strategy for Responsible Development for the period up to 2020 (including the perspective up to 2030) (SRD)
One of the specific objective (No. 6) is **Acquiring raw materials from anthropogenic deposits and supporting the development of the CE,** within which the following action is foreseen for implementation: • a Polish Geological Survey inventory of mining-waste landfills and assessment of the potential for their use; • construction of the knowledge base on sources of raw materials from waste, with their proper	National Raw Materials Policy (in Polish)

[4] Voivodship: the highest-level administrative division of Poland

Circular economy policy element	Included in policy
classification and indication of directions of their use; • measures to develop recovery of raw materials from waste, in particular, strategic and critical raw materials, including the development of processing technology.	
The main objective of the National Waste Management Plan 2022 (NWMP 2022) was to define a **waste management policy** compliant with the waste hierarchy, as part of a CE. In accordance with the provisions of NWMP 2022, it is first necessary to ensure the implementation of the action which ranks highest in the waste hierarchy, i.e., to prevent the generation of waste and to create the necessary infrastructure for the selective collection of waste at source to ensure its effective recycling and the achievement of the targets. NWMP 2022 sets, among others, targets reflecting the idea of the CE concerning such issues as the **reduction of food waste,** meeting the targets for **preparing municipal waste and packaging waste for re-use[5] and recycling,** as well as the reduction of landfilling and incineration of municipal waste. The NWMP 2022 includes The Waste Prevention Plan.	The National Waste Management Plan 2022 (NWMP 2022)

[5] according to the Waste Framework Directive

Monitoring and targets

Assessment of circular economy performance

The Polish Academy of Science published three studies dealing with the evaluation of CE monitoring and contain detailed references to and comments on the 2018 European Commission's framework for monitoring the EU's transition to a CE and other relevant EU strategic documents, including the Green Deal and Action Plan 2.

- Ewaluacja gospodarki o obiegu zamkniętym – wyzwania, bariery, korzyści" (Circular Economy Monitoring Evaluation – Challenges, Barriers, Benefits), Joanna Kulczycka, Polish Academy of Science Mineral and Energy Research Institute, 2021 ([6]).
- "Wskaźniki monitorowania gospodarki o obiegu zamkniętym" (Circular Economy Monitoring Indicators), Joanna Kulczycka, Polish Academy of Science Mineral and Energy Research Institute, 2020 ([7]).
- "Gospodarka o obiegu zamkniętym w polityce i badaniach naukowych" (Circular Economy in the Policy and Scientific Research), Joanna Kulczycka, Polish Academy of Science Mineral and Energy Research Institute, 2019 ([8]).

Regarding the overall progress of the transition to a CE in Poland, according to the Polish Academy of Sciences 2020 publication, the research results indicate that it is gradual and slow. The Polish Academy of Sciences believes, however, that this is a desirable pace, avoiding revolutionary changes and excessive restrictions.

Circular economy monitoring frameworks and their indicators beyond the ones from Eurostat

In 2021, the more than 2-year-long **This is the CE** (*oto-GOZ*) project ([9]), was completed. It was implemented by a consortium led by the Ministry of Economic Development and Technology. It was co-financed by the National Centre for Research and Development in the first competition of the Strategic Programme of Scientific Research and Development, Social and economic development of Poland in the conditions of globalising markets. The project resulted in an indicator system to assess the progress of the transition to a CE and the impact of the CE on socio-economic development at the meso- (regional) and macro-economic (national) levels. Eight CE indices were developed for different levels.

A. Local level – strategy implementation derived from the example of the city of Cracow, two indices, and a company, Krakowski Holding Komunalny S.A., two indices.

City level:

1. **Local circular economy transformation index**

- Main indicators:
    - share of municipal waste recycled and prepared for re-use relative to total municipal waste;
    - share of energy from renewable sources in the city's gross final energy consumption;
    - water productivity – the quotient of gross domestic product (GDP) and the city's total annual water withdrawal.

[6] https://min-pan.krakow.pl/wydawnictwo/ksiazki/https-min-pan-krakow-pl-wydawnictwo-wp-content-uploads-sites-4-2020-10-ksiazka-cele-zr-fin-pd-2-2-2-2-2-2-2-4/ (in Polish)

[7] https://min-pan.krakow.pl/wydawnictwo/ksiazki/https-min-pan-krakow-pl-wydawnictwo-wp-content-uploads-sites-4-2020-10-ksiazka-goz-wers-final-pdf/ (in Polish)

[8] https://min-pan.krakow.pl/wydawnictwo/ksiazki/gospodarka-w-obiegu-zamknietym-w-polityce-i-badaniach-naukowych/ (in Polish)

[9] https://www.gov.pl/web/rozwoj-technologia/projekt-oto-goz (in Polish)

- Auxiliary indicators:
    - funds spent on environmental investment relative to investment in the city per number of residents;
    - energy conservation rate (energy consumption per person in household);
    - service availability indicator (number of entities offering repair and maintenance services).

- Contextual indicators:
    - share of secondary raw materials generated in the city's total production;
    - greenhouse gas emissions from the city's industrial activities in carbon dioxide equivalent per year.

2. Local socio-economic impact index

- participation in CE awareness campaigns (percentage of people who participated in some CE-related activity or campaign in the last three years);
- eco-mobility index (average frequency of use of specific modes of transport: public transport, personal transport device, bicycle, car sharing, etc.);
- food sharing rate (average weight of food donated to charitable organizations, food banks or other institutions).

Enterprise level:

1. Circular Economy Index of transition for enterprises

- Main indicators:
    - volume of consumption of primary raw materials per volume of revenue (tonnes per Polish new zloty);
    - volume of consumption of secondary raw materials per revenue volume;
    - share of energy from renewable sources in total energy consumption;
    - volume of water consumption per revenue volume (litres per Polish new zloty);
    - volume of consumption of critical raw materials per revenue volume;
    - waste handling according to the waste hierarchy: volume of waste generated (t), amount of waste prepared for re-use, amount of waste recycled (t), amount of waste subjected to other recovery processes (t), indicator of certification of operations and environmental management – such as Environmental Technology Verification (ETV), International Organization for Standardization (ISO), the EU Eco-management and Audit Scheme (EMAS), or product and organisation environmental footprints (PEF/OEF).
- Supporting indicators
    - amount of waste disposed (t);
    - volume of hazardous waste generated (t);
    - volume of byproducts generated (t);
    - volume of carbon dioxide emissions per volume of production (t);
    - share of material and energy costs in total costs;
    - amount of money invested in CE projects.
- Contextual indicators
    - share of fees for use of the environment/total costs;
    - number of CE patents obtained;
    - number of industrial symbioses for waste utilisation/management.

2. Circular Economy Index of the economic impact of enterprises

- having a CE strategy (in small and medium-sized enterprises (SMEs) but excluding micro-entrepreneurs) confirmed by a CE audit (YES/NO);
- value of CE procurement in company's total procurement;

- number of people trained in the CE.

B. Regional level - implementation based on the example of Lesser Poland, two indices.

1. **Regional index of transition**

- Main indicators:
  - resource productivity (excluding foreign trade): the ratio of DMC to the region's GDP;
  - share of energy from renewable sources in the region's gross final energy consumption;
  - water resource productivity: the quotient of GDP and total annual water withdrawal in the region;
  - share of the mass of municipal waste recycled and reused relative to the mass of total municipal waste;
  - greenhouse gas emissions from regional industrial activities in carbon dioxide equivalent per unit of GDP.
- Supporting indicators:
  - Regional research and development (R&D) expenditure in the regional innovation scheme (RIS) area relative to all regional R&D expenditures;
  - share of secondary raw materials produced in total regional production;
  - companies in the region using/placing and receiving orders through the Internet.
- Contextual indicators:
  - number of new types of waste classified as byproducts or those that have lost their waste status, and average time of issuing a decision;
  - Number of "My Electricity" programme[10] grants awarded.

2. **Regional Circular Economy Index of socio-economic impact**

- full-time jobs in CE-related industries relative to total employment in the region;
- amount of money spent on CE-compliant environmental investments relative to all regional investments;
- resource productivity (excluding foreign trade) per person (GDP/DMC per person);
- number of people trained in the CE,
- expenditure on regional waste treatment including recycling.

C. National level - two indices that have been integrated into the Productivity Strategy project.

1. **National index of the circular economy transition**

- Main indicators:
  - resource productivity – ratio of GDP to DMC;
  - greenhouse gas emissions (carbon dioxide equivalent per year per unit of GDP);
  - volume of industrial waste generated relative to GDP;
  - water productivity - quotient of GDP and total annual water withdrawal.
- Supporting indicators:
  - eco-innovation index (according to EC methodology);
  - growth of certification of entities' operations and environmental management, such as ETV, ISO, EMAS or PEF/OEF;
  - share of energy generated from renewable sources in gross final energy consumption;
  - share of secondary raw materials in total production;
  - number of e-state services.
- Contextual indicators:
  - share of full-time equivalent jobs in CE-related entities relative to total employment;
  - value of CE procurement in total public procurement;

[10] https://www.gov.pl/web/climate/100-000-applications-under-the-government-programme-my-electricity

- share of investment in environmentally-friendly fixed assets in total investment.

2. **National Circular Economy Index of impact on socio-economic development**

- digital economy and digital society index - according to EC methodology,
- resource consumption (per person);
- number of jobs in CE industry;
- number of regional CE strategies;
- number of cities with CE strategies;
- number of municipalities with CE strategies;
- number of people trained in the CE;
- share of national R&D expenditure in the National Smart Specialisation (NSS) CE area relative to the total R&D expenditure in the country.

Circular economy targets

The Productivity Strategy project includes two national indices developed within the framework of the ***oto-GOZ*** project ([11]), which also include indicators relevant to the eco-design of products and production processes (i) the National CE Transition Index and (ii) the National CE index on the impact on socio-economic development as described under previous question. The progress will be monitored.

Besides this, the following targets have been set for Poland:

- productivity growth in the economy (climate-neutral, CE, data-driven) by 50 % by 2030;
- number of regional strategies incorporating CE aspects – minimum of seven by 2030.

[11] https://www.gov.pl/web/rozwoj-technologia/projekt-oto-goz (in Polish)

Innovative approaches and good practice

Examples of public policy initiatives (national, regional or local)

➔ *Good practice example: spatial planning and urban policy, Product-related policies, including on the R-strategies (repair, reuse, remanufacturing, etc.);*

Repair/maintenance shops at civic amenity sites

Every municipality can create repair/maintenance shops at civic amenities sites which are financed with funds from the fee paid by every property owner participating in the municipal waste collection system. These sites must be created within easy reach every citizen and information about them, the address and working hours, must be available online. These sites, in addition to being repair centres, can also be educational centres featuring facilities to help with the reuse of products. Although the waste fees are the main source of funds, there are various other sources which can be used to set these shops up.

➔ *Good practice example: financial support programme*

My Water programme

The My Water programme ([12]) is addressed at owners of single-family buildings. Its objective is to minimise the effects of drought and limit the effects of heavy rainfall by increasing the collection and use of rain water on the premises. The indirect objective is to relieve the burden on water supply and sewerage systems and increase the availability of water during hot periods. Financial support is given for purchase, assembly and launching of installations for:

- The collection of rainwater from impermeable surfaces of properties, i.e., from roofs, pavements and driveways;
- rainwater retention in tanks;
- retention of rainwater in the ground by, for example, unsealing of impermeable surfaces or building/improving absorption wells, drainage and rain gardens;
- rainwater retention in the drainage layer of green roofs;
- use of rainwater for domestic and agrarian purposes.

➔ *Good practice example: public procurement*

Support on sustainable public procurement

The Public Procurement Office publishes a range of useful information for contracting authorities in the field of sustainable public procurement on its website ([13]). It also conducts conferences and training for contracting authorities as part of the EU's co-financed project Professionalization of human resources in public procurement from 2020 to 2022. During these events, among other things, the environmental aspects of public procurement are promoted, as well as the lifecycle cost analysis method or the role of public procurement in achieving EU and national environmental goals.

➔ *Good practice example: change in consumption patterns and consumer behaviour, education (awareness-raising and training)*

The Five for separation information campaign

The Ministry of Climate and Environment, in addition to introducing legislative changes regarding waste separation, attaches great importance to public education, as a fundamental prerequisite for changing societal practice to sustainable consumption and a CE model.

Activities in this area focus on undertaking and supporting informal and education initiatives (e.g. educational graphics and video materials, educational articles, presentation of best practices) on resource efficiency and the CE:

[12] https://www.gov.pl/web/nfosigw-en/the-priority-programme-my-water

[13] https://www.uzp.gov.pl/baza-wiedzy/zrownowazone-zamowienia-publiczne (in Polish)

1. campaigns to promote the waste hierarchy, as well as less consumerist lifestyles and eco-design;
2. educational and information materials on the principles of handling municipal waste, including food and other biodegradable waste;
3. promotion of the repair and reuse of waste electrical and electronic equipment;
4. information and educational materials activities, aimed at local government units, to increase public awareness, including entrepreneurs.

Conducted in 2019–2020, the Five for separation information campaign supported the introduction of the Single Waste Separation System (JSSO) in Poland, according to which raw materials should be separated from non-recyclable waste. The aim of the campaign was to shape ecological awareness of Polish citizens and to support proper waste separation. The campaign also highlighted the environmental and economic benefits of separating waste.

In addition, the Ministry of Climate and Environment cooperates with the Ministry of Education and Science to support formal education ([14]) by:

- preparing material for teachers such as lesson plans with supporting materials;
- organising workshops for teachers and students on resource efficiency and the CE,

Action Plan for Environmental Education

The 2030 National Environmental Policy (NEP2030) ([15]) envisages the development of a strategic Action Plan for Environmental Education by 2025. This will include an implementation framework for environmental education activities, including the shaping of sustainable consumption patterns and a CE. The development of the strategic Action Plan for Environmental Education is coordinated by the Ministry of Climate and Environment.

FORCE project – cities cooperating FOR the circular economy and organising educational campaigns for residents

City of Lublin, with a population of 340 000 inhabitants, is the largest economic and academic centre in Eastern Poland, and also the only metropolitan macroregion city. Lublin is among the most dynamically developing Polish cities, and on top of the rankings of sustainable development and quality of life. In Lublin's concept of a smart city, the quality of life changing due to sustainable city management plays a key role. One of the aspects of this process is the gradual evolution of the economy to as circular one. Lublin is therefore supporting creative industries, participating in the FORCE project - cities cooperating FOR a Circular Economy and organising educational campaigns for residents ([16]). The issues of the CE are also included in the Lublin 2030 Strategy ([17]).

➔ *Good practice example: spatial planning and urban policy, institutional and regulatory arrangements to support the transition towards a resource-efficient CE*

Polish Circular HotSpot

Polish Circular Hotspot ([18]) is a public cooperation platform on which various stakeholders from all economic sectors work on introducing innovative, comprehensive, practical and scalable solutions. They work with big and small businesses, local and national government, universities and scientists from a wide range of disciplines. They cooperate with various industries, including construction, food, packaging, electronics, plastics, logistics, transport, energy and textiles.

14 https://naszesmieci.mos.gov.pl/materialy (in Polish)

15 https://bip.mos.gov.pl/strategie-plany-programy/polityka-ekologiczna-panstwa/polityka-ekologiczna-panstwa-2030-strategia-rozwoju-w-obszarze-srodowiska-i-gospodarki-wodnej/ (in Polish)

16 http://circularhotspot.pl/en/local-governments/69

17 https://lublin.eu/gfx/lublin/userfiles/_public/biznes/aktualnosci/konsultacje_spoleczne_ii_etap/2022.01.27_strategia_lublin_2030.pdf (in Polish)

18 http://circularhotspot.pl/en

Examples of private policy initiatives (sectoral)

On the Ministry of Economic Development and Technology's website three catalogues of good CE practice can be found:

- The agri-food sector ([19]): the eco-innovations presented are focussed on waste and its byproducts, their management as well as the opportunities and instruments to support the CE.
- chemistry ([20]): this presents examples of resource-product relations when using waste and byproducts, product and solutions that apply to the CE concept as well as examples of the efficient management of natural resources;
- buildings and construction ([21]): this presents eco-innovative solutions and models that support the CE, GPP and other instruments that support a CE, as well as a catalogue of companies supporting the CE.

The following are some examples of good practice from catalogues:

- **Byproduct use: Mazowsze Dairy Cooperative in Chorzele**
  Main food products: Dutch type cheese, pre-packaged Dutch type cheese, English type cheese and butter. Internal management of byproducts: whey cream, whey cream as an additive to cheese milk.
  Marketable products made from byproducts at the processor: sub-thickened whey and whey concentrate (16–18 %), collected in tankers. In turn, the recipients of these byproducts produce dried whey, whey protein concentrate, lactose and demineralised whey powder.
- **Using waste as a resource: Polski Koncern Naftowy ORLEN S.A.**
  Buildings that recover waste heat from flue gases – the product in the spirit of the CE is process heat and thermal energy. The project assumption was to recover 17 gigajoules (GJ) of waste heat from the flue gases, thus recovering thermal energy and reducing fuel consumption. Environmental benefits include the use of heat from the furnaces, which is often discharged through the flue gas ducts into the chimney as lost heat and a reduction of almost 8 000 tonnes of carbon dioxide emissions per year.
- **Re-use of wood: Divadlo brand**
  The Divadlo brand operates in the area of environmentally-friendly technologies in the construction and interior-design sectors. It is part of the current of drive for zero/less waste, upcycling and a return to craftsmanship. Divadlo recovers old wooden material and reuses it in modern architecture – in the form of facades, wall panelling or furniture fronts made from old wood. With its activities, it minimises the environmental footprint of construction and finishing work, as well as reducing the use of new wood.
- **Re-use of asphalt**
  The Regulation of the Minister of Climate and Environment of 23 December 2021 defined detailed conditions for ending the waste status of reclaimed asphalt ([22]). Treating reclaimed asphalt as waste, rather than as an essential component with documented properties that can be reused for the construction of roads and highways, is not in line with the concept of the CE which aims to keep materials in the economy for as long as possible while minimising waste as much as possible.

19 https://www.gov.pl/attachment/d3461524-656c-4aaf-a433-b0e003238c25 (in Polish)
20 https://www.gov.pl/attachment/76b50cec-46d8-4844-8bda-111294264081 (in Polish)
21 https://www.gov.pl/attachment/48d02eb2-a9c8-4140-92ea-f1dbfd2d606e (in Polish)
22 https://dziennikustaw.gov.pl/DU/rok/2021/pozycja/2468 (in Polish)

The way forward

Addressing barriers and challenges

Institutional

- Lack of a clear regulatory framework at EU level (e.g., such as the lack of criteria for end-of-waste at the EU level (albeit under development), and multiple or overlapping requirements for products and product parts), with the undesirable potential effects of hindering innovation and creating administrative burden. At EU level, having, as appropriate, the legislation in the form of regulations would be an important factor in speeding up the implementation of the CE both at the EU level and in individual Member States. Careful consideration must be given to each country's situation in order to decide which actions this would apply to.
  Policy silos and not seeing all the complex results of implemented and planned action – solving one environmental problem but causing more new ones – the cross-cutting nature of the CE as well as mutual relations between elements of the environment and between the environment and people are being forgotten.
- The cross-cutting nature of the CE, which means areas of competencies and work are spread across various ministries and other institutions.

Market

- The large number of EU regulations in force may have the effect of discrediting entrepreneurs from individual countries and thus of reducing competitiveness.
- The internal market should be made more coherent.
- At the EU level, legislation given in the form of regulations on a case-by-case basis and after careful analysis of needs and possibilities would be important for speeding up the implementation of the CE both at EU level and in the individual Member States. This will also translate into establishing direct requirements for all operators, thus providing the necessary legal certainty and scope for enforcement in a fully integrated market across the EU. The form of a regulation also ensures that obligations will be implemented at the same time and in the same way in all Member States, which can effectively contribute to increasing strategic autonomy and building partnerships at the EU level.

Indicators

- The indicators and targets proposed by the European Commission are very ambitious; it is difficult to monitor them.
- Member States should not be left alone in their efforts and endeavours to achieve ambitious environmental and climate protection targets, and there is a need for financial support from the EU.

Companies

- SMEs face many difficulties in adapting to new regulations.
- The necessary financial support should be provided, as well as the provision of know-how, especially to SMEs.

Consumer

- Consumers often are the victims of greenwashing. Moreover, changing daily habits and routines takes a long while.
- The recent European Commission initiative on sustainable products, especially the legislative proposal aiming at empowering consumers in the green transition, should have a positive impact on the current situation. In turn, the digital product passport, proposed in the draft Ecodesign for Sustainable Products Regulation, seems to be the only possible option for providing consumers and other market participants with full information on the various aspects and functionalities of a product and its components.

- In addition, there should be an adequate transition period for the implementation of the new regulations, which will be needed not only by traders but also consumers. Taking the example of the digital product passport, adequate time should be allowed for consumers to become familiar with and accept the new labelling format.
- Poorer society and a different history (including the results of tragic wars, communism and quite short period of freedom and free-market) compared to western countries as well as high inequality as regards to income and wealth. Many environmental, including CE, ideas coming from the western countries seem to be designed for richer societies with more possibilities. At the same time much can be learnt from people who experienced communism with empty shelves as well as so-called "collective ownership". This period strongly affects the habits of many people (in both directions: towards savings vs consumption) as well as their view on the upcoming CE solutions. It is important to hear these groups (and countries) as they can verify the expected effectiveness of the proposals.
- The younger generation exposed to the temptation of excessive consumerism thanks to inter alia the social media as in other countries. It is important to promote their circular economy friendly lifestyles.

Ranking types of barrier

High barrier	Institutional challenge to develop policy for a complex cross-sectoral issue
	Market barriers for recycled resources
	Good indicators and targets
	Companies' ability to grasp opportunities
Low barrier	Consumer behaviour and awareness

Future policy plans

Support for the transition to a CE is also envisaged in the National Recovery Plan. As part of the reform the creation of a framework for the development of the secondary raw materials market is planned. In addition, the reform will be complemented by investment particularly aimed at supporting the SME sector in the green transition and the development of technologies, including new ones, enabling the wider use of waste as secondary raw materials.

The purpose of the competition, organised by Polish Agency for Enterprise Development, is to support small and medium-sized entrepreneurs to develop and introduce or apply environmentally friendly innovative technologies. Co-financing will be provided for activities leading to the development and implementation of or deployment of innovative processes, products, services or solutions that lead to the development of the entrepreneur's business, in particular an increase in its revenue, profits or employment, and at the same time to better waste management, energy efficiency, reduced emissions of pollutants into the atmosphere and/or more efficient materials management. Activities leading to implementation may include the development, application or marketing (commercialisation) of innovative processes, products, services or solutions. At the same time, a project consisting only of development will not meet the objectives of the scheme.

In addition, The National Centre for Research and Development will support projects concerning the development of technologies enabling the conversion of waste into secondary raw materials and the search for new applications of waste in the economy in accordance with the value chain. Priority will be given to projects implemented jointly by entrepreneurs and R&D units.

European Topic Centre on
Circular economy and resource use
https://www.eionet.europa.eu/etcs/etc-ce

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