

EKO INDEX



Millennium



Millennium Eco-index: Regional eco-innovation potential

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WHY THE ECO-INDEX?



STRUCTURE OF MILLENNIUM ECO-INDEX



ECO-INDEX 2022: RESULTS



KEY CONCLUSIONS AND RECOMMENDATIONS

Agenda



WHY THE ECO-INDEX?

GROWING ENVIRONMENTAL AWARENESS

- 86% of Poles are willing to limit the purchase of material goods preserving natural resources and reducing waste*
- 64% of Gen Z and Millennials are willing to pay more to buy a sustainable product**

Source: * Single-thematic survey of environmental awareness and behaviour of Polish residents for the Ministry of Environment and Climate, carried out by PBS, 11.2021

** The Deloitte Global 2022 Gen Z & Millennial Survey



WHY THE ECO-INDEX?

LOCAL ACTIVITIES MATTER

- 32% believe that the inhabitants of the region should make decisions about how to use and protect natural resources in a given region*, and additionally:
- 30% believe that decisions on how to use and protect natural resources in a given region should be taken by regional authorities*

* Source: Single-thematic survey of ecological awareness and behaviour of Polish residents for the Ministry of Environment and Climate, carried out by PBS, 11.2021



COMBINATION OF TWO IMPORTANT TRENDS

INNOVATIONS + ECOLOGY

ECO-INNOVATION OBSERVATORY

27. PLACE FOR POLAND (2021)



MILLENNIUM ECO-INDEX

RESULTS OF MILLENNIUM ECO-INDEX 2022



1. sub-index

ECO-INNOVATION INPUTS



2. sub-index

ECO-INNOVATION OUTPUTS



3. sub-index

ECO-INNOVATION SOCIO-ECONOMIC ACTIVITIES



4. sub-index

ECO-INNOVATION RESOURCE EFFICIENCY OUTCOMES



01. sub-index

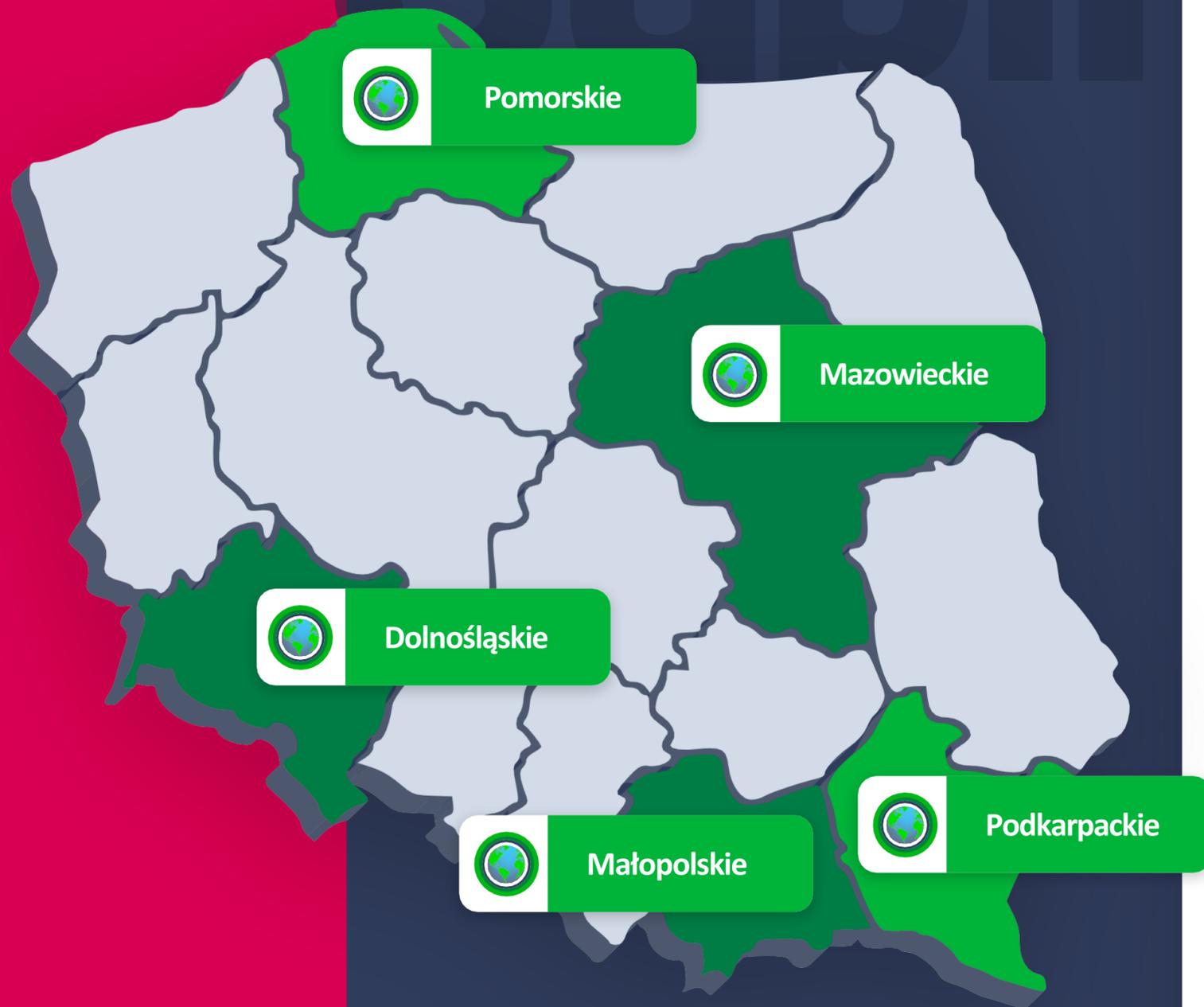
ECO-INNOVATION INPUTS

- Expenditures on investments in fixed assets for environmental protection and water management (PLN per capita)
- Expenditures on R&D - natural sciences, agriculture, veterinary, technical and engineering sciences (% of GDP)
- R&D personnel (% of total employment)
- University graduates in the fields belonging to the subgroups of biology, environmental sciences, engineering and technical, production and processing, agricultural, forestry, fisheries, veterinary (% of total)



ECO-INNOVATION INPUTS – TOP 3

VOIVODESHIP	2018	2019	2020	2021	2022
Dolnośląskie	48	55	67	60	71
Kujawsko-pomorskie	14	13	13	9	15
Lubelskie	27	28	51	38	38
Lubuskie	18	21	20	19	22
Łódzkie	24	27	32	25	46
Małopolskie	84	75	80	77	80
Mazowieckie	55	62	67	74	69
Opolskie	34	23	26	28	24
Podkarpackie	37	47	47	46	55
Podlaskie	12	23	34	23	25
Pomorskie	37	42	45	42	54
Śląskie	41	46	46	47	45
Świętokrzyskie	12	7	18	12	29
Warmińsko-mazurskie	18	17	16	20	21
Wielkopolskie	34	33	35	34	35
Zachodniopomorskie	21	42	39	20	30
Poland	40	44	49	46	50



ECO-INNOVATION INPUTS – ABOVE AVERAGE

VOIVODESHIP	2018	2019	2020	2021	2022
Dolnośląskie	48	55	67	60	71
Kujawsko-pomorskie	14	13	13	9	15
Lubelskie	27	28	51	38	38
Lubuskie	18	21	20	19	22
Łódzkie	24	27	32	25	46
Małopolskie	84	75	80	77	80
Mazowieckie	55	62	67	74	69
Opolskie	34	23	26	28	24
Podkarpackie	37	47	47	46	55
Podlaskie	12	23	34	23	25
Pomorskie	37	42	45	42	54
Śląskie	41	46	46	47	45
Świętokrzyskie	12	7	18	12	29
Warmińsko-mazurskie	18	17	16	20	21
Wielkopolskie	34	33	35	34	35
Zachodniopomorskie	21	42	39	20	30
Poland	40	44	49	46	50



01. sub-index - CONCLUSIONS

ECO-INNOVATION INPUTS

- The top of the of the eco-innovation inputs sub-index are voivodships with large industrial and academic centres – Małopolskie, Mazowieckie and Dolnośląskie. Podkarpackie and Pomorskie voivodships are also above the indicator value for Poland.
- Over the last five years, almost all voivodships have shortened the distance to the leader. In this respect, the most distinguished are the provinces of Dolnośląskie, Łódzkie, Podkarpackie, Pomorskie and Świętokrzyskie, which came closest to the leader.
- In the last five years, Łódzkie and Świętokrzyskie voivodships have advanced the most in this category. In both regions, recent years have brought a clear increase in expenditures on fixed assets for environmental protection. There is also a noticeable improvement in R&D expenditures focused on environmental issues. This indicates that smaller Polish regions are actively working to shorten the gap to the leader.
- The relatively high position of Podkarpackie Voivodeship and the shortening of the distance to the leader by Świętokrzyskie Voivodeship may suggest a great value of cooperation in the eco-innovation process. In both regions, the largest percentage of industrial companies active in innovation cooperate in the cluster initiative.



02. sub-index

ECO-INNOVATION OUTPUTS

- Production of energy from renewable resources (% of total energy consumption)
- Wastewater treated with increased nutrient removal (municipal and industrial, % of total wastewater discharged)
- Vehicles running on fuel other than petrol, diesel and LPG (% of total registered vehicles)
- Eco-innovation related patents (% of total patents granted for inventions)
- Gross value added in green industries (low and medium environmental risk industries, per worker)



ECO-INNOVATION OUTPUTS – TOP 3

VOIVODESHIP	2018	2019	2020	2021	2022
Dolnośląskie	39	35	30	34	31
Kujawsko-pomorskie	43	31	33	39	39
Lubelskie	27	22	26	27	20
Lubuskie	42	41	38	48	38
Łódzkie	50	36	33	49	48
Małopolskie	48	37	49	51	48
Mazowieckie	38	31	31	34	33
Opolskie	33	37	46	37	29
Podkarpackie	50	33	39	36	42
Podlaskie	47	32	38	46	38
Pomorskie	64	64	66	58	64
Śląskie	30	34	30	30	29
Świętokrzyskie	25	45	29	34	29
Warmińsko-mazurskie	45	37	31	23	35
Wielkopolskie	32	30	38	33	40
Zachodniopomorskie	41	29	33	39	29
Poland	37	32	34	35	34



ECO-INNOVATION OUTPUTS – ABOVE AVERAGE

VOIVODESHIP	2018	2019	2020	2021	2022
Dolnośląskie	39	35	30	34	31
Kujawsko-pomorskie	43	31	33	39	39
Lubelskie	27	22	26	27	20
Lubuskie	42	41	38	48	38
Łódzkie	50	36	33	49	48
Małopolskie	48	37	49	51	48
Mazowieckie	38	31	31	34	33
Opolskie	33	37	46	37	29
Podkarpackie	50	33	39	36	42
Podlaskie	47	32	38	46	38
Pomorskie	64	64	66	58	64
Śląskie	30	34	30	30	29
Świętokrzyskie	25	45	29	34	29
Warmińsko-mazurskie	45	37	31	23	35
Wielkopolskie	32	30	38	33	40
Zachodniopomorskie	41	29	33	39	29
Poland	37	32	34	35	34



02. sub-index - CONCLUSIONS

ECO-INNOVATION OUTPUTS

- The clear leader of the eco-innovation effects sub-index is Pomorskie Voivodeship, which is at the forefront of all variables forming this category. At the top of the ranking, although with a significant loss to the leader, were Małopolskie and Łódzkie voivodships.
- In recent years, Podkarpackie and Wielkopolskie voivodships have systematically shortened the distance to the leader. The situation of other regions is more volatile, which results from the multidimensionality of eco-innovation effects and the inclusion of some variables that aim to reflect the orientation of regions towards eco-innovation regardless of their size and economic potential.
An example of such a variable is the number of patents for eco-innovations, which the Polish Patent Office prepared for the first time for the needs of Millennium Eco-index. Therefore, for the correct assessment of conclusions, a more detailed analysis of trends at the level of the variables constituting this sub-index is advisable.
- The variable reflecting the share of energy produced from renewable sources in total energy consumption favours less industrialised regions and regions with more favourable natural conditions, but in the authors' opinion, the analysis of trends in this area is particularly important in the context of the escalating energy crisis in Europe.



03. sub-index

ECO-INNOVATION SOCIO-ECONOMIC ACTIVITIES

- Waste recovered without municipal waste (% of waste generated)
- Employment in green industries (working in industries with low and medium environmental risk, % of total employment in the enterprise sector)
- Enterprises that have invested in innovation activities (industry and services, % of total)
- Bicycle paths (per 100 km²)
- Passenger transport (per 1 inhabitant)



VOIVODESHIP	2018	2019	2020	2021	2022
Dolnośląskie	36	48	37	46	43
Kujawsko-pomorskie	50	53	53	51	56
Lubelskie	36	24	27	18	35
Lubuskie	34	44	33	31	28
Łódzkie	44	42	31	47	41
Małopolskie	63	73	63	71	62
Mazowieckie	73	74	77	74	76
Opolskie	45	45	50	52	40
Podkarpackie	34	42	38	39	34
Podlaskie	48	44	51	58	44
Pomorskie	83	82	74	70	71
Śląskie	57	61	54	56	50
Świętokrzyskie	31	28	29	25	21
Warmińsko-mazurskie	31	24	28	35	53
Wielkopolskie	50	50	45	46	43
Zachodniopomorskie	36	40	38	40	46
Poland	51	52	48	51	49



ECO-INNOVATION SOCIO-ECONOMIC
ACTIVITIES – ABOVE AVERAGE

VOIVODESHIP	2018	2019	2020	2021	2022
Dolnośląskie	36	48	37	46	43
Kujawsko-pomorskie	50	53	53	51	56
Lubelskie	36	24	27	18	35
Lubuskie	34	44	33	31	28
Łódzkie	44	42	31	47	41
Małopolskie	63	73	63	71	62
Mazowieckie	73	74	77	74	76
Opolskie	45	45	50	52	40
Podkarpackie	34	42	38	39	34
Podlaskie	48	44	51	58	44
Pomorskie	83	82	74	70	71
Śląskie	57	61	54	56	50
Świętokrzyskie	31	28	29	25	21
Warmińsko-mazurskie	31	24	28	35	53
Wielkopolskie	50	50	45	46	43
Zachodniopomorskie	36	40	38	40	46
Poland	51	52	48	51	49



03. sub-index - CONCLUSIONS

ECO-INNOVATION SOCIO-ECONOMIC ACTIVITIES

- At the forefront of the sub-index are the Mazowieckie, Pomorskie and Małopolskie voivodships, with a significant advantage over other regions. The value of the sub-index above the national level is also enjoyed by the Kujawsko-Pomorskie, Śląskie and Warmińsko-Mazurskie voivodships. In Warmińsko-Mazurskie Voivodship, the percentage of companies that incurred expenditure on innovation, as well as the rate of waste given to recovery, clearly improved. In the case of Kujawsko-Pomorskie Voivodeship, the percentage of companies incurring expenditures on innovative activities increased, and in addition, the region has a high position in the variable determining the infrastructure of bicycle paths.
- Over the last five years, as many as 12 out of 16 voivodships have caught up with the leader, and Warmińsko-Mazurskie, Zachodniopomorskie, Dolnośląskie and Kujawsko-Pomorskie voivodships came the closest to the top.
- This category includes variables that reflect environmental awareness in the regions (density of cycle paths, passenger transport). Environmental awareness does not have to be clearly associated with eco-innovation activities, but in the opinion of the authors of the report, it is an important element of building a culture for eco-innovation.



04. sub-index

ECO-INNOVATION RESOURCE EFFICIENCY OUTCOMES

- Carbon dioxide emission intensity (CO2 emissions in particularly onerous plants / GDP)
- Energy productivity (GDP / total electricity consumption)
- Water productivity (GDP / water consumption in the national economy)



VOIVODESHIP	2018	2019	2020	2021	2022
Dolnośląskie	65	67	67	46	43
Kujawsko-pomorskie	53	53	54	51	56
Lubelskie	58	58	59	18	35
Lubuskie	69	72	72	31	28
Łódzkie	29	29	28	47	41
Małopolskie	61	62	64	71	62
Mazowieckie	70	71	71	74	76
Opolskie	18	20	15	52	40
Podkarpackie	72	72	74	39	34
Podlaskie	81	84	81	58	44
Pomorskie	81	84	86	70	71
Śląskie	58	59	62	56	50
Świętokrzyskie	8	11	9	25	21
Warmińsko-mazurskie	77	76	76	35	53
Wielkopolskie	61	59	68	46	43
Zachodniopomorskie	40	42	46	40	46
Poland	51	52	53	55	58



VOIVODESHIP	2018	2019	2020	2021	2022
Dolnośląskie	65	67	67	46	43
Kujawsko-pomorskie	53	53	54	51	56
Lubelskie	58	58	59	18	35
Lubuskie	69	72	72	31	28
Łódzkie	29	29	28	47	41
Małopolskie	61	62	64	71	62
Mazowieckie	70	71	71	74	76
Opolskie	18	20	15	52	40
Podkarpackie	72	72	74	39	34
Podlaskie	81	84	81	58	44
Pomorskie	81	84	86	70	71
Śląskie	58	59	62	56	50
Świętokrzyskie	8	11	9	25	21
Warmińsko-mazurskie	77	76	76	35	53
Wielkopolskie	61	59	68	46	43
Zachodniopomorskie	40	42	46	40	46
Poland	51	52	53	55	58



04. sub-index - CONCLUSIONS

ECO-INNOVATION RESOURCE EFFICIENCY OUTCOMES

- The leaders in this category differ from the previous sub-indices, because regions that are smaller economic centres dominate. The leader is Pomorskie Voivodeship, followed by Warmińsko-Mazurskie, Podlaskie, Podkarpackie and Dolnośląskie voivodships. Łódzkie and Świętokrzyskie voivodships came closest to the leader in the horizon of the last five years.
- Over the last five years, a significant number of regions have made great efforts to improve resource efficiency. In terms of carbon dioxide emissions, the position of Małopolskie and Wielkopolskie voivodships has clearly improved. In the analysed period, however, the distance to the leader was shortened the most by Świętokrzyskie and Łódzkie voivodships.
- In terms of energy efficiency, Wielkopolskie, Mazowieckie, Warmińsko-Mazurskie, as well as Podlaskie and Podkarpackie voivodships are at the forefront. This is a particularly important aspect of eco-innovation in the context of the energy crisis.
- Over the past five years, almost all voivodships in each of the three variables that make up the sub-index have improved resource efficiency.



MILLENNIUM ECO-INDEX 2022

GENERAL OVERVIEW

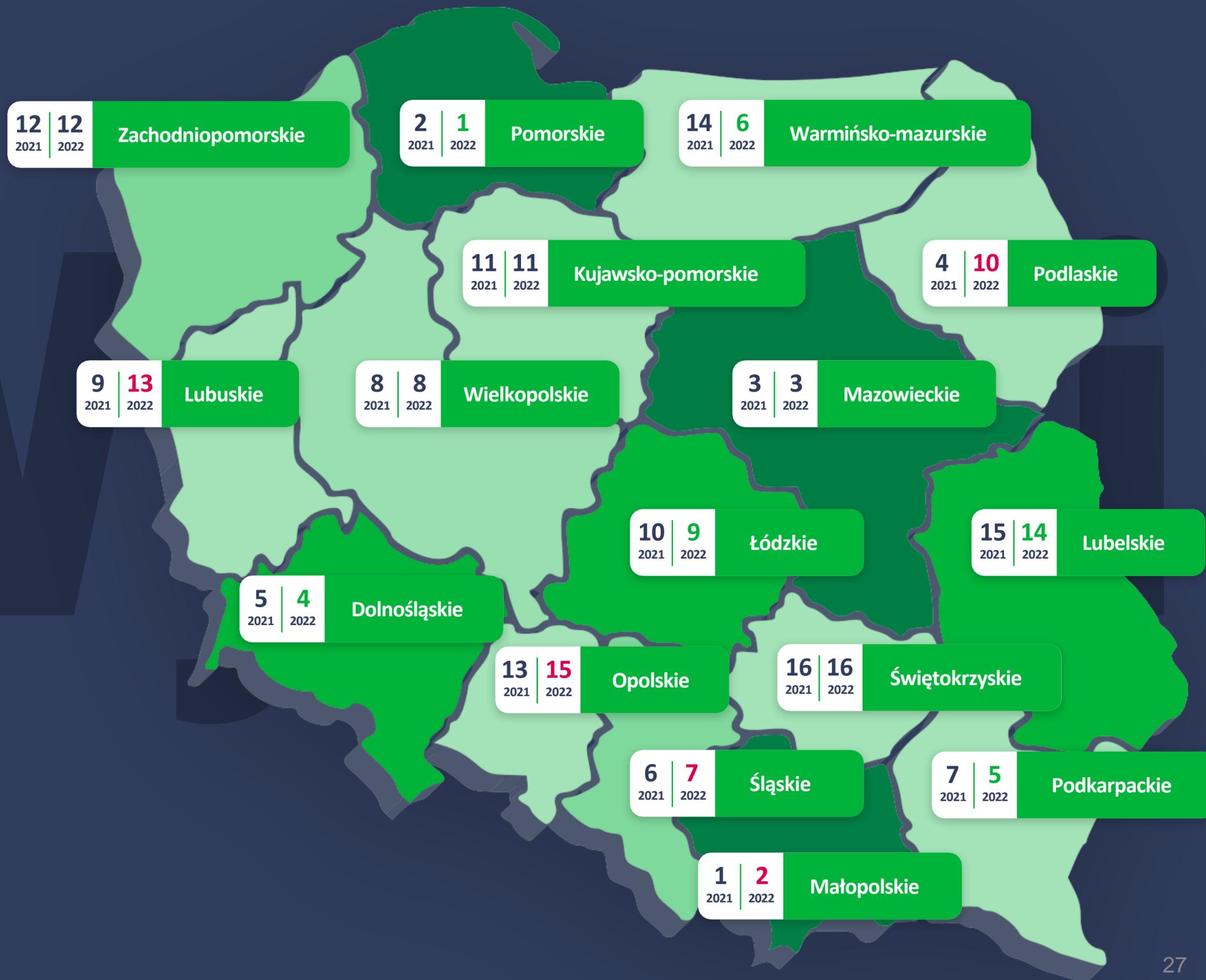
MILLENNIUM ECO-INDEX 2022:

GENERAL OVERVIEW

VOIVODESHIP	2018	2019	2020	2021	2022	3Y average
Pomorskie	66	68	67	63	68	66
Małopolskie	63	61	63	66	64	64
Mazowieckie	58	58	60	62	61	61
Dolnośląskie	45	49	47	50	51	49
Podkarpackie	46	46	47	46	49	47
Warmińsko-mazurskie	40	35	35	35	46	38
Śląskie	45	49	47	48	46	47
Wielkopolskie	43	42	44	43	45	45
Łódzkie	38	35	31	40	45	39
Podlaskie	45	42	48	50	44	48
Kujawsko-pomorskie	40	37	38	38	41	39
Zachodniopomorskie	35	37	38	37	38	37
Lubuskie	39	43	38	40	37	39
Lubelskie	35	30	38	33	36	36
Opolskie	34	33	37	35	29	34
Świętokrzyskie	21	25	23	22	25	23
Poland	44	44	45	46	46	

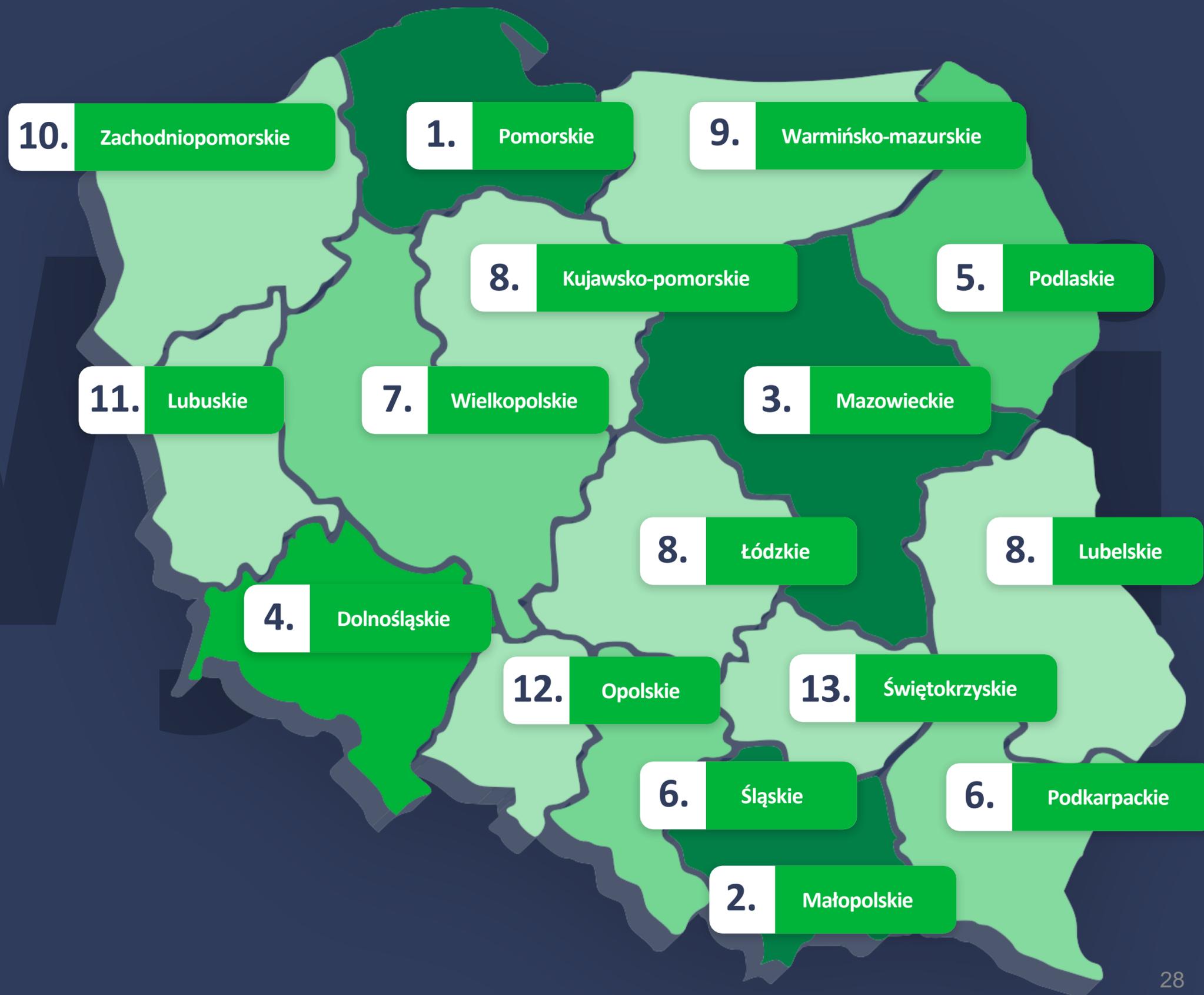
MILLENNIUM ECO-INDEX 2022:

GENERAL OVERVIEW



MILLENNIUM ECO-INDEX 2022:

3-YEAR AVERAGE RESULTS





KEY CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS:

- The aim of analysing the potential of eco-innovation should not be to rank regions, but to analyse the process over the years and to evaluate the strengths and weaknesses of regions.
- Focus on eco-innovation is crucial in the context of the energy crisis.
- Voivodships with large industrial and academic centres remain leaders in both innovation and eco-innovation, but there are noticeable differences in the distribution of focus. Smaller regions can be eco-innovative.
- Eco-innovation is a complex and long-term process, covering many aspects of eco-innovation. It should be viewed as a several-year process, and not through the optic of data for a given year, which may be distorted by the impact of one-off and temporary factors (e.g. data for 2020 under the influence of the COVID pandemic).
- Orientation for co-operation and environmental awareness are important aspects of eco-innovation (including sharing economy, economic symbiosis).



KEY CONCLUSIONS AND RECOMMENDATIONS

RECOMMENDATIONS:

- Regular collection of statistical data in the area of eco-innovation at the regional level in order to analyse changes in eco-innovation potential and progress in the implementation of regional development strategies (Programme of Statistical Surveys of Public Statistics).
- Regular measurement of the progress of eco-innovation and adjustment of the used measures and assessment methods to the available data.
- Measuring eco-innovation at enterprise level.
- Cooperation of various environments at the local level, but also at the central level in order to develop eco-innovation and improve environmental awareness (the result of such cooperation is, inter alia the Millennium Eco-index, which uses variables prepared by the Patent Office of the Republic of Poland on patents for eco-innovations).

LET US TALK ABOUT ECO-INNOVATION



MILLENNIUM ECO-INDEX 2022

METHODOLOGY

METHODOLOGY

The Millennium Eco-Index is a compilation of 17 different variables, which the authors grouped into four sub-indices (categories):

- Eco-innovation inputs
- Eco-innovation outputs
- Eco-innovation socio-economic activities
- Eco-innovation resource efficiency outcomes

ECO-INNOVATION INPUTS	unit	Source
Expenditures on investments in fixed assets for environmental protection and water management	PLN per capita	GUS
Expenditures on R&D - natural sciences, agricultural, veterinary, technical and engineering	% GDP	GUS
R&D personnel	% of total employment	GUS
University graduates in the fields belonging to the subgroups of biology, environmental sciences, engineering and technical, production and processing, agricultural, forestry, fisheries, veterinary	% of total graduates	GUS
ECO-INNOVATION OUTPUTS		
Production of Energy from renewable resources	% of total power consumption	GUS
Wastewater treated with increased nutrient removal (municipal and industrial wastewater)	% of total wastewater discharged	GUS
Vehicles running on fuel other than petrol, diesel and LPG	% of total registered vehicles	GUS
Eco-innovation related patents	% of total patents granted	Polish Patent Office
Gross value added in green industries	thousand PLN per one employee	GUS / Bank Millennium
ECO-INNOVATION SOCIO-ECONOMIC ACTIVITIES		
Recycled waste (excluding municipal waste)	% of waste generated during the year	GUS
Employment in green industries (working in industries with low and medium ecological risk)	% of total employment in the enterprise sector	GUS / Bank Millennium
Enterprises that have invested in innovation activities (industry and services)	% total	GUS
Bicycle paths	per 100 km ²	GUS
Passenger transport	per 1 inhabitant	GUS
ECO-INNOVATION RESOURCE EFFICIENCY OUTCOMES		
Carbon dioxide emission intensity	CO ₂ emissions in particularly onerous plants / GDP	GUS
Energy productivity	GDP / electricity consumption	GUS
Water productivity	GDP / water consumption in the national economy	GUS

The variables take into account economic and social activity, as well as environmental awareness, which in the opinion of the authors of the Millennium Eco-Index is conducive to the process of eco-innovation.

A wide range of variables allows for an overview of individual voivodships of Poland in various dimensions of eco-innovation, as well as an analysis of their strengths and weaknesses.

The list of the variables was also subject to availability of data over the last five years at the voivodship level.

MILLENNIUM ECO-INDEX

METHODOLOGY

- Of the variables used, 16 are eco-innovation stimulants and one (carbon emissions relative to GDP) is a destimulant. The direction of the effect of stimulants/destimulants on the index is included in the index.
- All variables have been standardised, as a result of which each variable in individual years covered by the analysis takes values from 0 (voivodship with the lowest reading of a given variable in a given year) to 100 (leader in a given variable in a given year).
- For each group of variables, a sub-index has been calculated, which is the arithmetic mean of standardized variables included in a given category (each variable has an equal weight in the sub-index). The general summary of the Millennium Eco-index is the arithmetic mean of all seventeen variables while maintaining equal weights included in the index of variables.
- The results of the Millennium Eco-Index were calculated on the basis of data provided by Statistics Poland - Local Data Bank and the Polish Patent Office. Data on employed people and added value in green industries were prepared by Statistics Poland at the request of Bank Millennium. The definition of green industries is based on the assessment of the United Nations Environment Programme Finance Initiative (UNEP FI) and includes industries with low and medium environmental risk. The scope of CSO data covers the years 2016-2020.
- Data on patents for eco-innovations have been prepared by the Polish Patent Office. They cover patents granted to domestic entities in the years 2015-2021 for inventions in the area of so-called "green technologies". The identification of these solutions was made on the basis of the International Patent Classification, taking into account the symbols proposed in the "IPC Green Inventory". This is a methodology used by WIPO and developed by the IPC Committee of Experts to facilitate the search for patent information related to environmentally sound technologies (EST), listed in the United Nations Framework Convention on Climate Change (UNFCCC). The symbols indicated under the "IPC Green Inventory" concern many areas of technology from alternative energy sources, through transport, agriculture and waste management to transport and technologies related to nuclear energy.
- The range of variables included in the index was the subject of analysis and consultation with substantive partners. The authors of the index do not exclude the modification of selected variables in the situation of improving the availability of data at the level of voivodships.

EKO INDEX



Millennium



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