Agnieszka **BARAN**

SUSTAINABLE INNOVATIONS – SELECTED ASPECTS

Agnieszka **Baran,** PhD (ORCID: 0000-0003-2068-019X) – *Bialystok University of Technology*

Correspondence address:
Faculty of Management Engineering
Ojca Tarasiuka Street 2, 16-001, Kleosin, Poland
e-mail: a.baran@pb.edu.pl

ABSTRACT: The article aims to analyse the state of art in the field of sustainable innovation in Poland and identify barriers to developing this type of innovations. The article describes the main barriers in the implementation of sustainable innovations and related problematic issues. Eco-innovation may help European entrepreneurs develop sustainable solutions, allowing better use of valuable resources and reducing the economy's negative impact on the environment. Awareness of the benefits brought by environmental technologies is still low. Implementing environmental innovation requires a strategic approach, and introducing them to the company's existing structures is difficult and time-consuming. Contemporary challenges, such as climate change and the depletion of natural resources, require new solutions. Modern economies are based on intangible assets protected by intellectual property rights, intellectual property management is now an integral part of any effective business strategy.

KEYWORDS: sustainable innovations, innovations, sustainable development, protection of intellectual property

Introduction

Poland is not a country with a high level of innovation. As shown by the innovation report in Europe for 2020, Poland is in the 33rd spot (European Innovation Scoreboard, 2020). Our country has been low in this ranking for many years, and only recently has it moved up from the group of the least effective innovators. The innovation level of an economy is measured through the number of granted patents. The significant innovation criteria are the number of registered inventions, registered patents, and the number of cited patents. The number of filed patent applications shows the need to protect inventions, while the number of granted patents points to the invented solutions' quality. The literature indicates that the number of patents can be used as an indicator of innovative activity in the environmental field. Similarly, as for innovation in general, patents of ecoinventions can be used to measure research and invention activities and study the directions of research in a given technological field (Oltra et al., 2008).

After the Paris Agreement (UNFCCC, 2015), sustainable development innovations became more significant in political debates. The agreement stressed the importance of the transfer of green technologies to developing countries as an element of supporting and fulfilment of the agreement's conditions. Sustainable innovation and green technologies are essential to Europe's future and at the heart of the European Union's policies. The EU's economic prosperity is intrinsically linked to its natural environment, and the global demand for resource-efficient solutions will also be a source of jobs. The Environmental Policy for 2030 (Environmental Policy 2030, 2019) lists the promotion of Polish environmental technologies and supporting this sector internally and internationally. Research and development work will be supported alongside implementation work in the area of innovative environmental technologies.

The article aims to analyse the state of art in the field of sustainable innovation in Poland and identify barriers to developing this type of innovations. The article describes the main barriers in the implementation of sustainable innovations and related problematic issues.

Sustainable innovations – theoretical issues

There are different terms used in the literature to describe innovations that have a reduced negative impact on the environment: "green", "eco", "environmental", and "sustainable" (Díaz-García et al., 2015).

Sustainable innovation combines long-term economic success with environmental protection and the social responsibility of business. There is no

single, precise definition for sustainable innovations. In author opinion, the correct definition is proposed by Charter and Clark, who claims that sustainable innovation is a process in which aspects of sustainable development are taken into account at every stage of the company's activity, starting with the idea, through research and development, up to commercialisation. It refers to products, services and technologies, new forms of economic activity and organisation models (Charter, Clark, 2007). *Sustainable innovation is the creation of something new that improves performance in the three dimensions of sustainable development: social, environmental and economic. Such improvements are not limited to technological changes, and may relate to changes in processes, operational practices, business models, thinking and business systems* (Kneipp et al., 2018). The concept of "sustainable innovation" refers to the concept of sustainable development, and authors often argue that this term is an alternative to the equivalent concept of "eco-innovation" (Gałązka, 2017).

The Commission of the European Communities defined the term of environmental technology in 2004 as a technology that is less harmful to the environment than other similar technologies. This is a broad definition, including resource collection methods, soil, water and air protection, global climate change prevention, sustainable production, sustainable consumption, and sustainable logistic systems. Eco-innovative solutions are used in such technologies, which can be technological solutions themselves or solutions that are non-technological, such as new products, services or new business practices, which reduce the negative environmental impact (CC, 2004). Agenda 21 contains the definition of environmentally sound technologies, describing them as less polluting, using resources more sustainably, recycling more waste and products, and managing production waste in a more balanced and acceptable way than the technologies which they replaced. The usage of such technologies can yield beneficial environmental effects and financial benefits to the organisation that should implement such technologies. Environmentally sound technologies are "technologies related to processes and products", which generate a small amount of waste or do not generate waste at all to prevent pollution. These include the end-of-pipe technologies for the treatment of waste after their production (Agenda 21, 1994).

Literature and strategic European Union documents use the terms of eco-innovations and sustainable innovations interchangeably. The framework programme for innovation and competitiveness defines eco-innovation as *any form of innovation, which helps achieve sustainable development through the decrease of environmental impact, increase of resistance to environmental pressure or more effective usage of natural resources* (EP, 2006). According to the definition formed by the OECD an innovation is defined as

the *implementation of a new or significantly improved product (item or service), process, new marketing method or new organisation method in business practice* (OECD, 2005). Eco-Innovation is any form of innovation resulting in or aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment, enhancing resilience to environmental pressures, or achieving more efficient and responsible use of natural resources (CC, 2011). According to the Ecoinnovation Observatory, eco-innovation is any innovation, which reduces the use of natural resources and reduces the release of harmful substances in the entire life cycle. As with all innovations, eco-innovations mean the introduction of a new product (item or service) into the market or the implementation of a new solution in production processes or organisation processes of a business. However, unlike other innovations, eco-innovations yield not only economic benefits but also environmental ones. Such environmental benefits can include the reduction of natural resource usage and the reduction of the release of harmful substances per production unit over the entire life cycle (Eco-innovation Observatory, 2011). It can be stated that eco-innovations are a specific type of innovation and that all new processes, which are more resource-effective, are eco-innovations. Everything can be an eco-innovation, provided it is more environmentally sound than other solutions (Kemp, Mainguy, 2011). Environmental innovations are defined as a tool for supporting sustainable development in the form of *new products and processes, which ensure value to business clients, while, at the same time, decreasing their influence on the environment* (Olejniczak, 2015). Distinguishing eco-innovations from innovations requires showing that as a result of their application, the negative impact on the environment decreases in relation to the effects of another solution (Kemp, Pearson, 2008).

The Polish Agency for Enterprise Development (PARP) defines pro-ecological innovations as *any innovation, implemented according to the law, which benefits the natural environment – especially in the form of reducing the usage of natural resources per unit of produced goods and reducing the release of harmful substances into the environment during the production and usage of a product as well as after its use* (PARP, 2011). In the 'Europe 2020' strategy, eco-innovation was defined as *relating to all forms of innovation – technological and otherwise – which create the opportunity for businesses and are beneficial to the environment through the prevention of negative environmental impact or reducing it, or through the optimisation of resource usage. These innovations help production companies to transition from 'end-of-pipe' solutions to 'closed-circuit' solutions, which minimise the energy and resource flow by changes in products and production methods, and, as a result, providing a competitive edge to many companies and areas of business* (EC, 2012).

Sustainable innovations development barriers

Modern-day challenges, such as climate change or the depletion of natural resources, require new solutions. In the face of the significant impact of climate change and resource depletion, the European Union has decided that the financing system is the main issue that requires being reworked to become a part of the solution for a greener and more sustainable economy. The predicted actions include the mobilisation of private capital for sustainable projects, especially in infrastructure, which is responsible for over 60% of greenhouse gas production. After 2020 the European Union proposes establishing a single investment fund that would integrate all EU market instruments to support the increase of investment support further. Implementing this plan will require legislative steps, which will ensure unified definitions and the possibility of providing reliable and comparable information relating to sustainable investments (CC, 2018).

According to the Central Statistical Office of Poland data, in 2019, gross domestic expenditure on R&D (Research and Development) increased by 18.1% compared to the previous year and exceeded PLN 30 billion. The R&D intensity index, which is the share of gross domestic expenditure on R&D activity in GDP (Gross Domestic Product), increased to 1.32%, a clear increase compared to 2018 (1.21%) (Statistical Offices, 2019). This is the result of reforms undertaken in recent years to increase the level of innovation, mainly those aimed at creating a legal framework that encourages entrepreneurs to undertake research and development works. In the European Union, expenditure on research and development (R&D) amounted to 2.19%. In relation to GDP (Eurostat, 2019). Poland, with the rate of 1.32%, was below the EU average. Often, the entrepreneur decides to use an existing solution that is more popular and less costly. Polish companies suffer from a lack of funds for innovations. Small and medium-sized companies' innovative activities are based on their own capital, which often is insufficient to introduce meaningful, innovative changes. Small and medium-sized companies in Poland do not seem to be highly innovative, with only 10-20% being considered innovative; innovative activities are undertaken mainly in large companies. The majority of Polish entrepreneurs are small companies employing just a few persons. Such small organisations are not at all interested, due to lack of capital, in investing in innovation. This is also linked to the strategic approach to intellectual property protection. Strong competition forces companies to search for new production methods, introduce new products or improve the existing ones. However, it is essential for companies to be aware of their intellectual and human capital, which can be of significant value. The strategy of managing intellectual property should be a part of the general strategy of

a company's growth. It should be unique, relating to a company's specific goals, size and business profile, which may, in turn, require more effort placed on a specific type of protection of individual intangible assets. There are many benefits of patenting which can be gained by the entrepreneurs, such as exclusive rights, strong market position, higher return of investment, possibility of licensing and selling of the invention/innovation, stronger negotiation position, positive company image, obtaining business partners (Kacprzak, 2018).

Barriers in the development of eco-innovations are also related to an uncertain market in environment protection. There is a lack of information on the benefits of using environmental technologies in Poland. Additionally, the low awareness of entrepreneurs in relation to how their businesses influence the environment is one of the causes of such a low number of environmental technologies being implemented. There are no developed rules for cooperation between the world of science and business, which may result from a lack of faith in the abilities of Polish scientists (Report of the European Commission, 2019). Additionally, it is easier and faster to purchase ready solutions, usually from abroad, than use ideas which are still being in development by the domestic science centres. However, it needs to be stressed that the environmental protection industry's development will result in new workplaces. Access to appropriate training courses in eco-innovations needs to be more significant to ensure the employers' necessary, qualified workforce. New knowledge and skills may ensure access to newly-created, innovative employment possibilities and make it easier to transfer from areas which are losing importance to the new environmental sectors.

Currently, a strong stimulant for eco-innovation development are the legal obligations that the EU puts in front of their member states, such as climate protection. With a certain degree of diversity in the socio-economic situation of EU member states, these stimulants can pose serious barriers for some of the countries. It is stressed that to stimulate innovation, the form of the regulations is less important than their adaptability – understood as the openness to non-standard solutions to environmental issues – and predictability (Szpor, Śniegocki, 2012). However, executing such regulations is not without meaning for environment protection, as it is difficult to hope for a pro-environmental attitude of entrepreneurs, including expenses on eco-innovations, without such regulations.

Sustainable innovations – selected problematic issues

Among the pro-innovation instruments and conditions, the expense amount on research and development, highly skilled human capital, system

of tax incentives, cooperation of science and business, developed technological infrastructure, availability of venture capital funds, strong market competition, as well as the implemented legal solutions for patent protection are mentioned (Czerniak, 2007).

Patents are crucial to the development of an economy based on modern technologies. Original technologies allow to development of competitive industry and profit from licence agreements. The current patent system is under scrutiny, and it is discussed how much does it really do to stimulate the development of new technologies. Such a system should support innovative entrepreneurs, protect companies and their innovative solutions from appropriation and exploitation of intangible assets. The development of modern technologies is strongly linked to invention activities, which results in an increasing number of granted patents. According to the World Intellectual Property Organisation data, the number of filed patents in 2019 decreased worldwide by 3%, and the total number of filed inventions was 3.2m (WIPO, 2020). However, the number of patents in the world rose by 7% to a number of 15m in 2019 (World Intellectual Property Indicators Report, 2019). In its annual report for 2019, the Polish Patent Office listed 3946 filed patents for inventions from Poland and foreign countries, which is a decrease in comparison to the previous year (2018- 4269). In 2019 a total of 3042 patents were granted (domestic and foreign entities), which is an increase compared with the previous year (2018-2980).

The solution to global environmental issues requires modern technologies. *Inventions in environment protection technology are an important factor of green growth in an eco-friendly economy. They contribute to the rational usage of natural resources, limitation of the negative impact of production and services on the environment, they can also lead to the creation of new products, workplaces, improvements in technologies, and, as a result, to an increasingly competitive economy. Patents create the basis for efficient management of knowledge in the field of technology and support the development potential of an innovative economy* (Statistical Offices, 2020). According to a Polish Patent Office report, there were 86 patents granted in 2019 to domestic concerns in relation to environmental protection technologies. Over the last 5 years, there was no visible increase in this area (2015-66, 2016-86, 2017-69, 2018-90) (Annual Report Patent Office of Poland, 2019). In 2019, the European Patent Office granted to Polish concerns 39 patents relating to environment protection technologies (the largest number since the year 2000). These constituted 10.7% of the total number of patents granted to Polish concerns. Compared with the previous year and the year 2000, this participation increased by 0.6 percentage point and 1.1 percentage point respectively. In 2019, in EU countries, the European Patent Office granted 6,000 patents relating to environment protection technologies, constituting 10.6% of the

total number of granted patents. The highest number was granted in Germany – 2286 (38.3% of the total of granted patents relating to environment protection technologies in the EU) and France – 1000 (16.8%). With a share of 0.7% of the total number of patents relating to environment protection technologies in the EU, Poland was placed 12th among the member states (Statistical Offices, 2020). A few reasons for such a low number of environmentally sound patents can be given. In Poland, it is mainly the large companies that can have success in implementing their innovative solutions. In this group of companies, the increase in expenditure on innovative activities is visible. The lowest innovative activity is seen in companies which employ 10-49 persons. Typically, industrial companies are more active with innovations (Statistical Office, 2019). Small and medium-sized companies often have low innovative potential, which, combined with complicated procedures and high patent protection costs, effectively discourages even the most innovative of these companies to file any patent applications. However, a patent protects the basic technology of a company. It ensures a competitive edge and income from licensing, which makes the company more attractive for buyers and investors.

A question needs to be formed, whether patents can be the preferred instrument encouraging innovation? Does the current system of intellectual property law help or hinder the designing and implementation of sustainable technologies? Patent protection creates monopolies and, in the literature, there is a view that intellectual property law can also negatively impact innovation and that too broad a range of legal protection can lead to legal uncertainty in relation to prior arts and whether the invention being filed for a patent does not infringe on anyone's rights (Miąsik, 2012). Some view the monopoly resulting from the protection of exclusive rights in a positive light, stating that the only goal of patent protection should be the innovative activity's support. This goal can be reached by ensuring, for a specific period, an exclusive right to use the innovations by their inventors. The perspective of significant income can encourage innovators to spend more on research (Czerniak, 2007). At the same time, despite the financial benefits, the innovator may have to spend more to benefit from innovations patented by others. In today's world, a new innovation often requires the use of many already existing inventions. In such a case, the patent monopoly will be a barrier to the development of innovations. It is also stressed that the increase of patent protection does not influence the development of innovations to such a degree as better expenses management for research and development within a company does (Boldrin, Levine, 2012). In 2008, during the European Patent Forum, the dependence between intellectual property rights and climate protection was discussed. It was stated that industrialised countries usually protect intellectual property rights as an indispensable element stim-

ulating the growth of innovation. On the other hand, according to developing countries' representatives, intellectual property rights are an obstacle in the transfer of technologies from developed countries to the developing regions of the world. The majority of technologies harmless to the climate is not protected by patents, which is a positive factor.

Additionally, developing countries seldom mention intellectual property rights as a significant issue. A larger issue is the cost of such protection, which is similar worldwide (EC, 2008). In 2019 the European Union Intellectual Property Office (EUIPO) and the European Patent Office (EPO) published the results of analyses relating to economic areas that intensively utilise the intellectual property rights in the EU. This report's goal was to analyse the contribution of various types of intellectual property rights in the building of the EU economy. The analysed sample was the 'sectors which intensively utilise intellectual property rights', in which there is an above-average number of patent-protected intellectual properties per single employee. The analysis shows that the sectors which use intangible assets have a beneficial influence on the building of the innovative economy of the EU (Kostrzewa, 2020). In 2020, the EU proposed Action Plan on Intellectual Property. The plan aims to help small and medium-sized companies (SMEs), make the most of their intangible assets. The plan proposed to ensure that innovators have access to fast, effective and affordable protection tools such as IP Helpdesks and by regularly monitoring the support available to small businesses. The goal of EU action is to provide intellectual asset management skills rather than increase IP rights registration, ensure links between IP specialist support and general business support, and ensure that support is coordinated at the national and EU levels. By 2021, the Commission wants to secure the unitary patent system's launch to create a one-stop-shop for patent protection and enforcement across the EU (Action Plan on Intellectual Property, 2020).

To sum up, the problem of patent monopolisation is unsolved, and, at the same time, it is most frequently discussed in the literature. Attempts to resolve it are made primarily through legislation.

Conclusions

The implementation of environmentally friendly innovations directly influences sustainable development. It helps find solutions to global environmental issues by reducing the negative impact of economic activity on the natural environment by lowering energy consumption, reducing natural resource usage or reducing the emission of harmful substances (Pakulska, 2020). The use of environmental technologies improves the effects of economic activities by reducing costs and increasing sales and, at the same time,

helping to adjust to increasingly stricter legal requirements relating to environmental protection. In the author opinion, civil service should create an environment friendly for business in relation to eco-innovations and environmental technologies. In turn, the business should generate interest in such solutions, and the science should generate them based on the needs of domestic, EU and worldwide economy. In Poland, there is still no significant interest in pro-ecological innovations. The main barriers are implementation costs, costs of introduction to the market, lack of partners for cooperation, unwillingness to take risks related to introducing new technologies and lack of cooperation with research and development centres. Modern economies are based on intangible assets protected by intellectual property rights, and intellectual property management is currently an indispensable part of any successful business strategy. It can be concluded that patents are a double-edged sword, with a positive and a negative side. They often contribute to enhance incentives to invent, disclose and trade technology. However, they also generate costs to society in terms of monopoly rents and barriers to access and knowledge use (Encaoua et al., 2007).

Acknowledgements

This research has been supported by Bialystok University of Technology within the framework of project No. WZ/WIZ-INZ/1/2020.

References

Action Plan on Intellectual Property, 2020, European Commission, https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_2188 [08-03-2021].

Boldrin, M., Levine, D.K., 2012. Czy monopol intelektualny przyczynia się do wzrostu innowacyjności?, https://mises.pl/wp-content/uploads/2012/01/Boldrin-Levine-IP-innowacyjnosc.pdf [24-01-2021].

CC, 2004, Communication from the Commission to the Council and the European Parliament – Stimulating Technologies for Sustainable Development: An Environmental Technologies Action Plan for the European Union, COM/2004/0038 final.

CC, 2008, Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee – A European Industrial Property Rights Strategy, COM/2008/0465 final.

CC, 2011, European Commission, Communication from the Commission. Innovation for a sustainable future – The Eco-innovation Action Plan (Eco-AP), Brussels, COM/2011/0899 final.

CC, 2018, Communication from the Commission to the European Parliament, The European Council, The Council, The European Central Bank, The European Economic and Social Committee and The Committee of the Regions, Action Plan: Financing Sustainable Growth, COM/2018/097 final.

CC, 2020, Communication from the Commission to the European Parliament, The European Council, The Council, The European Central Bank, The European Eco-

nomic and Social Committee and The Committee of the Regions, European Skills Agenda for sustainable competitiveness, social fairness and resilience, COM (2020) 274 final.

Charter, M.T., Clark, T., 2007. Sustainable Innovation, Key conclusions from Sustainable Innovation, http://cfsd.org.uk/Sustainable%20Innovation/Sustainable_Innovation_report.pdf [20-01-2021].

Czerniak, J., 2007. Ochrona patentowa jako element polityki proinnowacyjnej. ANNALES UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA LUBLIN – POLONIA VOL. XLI, 5, Sectio H, p. 80.

Diaz-García, C. et al., 2015. Eco-innovation: insights from a literature review. Innovation: Management, Policy & Practice, 17(1), 6-23, http://dx.doi.org/10.1080/14479338.2015.1011060.

Działalność innowacyjna przedsiębiorstw w latach 2016-2018, GUS, Warszawa 2019, file:///C:/Users/pc/Downloads/dzialalnosc_innowacyjna_przedsiebiorstw_w_latach_2016-2018.pdf [22-01-2021].

Eco-innovation is the key to Europe's future competitiveness, European Commission, 2012, http://ec.europa.eu/environment/pubs/pdf/factsheets/ecoinnovation/pl.pdf [12-01-2021].

Encaoua, D. et al., 2006. Patent Systems for Encouraging Innovation: Lessons from Economic Analysis. Research Policy, Elsevier, 35(9), 1423-1440, ff10.1016/j.respol.2006.07.004ff. ffhalshs-00177614f [22-01-2021].

EP, 2006, Decision No 1639/2006/EC of the European Parliament and of the Council of 24 October 2006 establishing a Competitiveness and Innovation Framework Programme (2007 to 2013).

European innovation scoreboard 2020 – main report, file:///C:/Users/pc/Downloads/ET-AY-20-002-EN-N%20Online.pdf [22-01-2021].

Eurostat, 2019, https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20201127-1 [02-02-2021].

Gałązka, K., 2017. Ekoinnowacje jako element zrównoważonego rozwoju na przykładzie województwa lubelskiego. Zeszyty Naukowe Politechniki Częstochowskiej, Zarządzanie, 25(2), 59-72, http://www.zim.pcz.pl/znwz [08-03-2021].

Introducing eco-innovation: from incremental changes to systemic transformations, 2011, file:///C:/Users/pc/Downloads/eio_brief_01.pdf [12-01-2021].

Kacprzak, J., 2018. System patentowy w procesie innowacyjnym. Studia i Prace WNEIZ US, 52(2), DOI: 10.18276/SIP.2018.52/2-06.

Kemp, R.A., 2008. Pearson, Measuring Eco-Innovation, final report of MEI project for DG Research of the European Commission, Brussels, p. 7.

Kemp, R.A., Mainguy, G., 2011. Ten themes for eco-innovation policies in Europe. Sapiens, 4.2, https://journals.openedition.org/sapiens/1169#ftn2 [12-01-2021].

Kneipp, J.M. et al., 2018. Sustainable innovation practices and their relationship with the performance of industrial companies. Emerald Publishing Limited, 2177-8736, 26(2), 94-111, DOI 10.1108/REGE-01-2018-0005, https://www.emerald.com/insight/content/doi/10.1108/REGE-01-2018-0005/full/pdf [12-01-2021].

Kostrzewa, J., 2020. Znaczenie prawa własności intelektualnej dla rozwoju gospodarki. Kancelaria Traple, Konarski, Podrecki & Wspólnicy, https://www.traple.pl/2020/04/27/znaczenie-prawa-wlasnosci-intelektualnej-dla-rozwoju-gospodarki/ [25-01-2021].

Miąsik, D. 2012. Stosunek prawa ochrony konkurencji do prawa własności intelektualnej. Wolters Kluwer, 137.

OECD, 2005. Oslo Manual. The measurement of scientific and technological activities. Proposed guidelines for collecting and interpreting technological innovation data. OECD, Paris, https://www.oecd.org/science/inno/2367614.pdf [12-01-2021].

Olejniczak, K., 2015. Innowacje ekologiczne jako narzędzie wspierania zrównoważonego rozwoju. Zeszyty Naukowe Politechniki Częstochowskiej Zarządzanie, 19, 54-62, http://zim.pcz.pl/znwz/files/Innowacje-ekologiczne-jako-narzedzie-wspierania-zrownowazonego-rozwoju.pdf [22-01-2021], cited after Carrillo-Hermosilla, J. et al., 2010. Diversity of eco-innovations: Reflections from selected case studies. Journal of Cleaner Production, 18, 1073.

Oltra, V. et al., 2008. Patents as a measure for eco-innovation, Report for MEI project, 15, https://core.ac.uk/download/pdf/9835259.pdf [22-01-2021].

Pakulska, J. 2020. Nakłady na innowacje ekologiczne w krajach Unii Europejskiej w latach 2010-2018. Studia Ecologiae et Bioethicae, 18(2), 58, DOI: 10.21697/seb.2020.2.06.

Polityka Ekologiczna Państwa 2030, https://bip.mos.gov.pl/fileadmin/user_upload/bip/prawo/projekty/PROJEKT_POLITYKI_EKOLOGICZNEJ_PANSTWA_2030/Projekt_Polityki_ekologicznej_panstwa_2030.pdf [23-01-2021].

Roczny raport Urzędu Patentowego RP 2019, https://uprp.gov.pl/sites/default/files/inline-files/Raport%20roczny%202019_1.pdf [03-01-2021].

Statistical Offices, 2019. https://stat.gov.pl/en/topics/science-and-technology/science-and-technology/research-and-experimental-development-in-poland-in-2019,4,4.html [24-01-2021].

Szpor, A., Śniegocki, A., 2012. Ekoinnowacje w Polsce, Stan obecny, bariery rozwoju, możliwości wsparcia, Warszawa, https://ibs.org.pl/publications/ekoinnowacje-w-polsce-stan-obecny-bariery-rozwoju-i-mozliwosci-wsparcia-2/ [02-01-2021].

The Eco-Innovation Challenge Pathways to a resource-efficient Europe, Annual Report 2010 May 2011, Eco-innovation Observatory, http://www.eurosfaire.prd.fr/7pc/doc/1308928736_eco_report_2011.pdf [12-12-2020].

The Environmental Implementation Review 2019. Country Report Poland, 2019, https://ec.europa.eu/environment/eir/pdf/report_pl_en.pdf [08-03-2021].

UNFCCC/CP/2015/L.9, 2015. Framework Convention on Climate Change, Paris, https://unfccc.int/resource/docs/2015/cop21/eng/109r01.pdf [23-01-2021].

United Nations Conference on Environment & Development Rio de Janerio, 1992, Agenda 21, https://sustainabledevelopment.un.org/content/documents Agenda 21.pdf [12-01-2021].

WIPO IP Facts and Figures 2020, https://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2020.pdf [05-12-2020].

World Intellectual Property Indicators Report 2019, https://www.wipo.int/pressroom/en/articles/2020/article_0027.html [05-12-2020].

Wskaźniki zielonej gospodarki w Polsce 2020. Raport GUS, https://stat.gov.pl/files/gfx/portalinformacyjny/pl/defaultaktualnosci/5484/5/4/1/wskazniki_zielonej_gospodarki_w_polsce_2020_2.pdf [12-01-2021].

Wzorce zrównoważonej produkcji w działalności przedsiębiorstw (WZP) – propozycja rozwiązań systemowych wspierających wdrażanie WZP w MŚP, 2011. Raport z analizy danych zastanych, https://www.parp.gov.pl/storage/publications/pdf/2011_wzp_aanalizajakosciowa.pdf [12-01-2021].