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ENERGY AND ENVIRONMENTAL INDICATORS AS A SOURCE OF INFORMATION FOR DECISION MAKERS

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ENERGIA I WSKAŹNIKI ŚRODOWISKOWE JAKO ŹRÓDŁO INFORMACJI DLA DECYDENTÓW

STRESZCZENIE: Jednym z kluczowych sposobów zmniejszających ryzyko podjęcia złych decyzji w obszarze energii i ochrony środowiska jest jakość informacji. Nie istnieje w Polsce kompleksowy zestaw wskaźników energetyczno-środowiskowych, gromadzonych na poziomie krajowym podobnych do tych, które publikowane są przez Europejską Agencję Środowiska (EEA). Niemniej jednak istniejące wskaźniki, zbierane przede wszystkim przez Główny Urząd Statystyczny (GUS), opisują różne obszary działania krajowego sektora energetycznego, w tym związane z jego wpływem na środowisko. Celem niniejszego artykułu jest analiza porównawcza istniejących wskaźników energetyczno-środowiskowych, biorąc pod uwagę ich wszechstronność i przydatność dla decydentów. Omówiono dane zawarte w krajowych dokumentach, takich jak Gospodarka paliwowo-energetyczna, Efektywność wykorzystania energii, Ochrona Środowiska i Energia ze źródeł odnawialnych oraz porównano je ze wskaźnikami publikowanymi przez EEA. Zwrócono uwagę, że zakres publikowanych danych wynika przede wszystkim z celów krajowej polityki energetycznej, a krajowe dokumenty spełniają to zadanie w sposób zadowalający. Niemniej jednak konieczna jest ich weryfikacja, przede wszystkim w związku z nowymi wyzwaniami stojącymi przed polską energetyką.

SŁOWA KLUCZOWE: wskaźniki środowiskowe, wskaźniki energetyczne, polityka energetyczna

Introduction

The challenges that decision makers of widely understood energy-related entities face nowadays are substantially different when compared to those faced decades ago. The authorities as well as enterprises operate in significantly more complicated circumstances, e.g.: energy companies are exposed to significantly higher risk of operation, national and local authorities have to balance economic development with protection of the environment. One of the key risks that energy-related entities deal with is the one linked with the environment, or rather the environment protection constraints that affect their activities. As the process of decision making is significantly more complex these days, one of the key means to reduce the risk of taking an inefficient decision is to improve the quality of information on which decisions are based. The better the information, the more appropriate the decision. Consequently, when the environmental aspects are taken into account, a good source of information could be a database of indicators developed by proper authorities (such as agencies, ministries, independent institutes). However, there is no a comprehensive set of energy-environmental indicators collected at a country level, hence those published by the European Environmental Agency (EEA) are very useful. Poland, as a member state of the European Union, European Economic Area, Organisation for Economic Co-operation and Development and other international bodies, provides data and indicators required by those organizations. Therefore the actions focused on monitoring the energy-environment relationships taken at the national level are largely driven by international initiatives and requirements.

Polish authorities collect a wide range of environmental and energy data that are used to develop meaningful indicators. The indicators primarily describe various aspects of the energy sector. Some of them are directly related with the impact of energy on the environment. However, there is no comprehensive assessment of adverse effects of energy on the environment. The indicators are selected and calculated mainly for the assessment of the most important environmental and energy policy goals and other environmental objectives. International indicators, including the EEA's indicators, are used as comparative data. As far as the Polish statistical system is concerned, there are authorities responsible for providing data to the national and international statistics. GIOS (The Chief Inspectorate of Environmental Protection) is responsible for providing environmental data collected by the EEA and the OECD. The Central Statistical Office – in cooperation with ministries – is responsible for data gathering for Eurostat indicators (including the Environment and Energy subsection).

In this context, the aim of this paper is to analyse and discuss the energy and environmental indicators, taking into account their comprehensiveness and usefulness for decision makers at the national level. The paper, partially, presents the results of research carried out for the European Environmental Agency by the Division of Energy and Environmental Policy of the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences.

Domestic sources of energy and environmental indicators

The overview of energy and environmental domestic reporting mechanisms was based on the review of core documents. Furthermore, interviews with National Focal Points (NFP) was carried out for this study. The documents discussed in this paper are as follows:

- Energy Statistics 2008, 2009¹;
- Energy Efficiency in 1998-2008²;
- Environmental Protection (2010)³;
- Energy from Renewable Sources in 2009⁴.

All of the listed sources are developed on the basis of data provided mostly by the Central Statistical Office (GUS) – the main Polish body responsible for the national statistical issues.

Three institutions using energy-environmental data sets were selected for further discussion: the Chief Inspectorate of Environmental Protection (GIOS), the Ministry of Economy (ME) and the Polish National Energy Conservation Agency (KAPE).

Key documents related to environmental and energy issues can be split into two groups. The first one covers strategic documents that set out key objectives of environmental and energy policy. The latter contains statistical publications of relevant indicators.

Strategic documents that set out key objectives of energy and environmental policy

The most important documents that cover the issue of energy and environmental policy are:

- The Polish Energy Policy until 2030 (2009)⁵;
- The National Environmental Policy (2008)⁶;
- Report on the State of the Environment in Poland (2008)⁷.

Although these documents do not include specific and detailed indicators of energy and environmental impacts such as the EEA publishes, they affect the nature and scope of data and indicators enclosed in national statistics. The Polish Energy Policy includes measures to reduce the energy impact on the environment and stresses that the National Environmental Policy significantly influenced these measures. The document contains a list of basic indicators for monitoring the implementation of energy policy on the basis of statistical data, but not as

¹ *Energy Statistics*, www.stat.gov.pl [10-01-2014].

² *Energy Efficiency in 1998-2008*, www.stat.gov.pl [10-01-2014].

³ *Environmental Protection (2010)*, www.stat.gov.pl [10-01-2014].

⁴ *Energy from Renewable Sources in 2009*, www.stat.gov.pl [10-01-2014].

⁵ *The Polish Energy Policy until 2030 (2009)*, www.mg.gov.pl [20-12-2013].

⁶ *The National Environmental Policy (2008)*, www.mos.gov.pl [20-12-2013].

⁷ *Report on the state of the environment in Poland (2008)*, www.gios.gov.pl [20-12-2013].

detailed as the list of EEA indicators. Moreover the document contains: assessment of implementation of energy policy since 2005 onwards, projection of demand for fuels and energy until 2030, action plan for 2009–2012, conclusions from the strategic environmental impact assessment of energy policy. The Environmental Impact Assessment contains the following general recommendations on reinforcing the possibilities to implement the objectives included in the Polish Energy Policy:

- Activities related to energy efficiency should be carried out in an equally intensive manner in two complementary areas: the fastest possible improvement of primary energy efficiency (by increasing efficiency of generation equipment and preferences for cogeneration processes) and the reduction in demand for final energy, in particular in service, household, and transport sectors (inter alia by replacing equipment and vehicles with those which consume less energy, thermo-modernisation, passive construction, lighting rationalisation).
- Instruments adopted to implement the Energy Policy, including environmental and energy standards, as well as flexible mechanisms for balancing most important emission sources (CO_2 , SO_2 , NO_x), should be adjusted to the issues related to the improvement of energy efficiency, which will ensure preferences for the use of installations with highest energy efficiency.
- The development of nuclear energy, as compared to the EU average, may be the ultimately effective method to ensure balancing and significant reduction in demand for non-renewable energy carriers. However, these matters are socially controversial and a wide, national debate on the issue must be carried out and also the conditions for the development of this part of the energy sector should be determined sooner, which is crucial to developing and modernising other energy subsectors.
- The Assessment shows that the share of the renewable energy sources in total demand for final energy supply at 20-30% is realistic, which would give the renewable energy subsector a share comparable with other energy sources. This would also support creation of new jobs and would be a significant step forward to “balance” the Polish energy and would ensure long-term energy security, enabling significant reduction in the use of non-renewable fossil fuels. However, in order to achieve this level of satisfying the domestic energy demand, it is necessary to limit the increase in the demand for final energy, in particular for electricity, and ensure maximum use of the potential offered by the renewable energy sector.

The “Report on the state of the environment in Poland” describes the energy sector as a key factor of the pressure on the environment using the data available in the public statistics.

Statistical publications of relevant indicators

The following paragraphs discuss key statistical sources of relevant indicators published by the Central Statistical Office (GUS).

Energy Statistics⁸ – this publication is a successive edition of the study “Energy Statistics” published on an annual basis by the Central Statistical Office (GUS) and the Ministry of Economy as part of the series entitled “Information and statistical papers”. The aim of this publication is to present basic data about the balances in natural units (tons, or m³) and in energy units (GWh, GJ, etc.) of all energy commodities which constitute the Polish national energy balance. The balances contain data on all energy commodities as well as on the auto-produced and self-consumed energy. The publication contains the national energy balance, energy transformations balances and the energy balances for selected sections, divisions and groups according to NACE Rev. 2 classification. The publication was elaborated on by the staff of Energy Market Agency and Central Statistical Office, Production Division.

Energy Efficiency in 1998-2008 – the aim of this publication is to present global and sectoral energy efficiency indicators. The development of energy efficiency indicators adapting statistics to changing economic conditions and present needs (monitoring of energy economy and controlling its management towards sustainable development) is realised in answer to EC and IEA/OECD documents. These documents recommended joint actions of Eurostat and Member States, aimed at the creation of a statistical indicators system which would serve for the assessment of trends in the field of energy efficiency, and also as a support for decision-making and coordination with works carried out by the International Energy Agency. The publication was elaborated by staff of the Polish National Energy Conservation Agency, Energy Market Agency and Central Statistical Office, and is based on indicators used by the EU ODYSSEE-MURE project.

Environmental Protection – the main sources of the data presented in this publication are materials based on the Central Statistical Office surveys and reports. The data obtained from these sources have been grouped into nine chapters which cover: environmental components (land area, soil and useful raw materials; water; air; flora and fauna with a special emphasis on the forest environment and nature protection); hazardous factors – industrial and municipal waste, noise and radiation; activities for protection of the environment. The characteristics of a concentration and diversification of the scale of degradation and pollution of the environment, in geographical distribution is worked out by voivode-ships and selected data also by: regions, sub-regions, administrative districts, and towns.

In addition, international comparisons are included, based mainly on the New Cronos database of the Statistical Office of the European Communities (EUROSTAT), as well as publications and documents of the OECD, and the Food and Agriculture Organization of the United Nations (FAO), covering the broad

⁸ *Energy Statistics*, www.stat.gov.pl [10-01-2014].

problems on the state, threats to and protection of the environment in Poland in relation to the OECD and European Union Member States.

Energy from Renewable Sources in 2009 – the aim of the publication is to provide information on production and consumption of energy from renewable sources; data for 2001 – 2009 are presented.

Results and findings

National reporting mechanisms & policy questions

The most important issues of energy and environmental policies are (in order of importance):

- energy security (increased security of supply of fuels and energy as one of the major Polish Energy Policy goals);
- energy efficiency (improving energy efficiency as one of the major Polish Energy Policy goals, monitored in detail in Energy Statistics and Energy Efficiency in 1998-2008);
- the share of RES production in the country's energy balance (increase in the share of RES, as one of the major Polish Energy Policy goals, treated as an aim in itself and as an instrument to reduce the country's CO₂ emissions – practically all mentioned documents studied this indicator);
- CO₂, SO₂, NO_x and PM emissions (reduction of the impact on the environment as one of the major Polish Energy Policy goals, virtually in any of these publications, with a strong focus on CO₂ and other greenhouse gases);
- energy balances (energy conversion in the sections and sectors of the economy and energy balances according to the methodology of Eurostat);
- energy intensity indicators at the country level and for sectors of the economy.

With respect to the integration of energy issues in environmental reporting and vice-versa in the strategic documents such as the "Polish Energy Policy until 2030" and "National Environmental Policy", environmental and energy issues are considered together. In contrast, statistical publications tend to illustrate the unilateral approach either to environmental or to energy issues.

The primary objectives of Polish energy policy indicated in the document "Polish Energy Policy until 2030" are as follows: to improve energy efficiency, to enhance security of fuel and energy supplies, to diversify the electricity generation structure by introducing nuclear energy, to develop the use of renewable energy sources, including biofuels, to develop competitive fuel and energy markets, to reduce the environmental impact of the power industry. Those policy concerns are reflected in the energy and environmental indicators that are collected and/or published by Polish state institutions (e.g. Central Statistical Office). The table below provides examples of indicators that address the main policy questions.

Table 1
The basic indicators of energy policy implementation monitoring

Name of the indicator	Baseline value, 2007	Expected value by 2030	Data source
Annual average change in primary energy consumption in the country since 2005 [%] ⁹	2.7	Below 1	Central Statistical Office
Hard coal and lignite extraction to domestic consumption (in tons) ratio [%]	105.0	Over 100	Central Statistical Office
Maximum share of total natural gas and crude oil imports (in tons) from a single direction in the domestic consumption of both those resources [%]	85.0	Below 73	Ministry of Economy
Generation capacity of domestic generation sources (conventional and nuclear) to maximum demand for electricity ratio [%]	130.0	Over 115	Ministry of Economy
Share of nuclear power in the electricity production [%]	0	Over 10	Ministry of Economy
Share of energy from renewable sources in the final consumption of energy [%]	7.7	Over 15	Ministry of Economy
Annual emission of CO ₂ in utility power generation as compared to the national electricity generation [tons/MWh]	0.95	Below 0.70	Ministry of Economy

Source: *The Polish Energy Policy until 2030 (2009)*, www.mg.gov.pl [10-01-2014].

It should be noted that the energy data included in the statistical publications are quite detailed, while the environmental issues related to “energy” include, in principle, only emissions of pollutants, including CO₂ and the share of RES. Generally, one can say that these publications contain detailed data, but without direct links to environmental and energy issues in terms of their relationship. This occurs because those publications are mostly designed to provide objective and unbiased statistical data rather than to analyse the energy and environmental policy links. One can also notice that more importance is attached to the energy statistics (energy production, energy balances, energy security, energy efficiency), while the environmental indicators seem to be perceived as an outcome of energy industry activities. It should also be emphasized that the Polish statistics are relatively rich at the national level, but insufficient at the regional level, which is caused mainly by legal limitations of public statistics.

Application of energy and environmental indicators

With respect to energy and environmental indicators, “Energy Statistics” contains the following indicators:

- production and consumption of primary energy;
- production and consumption of electricity;

⁹ Calculated as percentage change from 2005 value and then divided by number of years in the period.

- basic energy supply and use balance;
- balances of energy transformations;
- energy balances of industry, construction and transport;
- direct energy consumption of households, agriculture and other consumers;
- energy intensity of selected products and activities;
- heat generation in autoproducing heat plants;
- energy carriers prices;
- structure of selected energy carriers consumption;
- energy balances according to Eurostat methodology.

This set of indicators includes the national energy balance, energy transformations balances and the energy balances for selected groups, divisions and sections. The publication contains also a complete description of the methodological remarks and definitions of primary fuels, balances of energy, energy consumption and energy efficiency indicators.

“Energy Efficiency in 1998-2008” contains the following indicators:

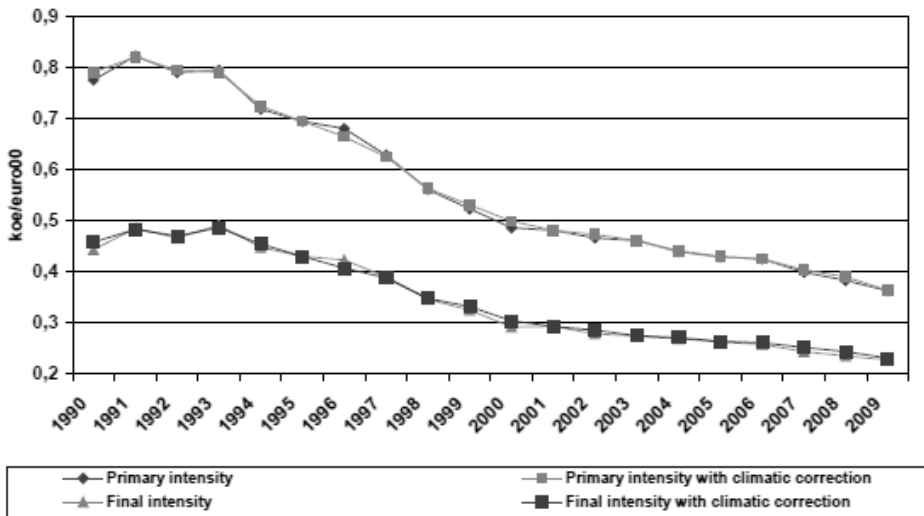
- consumption of primary energy and final energy consumption;
- structure of final energy consumption by fuels;
- structure of final energy consumption by sectors;
- prices of electricity for households and industry;
- prices of gas for households and industry;
- energy intensity of GDP;
- ratio of final energy intensity of GDP to primary energy intensity of GDP;
- final energy intensity of GDP;
- final energy consumption in industry by fuels;
- energy intensity in energy intensive industries;
- energy intensity of production of selected industrial products;
- structure of energy consumption in households by type of use;
- transportation and energy consumption in transport;
- comparison of Poland and other EU countries:
 - primary energy intensity of GDP by the climatic correction (euro05, ppp),
 - final energy intensity of GDP with climatic correction (euro05, ppp).

This publication and presented energy efficiency indicators are the result of research carried out under the project „Monitoring of the European Union and national energy efficiency targets” (the acronym ODYSSEE-MURE 2010). The aim of the project was to provide the results of monitoring and evaluation of energy efficiency progress, as well as policies and programmes aiming to improve energy efficiency, as presented in Poland’s National Energy Efficiency Action Plan (NEEAP). The ODYSSEE database on efficiency indicators and the MURE database with information on measures to improve energy efficiency were used.

The publication provides no methodological details on how these indicators were calculated.¹⁰ It contains a set of tables and graphs on energy efficiency of the Polish economy and its sectors, along with an explanation of the dynamics of changes of each individual indicator. A typical example is the analysis of energy

¹⁰ Details are available from the project website: www.odyssee-indicators.org [10-12-2013].

Figure 1
Energy Intensity of GDP in Poland



Source: *Energy efficiency in Poland in years 1999-2009*, Warsaw 2011.

intensity of GDP. Stable levels of energy consumption and increasing values of GDP caused a decrease of primary and final energy intensity of GDP (see Figure 1). Initial growth of intensity until 1993 was followed by the period of dynamic improvement which lasted until 2000. Since that time gradual improvement of intensity at the rate of 2% per year took place, which accelerated in 2007. In 2009 the positive trend continued and the final intensity of GDP fell by 3%, while primary intensity fell by 5%.

Currently energy efficiency indicators are used for:

- monitoring trends in energy efficiency;
- verifying the results of actions taken at the national level in the field of energy efficiency;
- providing input data for monitoring objectives included in the Polish Energy Policy;
- providing relevant information to determine the purposes of the present and the future of domestic energy policy.

“Environmental Protection” contains the following indicators:

- total consumption of primary energy in the national economy;
- consumption of primary fuels in the national economy;
- production and consumption of renewable energy by source;
- total emissions of major air pollutants;
- total emissions of sulphur dioxide, nitrogen oxides and particulates;
- total emissions of major air pollutants by type of activity;

- total emissions of greenhouse gases;
- total emissions of major GHG by emission sources;
- concentration of major air pollutants and heavy metals.

International comparisons:

- primary energy production;
- renewable energy production by source;
- air pollution;
- emissions of greenhouse gases;
- total emissions of major GHG by emission sources;
- emissions of carbon dioxide per inhabitant.

“Energy from Renewable Sources” contains the following indicators:

- production of renewable energy sources in the Polish Economy;
- production of electricity and heat from renewable sources;
- balances of energy from renewable sources in 2002-2009;
- capacity available for renewable sources to produce electricity;
- international comparisons.

There are no particular reports or statistics that combine a wide range of environmental and energy issues, such as those covered by the EEA indicators. The publications focus on the analysis of individual problems, often duplicating published data. The first two publications deal strictly with energy issues. In addition to these publications there are also dedicated comprehensive data prepared by the Energy Market Agency (Agencja Rynku Energii S.A.) based on surveys conducted by the Ministry of Economy. They cover emissions from fuel combustion (CO_2 , SO_2 , NO_x), balances of primary and final energy (including renewables) and energy efficiency. However, these are usually specialised reports that are used mainly by the energy industry. Data on energy, produced by the CSO (in collaboration with ME) for organizations and international institutions, are developed based on Eurostat and IEA methodologies. “Environmental Protection” contains data on energy and emissions, but aggregated at the national level, not disaggregated by energy processes. “Energy from Renewable Sources” focuses on RES sources. Emissions of main air pollutants and greenhouse gases from energy combustion are collected by KOBIZE (National Database of Greenhouse Gas Emissions and Other Substances) and reported by the Ministry of Environment within the obligations coming from EMEP and UNFCCC and relevant EU legislation concerning these mechanisms.

Comparison of energy and environmental indicators

There is a lack of comprehensive set of energy-environmental indicators in Poland which could be compared to the one developed by EEA. However, for some indicators the consistency exists, mainly for the Polish Energy Policy implementation actions. Nevertheless, Poland regularly reports data to Eurostat, from which EEA draws data and publishes its own reports. Hence the conclusion must

Table 2
Comparison of Polish energy indicators and the EEA energy indicators

Acronym	EEA indicator	Availability of national Polish indicator	Relevant Polish indicator	Document	Comments
ENER11	Energy efficiency in transformation	No			
ENER12	Security of energy supply	Yes – but not a perfect match	Basic energy supply and use balance	Energy Statistics	There is no one specific indicator; however the document contains relevant data on which an indicator similar to ENER12 can be calculated
ENER13	Nuclear waste production	No			Currently there are no nuclear power plants in Poland
ENER16	Final energy consumption by sector	Yes – but not a perfect match	Final energy consumption by sectors	Energy Efficiency in 1998-2008	Polish indicator presents a comparison of the final energy consumption in 1998 and 2008. Consumption in economic sectors is shown as a percentage of the total final consumption. Additionally, Polish indicator contains neither EU-27 nor per capita final energy consumption as ENER16 does.
ENER17	Total primary energy intensity	Yes – but not a perfect match	Primary intensity of GDP; Energy intensity of GDP; Ratio of final to primary intensity; Energy intensity of Poland and the EU	Energy Efficiency in 1998-2008	Polish indicators contain time series data from 1990 to 2008 in kgoe/euro00 units and not as an index based on 1990. Polish indicators also do not contain real GDP and total energy consumption trends as well as forecasts of energy intensity.
ENER18	Final Electricity Consumption	Yes – but not a perfect match	Energy balances of industry, construction, and transport; Direct energy consumption of households, agriculture and other consumers; Changes of price and electricity consumption in households per dwelling;	Energy Statistics; Energy Efficiency in 1998-2008	There is no specific indicator; however the document contains relevant data on which an indicator similar to ENER18 can be calculated
ENER19	Efficiency of conventional thermal electricity production	Yes – but not a perfect match	Efficiency of heat plants and CHP; Public thermal plants – electricity generation, heat generation; Autoproducing thermal plants – electricity generation, heat generation	Energy Efficiency in 1998-2008; Energy Statistics	Tables in Energy Statistics contain (among other data) gross and net transformation efficiency in public thermal plants and autoproducing thermal plants

ENER20	Combined heat and power (CHP)	No					
ENER21	Final energy consumption intensity	Yes – but not a perfect match	Final intensity of GDP; Ratio of final to primary intensity. Final intensity in industry branches	Energy Efficiency in 1998-2008	Polish indicators contain time series data from 1990 to 2008 in kgoe/euro00 units and not as an index based on 1995. There is also no comparison to other EU or EEA countries.		
ENER22	End-use energy efficiency – household	Yes – but not a perfect match	Structure of energy consumption in households by end use; Changes in indicator of energy consumption in households per dwelling; Energy consumption in households per m ² Changes of price and electricity consumption in households per dwelling ODEX indicator	Energy Efficiency in 1998-2008	Polish indicators are similar to ENER22 but are not as expanded as ENER22 and cover less data. Polish indicators do not contain household energy consumption per person, comparison with other EU countries nor any of the indicators related to CO2 emissions.		
ENER23	End-use energy efficiency – transport	Yes – but not a perfect match	Passenger and freight traffic and energy consumption in transport	Energy Efficiency in 1998-2008	Polish indicator is limited only to the energy consumption in transport (ktoe) and shows also passenger and freight traffic (index based on 1990)		
ENER24	End-use energy efficiency – services	Yes – but not a perfect match	Changes of energy intensity and electricity intensity indicator in service sector Changes of energy consumption and electricity consumption per employee of the service sector	Energy Efficiency in 1998-2008	Polish indicator contains time series data from 1990 to 2008. It does not contain however the final energy consumption per person in services.		
ENER25	End-use energy efficiency – industry	Yes – but not a perfect match	ODEX indicator Final energy consumption in industry by energy carrier Energy consumption in manufacturing by branch Changes of energy intensity indicators in low energy intensive industry branches Unit consumption of selected industrial products	Energy Efficiency in 1998-2008	The ODEX indicator shows only the global trend and trend in manufacturing sector.		
ENER26	Total primary energy consumption by fuel	Yes – but not a perfect match	Primary energy consumption	Energy Statistics	The indicator includes primary energy consumption by fuel		

Acronym	EEA Indicator	Availability of national Polish indicator	Relevant Polish indicator	Document	Comments
ENER27	Electricity production by fuel	No			
ENER28	Renewable final energy consumption	Yes – but not a perfect match	Total final energy consumption (including from renewable sources) for EU-25 and Poland in the years 2001-2008	Energy From Renewable Sources in 2009	The table contains total final energy consumption (including these from renewables) and share of energy from renewable sources in the total final energy consumption
ENER29	Renewable primary energy consumption	Yes – but not a perfect match	Production of energy from renewable sources in selected EU countries in the years 2004 – 2008; Production of primary energy (including from renewable sources) for EU-25 and Poland in the years 2001 – 2008	Energy From Renewable Sources in 2009	The tables contains production of primary energy (including production from renewables) and share of energy from renewable sources in the total primary energy
ENER30	Renewable gross electricity consumption	Yes – but not a perfect match	The share of generated electricity from renewable sources in the total gross use of electricity in selected EU countries in the years 2004 – 2008 [%]; The structure of electricity production from renewable energy sources in selected EU countries in the years 2004 – 2008 [%]; National overall targets for the share of energy from renewable sources in gross final consumption of energy in 2020.	Energy From Renewable Sources in 2009	Polish indicator does not contain annual growth rates of renewable energy in electricity consumption. It also does not cover the whole period 1990-2008.

Note: Some indicators marked in the above table as not available are in fact monitored in Poland – for example in publications published by The Energy Market Agency – but they are not included in this paper (for example “Combined heat and power (CHP)” and “Electricity production by fuel”).

Source: own work.

be that the indicators that are collected by Eurostat are comparable and consistent with the EEA ones.

A comparison of the EEA's energy indicators with Polish national statistics-based energy indicators is given in table 2.

Conclusions

The existing system of indicators developed in Poland is to the very large extent linked with current energy and environmental trends. The informative value of these indicators seems to be substantial, hence they are a useful source of information for decision makers. However, a verification of the scope of data collected is recommended, due to the fact that new energy and environmental concerns need to be addressed and monitored. Furthermore, an update of the scope and purpose of the existing indicators should be carried out. It is expected that the collection of data and calculation of the national indicators will be continued.

As Polish public statistics do not provide a broad set of energy and environmental indicators such as EEA does, there is often a lack of links between energy and the environment. The documents and publications describe domestic energy sector adequately, in particular in the case on the production side. Less importance is attributed to the impact of the energy sector on the environment. It does not mean, however, that this set of information is completely ignored. The scope of environmental indicators results from the energy policy objectives, and the national environmental statistics perform it satisfactory. Unfortunately, there is no single publication which includes a consistent set of energy and environmental indicators. Moreover, the existing publications often duplicate some indicators, which sometimes hinder a reliable analysis of problems concerning both fields. It should be noted, however, that Poland fulfils the obligation to provide appropriate indicators to Eurostat. Therefore, comparisons with other countries are possible.

The usefulness and applicability of collected indicators by decision makers is highly appreciated. They are used not only to monitor the implementation of energy and environmental policy objectives, but also in the process of decision making, of which investment decisions are a good example.

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