

Shift towards a low-carbon economy. An impact of support under operational programmes on climate and energy targets

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Abstract: The aim of the analysis is to estimate the impact of Cohesion Policy in the programming period 2014-2020 on the EU climate and energy targets in 9 chosen European countries and on transition into low-carbon economies. The paper discusses benefits expected at the beginning of the 2014-2020 programming period. The benefits include reduction of greenhouse gas emissions of at least 9 million tonnes CO₂ equivalent per year, increase in the capacity of renewable energy sources and improvement in the primary energy consumption. The analysis of operational programs allowed also for a rough estimate of the amount of the support for different types of energy investments in EU Member States. The paper finds that the largest financial support for low carbon transformations will be provided under operational programmes in Poland.

Keywords: climate change, energy, greenhouse gases, subsidies, Cohesion Policy
JEL codes: H23, Q54

1. Introduction

The European Union has been at the forefront of international initiatives to tackle climate change (European Commission, 2015b). One of the instruments which help the EU move towards a so called low-carbon economy is support from Cohesion Policy for a wide range of interventions aimed at reducing greenhouse gas (GHG) emissions and negative effects of energy production. The financial assistance, mainly based on non-repayable financial grants, helps to achieve the climate and energy targets that have been established on regional, national, European or international level.

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The aim of the analysis is to estimate the impact of Cohesion Policy in the programming period 2014-2020 on climate and energy targets in chosen European countries. The paper discusses benefits expected at the beginning of the 2014-2020 programming period. The benefits include greenhouse gas emissions, increase in the capacity of renewable energy sources (RES) and improvement in the primary energy consumption. The countries included in the analysis are Central European countries (Czech Republic, Poland, Slovakia), North European countries (Estonia, Latvia, Lithuania) and Western European countries (Austria, Germany, the United Kingdom).

The analysis of the amount of the financial assistance and its impacts is mainly based on data included in 49 operational programmes (OP) prepared by chosen countries in order to address the climate and energy challenges. The starting point for the analysis are the European Union targets on climate and energy.

2. Climate and energy targets of the European Union and chosen Member States

In March 2007 the European Council adopted climate and energy targets for 2020, known as the '20-20-20' targets. The targets are as follows (European Commission, 2015a):

- a reduction in overall EU greenhouse gas emissions of at least 20% below 1990 levels,
- raising the overall EU share of renewable energy in final energy consumption to 20%,
- a 20% improvement in the EU's primary energy consumption compared with projected levels.

The climate change and energy targets are integral part of the Europe 2020 strategy (adopted in 2010) aimed at achieving smart, sustainable and inclusive growth (European Commission, 2010). Other headline targets of the strategy relate to employment, research and development, education, poverty and social exclusion.

The first of the '20-20-20' targets (a 20% reduction of greenhouse gas emissions compared to 1990 levels) is equivalent to an overall GHG reduction of 14% compared to 2005 levels (Dehousse and Zgajewski, 2010: 14). The 14% emission reduction is to be achieved by a 21% cut in sectors covered by the European Union Emissions Trading System (EU ETS) and 10% cut in non-ETS sectors (space-heating, transport, agriculture, services) between 2005 and 2020 (Tišma et al., 2012: 145; OECD 2011: 104). The target for ETS sectors is to be achieved

by the European Union as a whole and the non-ETS target is translated into different national targets for Member States (Eurostat, 2016). Individual binding annual targets are defined in the EU Effort Sharing Decision (ESD) for the period from 2013 to 2020. National ESD targets for the EU Member States for 2020 vary widely from -20% to +20% compared to 2005 (Kettner et al., 2015: 9; Decision 406/2009/EC). As Table 1 shows, Austria, Germany and the United Kingdom need to significantly reduce their emissions in 2020 below 2005 levels. Central and North European countries are allowed to increase GHG emissions.

Table 1. GHG emissions in non-ETS sectors and national ESD targets for 2020

Country	2013 emissions	Projected 2020 emissions	2020 targets		Gap between 2013 emissions and 2020 targets	Gap between 2020 targets and projected 2020 emissions
	Mt CO ₂ eq	Mt CO ₂ eq	Compared to 2005 (%)	Mt CO ₂ eq	Mt CO ₂ eq	Mt CO ₂ eq
Austria	49.7	51.0	-16	48.8	0.9	-2.2
Czech Republic	61.8	57.2	9	67.7	-5.9	10.5
Estonia	5.8	5.7	11	6.5	-0.7	0.8
Germany	467.5	421.7	-14	425.6	41.9	3.9
Latvia	8.4	9.1	17	9.9	-1.5	0.8
Lithuania	12.2	13.0	15	15.5	-3.3	2.5
Poland	189.0	189.0	14	202.3	-13.3	13.3
Slovakia	21.8	22.6	13	26.5	-4.7	3.9
United Kingdom	348.5	315.6	-16	327.1	21.4	11.5

Source: European Environment Agency, 2015: 94-95.

Table 1 also provides projected levels GHG emissions for 2020 published in the European Environment Agency (EEA) report (European Environment Agency, 2015). As one can see, for Austria reaching the 2020 target will be a challenge.

The second '20-20-20' target (the EU renewable energy target) is also divided into national mandatory targets for 2020. Required levels of renewable energy take into account Member States' starting points and their renewable energy potentials (Directive 2009/28/EC; European Commission, 2016c; Razzaque, 2013: 105-106; Talus, 2013: 193). The targets for countries included in the analysis range from 13% for Czech Republic to 40% for Latvia. Table 2

shows that in 2013 in most of the analysed countries the share of RES was below their 2020 targets. However, it is expected that all countries included in the analysis except the United Kingdom will reach the target until 2020 (European Environment Agency, 2015: 9).

Table 2. Renewable energy shares, primary energy consumption and national targets for 2020

Country	Share of renewables in final energy consumption			Primary energy consumption		
	2013 levels	2020 targets	Gap between 2013 levels and 2020 targets	2013 levels	2020 targets	Gap between 2013 levels and 2020 targets
	%	%	Percentage point	Mtoe	Mtoe	Mtoe
Austria	32.6	34	-1.4	31.9	31.5	0.4
Czech Republic	12.4	13	-0.6	39.6	39.6	0
Estonia	25.6	25	0.6	6.5	6.5	0
Germany	12.4	18	-5.6	302.5	276.6	25.9
Latvia	37.1	40	-2.9	4.4	5.4	-1.0
Lithuania	23.0	23	0	5.7	6.5	-0.8
Poland	11.3	15	-3.7	93.2	96.4	-3.2
Slovakia	9.8	14	-4.2	16.2	16.4	-0.2
United Kingdom	5.1	15	-9.9	194.5	177.6	16.9

Source: European Environment Agency, 2015: 97-98, 100.

The 20% energy efficiency target for 2020 is translated into two absolute EU targets. According to the Directive 2012/27/EU and 2013/12/EU the UE' energy consumption in 2020 has to be no more than 1483 Mtoe of primary energy and/or no more than 1086 Mtoe of final energy (Directive 2012/27/EU; Council Directive 2013/12/EU; European Environment Agency, 2015: 49). The directive 2012/27/EU also requires member states to set their own indicative national energy efficiency targets. The indicative targets (as well as other energy efficiency targets) are described in national energy efficiency action plans. According to the EEA, all analysed countries (except Estonia, Germany and Poland) are on track to deliver on their energy efficiency targets (European Environment Agency, 2015: 9).

European Union set itself some other long-term climate and energy targets. According to 'A roadmap for moving to a competitive low carbon economy in 2050' (presented by European Commission in 2011) the transition towards a competitive low carbon economy means that the

EU should prepare for reductions in its emissions by 80% by 2050 compared to 1990 levels (European Commission, 2011a).

In January 2014, the European Commission proposed new and more ambitious climate and energy goals for 2030. The goals include (Dewulf et al., 2016: 156; European Council, 2014):

- a binding target at the EU level of an at least 40% domestic reduction in greenhouse gas emissions by 2030 relative to 1990 levels,
- a binding UE target of at least 27% share of renewable energy consumed in the EU in 2030,
- an indicative UE target of at least 27% improvement in energy efficiency in 2030 compared to projections of future energy consumption.

The 40% greenhouse gas reduction target will be divided between ETS and non-ETS sectors. A reduction target for the ETS sectors is 43% and a reduction target for sectors not covered by the EU ETS – 30%.

In March 2015 the 40% GHG reduction target was formally approved for the 2015 Paris Climate Change Conference which main goal was to reach an agreement to limit temperature rise to 2°C from pre-industrial levels (European Commission, 2015b).

3. Resources to supporting the shift towards a low-carbon economy in chosen countries

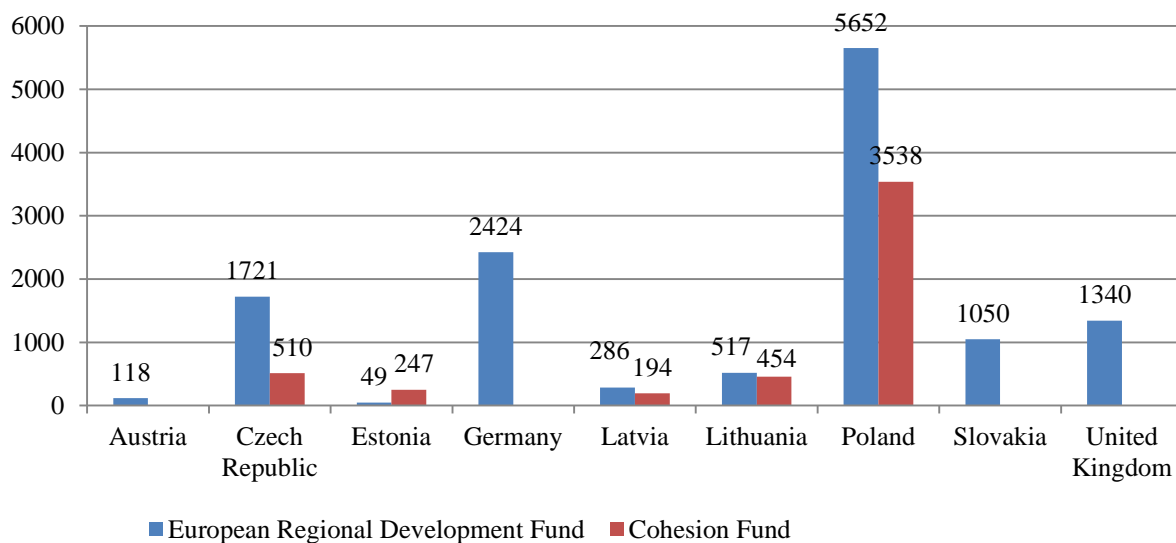
The cost of investments which need to be made in order to achieve climate and energy targets for 2020 are estimated at EUR 125 billion per year. The investment cost should be funded primarily by private sources. However, there is also an important role for the European Union budget in promoting actions against climate change and in boosting national and private investments (European Commission, 2011b; European Commission, 2016a).

‘Supporting the shift towards a low-carbon economy in all sectors’ is one of the 11 policy’s priorities (‘thematic objectives’) which are supported by the European Structural and Investment Funds, including the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) in the 2014-2020 programming period (European Commission, 2016d). The thematic objectives were designed to implement a strategically coherent use of EU budgetary resources in the 2014-2020 and are linked to the Europe 2020 objectives (Vesco and Ferrero,

2015: 420). Under European Structural and Investment Funds over EUR 27 billion has been ring-fenced for low carbon transformations (thematic objective 4, ‘TO4’).

The indicative allocation of support for thematic objectives (including TO4) at national level is defined in partnership agreements which should ensure effective implementation of the European Structural and Investment Funds and alignment with the Europe 2020 strategy (Regulation 1303/2013). The analysis of 9 agreements between individual countries and European Commission shows that the share of support for low carbon transformations in total allocation from ERDF and CF ranged from 9.1% (Slovakia) to 23% (the United Kingdom). In absolute terms, the largest support for TO4 (EUR 9.2 billion) is indicated in the Partnership Agreement for Poland (Figure 1).

Figure 1. Indicative allocation for thematic objective 4 ‘Supporting the shift towards a low-carbon economy in all sectors’ defined in partnership agreements (EUR million)



Source: Austrian Conference on Spatial Planning, 2014b; Bundesministerium für Wirtschaft und Energie, 2014; Government Office of the Slovak Republic, 2014; HM Government, 2014; Ministry of Finance of the Republic of Estonia, 2014a; Ministry of Finance of the Republic of Lithuania, 2014b; Ministry of Finance. Republic of Latvia, 2014b; Ministry of Infrastructure and Development, 2014b; Ministry of Regional Development, 2014.

The support for low carbon transformations is provided through operational programmes managed at national and regional level (Table 3)¹. The division between projects which are

¹ The analysis does not include cross-border, transnational and interregional co-operation programmes.

financed under national and regional programmes can be based on, for example, the size of supported enterprises or capacity of renewable energy installations.

Table 3. Operational programmes addressing the thematic objective 4 ‘Supporting the shift towards a low-carbon economy in all sectors’

Country	Operational programme
Austria	Investments in Growth and Employment
Czech Republic	Enterprise and Innovation for Competitiveness, Environment, Prague – Growth Pole, The Integrated Regional Operational Programme
Estonia	Cohesion Policy Funding
Germany	16 programmes for German states
Latvia	Growth and Employment
Lithuania	EU Structural Funds Investments for 2014-2020
Poland	Infrastructure and Environment, 16 regional operational programmes.
Slovakia	Integrated Regional Operational Programme, Quality of Environment
United Kingdom	England OP, ERDF East Wales, ERDF Northern Ireland, Gibraltar ERDF, Scotland ERDF, West Wales and the Valleys ERDF

Source: European Commission, 2016b.

The ERDF and the CF support the following investment priorities (PI) within the TO4 (Regulation 1300/2013; Regulation No 1301/2013):

- promoting the production and distribution of energy derived from renewable sources (PI 4a);
- promoting energy efficiency and renewable energy use in enterprises (PI 4b);
- supporting energy efficiency, smart energy management and renewable energy use in public infrastructure, including in public buildings, and in the housing sector (PI 4c);
- developing and implementing smart distribution systems that operate at low and medium voltage levels (PI 4d);
- promoting low-carbon strategies for all types of territories, in particular for urban areas, including the promotion of sustainable multimodal urban mobility and mitigation-relevant adaptation measures (PI 4e);
- promoting research and innovation in, and adoption of, low-carbon technologies (financed only by the ERDF) (PI 4f);
- promoting the use of high-efficiency co-generation of heat and power based on useful heat demand (PI 4g).

The analysis of operational programs allows for a rough estimate of the amount of the support for different investment priorities in chosen EU Member States (Table 4).

Table 4. Estimation of allocation for investment priorities of TO4 (according to the operational programmes) (EUR million)^{a)}

Country	4a	4b	4c	4d	4e	4f	4g	Total
Austria	–	–	5.9	–	2.7	6.0	–	9.2
Czech Republic	253.3	783.8	1188.7	37.1	24.2	–	92.9	2380.0
Estonia	9.6	–	154.6	–	–	–	83.0	247.2
Germany	91.8	372.8	710.7	38.6	296.3	195.0	76.1	1781.3
Latvia	26.6	32.6	279.3	–	115.6	–	26.6	480.7
Lithuania	329.9	11.6	448.6	20.8	86.9	–	73.6	971.4
Poland	1513.1	369.4	2090.9	102.0	4061.4	13.8	787.9	8938.5
Slovakia	167.7	110.0	474.9	–	–	–	185.0	937.6
United Kingdom	329.1	146.1	201.1	61.5	145.9	46.1	5.5	935.3

a) Presented structure of the allocation should be treated with caution since the operational programmes provide data on financial assistance (according to the codes of intervention) for the whole priority axes. In the analysis, all interventions to support renewable energy sources have been included in the PI 4a although investment priorities 4b and 4c also assume support for renewables.

Source: Austrian Conference on Spatial Planning, 2014a; Bayerisches Staatsministerium für Wirtschaft und Medien, Energie und Technologie, 2014; Capital City of Prague, 2015; Department for Communities and Local Government, 2015; HM Government of Gibraltar, 2014; Integrated regional operational programme 2014-2020, 2014; Ministerium für Ländlichen Raum und Verbraucherschutz Baden-Württemberg, 2014; Ministerium für Wirtschaft und Energie, 2014; Ministerium für Wirtschaft, Arbeit, Verkehr und Technologie, 2014; Ministerium für Wirtschaft, Bau und Tourismus. Mecklenburg-Vorpommern, 2014; Ministry of Environment of the Slovak Republic, 2014; Ministry of Finance of the Republic of Estonia, 2014b; Ministry of Finance of the Republic of Lithuania, 2014a; Ministry of Finance. Republic of Latvia, 2014a; Ministry of Industry and Trade, 2015; Ministry of Infrastructure and Development, 2014a; Ministry of Regional Development, 2015; Ministry of the Environment of the Czech Republic, 2015; OP Berlin EFRE 2014-2020, 2014; OP Bremen EFRE 2014-2020, 2014; OP Hamburg EFRE 2014-2020, 2014; OP Hessen EFRE 2014-2020, 2014; OP Niedersachsen EFRE-ESF 2014-2020, 2014; OP Nordrhein-Westfalen EFRE 2014-2020, 2014; OP Rheinland-Pfalz EFRE 2014-2020, 2014; OP Saarland EFRE 2014-2020, 2014; OP Sachsen-Anhalt EFRE 2014-2020, 2014; OP Thüringen EFRE 2014-2020, 2014; Operational Programme under the ‘Investment for Growth and Jobs’ Goal. United Kingdom – ERDF Scotland, 2014; Operational Programme under the ‘Investment for Growth and Jobs’ Goal. United Kingdom – ERDF Northern Ireland, 2014; Pomorze Zachodnie, 2015; Sächsisches Staatsministerium für Wirtschaft, Arbeit und Verkehr, 2014; United Kingdom – ERDF East Wales, 2014; Urząd Marszałkowski Województwa Lubelskiego w Lublinie, 2015; West Wales and the Valleys European Regional Development Fund Operational Programme, 2014; Województwo Kujawsko-Pomorskie, 2014; Zarząd Województwa Dolnośląskiego, 2015; Zarząd Województwa Lubuskiego, 2015; Zarząd Województwa Lubuskiego, 2015; Zarząd Województwa Małopolskiego, 2015; Zarząd Województwa Mazowieckiego, 2015; Zarząd Województwa Opolskiego, 2014; Zarząd Województwa Podkarpackiego, 2015; Zarząd Województwa Podlaskiego, 2015; Zarząd Województwa Pomorskiego, 2015; Zarząd Województwa Śląskiego, 2014; Zarząd Województwa Świętokrzyskiego, 2014; Zarząd Województwa Warmińsko-Mazurskiego, 2015; Zarząd Województwa Wielkopolskiego, 2014.

Table 4 shows that one third of the total resources to supporting the investment priorities relating to the shift towards a low-carbon economy is allocated to improving energy efficiency, smart

energy management and renewable energy use in public infrastructure and in the housing sector. Slightly less (29% of the resources) is allocated to promoting low-carbon strategies. The structure of the allocation in each country is quite different.

4. Expected effects of the support from operational programmes

Operational programmes set out some indicators which are used to assess and monitor progress in programmes' implementation (Regulation 1303/2013). A set of indicators shall include so called output indicators which describe direct and physical products of spending resources (produced goods and services) (European Commission, 2014; Ministry of Infrastructure and Development, 2015). Whenever appropriate, Member States shall use indicators from the list of common indicators with agreed definitions and measurement units. The common output indicators reflect frequently used investments of the ERDF and the CF and are designed to aggregate information on the national and EU level. Baseline value of the indicators are zero. Target values are set for 2023 (European Commission, 2014).

The common output indicators are listed in the annexes to the ERDF and the CF regulations. Common output indicators for energy and climate change investment priorities include inter alia (European Commission, 2014):

- Estimated annual decrease of GHG. The calculation of the indicator is only mandatory for interventions directly aiming to increase renewable energy production or to decrease energy consumption. Managing authority of a given operational programme can optionally calculate the indicator for other interventions.
- Additional capacity of renewable energy production. The indicator includes both electricity and heat.
- Decrease of annual primary energy consumption of public buildings. The calculations the indicator are based on energy certificates of buildings.

Table 5 presents the values of output indicators adopted in the analysed operational programmes.

Table 5. Expected outputs of the operational programmes

Country	Estimated annual decrease of GHG	Additional capacity of renewable energy production	Decrease of annual primary energy consumption of public buildings
	Mt CO ₂ eq/year	MW	GWh/year
Austria	0.21	–	–
Czech Republic	1.31	100.0	26.9
Estonia	0.04	–	–
Germany	2.38	103.6	222.7
Latvia	0.06	34.0	50.1
Lithuania	0.68	759.0	60.0
Poland	3.35	961.9	974.6
Slovakia	0.75	624.0	510.0
United Kingdom	0.27	45158.0 ^{a)}	5.5
Total	9.05	47740.5	1849.8

a) 1358 MW without Gibraltar ERDF.

Source: as in Table 4.

It is expected that all of the analysed operational programmes will contribute to a GHG cut by at least 9 Mt CO₂ eq in 2023. One quarter of the reduction is to be achieved through projects financed under priority investment ‘promoting the production and distribution of energy derived from renewable sources’.

The largest effects (the reduction of 3.4 Mt CO₂ eq annually) are to be found in Poland where the support from operational programmes will complement existing public funding sources based on environmental funds established at the national and regional level. Support programmes offered only by the National Fund for Environmental Protection and Water Management are assumed to reduce GHG emissions by 0.64 Mt CO₂ eq annually². The total budget of the programmes is EUR 1059 million³. Such funds for which revenues are raised through environmental charges or fines operate also in other Central and Eastern European countries.

² Data for regional funds are not available.

³ Only national support programmes were considered (i.e. without support provided under the green investment scheme or the European Economic Area Financial Mechanism). The analysis included programmes supporting RES installations (the Stork Programme implemented in 2015-2023, the Prosument Programme implemented in 2015-2022), energy efficiency in industry (the Energy-saving investments Programme implemented in 2014-2017, the E-kumulator Programme implemented in 2015-2023), energy efficiency in buildings, urban transport and street-lighting (the Lemur Programme implemented in 2015-2020, the Lynx Programme implemented in 2015-2023, the Energy-efficient homes Programme implemented in 2013-2022, the Jackdaw Programme implemented in 2015-2018

It can be assumed that much of the decrease GHG will be attributable to reductions in non-ETS sectors such as public buildings, housing sector, renewable energy and energy efficiency improvements in small and medium enterprises, low-carbon strategies, including sustainable transport⁴. Therefore, it is justified to calculate the expected impact of the support on the required reduction of emissions from the non-ETS sector below 2013 levels. In Austria and Czech Republic the expected cut in annual GHG emissions in 2023 represent 22-23% of the gap between 2013 levels and 2020 targets. In Poland and Lithuania the effects of the support will significantly contribute to keep emissions below the target levels.

The largest impacts of the support on the capacity of renewable energy production is expected to be achieved in the United Kingdom, Poland, Lithuania and Slovakia. According to the *United Kingdom Partnership Agreement* one of the main UK challenges in relation to supporting a shift towards a low-carbon economy is ‘still a significant way to go to meet renewable energy production’ target (HM Government, 2014). This is also presented as a challenge in some of the operational programmes. It is worth noting that the UK has the biggest distance between the renewable energy share and 2020 target.

As shown in Table 4, the largest financial support for renewables will be provided *under operational programmes in Poland*. It is expected that the increase in capacity of renewable energy (electricity and heat) production will be 601 MW as a result of intervention under the regional programmes and 361 MW as a result of intervention under national (‘Infrastructure and Environment’) programme. For comparison, in 2015 the renewable electricity capacity in Poland amounted to 6970 MW (Energy Regulatory Office, 2016).

It can be assumed that all of the analysed operational programmes will contribute to a decrease of annual primary energy consumption of public buildings of at least 1850 GWh per year. The largest effects are to be found in Poland. This should be viewed positively, as energy savings in Poland are not sufficient and the potential to improve energy efficiency remains untapped (Ministry of Infrastructure and Development, 2014b). Poland is one of two EU member states where primary energy consumption increased between 2005 and 2013 (European Environment Agency, 2015: 9, 48, 54). The energy savings are to be mainly achieved due to

and the Gazelle Bis Programme implemented in 2016-2023). National Fund for Environmental Protection and Water Management (2016).

⁴ 13% of the total GHG annual decrease is to be achieved through projects financed under investment priority on promoting low-carbon strategies.

investments financed by regional operational programmes. The value of output indicator in the ‘Infrastructure and Environment’ programme is only of 0.2 GWh/year. However, it should be noted that the programme uses also other energy consumption indicator which measures ‘decrease of primary energy consumption’. The total value of the indicator for 2023 is 3920 TJ/year. The reduction of energy consumption has to be mainly achieved due to investments in energy efficiency made by enterprises.

5. Conclusion

The use of common output indicators allows for some comparison of expected effects of the support provided under Cohesion Policy between operational programmes and different countries. Indicators used to measure the impact on climate change mitigation and energy transition refer to the Europe 2020 climate and energy targets. However, only the impact on GHG emission targets can be directly estimated.

The distance to the energy and climate targets differs widely from country to country. Four countries included in the analysis (Czech Republic, Latvia, Lithuania and Slovakia) are on course to meet their individual targets by 2020. For 5 other Member States reaching all three targets will be a challenge. In two of those countries (Austria and Estonia) expected effects of the support are particularly small. The biggest effects of the support under thematic objective 4 ‘Supporting the shift towards a low-carbon economy in all sectors’ are to be achieved in Poland.

It should be noted that the actual impact on the 2020 targets depends on when the supported projects occur within the 2014-2020 programming period and on sustainability of projects effects. It can be assumed that some part of the expected outputs in terms of GHG emission reductions, increase in renewable energy’s share and improvement in energy efficiency will contribute to the EU post-2020 targets.

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Przejście na gospodarkę niskoemisyjną. Wpływ wsparcia udzielanego w ramach programów operacyjnych na cele polityki klimatyczno-energetycznej

Streszczenie

Celem artykułu jest oszacowanie wpływu Polityki Spójności w okresie programowania 2014-2020 na realizację celów polityki energetyczno-klimatycznej dziewięciu wybranych krajów europejskich, a także na transformację tych krajów w kierunku gospodarek niskoemisyjnych. W opracowaniu omówiono efekty, których osiągnięcie zakłada się na początku okresu programowania.

Oczekiwane efekty polegają na redukcji emisji gazów cieplarnianych (na poziomie co najmniej 9 milionów ton ekwiwalentu CO₂), zwiększeniu zdolności wytwarzania energii ze źródeł odnawialnych, a także na zmniejszeniu zużycia energii pierwotnej.

Analiza zapisów programów operacyjnych pozwoliła również na oszacowanie wysokości wsparcia na różne rodzaje przedsięwzięć energetycznych w analizowanych krajach członkowskich Unii Europejskiej. Z przeprowadzonych badań wynika, że największe wsparcie na cel związany z przechodzeniem na gospodarkę niskoemisyjną będzie oferowane w ramach programów operacyjnych przygotowanych w Polsce.

Słowa kluczowe: zmiany klimatu, energetyka, gazy cieplarniane, subsydia, Polityka Spójności