



MINISTER OF ECONOMY

NATIONAL RENEWABLE ENERGY ACTION PLAN

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INTRODUCTION

The National Renewable Energy Action Plan, hereinafter referred to as the *National Plan*, has been drawn up to meet a commitment under Article 4(1) of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 *on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC*. The *National Renewable Energy Action Plan* has been prepared based on a template established by the European Commission (Commission decision 2009/548/EC of 30 June 2009 *establishing a template for National Renewable Energy Action Plans under Directive 2009/28/EC of the European Parliament and of the Council*).

Assumptions underlying forecasts of the national RES development until 2020

The following general assumptions have been accepted when drawing up forecasts for each type of RES for the *National Renewable Energy Action Plan* until 2020:

1. In Poland, producers of energy from renewable sources will enjoy support, in order to satisfy requirements of Directive 2009/28/EC.
2. The final energy use in the years 2010-2015-2020 was assumed as determined in accordance with *Energy Policy of Poland until 2030*.
3. Gross final energy consumption has been presented for the following two scenarios:
 - (1) *reference scenario* that takes into account the energy efficiency and saving measures adopted before 2009;
 - (2) *additional energy efficiency scenario* taking into account all measures to be adopted from 2009.
4. It has been assumed that in 2010, no new or additional forms of financial support to RES will be introduced, however efforts will be made to propose new legislation aimed at increasing the share of energy from renewable sources in gross final energy consumption (taking into account the development of all RES technologies).
5. The support to renewable energy sources is assumed to be maintained. The development of distributed renewable energy sources will be supported, including determining conditions for retaining rights already acquired for the investments completed or started, and their duration, which would allow reducing end user charges.
6. Maintaining so-called co-firing as RES form to be used in Poland is expected until 2020, taking into account limitations with respect to forest biomass firing.
7. All forecasts, including sectoral ones, are estimates, are based on expert calculations and on existing source documents made available to industry associations.
8. The *National Plan* presents a path to achieve the objective assumed, together with proportionate shares of electricity, heating and cooling, as well as transport in the achievement of this objective.
9. The *National Plan* takes into account the existing technologies of RES use, as well as the technologies that might be developed in the future, in Polish functional conditions, as well as the energy market development, taking into account economic, technical, as

well as formal and legal aspects. All costs calculations have been performed based on prices of given technologies from 2010. It has been assumed that electricity exchange balance with neighbouring countries would equal zero.

10. Taking into account the development of RES in the electricity sector, the development of sources based on wind energy and biomass is primarily expected. An increase in the number of small hydro power plants has also been assumed. Taking into account the development of RES in the heating and cooling sector, maintaining the market structure existing until now has been expected, taking into account the development of geothermal and solar energy.
11. Energy consumption in the heating and cooling sector, and the share of RES in this sector shall be understood as heat including so-called network heat, as well as heat generated on an individual bases in the household, services and agricultural sectors
12. Taking into account the development of RES with respect to the transport sector, a growth in the share of biofuels and biocomponents in transport fuels has been primarily expected. In accordance with estimates of industry association, until 2020 the car transport shall not use electricity to a large extent, which translates to a limited share of this technology in the fuel market.

Summary of the forecast included in *Energy Policy of Poland until 2030*.

The document entitled *Energy Policy of Poland until 2030* presents the strategy of the state which aims to address the most important challenges that the Polish energy industry must face, both in the short and in the long run, until 2030. This document was adopted by the Council of Ministers on 10 November 2009. In accordance with summary 1, the projected increase in final energy use over the period from 2006 to 2020 amounts to 11%, with the highest share in this increase (31.7%) expected for the transport. The increase in other sectors is expected as follows: services – 31.3%, 13.6% – agriculture and 0.5% – households. Energy use in the industry sector would not change.

Summary 1. Demand for final energy by sectors of the economy [Mtoe]

	2006	2010	2015	2020	2025	2030
Industry	20.9	18.2	19.0	20.9	23.0	24.0
Transport	14.2	15.5	16.5	18.7	21.2	23.3
Agriculture	4.4	5.1	4.9	5.0	4.5	4.2
Services	6.7	6.6	7.7	8.8	10.7	12.8
Households	19.3	19.0	19.1	19.4	19.9	20.1
TOTAL	65.5	64.4	67.3	72.7	79.3	84.4

Source: Energy Policy of Poland until 2030

The analysis of the same data by energy carriers shows that consumption of coal would decrease over the period from 2006 to 2020. Other carriers would record a growth: oil products – by 11%, natural gas – also by 11%, renewable energy – by 40.5%, and electricity – by 17.9%. A growth of consumption of district heat by 30% and of other fuels – by 33% is also anticipated.

Summary 2. Demand for final energy by carriers [Mtoe]

	2006	2010	2015	2020	2025	2030
Coal	12.3	10.9	10.1	10.3	10.4	10.5
Oil products	21.9	22.4	23.1	24.3	26.3	27.9
Natural gas	10.0	9.5	10.3	11.1	12.2	12.9
Renewable energy	4.2	4.6	5.0	5.9	6.2	6.7
Electricity	9.5	9.0	9.9	11.2	13.1	14.8
District heat	7.0	7.4	8.2	9.1	10.0	10.5
Other fuels	0.6	0.5	0.6	0.8	1.0	1.2
TOTAL	65.5	64.4	67.3	72.7	79.3	84.4

Source: *Energy Policy of Poland until 2030*

Due to the character of the document, it would be justified to present the projection of renewable energy consumption by types of energy. It was divided into electricity (sevenfold increase by 2020), heat (increase by 45%) and transport biofuels (increase by fifteen times).

In accordance with *Energy Policy of Poland until 2030*, production of energy using photovoltaic technology, as well as the second-generation bioethanol, second-generation biodiesel and biohydrogen is planned to start in the years 2020-2025. Relatively, in the years 2006-2020, the highest growth dynamics will be recorded in case of wind energy production (increase by 54 times) and solar thermal energy (increase by 35 times).

Summary 3. Demand for gross final energy¹ from RES by types of energy [ktoe]

	2006	2010	2015	2020	2025	2030
Electricity	370.6	715.0	1,516.1	2,686.6	3,256.3	3,396.3
<i>Solid biomass</i>	159.2	298.5	503.2	892.3	953.0	994.9
<i>Biogas</i>	13.8	31.4	140.7	344.5	555.6	592.6
<i>Wind</i>	22.0	174.0	631.9	1,178.4	1,470.0	1,530.0
<i>Water</i>	175.6	211.0	240.3	271.4	276.7	276.7
<i>Photovoltaics</i>	0.0	0.0	0.0	0.1	1.1	2.1
Heat	4,312.7	4,481.7	5,046.3	6,255.9	7,048.7	7,618.4
<i>Solid biomass</i>	4,249.8	4,315.1	4,595.7	5,405.9	5,870.8	6,333.2
<i>Biogas</i>	27.1	72.2	256.5	503.1	750.0	800.0
<i>Geothermal</i>	32.2	80.1	147.5	221.5	298.5	348.1
<i>Solar</i>	3.6	14.2	46.7	125.4	129.4	137.1

¹ Gross final has been defined in the RES Directive as final consumption of energy commodities delivered for energy purposes + losses of electricity and heat in distribution and transmission + the consumption of electricity and heat by the energy branch for electricity and heat production.

Transport biofuels	96.9	549.0	884.1	1,444.1	1,632.6	1,881.9
<i>Sugar and starch bioethanol</i>	61.1	150.7	247.6	425.2	443.0	490.1
<i>Rape biodiesel</i>	35.8	398.3	636.5	696.8	645.9	643.5
<i>2nd generation bioethanol</i>	0.0	0.0	0.0	210.0	240.0	250.0
<i>2nd generation biodiesel</i>	0.0	0.0	0.0	112.1	213.0	250.0
<i>Biohydrogen</i>	0.0	0.0	0.0	0.0	90.8	248.3
TOTAL gross final energy from RES	4,780	5,746	7,447	10,387	11,938	12,897
Gross final energy	61,815	61,316	63,979	69,203	75,480	80,551
% share of renewable energy	7.7	9.4	11.6	15.0	15.8	16.0

Source: Energy Policy of Poland until 2030

In accordance with *Energy Policy ...*, in Polish conditions, the progress made in wind energy production, biogas and solid biomass production and in transport biofuels will be of decisive importance in the context of achieving the objective of 15% share of energy from renewable sources in the gross final energy structure by 2020. In 2020, these four areas will account in total for about 94% of consumption of energy from all renewable sources. Summary 4 presents the forecasts of installed production capacity of gross electricity by type of fuels (17) and production technology used, drew up as a part of the *Energy Policy* Until 2020, renewable technologies would account in total for 25.4% of total generation capacity (22.6% in 2030). A drop in this percentage share in the years 2020-2030 will primarily be due to the inclusion in the summary of nuclear energy, which is to be introduced in Poland after 2020.

Summary 4. Generation capacity of gross electricity [MW]

Fuel/technology	2006	2010	2015	2020	2025	2030
Lignite – PC boiler/fluidized-bed furnace	8,819	9,177	9,024	8,184	10,344	10,884
Hard coal – PC boiler/fluidized-bed furnace	15,878	15,796	15,673	15,012	11,360	10,703
Hard coal – CHP	4,845	4,950	5,394	5,658	5,835	5,807
Natural gas – CHP	704	710	810	873	964	1,090
Natural gas – GTCC	0	0	400	600	1010	2,240
Large water	853	853	853	853	853	853
Pump water	1,406	1,406	1,406	1,406	1,406	1,406
Nuclear	0	0	0	1,600	3,200	4,800
Industrial Coal – CHP	1,516	1,411	1,416	1,447	1,514	1,555
Industrial Gas – CHP	51	50	63	79	85	92
Industrial Other – CHP	671	730	834	882	896	910
Local Gas	0	0	22	72	167	278
Small water	69	107	192	282	298	298
Wind	173	976	3,396	6,089	7,564	7,867

Solid biomass – CHP*	25	40	196	623	958	1,218
Biogas CHP	33	74	328	802	1,293	1,379
Photovoltaics	0	0	0	2	16	32
TOTAL	35,043	36,280	40,007	44,464	47,763	51,412

* – co-firing not included

Source: Energy Policy of Poland until 2030

Summary of forecasts of liquid fuel consumption

Forecasts of liquid fuel consumption drew up by two major entities distributing liquid fuels in Poland are presented below. Due to the scale of their operations and key importance for the correct functioning of the economy, both entities pursue long-term investment policy (draw up long-term forecasts of liquid fuel consumption (in this case for the period from 2010 to 2020)).

Forecasts of petrol consumption, made by entity no 1, assume the growth in petrol consumption from 4,260 thousand tonnes in 2010 to 4,430 thousand tonnes in 2020 (by 4%). The growth in petrol consumption is expected only in 2013 (by 1.9%) and 2017 (by 2.1%). Entity no 2 predicts higher fluctuations in petrol consumption. Growth in petrol consumption by 2.7% (from 4,684 thousand tonnes in 2010 to 4,808 thousand tonnes in 2020) is assumed in the years 2010-2020. In particular, consumption growth is predicted in the years 2010-2012, 2015, 2017 and 2020, while a drop in consumption is expected in the years 2013-2014, 2016 and 2018-2019.

Both entities assume a growth in diesel oil consumption much higher than in petrol consumption in the years 2010-2020. Entity no 1 predicts that diesel oil consumption would increase by 29.8% in the years 2010-2020, while entity no 2 expects the growth of 42.9%. Entity no 1 assumes that the cumulative annual average growth rate (CAGR) of oil diesel consumption in the years 2010-2020 would equal 2.6%, while according to entity no 2, the cumulative annual average growth rate (CAGR) of oil diesel consumption in the years 2010-2020 would equal 3.7%. However, when analysing forecasts of oil diesel consumption, it is necessary to take into account the fact that the development of hybrid car drive technologies might have a significant impact thereon.

Summary 5. Forecasts of transport fuel consumption in Poland in the years 2010-2020 [thousand tonnes]

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Forecast by entity no 1											
Petrol	4,260	4,260	4,260	4,340	4,340	4,340	4,340	4,430	4,430	4,430	4,430
Dynamics		0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%
Diesel oil	11,220	11,610	12,020	12,440	12,880	13,140	13,400	13,720	13,980	14,260	14,560
Dynamics		3.5%	3.5%	3.5%	3.5%	2.0%	2.0%	2.4%	1.9%	2.0%	2.1%
Forecast by entity no 2											
Petrol	4,684	4,730	4,825	4,798	4,702	4,743	4,726	4,793	4,788	4,782	4,808
Dynamics		1.0%	2.0%	-0.6%	-2.0%	0.9%	-0.4%	1.4%	-0.1%	-0.1%	0.5%
Diesel oil	12,389	12,959	13,970	14,613	15,270	15,652	16,043	16,444	16,855	17,277	17,709
Dynamics		4.6%	7.8%	4.6%	4.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%

Source: Estimates based on the information provided by entity no 1 and entity no 2.

1. Summary of the national renewable energy policy

The first general EU and Polish legislation on energy from renewable sources was published in 1997. They included: White Paper of the European Commission *Energy for the future – renewable sources of energy* (December 1997) and *Energy Act* of 1997 April 10 (Journal of Laws of 1997 No 54, item 348).

The regulation of the Minister of Economy of 2 February 1999 *on the obligation to purchase electricity and heat from unconventional sources and a scope of this obligation* (Journal of Laws of 1999 No 13, item 119) was the first national legal regulation on renewable energy sources (RES). Based on this regulation, distribution companies were obliged to purchase total production from all renewable sources connected to their grids at the highest price of electricity included in a tariff of a given company.

In the next period it was replaced by the regulation of the Minister of Economy of 15 December 2000 *on the obligation to purchase electricity from unconventional and renewable sources and electricity from combined heat and electricity generation as well as heat from unconventional and renewable sources, and a scope of this obligation* (Journal of Laws of 2000 No 122, item 1336). As a result of amending Article 9a of the *Energy Act*, as of 1 July 2003, this regulation was replaced by the regulation of the Minister of Economy, Labour and Social Policy of 30 May 2003 *on a detailed scope of the obligation to purchase electricity and heat from renewable sources and electricity from combined heat and electricity generation* (Journal of Laws No 104, item 971). In accordance with its provisions, the obligation to purchase renewable energy had been imposed on all electricity trading companies, which are required to ensure the relevant share of energy from RES in electricity sales volume. In 2001, this share equalled 2.4%, in 2002 – 2.5%, in 2003 – 2.65%, and ultimately, it was to increase to 7.5% in 2010. This legislation coming into force was aimed at the development of RES by administrative development of demand for this energy, as a result stimulating new investments in renewable energy sources.

In 2001, the European Parliament and the Council adopted *Directive 2001/77/EC on the promotion of the electricity produced from renewable energy sources in the internal electricity market*, setting the share of electricity produced from renewable energy sources in total Community electricity consumption by 2010. Meanwhile, on 23 August 2001, the Sejm of the Republic of Poland adopted the resolution on the *Development Strategy on Renewable Energy Sector*.

When Poland became a Member State of the European Community, a need appeared for fully adjusting national RES legislation to EU principles, especially provisions of Directive 2001/77/EC. On 2 April 2004, the Act was passed *on amendments to the Energy Act and the Environmental Act*, which resulted in significant changes to the subsector of renewable sources of electricity. The most important one referred to allowing for sale of ownership rights to the certificates of origin, being documents confirming generation of certain amount of electricity in a renewable source, irrespective of electricity sales. Then, based on the Act of 4 March 2005 *on amendments to the Energy Act and the Environmental Act*, energy companies selling electricity to end users were obliged to obtain and present for cancellation certificates of origin or to pay so-called substitution fee.

Adoption of amendments to the *Energy Act* was coincident with passing the *Energy Policy until 2025* (adopted by the Council of Ministers of 4 January 2005). The aforementioned

document provided for monitoring and development of RES support mechanisms in order to increase the application of market principles in the national energy sector and initiate changes consistent with global trends. Implementation of the new system accelerated the development of RES in Poland, which is confirmed by the following statistical data reflecting the dynamics of changes in the years 2006-2008.

Summary 6. Production of renewable energy in the years 2006-2008 [TJ]*

	2006	2007	2008
Solid biomass	192,097	197,150	198,401
Solar energy	11	15	54
Hydro energy	7,352	8,467	7,748
Wind energy	922	1,878	3,012
Biogas			
- from landfills	791	879	1,432
- from wastewater	1,803	1,802	3,976
- other	19	27	107
Heat pumps	33	68	605
Liquid biofuels			
- bioethanol	3,542	2,792	2,459
- biodiesel	3,423	1,822	9,943
Geothermal energy	535	439	531
Municipal waste	27	35	9
TOTAL	210,555	215,374	228,277

* Productions means the energy quantity obtained from natural resources

Source: "Energy from renewable sources in 2008", Central Statistical Office, Warsaw 2009.

Summary 7. Dynamics of renewable energy production year to year [%]*

	2007/2006	2008/2007
Solid biomass	2.63	0.63
Solar energy	36.36	260.00
Hydro energy	15.17	- 8.49
Wind energy	103.69	60.38
Biogas		
- from landfills	11.13	62.91
- from wastewater	- 0.06	120.64
- other	42.11	296.30
Heat pumps	106.06	789.71
Liquid biofuels		
- bioethanol	- 21.17	- 11.93
- biodiesel	- 46.77	445.72
Geothermal energy	- 17.94	20.96
TOTAL	2.29	5.99

* Productions means the energy quantity obtained from natural resources

Source: "Energy from renewable sources in 2008", Central Statistical Office, Warsaw 2009.

Summary 8. Dynamics of electricity from certified renewable energy sources

Production period	2005*		2006		2007		2008		2009**	
	energy quantity [MWh]	number of certificates of origin issued	energy quantity [MWh]	number of certificates of origin issued	energy quantity [MWh]	number of certificates of origin issued	energy quantity [MWh]	number of certificates of origin issued	energy quantity [MWh]	number of certificates of origin issued
biogas	29,712	56	117,067	319	161,767	475	220,882	637	241,341	724
biomass	125,895	8	503,846	52	545,764	53	560,967	64	426,817	75
wind	40,795	57	280,909	381	472,115	777	806,079	1,313	836,215	1,716
water	316,481	629	2,038,526	3,349	2,252,658	4,253	2,152,870	4,784	1,985,910	4,355
co-firing	281,520	14	1,363,545	135	1,797,216	181	2,751,953	138	2,899,372	187
TOTAL	794,406	764	4,339,895	4,236	5,229,525	5,739	6,492,755	6,936	6,389,657	1,057
dynamics vs. the previous year	-	-	446.3%	454.5%	20.5%	35.5%	24.2%	20.9%	-1.6%	-84.8%

* The first year of application of support in form of certificates of origin.

** The data include only certificates of origin issued in 2009; these values do not include the volume of certificates issued in 2010.

Source: Own work based on reports of the President of the Energy Regulatory Office of Poland.

Summary 9. Power installed in units generating electricity based on RES technologies (based on certificates valid as at the end of each year) [MW]

power installed based on certificates valid as at the end of each year [MW]	2006	2007	2008	2009
biogas	2.6	45.7	54.6	70.9
biomass	0.5	255.4	232	252.5
photovoltaics	0	0	0	0.001
wind	675.3	287.9	451	724.7
water	0.45	934.8	940.6	945.2
co-firing*	-	-	-	-
TOTAL	678.85	1,523.8	1,678.2	1,993.301

* Due to various ranges of percentage share of biomass (in total fuel flow) no total installed power has been disclosed for co-firing installations.

Source: Own work based on reports of the President of the Energy Regulatory Office of Poland.

The aforementioned results have been achieved primarily as a result of applying the following measures to support certified RES producers:

a) **Based on the *Energy Act*** and secondary legislation to this Act, *inter alia*:

- obligation to purchase energy from RES imposed ex officio on sellers of electricity, who issued conditions of connections to the grid for a given source;
- obligation of energy grid operators to ensure priority to all entities in the provision of services involving transmission or distribution of electricity produced from renewable energy sources;
- reduction of the fee for connection to the grid, determined based on actual outlays incurred for installing the connection for renewable energy sources with total installed power not exceeding 5 MW and cogeneration units with power not exceeding 1 MW;
- special principles of wind farm balancing;
- additional support to small RES (below 5 MW) producing electricity (for instance: exemption from stamp duty for issuing the licence and certificates of origin).

b) **Based on other legislation:**

- exemption of energy produced from renewable sources from excise duty that currently equals PLN 20 per 1 MWh.

c) **Financial support to investments in RES** provided in form of grants or borrowings and investment loans bearing low interest rate:

- from public funds, including EU funds within financing of Operational Programme: *Infrastructure and Environment* and *Regional Operational Programmes*;
- from regional funds, including from the budget of the European Union, within the scope of support to investment projects pertaining to RES;
- from funds of the National Fund for Environmental Protection and Water Management (*Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej*);
- from funds of the Eco-Fund that provided co-financing for investments in solar, wind, biomass and biogas energy, and highly efficient co-generation in the years 2005-2009;
- from resources of the European Economic Area, including the Norwegian Financial Mechanism that provided co-financing for, *inter alia*, projects increasing the use of renewable energy sources in the years 2004-2009.

In 2010, the national RES policy has been focused on implementation of provisions of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 *on the promotion of the use of energy from renewable sources*, including in particular preparation and adoption of necessary normative acts.

2. Expected final energy consumption 2010-2020

Estimates of gross final energy consumption of all types of energy (from both renewable and conventional sources), overall and for each sector, in the period up to 2020 are presented in table 1. These estimates take into account the expected effects of energy efficiency and saving measures to be introduced during the period. Under heading "*additional energy efficiency scenario*", a scenario (in accordance with the *Energy Policy of Poland until 2030*) has been presented taking into account all measures to be adopted from 2009, including measures obtained as a result of planned enactment of the Energy Efficiency Act. The bill on energy efficiency was accepted by the Council of Ministers on 12 October 2010 and was submitted for urgent parliamentary work, which allows believing that relevant legislation would come into force as early as in 2011.

The forecast for additional energy efficiency scenario has assumed implementation of basic directions of energy policy of Poland, taking into account requirements of the European Union:

- improving energy efficiency;
- enhanced security of fuels and energy supplies;
- diversification of the electricity generation structure by introducing nuclear energy;
- development of the use of renewable energy sources, including biofuels;
- development of competitive fuel and energy markets;
- mitigating the environmental impact of the energy industry.

As concerns energy efficiency, the following goals of the energy policy, essential to the projection, have been taken into account:

- to achieve zero-energy economic growth, i.e. economic growth with no extra demand for primary energy;
- reducing the energy intensity of Polish economy to the EU-15 level, consistently.

Both the application was predicted and the impact on the demand for energy was assessed for existing capacity reserves resulting from the market reform of the economy and from other instruments to increase energy efficiency, *inter alia*:

- extension of the application of energy audits;
- introduction of energy management systems in industry;
- introduction of sustainable traffic and infrastructure management in the transport industry;
- introduction of energy efficiency standards for public utility buildings and facilities;
- intensification of replacing lighting systems with energy-saving ones;
- introduction of the white certificates system.

In the area of security of fuels and energy supplies:

- generally, implementation of the strategic direction which consists in diversification of both primary energy carriers and directions of supplies of these carriers has been taken into account, as well as the development of all available energy generation technologies with reasonable costs, especially of the nuclear energy industry as an important

technology of zero emission of greenhouse gases and low sensitivity to an increase in nuclear fuel prices;

- it has been assumed that domestic resources of hard coal and lignite would remain important stabilisers of Poland's energy security. It has been assumed that coal energy sources which are being withdrawn from use would be reconstructed on the basis of the same fuel by 2017 and that a part of baseload CHP plants to be built will be fired with hard coal. Simultaneously, no restrictions were imposed on the increase in the share of gas in the energy industry, both in gas-fired units generating electricity in cogeneration with heat as well as in peak sources and reserve for wind power plants.

Additionally, as it was assumed that the market of fuel and energy as well as the system regulating the operation of energy companies function efficiently, rational behaviour of customers when selecting energy suppliers was used for the calculation method.

At the same time, under heading "*additional energy efficiency scenario*", a scenario taking into account only the energy efficiency and savings measures adopted by 2009, was presented.

Table 1. Expected gross final energy consumption of Poland in heating and cooling (district and non-district heat), electricity and transport up to 2020 taking into account the effects of energy efficiency and energy saving measures 2010-2020 [Mtoe]*

Description	2010		2011		2012		2013		2014	
	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency
(1) heating and cooling (district and non-district)	31.6	32.4	33.0	32.5	34.7	32.7	35.9	32.8	37.3	32.9
(2) electricity	12.9	12.1	13.4	12.3	14.0	12.5	14.4	12.7	14.9	12.9
(3) transport as in Article 3(4)a	16.8	16.8	17.0	17.0	17.5	17.2	17.5	17.4	17.7	17.6
(4) Gross final energy consumption	61.3	61.3	63.4	61.8	66.2	62.4	67.8	62.9	69.9	63.4

Source: Own work based on forecasts included in the Energy Policy of Poland until 2030. The table structure and headings are consistent with Decision 2009/548/EC.

Table 1. (continued) Expected gross final energy consumption of Poland in heating and cooling, electricity and transport up to 2020 taking into account the effects of energy efficiency and energy saving measures 2010-2020 [Mtoe]

Description	2015		2016		2017		2018		2019		2020	
	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency	reference scenario	additional energy efficiency
(1) heating and cooling	38.8	33.1	40.3	33.4	41.8	33.8	43.2	34.1	44.7	34.4	46.2	34.7
(2) electricity	15.3	13.1	15.7	13.4	16.2	13.7	16.6	14.0	17.1	14.3	17.4	14.6
(3) transport as in Article 3(4)a	17.9	17.8	18.2	18.2	18.4	18.6	18.6	19.0	18.9	19.5	19.1	19.9
(4) Gross final energy consumption	72.0	64.0	74.2	65.0	76.4	66.1	78.4	67.1	80.7	68.2	82.7	69.2

Source: Own work based on forecasts included in the Energy Policy of Poland until 2030. The table structure and headings are consistent with Decision 2009/548/EC.

3. Renewable energy targets and trajectories

3.1 National overall target

The national overall target for the share of energy from renewable sources in gross final consumption of energy in 2005 and 2020 is presented in table 2. Values consistent with Annex I, Part A to Directive 2009/28/EC were used within the national overall target for the share of energy from renewable sources in gross final consumption of energy in 2005 and 2020. The expected total adjusted energy consumption in 2020 corresponds to the expected gross final energy consumption of Poland taking into account the effects of energy efficiency and energy saving measures.

Table 2. National overall target for the share of energy from renewable sources in gross final consumption of energy in 2005 and 2020

(A) Share of energy from renewable sources in gross final consumption of energy in 2005 (S_{2005})	7.2 %
(B) Target of energy from renewable sources in gross final consumption of energy in 2020 (S_{2020})	15 %
(C) Expected total adjusted energy consumption in 2020 (from Table 1)	69,200 ktoe
(D) Expected amount of energy from renewable sources corresponding to the 2020 target (calculated as $B \times C$)	10,380.5 ktoe

Source: Own work. The table structure and headings are consistent with Decision 2009/548/EC.

National overall target for biofuels

A 10% target for energy from renewable sources in transport by 2020, set in Directive 2009/28/EC, in Polish conditions would be achieved mainly by applying biocomponents in liquid fuels and liquid biofuels. National indicative targets (NIT) set currently by Poland cover the period until 2013. Biofuels introduced to the market should satisfy sustainable development criteria, including ensuring compliance with requirements of Directive 2009/28/EC by greenhouse gas (GHG) emission saving from the manufacturing chain and the use of biofuels by 31 December 2016 by 35%. With the effect from 1 January 2017, this saving shall be at least 50%, and from January 2018 – at least 60% for biofuels and bioliquids produced in installations in which production started on or after 1 January 2017.

From 2011, the use of waste oils and fats and used vegetable oils is assumed, which are considered waste, and as such are classified to raw materials listed in Directive 2009/28/EC. At the same time, the introduction of the first second-generation fuels was assumed since 2017, which would allow for a significant increase of RES in transport.

3.2 Sectoral targets and trajectories

Sectoral targets and trajectories ensuring that in 2020, Poland achieves the required share of energy from renewable sources by electricity, heating and cooling, and transport sectors are presented in table 3 and on chart 1. Selected trajectories include potential technologies of RES use, applied currently as well as the technologies that might be developed in the future, in Polish conditions. The analyses have taken into account trajectories for the years 2010-2020, which include – in accordance with detailed directions and trajectories presented by professional association – the most economic solutions, also considering costs of their introduction,

demonstrating the highest effectiveness of the use of renewable resource, development of the technology of their use and the best environmental effects.

The data have been compiled assuming implementation of the RES development path included in table 4a and the *additional energy efficiency scenario of gross energy consumption* for 2010-2020, included in table 1. *The sectoral renewable targets in electricity and heating and cooling and the sectoral trajectories are estimations.*

When defining the trajectory for biofuels and bioliquids, the scope of biofuels and bioliquids production and use in the agricultural sector, biocomponent and biofuel producing industry and the fuel sector were taken into account.

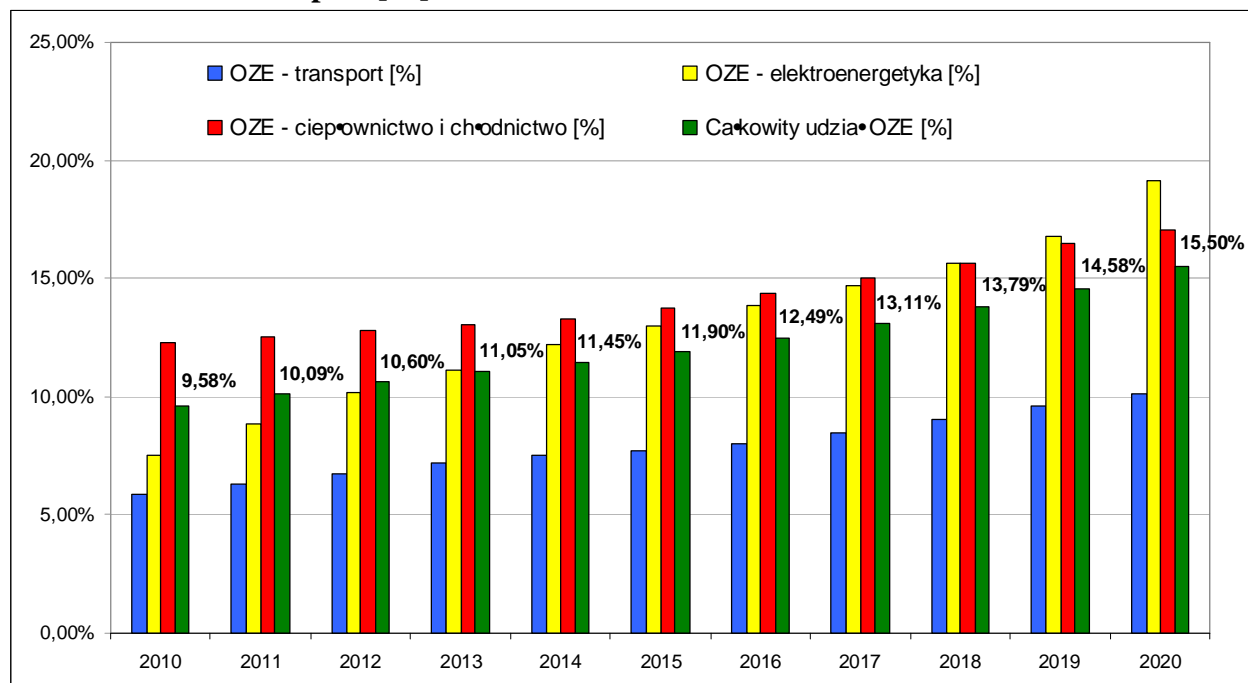
The target of the agricultural sector is ensuring the growth in production of energy raw materials in quantities maximally covering the demand of the biofuel and fuel sector. At the same time, the target of this sector is satisfying sustainable development criteria for the whole array of raw materials supplied for the purposes of biocomponent and biofuel manufacture.

The target of the biocomponent and biofuel production sector is generating biocomponents in quantities corresponding to NIT and launching investment initiatives with respect to implementation of second-generation biofuels technologies. Additionally, it is necessary to undertake activities aimed at modernisation of existing technologies in order to achieve greenhouse gas (GHG) emission savings from the production chain and the use of biofuels.

The biocomponent and biofuel production sector should also supply to the market the required quantity of bioliquids arising from the overall target, i.e. in accordance with Directive 2009/28/EC, 15% share of RES.

The target of the fuel sector is achieving the NIT by introducing liquid fuels with the permitted content of biocomponents and liquid biofuels.

Chart 1. National 2020 target and estimated trajectory of energy from renewable sources in heating and cooling (district and non-district systems), electricity and transport [%]



Source: Own work based on the forecasted RES energy basket until 2020.

OZE – transport – RES – transport

OZE – elektroenergetyka – RES – electricity

OZE – ciepłownictwo i chłodnictwo – RES – heating and cooling

Całkowity udział OZE – Total RES share

Table 3. National 2020 target and estimated trajectory of energy from renewable sources in heating and cooling, electricity and transport

Description	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RES – heating and cooling (district and non-district systems) [%]	12.29%	12.54%	12.78%	13.05%	13.29%	13.71%	14.39%	15.02%	15.68%	16.50%	17.05%
RES – electricity [%]	7.53%	8.85%	10.19%	11.13%	12.19%	13.00%	13.85%	14.68%	15.64%	16.78%	19.13%
RES – transport [%]	5.84%	6.30%	6.76%	7.21%	7.48%	7.73%	7.99%	8.49%	9.05%	9.59%	10.14%
Overall RES share [%]	9.58%	10.09%	10.60%	11.05%	11.45%	11.90%	12.49%	13.11%	13.79%	14.58%	15.50%
<i>of which from cooperation mechanism [%]</i>		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
<i>surplus for cooperation mechanism* [%]</i>		1.31%	1.82%	1.48%	1.88%	1.16%	1.75%	0.81%	1.48%		0.50%
In accordance with Annex I, Part B to the Directive		2011-2012		2013-2014		2015-2016		2017-2018			2020
		S ₂₀₀₅ + 20% (S ₂₀₂₀ -S ₂₀₀₅)		S ₂₀₀₅ + 30% (S ₂₀₂₀ -S ₂₀₀₅)		S ₂₀₀₅ + 45% (S ₂₀₂₀ -S ₂₀₀₅)		S ₂₀₀₅ + 65% (S ₂₀₂₀ -S ₂₀₀₅)			S ₂₀₂₀
RES minimum trajectory [%]		8.76%		9.54%		10.71%		12.27%			15.0%
RES minimum trajectory [ktoe]		5,439.96		6,024.51		6,907.95		8,171.82			10,380.5
<i>*adjusted surplus for cooperation mechanism* [%]</i>		1.58%		1.71%		1.49%		1.20%			0.50%

* Calculated for subsequent years, taking into account estimated trajectory (two-year) in accordance with Appendix I Part B to Directive 2009/28/EC.

Source: Own work. The table structure and headings are consistent with Decision 2009/548/EC.

Table 4a. Calculation table for the renewable energy contribution of each sector to final energy consumption 2010-2020 (ktoe)

Description	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
(A) Expected gross final consumption of RES for heating and cooling	3,980	4,073	4,175	4,277	4,369	4,532	4,806	5,079	5,350	5,680	5,921
(B) Expected gross final consumption of electricity from RES	913	1,090	1,276	1,417	1,577	1,709	1,858	2,010	2,185	2,393	2,786
(C) Expected final consumption of energy from RES in transport	981	1071	1162	1255	1316	1376	1454	1579	1719	1870	2018
(D) Expected total RES consumption	5,873	6,233	6,614	6,949	7,262	7,617	8,117	8,668	9,255	9,944	10,725
(E) Expected transfer of RES to other Member States	0	0	0	0	0	0	0	0	0	0	0
(F) Expected transfer of RES from other Member States and 3 rd countries	0	0	0	0	0	0	0	0	0	0	0
(G) Expected RES consumption adjusted for target (D)-(E)+(F)	5,873	6,233	6,614	6,949	7,262	7,617	8,117	8,668	9,255	9,944	10,725

Source: Own work based on the Energy Policy of Poland until 2030. The table structure and headings are consistent with Decision 2009/548/EC.

Table 4b. Calculation table for the renewable energy in transport share

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
(C) Expected RES consumption in transport	43	981	1,071	1,162	1,255	1,316	1,376	1,454	1,579	1,719	1,870	2,018
(H) Expected RES electricity in road transport	0	0	0	0	0	0	0	0	0	0	0	0
(I) Expected consumption of biofuels from wastes, residues, non-food cellulosic, and lignocellulosic material in transport	0	0	44	88	88	88	88	88	132	132	176	176
(J) Expected RES contribution to transport for the RES-T target: (C)+(2,5-1)x(H)+(2-1)x(I)	43	971	1,105	1,235	1,328	1,384	1,444	1,523	1,691	1,824	2,019	2,194

Source: Own work based on the Energy Policy of Poland until 2030. The table structure and headings are consistent with Decision 2009/548/EC.

4. Measures for achieving the targets

4.1 Overview of all policies and measures to promote the use of energy from renewable sources

The support to licensed producers of energy from RES, set in the *Energy Act* of 10 April 1997 (Journal of Laws of 2006 No 89, item 625, as amended) includes:

- the obligation to submit for cancellation to the President of the Energy Regulatory Office of Poland the relevant number of certificates of origin for electricity produced from RES and from cogeneration (or the obligation to pay substitution fee), imposed on companies carrying out activities involving electricity generation or trading, and selling this energy to end users;
- the obligation to purchase energy produced from RES imposed *ex officio* on sellers of electricity, who issued conditions of connections to the grid for a given source;
- the obligation of energy grid operators to ensure priority to all entities in the provision of services involving transmission or distribution of electricity produced from renewable energy sources;
- reduction of the fee for connection to the grid, determined based on actual outlays incurred for installing the connection for renewable energy sources with total installed power not exceeding 5 MW and cogeneration units with power not exceeding 1 MW;
- exemption from stamp duty for issuing certificates of origin and from stamp duty for issuing the licence for renewable energy sources with the installed power not exceeding 5 MW;
- exemption from the obligation to obtain a licence for installations generating electricity from agricultural biogas with the installed power not exceeding 50 MW and for heat installations with the total installed heat power not exceeding 5 MW;
- the possibility to obtain, in addition to certificates of origin for RES energy, so-called certificates of origin from cogeneration, which also have a financial value;
- special principles for commercial balancing for wind farms; unlike other participants of commercial balancing (producers and end users), wind farms can report their energy production programmes to the transmission system operator one hour before the production start. Other participants are obliged to provide the notification of energy produced or required from the grid two hours in advance.

Additionally, the Act of 6 December 2008 *on excise duty* (Journal of Laws of 2009 No 3, item 11, as amended) provides for exemption of energy produced from renewable sources from excise duty in case of its sale to end users.

The overview of policies and key measures to promote the use of energy from renewable sources is presented in table 5. However, it should be noted that on the regional/voivodship level, various policies and measures are aimed at indicating the direction only, and their implementation depends on local/regional conditions.

More information on the systems of support to promotion of the use of energy from renewable sources in electricity, heating and cooling applied in Poland are presented in sections 4.2 and 4.3.

Polish legislation that supports implementation of the national policy to promote the use of energy from renewable sources includes mainly:

1. *Energy Act* of 10 April 1997 (Journal of Laws of 2006 No 89, item 625, as amended).
2. Act of 2 July 2004 *on freedom of economic activity* (Journal of Laws of 2007 No 155, item 1095, as amended).
3. Act of 6 December 2008 *on excise duty* (Journal of Laws of 2009 No 3, item 11, as amended).
4. *Environmental Act* of 27 April 2001 (Journal of Laws of 2008 No 25, item 150, as amended).
5. Regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source* (Journal of Laws No 156, item 969, as amended).
6. Regulation of the Minister of Economy of 4 May 2007 *on detailed conditions for the electricity system functioning* (Journal of Laws No 93, item 623, as amended).
7. Regulation of the Minister of Economy of 2 July 2007 *on detailed principles for defining and calculating tariffs and principles for settlements in electric energy trading* (Journal of Laws No 128, item 895, as amended).
8. Regulation of the Minister of Economy of 3 February 2009 *on granting public aid for investments involving construction or extension of units producing electricity or heat from renewable energy sources* (Journal of Laws No 21, item 112).
9. *Energy Policy of Poland until 2030* (with appendices) adopted by the Council of Ministers on 10 November 2009 and announced by the announcement of the Minister of Economy of 21 December 2009 on the national energy policy until 2030 (M.P. of 2010, No 21, item 11).
10. Act of 26 October 2000 on commodity exchanges (Journal of Laws of 2010 No 48, item 284, as amended) together with the Act of 29 July 2005 *on public offer and the conditions for introducing financial instruments to the organized trading system and on public companies* (Journal of Laws of 2009 No 185, item 1439, as amended), as well as regulation of the Council of Ministers of 22 December 2009 *on special procedure and conditions for introducing property rights to trading on the exchange* (Journal of Laws of 2010 No 6, item 30) issued based thereon.
11. Regulation of the Minister of the Environment of 2 June 2010 *on detailed technical conditions for qualifying a part of energy recovered from heat treatment of municipal waste* (Journal of Laws of 2010 No 117, item 788).
12. *Regulations of the Commodity Energy Exchange (Towarowa Giełda Energii S.A.)* and the related document *Conditions of trading of property rights to certificates of origin for energy produced from renewable energy sources* issued by the Commodity Energy Exchange S.A.
13. *Regulations of the Register of Certificates of Origin kept by the Commodity Energy Exchange S.A.*, issued by the Commodity Energy Exchange S.A.

14. *Operating and Maintenance Instructions of the Transmission Grid* drawn up and published by PSE Operator S.A.
15. Financial priority programme of the National Fund for Environmental Protection and Water Management (*Narodowy Fundusz Ochrony •rodowiska i Gospodarki Wodnej, NFO•iGW*) titled *Energy use of geothermal resources (Energetyczne wykorzystanie zasobów geotermalnych)*.

Table 5. Overview of all policies and measures

Name and reference of the measure	Type of measure	Expected result	Target group or activity	Existing or planned	Start and end dates of the measure
1. The obligation to obtain certificates of origin and submit them for cancellation or to pay the substitution fee imposed on energy companies selling electricity to end users	Regulatory	Increase in the installed power in renewable sources	Producers of energy from renewable sources, investors in generating installations using renewable energy sources, President of the Energy Regulatory Office of Poland, company selling energy to end users	Existing	Since 24 February 2007
2. Obligation to purchase energy produced from renewable sources imposed <i>ex officio</i> on sellers	Regulatory	Increase in the installed power in renewable sources	Producers of energy from renewable sources, investors in generating installations using renewable energy sources, sellers <i>ex officio</i> , President of the Energy Regulatory Office of Poland	Existing	Since 4 March 2005
3. Obligation of energy grid operators to ensure priority to all entities in the provision of services involving transmission or distribution of electricity produced from renewable energy sources	Regulatory	Increase in the installed power in renewable sources	Energy grid operators, investors in generating installations using renewable energy sources, producers of energy from renewable sources	Existing	Since 1 July 2007
4. 50% reduction of the fee for connection to the grid, determined based on actual outlays incurred for installing the connection for renewable energy sources with total installed power not exceeding 5 MW	Financial	Increase in the installed power in renewable sources	Energy grid operators, producers of energy from renewable sources, investors in generating installations using renewable energy sources	Existing	Since 4 March 2005 for sources with installed power not exceeding 5 MW – since 31 December 2010
5. Exemption of energy produced from renewable sources from excise duty in case of its sale to end users	Financial	Reduction of costs of production of renewable energy	Producers of energy from renewable sources, investors in generating installations using renewable energy sources, President of the Energy Regulatory Office of Poland, Heads of Customs Offices	Existing	Since 26 April 2004
6. Special principles of wind farm balancing	Financial	Reduction of costs of production of renewable energy	Transmission System Operator, producers of energy from renewable sources	Existing	2007

7. Exemption from stamp duty for issuing the licence (in case of power < 5 MW)	Financial	Reduction of costs of production of renewable energy	President of the Energy Regulatory Office of Poland, producers of energy from renewable sources, investors in generating installations using renewable energy sources	Existing	Since 4 March 2005
8. Exemption from stamp duty for issuing the certificate of origin (in case of power < 5 MW)	Financial	Reduction of costs of production of renewable energy	President of the Energy Regulatory Office of Poland, producers of energy from renewable sources	Existing	Since 4 March 2005
9. Exemption from the duty to pay annual fee to the state budget for obtaining the licence for energy generation (in case of the producer's power < 5 MW)	Financial	Reduction of costs of production of renewable energy	President of the Energy Regulatory Office of Poland, producers of energy from renewable sources	Existing	Since 4 March 2005
10. Exemption from the fee for recording certificates of origin in the Register of the Commodity Energy Exchange (in case of power < 5 MW)	Financial	Reduction of costs of production of renewable energy	Commodity Energy Exchange, producers of energy from renewable sources	Existing	Since 4 March 2005
11. Exemption from the fee for making changes in the Register of certificates as a result of selling the property rights (in case of power < 5 MW)	Financial	Reduction of costs of production of renewable energy	Commodity Energy Exchange, producers of energy from renewable sources	Existing	Since 4 March 2005
12. NFO•iGW programme for projects regarding renewable energy sources and highly efficient cogeneration – part 1	Financial	Increase in the installed power in renewable sources by 300 MW and energy amount by 1,000 GWh	Investors in generating installations using renewable energy sources	Existing	2009-2012
13. NFO•iGW programme for projects regarding renewable energy sources and highly efficient cogeneration – part 2	Financial	Increase in the installed power in renewable sources by 120 MW and energy amount by 330 GWh	Investors in generating installations using renewable energy sources	Existing	2009-2012
14. NFO•iGW programme for projects regarding renewable energy sources and highly efficient cogeneration – part 3	Financial	Installation of solar collectors with the floor area of 200 thousand m ² , which would result in an increase in renewable energy production by 100 thousand MWh per year	Natural persons and housing cooperatives	Existing	2010-2014
15. Measure 9.1 <i>High-efficiency energy generation</i> Operational Programme Infrastructure and Environment	Financial	Alteration and construction of electricity and heat co-generation units	Entrepreneurs, local governmental units and their unions and associations, entities providing public services based on the agreement concluded with local government units	Existing	2007-2015
16. Measure 9.2 <i>Efficient distribution of energy</i> Operational Programme Infrastructure and Environment	Financial	Construction and extension of: – energy distribution grid aimed at limiting network losses – heat distribution network involving application of energy-saving technologies and solutions	Energy companies	Existing	2007-2015
17. Measure 9.4 <i>Production of energy from renewable sources</i> Operational Programme Infrastructure and Environment	Financial	increase in generation of electricity and heat from renewable sources	Entrepreneurs, local governmental units, entities providing public services, churches	Existing	2007-2013

18. Measure 9.5 <i>Production of biofuels from renewable sources</i> Operational Programme Infrastructure and Environment	Financial	Projects involving production of biocomponents and biofuels, including second-generation biofuels	Entities listed in the Detailed description of the priorities of OPI&E, point 17, which in case of measure 9.5 include entities having the status of an entrepreneur	Existing	2010
19. Measure 9.6 <i>Networks facilitating reception of energy from renewable sources</i> Operational Programme Infrastructure and Environment	Financial	Construction and modernisation of grids allowing for connecting units generating electricity from renewable sources to the National Energy System	Entrepreneurs, local governmental units, entities providing public services	Existing	2007-2013
20. Measure 10.3 <i>Development of industry based on RES</i> Operational Programme Infrastructure and Environment	Financial	Construction of plants manufacturing equipment for the production of: – electricity from wind, water in small hydro power plants up to 10 MW, biogas and biomass; – heat using biomass and geothermal and solar energy; – electricity and heat from co-generation using only biomass or geothermal energy; – biocomponents and biofuels which are fuels in its own right, excluding equipment used for the purposes of production of biofuels blended with petroleum-derivative fuels, pure vegetable oil, as well as for the production of bioethanol from agricultural products	Entrepreneurs	Existing	2007-2013
21. List of priority projects of the Voivodship Fund for Environmental Protection and Water Management (<i>Wojewódzki Funduszu Ochrony •rodowiska i Gospodarki Wodnej</i>) in Wrocław, planned to be co-financed in 2010	General (indicating the direction)	Within point 3 (Air protection), item 3.4. Energy management rationalisation and item 3.5. Use of renewable energy sources, including biofuels. (no detailed results)	Entities listed in <i>Principles for granting and redeeming the loans, providing grants and co-financing interest on preferential loans and borrowings</i> (see resolution of the Supervisory Board of the Fund) No 34/2009	Planned	2010
22. Funds from the Voivodship Fund for Environmental Protection and Water Management in •ód•	Financial	Purchase and assembly of solar systems, heat pumps, photovoltaic cells and equipment used in the energy recuperation process	Buildings of public administration authorities and their units, used for the purposes of fulfilment of tasks entrusted to these authorities and units	Existing	Applications are examined in the calendar year of their filing
23. List of priority projects of the Voivodship Fund for Environmental Protection and Water Management in Warsaw for 2010	General (indicating the direction)	Tasks and programmes concerning the use of renewable energy sources	Application examined on an individual basis	Existing	2010
24. Granting and redeeming loans, providing grants and co-financing interest on preferential loans and borrowings from funds of the Voivodship Fund for Environmental Protection and Water Management in Opole	Financial	Limiting emission of pollution to the environment and increasing the share of energy produced from unconventional and renewable sources	Application examined on an individual basis	Existing	2010

25. Financial aid from funds of the National Fund for Environmental Protection and Water Management in Białyсток	Financial	Liquidation of low emission using renewable energy sources	Application examined on an individual basis	Existing	2010
26. List of priority projects of the Voivodship Fund for Environmental Protection and Water Management in Gdańsk for 2010	General (indicating the direction)	Support to the use of renewable energy sources	Application examined on an individual basis	Existing	2010
27. Loan or grant from funds of the Voivodship Fund for Environmental Protection and Water Management in Kielce	Financial	Facilities and infrastructure related to investments in electricity, heat and gas supply	Application examined on an individual basis	Existing	2010
28. Aid from funds of the Voivodship Fund for Environmental Protection and Water Management in Olsztyn	Financial	Use of renewable energy sources	Application examined on an individual basis	Existing	2010
29. List of priority projects of the Voivodship Fund for Environmental Protection and Water Management in Poznań for 2010	General (indicating the direction)	Increased use of energy from renewable sources	Application examined on an individual basis	Existing	2010
30. Aid from funds of the Voivodship Fund for Environmental Protection and Water Management in Zielona Góra	Financial	Use of renewable energy sources	Co-financing provided to natural persons, natural persons carrying out business activities, housing cooperatives, state budget units	Existing	2010
31. Swiss-Polish Cooperation Programme	Financial	Use of energy from renewable sources	Co-financing from 60 to 100% of eligible costs of a project/programme	Existing	2007-2017
32. NFO•iGW programme: Energy use of geothermal resources	Financial	Use of thermal water for energy production	Beneficiaries – entities entitled to implement projects involving exploration and examination of deposits of mineral based on provisions of the <i>Geological and Mining Act</i>	Existing	31 December 2013

Source: Own work based on binding legal regulation and generally available information materials.
The table structure and headings are consistent with Decision 2009/548/EC.

Overview of all policies and measures to promote the use of energy from renewable sources with respect to biofuels

Measures emphasising popularisation of renewable energy source, including transport biofuels, have been implemented in order to limit emission of carbon dioxide to the atmosphere. Since 1 January 2008, by setting *national indicative targets*, the obligation to ensure a certain share of biocomponents in the transport fuel markets has been imposed in Poland. In accordance with the regulation of the Council of Ministers of 2007 *on national indicative targets for 2008-2013* (Journal of Laws No 110, item 757), in 2009 the ratio of biofuel use in Poland was to equal 4.60%, while in 2013 – 7.10%.

New legal conditions support the development of next generations of transport biofuels from wastes and non-food lignocellulosic materials. In accordance with Directive 2009/28/EC, the share of second-generation transport biofuels will double vs. first-generation biofuels when calculating the target 10% share of RES in transport in 2020.

Provisions of Directive 2009/28/EC and Directive 2003/30/EC are aimed at the promotion of the use of biofuels and other renewable fuels in order to replace diesel oil and petrol used in transport to fulfil obligations of the EU with respect to climate changes, environmental safety, as well as supply and promotion of renewable energy sources.

Future measures aimed at increasing the share of energy from renewable sources

Appreciating a need for legislative transparency in the area of RES, Poland aims at separating and systematising mechanisms of support to energy from RES included in existing legislation. At the first stage, the transposition of the support schemes to promote energy from RES should refer to legislation at the level of an act, subject to transition periods of validity of regulations allowing for functioning mechanisms of support to energy from RES. The development of new principles for supporting energy produced from RES is assumed that would be differentiated depending on the carrier of renewable energy, installed power of energy-generating equipment and the date of commissioning or modernisation. New principles will support the development of distributed renewable energy sources, will determine conditions for retaining rights already acquired for the investments completed or started, their duration, and will allow reducing end user charges. Specific solutions will be included in the act on renewable energy sources.

Legislative projects planned in Poland would clarify the existing support to energy from RES which, *inter alia*, would allow for increasing investments in new generating capacities. The development of energy from RES will be based on principles of the rational use of existing resources of this energy, which is one of the targets of the climate and energy package implementing the Council Conclusion of March 2007. Directive 2009/28/EC is a part of this package, based on which Poland is obliged to increase the share of energy from renewable sources in gross final consumption of energy to at least 15% in 2020. Achieving the aforementioned objective certainly requires undertaking various analyses of the renewable energy market, continuous monitoring of energy generation at the level of overall renewable energy sector and by each technology using RES for energy generation. Poland also has an opportunity to experience significant technology development with respect to extension and modernisation of the existing energy infrastructure. Implementation of the aforementioned measures has to be supported by the public administration to ensure coordination of activities on the national level, as well as the application of consistent, flexible and the most efficient mechanisms of support. Consequently, the new planned legislation will be aimed at directing stronger, systemic and multi-dimensional support for sustainable development of the renewable energy sector. It should be concluded that the statutory regulation level would allow for proper coordination of activities supporting the development of RES and thus achieving even greater benefits pertaining to protection of the environment as invaluable property of the whole society.

Planned activities for the development of RES would require several amendments to legislation with respect to: definitions, overall objectives and measures necessary to achieve these objectives, principles of calculation of the share of energy from RES, administrative procedures, legislation and codes, installer information and certification, guarantee of electricity RES origin, access to the grids and their operations, as well as reporting.

The planned Act *on energy from renewable sources* is the main legislative project aimed at gradual increase of the share of energy from renewable sources in total gross demand for energy. This regulation will assume, *inter alia*, implementation of the coherent and clear support schemes for producers of green energy that would constitute a sufficient investment incentive for the development of new generating capacities, and thus would result in a growth in the share of energy from RES. As in the present case, this system would be based on the mechanism of so-called certificates of origin. The proposed mechanism would depend on the RES technology and would take into account, *inter alia*, the investment rate of return, technical progress, including reduction of costs of the technology application and estimated

effective useful life of the installation. At the same time, the proposed system would simplify the method of calculation of the substitution fee, while eliminating the risk of uncontrolled annual growth of this fee, resulting in an increase in electricity prices. The introduction of the guaranteed minimum income level to the support scheme would be an additional regulation ensuring more effective use of resources and elimination of the barrier in form of the investment risk. The analyses carried out proved that such regulation would significantly stimulate the investor's interest in RES technologies.

The issue of stability and long-term character of the support scheme will be of particular importance from the point of view of the development of RES, in order to ensure investment security for entities interested in construction of generating units.

Aiming at increasing the share of energy from renewable sources generated in individual systems and for internal needs of households, Poland will undertake activities designed to providing direct support to such systems and to calculate energy generated therein and to include it in relevant statistics.

While appreciating the need to develop new RES technologies, Poland will carry out activities aimed at promoting scientific researches and educational activities in this respect.

4.2 Specific measures to fulfil requirements under Articles 13, 14, 16, and Articles 17 to 21 of Directive 2009/28/EC

Poland has a significant potential for the production of biomass and biofuels. While other EU countries start the research or even production of second-generation biofuels, Poland is at the stage of necessary modification of the fiscal and legal environment created for biofuels.

Polish legislation is one of the most restrictive ones in the European Union, taking into account sanctions for non-achieving the *national indicative target*. On average, penalties reach about PLN 15 = EUR 3.6 per 1 litre of biofuel not introduced.

A majority of countries having a significant agricultural potential, including Poland, primarily endeavour to use own production capacities for the purposes of implementing EU policy pertaining to climate protection, diversification of fuel supplies and stabilisation of agricultural production by allocating a part of crops and harvests for energy purposes.

After Poland's accession to the EU and gradual adoption of its legal requirements (*inter alia*, Directive 2003/30/EC),² the potential interest in investments in biofuels translated into declarations on planned investments aimed at increasing production capacities reaching about 1.5 million tonnes for esters and about 0.5 million tonnes for bioethanol.

Key legal acts including specific measures aimed at implementation of assumptions of Directive 2009/28/EC that directly influence the development of the biofuel sector in Poland include:³

- Act of 25 August 2006 *on biocomponents and liquid biofuels* (Journal of Laws No 169, item 1199, as amended);

² Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport.

³ Work aimed at amending some of the acts listed is currently in progress. Amending the acts is necessary to introduce B7/B10 and E10 fuels to the market.

- Act of 25 August 2006 *on monitoring and control of liquid fuel quality* (Journal of Laws No 169, item 1200, as amended);
- Act of 6 December 2008 *on excise duty* (Journal of Laws of 2009 No 3, item 11 as amended);
- regulation of the Minister of Economy of 9 December 2008 *on qualitative requirements for liquid fuels* (Journal of Laws No 221, item 1441);
- regulation of the Minister of Economy of 1 September 2009 *on the method of obtaining samples of liquid fuels and liquid biofuels* (Journal of Laws No 147, item 1189);
- regulation of the Minister of Finance of 24 February 2009 *on excise duty exemptions* (Journal of Laws No 32, item 228, as amended);
- regulation of the Minister of Economy of 22 January 2007 *on qualitative requirements for liquid biofuels used in selected fleets and manufactured by farmers for their own purposes* (Journal of Laws No 24, item 149);
- regulation of the Minister of Economy of 31 January 2007 *on the method of obtaining samples of liquid biofuels at farmers manufacturing liquid biofuels for their own purposes* (Journal of Laws No 24, item 150);
- regulation of the Minister of Economy of 22 April 2010 *on liquid biofuel quality testing methods* (Journal of Laws No 78, item 520);
- Regulation of the Council of Ministers of 15 June 2007 *on national indicative targets for 2008-2013* (Journal of Laws No 110, item 757);
- regulation of the Minister of Economy of 23 August 2007 *on the detailed scope of the summary quarterly report on the biocomponent, liquid fuel and liquid biofuel market* (Journal of Laws No 159, item 1121);
- regulation of the Minister of Economy of 27 December 2007 *on calorific value of individual biocomponents and liquid fuels* (Journal of Laws of 2008 No 3, item 12);
- regulation of the Minister of Economy of 22 January 2009 *on qualitative requirements for liquid biofuels* (Journal of Laws No 18, item 98);
- Resolution No 134/2007 of the Council of Ministers of 24 July 2007 *on the Long-Term Project for the Promotion of Biofuels and Other Renewable Fuels for 2008-2014* (M.P. No 53, item 607).

Since the day of announcement of a positive decision of the European Commission, i.e. since 15 October 2009, provisions of Article 89(1)(3), (7) and (8) of the Act of 6 December 2008 *on excise duty* have been applied. Excise duty/exemption rates are as follows:

- PLN 1,565.00/1000 litre of engine petrol/ exemption of PLN 1.565 for each litre of biocomponents added to this petrol;
- PLN 1,048.00/1000 litre of diesel oil/ exemption of PLN 1.048 for each litre of biocomponents added to diesel oil;
- PLN 10.00/1000 litre of biocomponents which is fuel in its own right.

Excise duty for biocomponents in biofuels cannot be less than PLN 10/1000 litres.

At the same time it should be mentioned that the aforementioned decision of the European Commission refers to the N57/2008 programme notified – Operating aid for biofuels – Poland, which in accordance with the assumption, would remain in force until 30 April 2011.

Biocomponents which are fuel at its own right are also exempt from the fuel fee. Excise duty exemptions for biofuels that came into force have resulted in intensifying the incentive to use

environmentally friendly fuels by the promotion of the production and wider use of renewable fuels. It should also be remembered that an increased consumption of biofuels vs. traditional fuels would have a positive impact on the environment as a result of reduced emission of pollution from transport, including mainly reduced greenhouse gas emission.

Improvement of the country energy security and reduced dependency on imports of oil are other arguments that justify supporting transport biofuels. Additionally, in case of higher use of national production capacities, it would be possible to better utilise idle agricultural land and create new jobs at rural areas.

Implementation of the aforementioned legislation is directed at increased use of biocomponents in Poland, and thus supports fulfilment of recommendations of Directive 2003/30/EC of 8 May 2003 *on the promotion of the use of biofuels or other renewable fuels for transport*, which obliges Member States to achieve 5.75% share of biocomponents in the transport fuel market by 2010.

The year 2008 witnessed a significant growth in the use of biocomponents in Poland. Companies fulfilling the *national indicative target* satisfied the obligation imposed, which ultimately allowed for meeting the NIT at the level of 3.66% in 2008. In 2009, the aforementioned obligation was fulfilled at the level of 4.63% (see the summary below).

Summary 10. Consumption of fuels and biocomponents in the years 2000-2009 in thousand tonnes

Year	Consumption for transport (in thousand tonnes)				Share of biocomponents based on calorific value
	Petrol	Diesel oil	Bioethanol	Esters	
2000	4,841	2,343	40.6	0	0.35%
2001	4,484	2,562	52.4	0	0.46%
2002	4,109	2,940	65.3	0	0.57%
2003	3,941	3,606	60.1	0	0.49%
2004	4,011	4,303	38.3	0	0.29%
2005	3,915	5,075	42.8	17.1	0.47%
2006	4,048	6,042	84.3	44.9	0.92%
2007	3,997	7,212	70.8	37.3	0.68%
2008	4,109	10,069	185.6	479.9	3.66%
2009	4,125	10,387	232.2	635.8	4.63%

Source: Data for 2000-2006 – Central Statistical Office, data for 2007-2009 – quarterly reports of the President of the Energy Regulatory Office of Poland

In practice, the market of transport biofuels, mainly methyl esters, has started to function on the date of the regulation of the Council of Ministers of 15 June 2007 *on national indicative targets for 2008-2013* coming into force. The overall target involving the use of biocomponents and biofuels for transport became an obligatory one, and entities (undertakings carrying out business activities pertaining to production, imports or intra Community purchases of liquid fuels or liquid biofuels, who sell or market them in another way on the territory of the Republic of Poland or use them for internal purposes), which do not meet this obligation, are subject to the relevant penalty payment.

At present, the national legislation offers a number of opportunities to sell biofuels (fuels including more than 5% of biocomponents). It is possible to sell B100, B20 and E85 type biofuels, and additionally, since implementation of the Act of 25 August 2006 *on monitoring*

and control of liquid fuel quality and relevant “quality” regulations, fuel manufacturers can offer institutional clients biofuels with any composition – containing significant quantities of biocomponents (so-called “fleet” biofuels).

The achievement of the NIT will require amending the national legislation due to maximum statutory permitted 5% volume content of biocomponents in liquid biofuels. In the EU, standard fuel can contain (Directive 2009/30/EC) as much as up to 7% of the volume of esters in diesel oil. The new Directive also allows for producing petrol with up to 10% of the volume of bioethanol E10 added.

Irrespective of the obligation to use energy from renewable sources for transport, manufacturers of vehicles emphasise that some vehicles may not be adjusted to use increase quantities of biocomponents in transport fuels or fuels composed of biocomponents in 100%.

Additionally, new EU legislation would impose more demanding requirements for growing plants for energy purposes. For the first time, their crops will be required not to compete with food and not to reduce food safety. It will also be required to satisfy very demanding requirements pertaining to sustainable production, obligation to make LCA⁴ analysis for production and processing of agricultural raw materials for biocomponents, biofuels and bioliquids. Activities planned for the nearest future include the development and obtaining social agreement on the methodology of calculation of greenhouse gas emission using the LCA method.

Supporting the development of new technologies with respect to transport fuels (including second-generation biofuels) will be of particular importance from the point of view of increasing the share of RES in transport.

4.2.1 Administrative procedures and spatial planning (Article 13(1) of Directive 2009/28/EC)

a) List of existing national and, if applicable, regional legislation concerning authorisation, certification, licensing procedures and spatial planning applied to plants and associated transmission and distribution network infrastructure for the production of electricity, heating or cooling from renewable sources

The Polish certification and authorisation system is to a large extent a derivative of the EU law. Act of 30 August 2002 *on conformity assessment system* (Journal of Laws of 2010 No 138, item 935, as amended) is the main legal act on certification and authorisation. Taking into account equipment and installation using energy from renewable energy sources, the following secondary legislation to the aforementioned act needs to be mentioned:

- regulation of the Minister of Economy of 18 December 2006 *on essential requirements for measuring instruments* (Journal of Laws of 2007 No 3, item 27, as amended);
- regulation of the Minister of Economy of 21 December 2005 *on essential requirements for appliances burning gaseous fuels* (Journal of Laws No 263, item 2201);
- regulation of the Minister of Economy and Labour of 20 October 2005 *on essential requirements concerning energy efficiency of new hot-water boilers burning gaseous and liquid fuels* (Journal of Laws No 218, item 1846, as amended);
- regulation of the Council of Ministers of 13 August 2007 *on the register of products non-conforming with the essential or other requirements* (Journal of Laws No 150, item 1057).

⁴ LCA – Life Cycle Assessment.

Additionally, announcement of the President of the Polish Committee for Standardisation on lists of harmonised standards shall be pointed out as a source of the law within the aforementioned scope.

In accordance with the aforementioned *Act on conformity assessment system*:

- certification shall be understood as an activity of the *certifying body proving that the correctly identified product or its manufacturing process conforms with the essential or specific requirements* (Article 5(8));
- authorisation shall be understood as *a minister or a head of the central office competent taking into account the conformity assessment subject, qualifying the unit or laboratory applying to the notification process* (Article 5(12));
- the licensing procedure does not occur in the aforementioned legal act or in any other legal act pertaining to plants and associated transmission and distribution network infrastructure for the production of electricity, heating or cooling from renewable sources.

Taking into account terminology inconsistencies between the EU legislation and the national legislation, it should be concluded that in the context of procedures pertaining to plants and associated transmission and distribution network infrastructure for the production of electricity, heating or cooling from renewable sources within the meaning of the Polish law, the certification procedure under the *Act on conformity assessment system* should be considered the adequate procedure. The licensing procedure shall not apply in this case, while the authorisation procedure in accordance with the act on conformity assessment system applies only to certification units, control units and laboratories.

Consequently, in accordance with the *act on conformity assessment system*, installations and equipment used by plants generating electricity, heat for heating or cooling from renewable sources constitute products, i.e. items, irrespective of the degree of their processing, designed for marketing or commissioning, except for agricultural and food products, as well as animal feed (Article 5(1)). In accordance with the definition included in Article 5(2), marketing *shall mean the manufacturer, his authorised agent or importer making available free-of-charge or against payment, for the first time on the territory of a Member State of the European Union or a member state of the European Free Trade Association (EFTA) – parties to the agreement on the European Economic Area, a product for the purposes of its use or distribution.*

The certification procedure is carried out at the request of the manufacturer or his authorised agent. In accordance with the *Act on conformity assessment system*, the manufacturer shall be understood as a *natural or legal person, or unincorporated legal entity that designs and manufactures a product, or for which this product was designed or manufactured, for the purposes of its marketing or commissioning, under own name and sign.* At the same time, the agent shall be obliged to obtain from the manufacturer a written authorisation to act on his behalf. The request for certification of a product is subject to a fee. Certification is performed by a responsible certification unit that was granted accreditation by the Polish Accreditation Centre. Certification involves verifying conformity of a given product with essential or specific requirements. Essential requirements have been set forth in so-called New Approach Directive, while specific requirements – in other legal acts of European Communities.

When assessing conformity with the essential requirements, the product can undergo tests carried out by the manufacturer or a notified laboratory, verification of the conformity with the essential requirements by a notified control unit or certification by a notified certification unit (Article 7 of the *Act on conformity assessment system*). Positive result of the assessment of conformity with the essential requirements in the certification procedure provides a basis for issuing the certificate of conformity to the manufacturer or his authorised agent. As of

specific requirements, conformity is assessed by the manufacturer or importer, in a way determined in secondary legislation to the *Act on conformity assessment system* or in other specific acts. The certificate of conformity confirms that the product and its manufacturing process conform to the essential or specific requirements.

The manufacturer or his authorised agent, who obtained the certificate of conformity, shall be obliged to issue a declaration of conformity, i.e. make the statement of will confirming, at his own responsibility, that the product conforms to the essential requirements, if the conformity assessment procedure applied requires so. When the product is designed to be used or distributed on the territory of Poland, the declaration of conformity shall be translated into Polish language. Additionally, the manufacturer or his authorised agent shall be obliged to submit a copy of the declaration of conformity to the minister competent for the subject of conformity assessment and to the European Commission (if such obligation arises from relevant secondary legislation). Additionally, the manufacturer or his authorised agent shall be obliged to put the conformity mark on the product (CE symbol), in accordance with requirements of secondary legislation to the *Act on conformity assessment system* or other specific provisions. In accordance with the Act, the documentation of the products or results of the assessment of conformity of products with essential requirements shall be stored for a period of 10 years from the date of manufacturing of the last product to which this documentation pertains. This shall be the obligation of the manufacturer or his authorised agent, and when the manufacturer has his registered office outside the territory of one of members states of the European Economic Area – of the importer. The *Act on conformity assessment system* prohibits marketing or commissioning of products without conformity marks is putting a mark on a given product is obligatory.

As already mentioned above, in accordance with the *Act on conformity assessment system*, authorisation shall be understood as a minister or a head of the central office competent taking into account the conformity assessment subject, qualifying the unit or laboratory applying to the notification process. Meanwhile, notification shall mean notifying the European Commission and Member States of authorised certification and control units, and authorised laboratories competent to carry out activities set forth in conformity assessment procedures. Consequently, obtaining authorisation is necessary for making the notification.

Authorisation is granted at the request of a certification unit, control unit or a laboratory. In accordance with the *Act on conformity assessment system*, the aforementioned entities shall satisfy the following criteria:

- to have a staff with relevant technical knowledge of products and a given conformity assessment procedure;
- to be independent and unbiased relating to entities directly or indirectly associated with the product manufacturing process;
- to have proper equipment;
- to comply with legislation on protection of classified and other legally protected information.

Authorisation shall be granted subject to obtaining the certificate of authorisation, a given unit obtaining civil liability insurance for the amount corresponding to the risk related to a given activity and subject to satisfying additional criteria set forth in secondary legislation to the *Act on conformity assessment system*.

Authorisation shall be granted by a minister or a head of the central office competent taking into account the conformity assessment subject based on an administrative decision. The

minister or the head of the central office may also withdraw the authorisation or limit its scope based on an administrative decision. The aforementioned depends on the nature and the seriousness of the violation committed. After granting the authorisation, the entity that granted the authorisation reports authorised certification units and control units, and authorised laboratories to the minister in charge of economic affairs for the purposes of their notification to the European Commission and Member States of the European Union.

b) Responsible Ministry(ies)/authority(ies) and their competences in the field

Taking into account the certification procedure under the *Act on conformity assessment system*, responsible certification units shall be in charge of carrying out certification and issuing the certificate of conformity.

Taking into account the authorisation procedure (which, however, does not directly apply to plants and associated transmission and distribution network infrastructure for the production of electricity, heating or cooling from renewable sources) under the *Act on conformity assessment system*, authorisation is granted by the minister or head of the central office competent taking into account subject of conformity assessment.

c) Revision foreseen with the view to take appropriate steps as described by Article 13(1) of Directive 2009/28/EC

Poland endeavours to simplify administrative procedures related to the investment process in the field of renewable energy sources. In order to fulfil requirements of the Directive that administrative procedures concerning investments in renewable energy are proportionate and necessary, activities were undertaken to initiate necessary legislative changes in the area of spatial planning and development, and environmental protection.

Endeavours to identify potential barriers prohibiting or hindering investments in offshore wind farms have been made recently. As a result of work undertaken, the Government of the Republic of Poland entered work on relevant legal solution by preparing amendments to provisions of the Act of 21 March 1991 *on the maritime areas of the Republic of Poland and the maritime administration* (Journal of Laws of 2003 No 153, item 1502, as amended). The aforementioned activities are consistent with activities simplifying administrative procedures concerning implementation of investments in maritime areas. They also result in reduced financial encumbrances related to the investment process.

Additionally, work is in progress on legislation simplifying the investment process related to obtaining geothermal energy, including pertaining to the detailed definition of individual authorities, reduction of maximum waiting period for relevant decisions; exemptions and simplifications with respect to costs incurred are also being considered. The bill – *Geological and Mining Law* has been presented to the Sejm and is being considered. Planned legislation is to come into force in 2011.

Work on legislation implementing Directive 2009/28/EC is currently in progress. Suitable detailed provisions will be included in the bill on energy from renewable sources that is going to be adopted in 2011. At the current stage, it is being considered whether the regulation planned would include, *inter alia*, timing and financial preferences with respect to the issue of connecting new RES power to the energy system.

d) Summary of the existing and planned measures at regional/local levels (where relevant)

Authorisation, certification and licensing procedures for plants and associated transmission and distribution network infrastructure for the production of electricity, heating or cooling from renewable sources cannot be introduced in legal acts of limited scope (local, regional).

Such procedures impose obligations on citizens and limit the freedom of business, and as such, in accordance with Articles 2, 22 and 31 of the Constitution of the Republic of Poland, can be introduced only in a legal regulation at the level of an act.

Poland considers appointing a competence unit responsible for all matters related to the development of renewable energy sources in Poland in the *Act on energy from renewable sources*. One of key tasks within directions of activities of this unit would be carrying out extensive data aggregation activities as well as information and promotion activities aimed at raising awareness on *energy from renewable sources*. Taking into account the above, the scope of subjects participating in the information campaign would cover, *inter alia*, local government units, in order to ensure that local documents, e.g. local spatial development plans and heat and energy supply plans, include investments in renewable sources.

e) Are there unnecessary obstacles or non-proportionate requirements detected related to authorisation, certification and licensing procedures applied to plants and associated transmission and distribution network infrastructure for the production of electricity, heating or cooling from renewable sources, and to the process of transformation of biomass into biofuels or other energy products? If so, what are they?

Taking into account unnecessary obstacles related to the development of plants and associated transmission and distribution network infrastructure for the production of electricity, heating or cooling from renewable sources, it is necessary to emphasise a need to obtain two separate decisions: decision on construction conditions for the location of an energy production equipment and the decision on identifying the location of the public purpose investment for "transmission infrastructure", that is location of the energy grid.

In accordance with Article 6(2) of the Act of 21 August 1997 on real estate management (Journal of Laws of 2010, No 102, item 651, as amended), public purposes include construction and maintenance of drainage paths, lines and facilities for transporting or distributing liquids, steam, gases and electricity, as well as other utilities and equipment necessary to use these lines and facilities. This provision does not cover energy producing equipment, which means that in case of the energy producing equipment, the decision on identifying the location of the public purpose investment cannot be issued.

Taking into account Article 13(1)(e) (simplification and reduction of time of administrative procedures on the relevant administration level) of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 *on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC*, it is necessary to consider, whether construction of energy producing equipment and associated transmission and distribution network infrastructure should be governed by the same provisions, by issuing one decision on the location.

f) What level of administration (local, regional and national) is responsible for authorising, certifying and licensing renewable energy installations and for spatial planning? If more than one level is involved, how is coordination between the different levels managed? How will coordination between different responsible authorities be improved in the future?

Accredited and authorised certification units, notified by the responsible authority appointed in the *Act on conformity assessment system* is competent to certify renewable energy installations. Certification units are usually private law entities (companies), due to which it is impossible to determine the level of administration on which their activities are carried out. Accreditation is granted by the Polish Accreditation Centre (Article 15), while the authorisation is granted by the minister or head of the central office competent taking into

account subject of conformity assessment (Article 20) and notification is made by the minister in charge of economic affairs (Article 21). Taking into account the above, accreditation takes place at the level of public administration (national).

In case of spatial planning, the responsible administration level has to be identified taking into account the scope of a given spatial development plan. The legal regulation that appoints responsible bodies with this respect is the Act of 27 March 2003 *on spatial planning and development* (Journal of Laws No 80, item 717, as amended).

In accordance with Article 3 of the Act *on spatial planning and development*, the development and implementation of the spatial policy on the community level, including enacting the study of conditions and directions of spatial development of the community and local spatial development plans (except for sea inland waters, territorial sea, exclusive economic area and closed areas) belong to the own tasks of the community. The local government of a given poviát is responsible for spatial planning on the poviát level. It should be emphasised that spatial planning on the poviát level is limited to making (within own competences with respect to subject) spatial development analysis and studies, pertaining to the area of poviát and issues related to its development. On the voivodship level, the voivodship local government bodies are responsible for spatial planning.

The Council of Ministers is responsible for spatial planning on the national level. Its tasks include the development and implementation of the national spatial policy expressed in the national spatial development concept. Tasks of the minister in charge of construction, spatial and housing management include coordinating the compliance of voivodship spatial development plans with the national spatial development concept, trans-border and cross-border cooperation in the field of spatial development carried out in agreement with the minister in charge of regional development, and drawing up regular report on the national spatial development status (Article 46 of the Act *on spatial planning and development*). Duties of the minister in charge of regional development include, *inter alia*, drawing up the national spatial development concept (Article 47 of the Act *on spatial planning and development*). The national spatial development concept and regular reports on the national spatial development status are accepted by the Council of Ministers. Then, the President of the Council of Ministers presents them to the Sejm of the Republic of Poland.

The spatial planning system in Poland is based on the assumption of facultative character of the local spatial development plan, subject to Article 10(2)(8) of the Act of 27 March 2003 *on spatial planning and development* (Journal of Laws No 80, item 717, as amended), which imposes the obligation to draw up the local plan for areas determined based on separate provisions and in other instances identified in the Act. A community is obliged to prepare the local plan only when the specific provisions impose such obligation. However, provisions of the *Energy Act* of 10 April 1997 (Journal of Laws of 2006 No 89, item 625, as amended) do not impose the obligation to draw up the local plan in case of renewable energy sources.

Local planning, at the level of community, is of principal importance to the position of locations of energy producing equipment based on renewable sources, with the power exceeding 100 kW. In accordance with Article 3(1) of the Act *on spatial planning and development*, a community shall be responsible for the development and implementation of the spatial policy on the area of community, including enacting the study of conditions and directions of spatial development of the community and local spatial development plans except for sea inland waters, territorial sea, exclusive economic area and closed areas other than identified by the minister in charge of transport matters.

Taking into account the above, locations of energy producing equipment based on renewable energy sources are determined based on the local spatial development plan and, when such plan is missing, based on the decision on construction conditions.

In accordance with Article 10(2a) of the *Act on spatial planning and development*, when areas on which energy producing equipment based on renewable energy sources with the power exceeding 100 kW together with protection zones are to be placed in the area of the community, the study of conditions and directions of spatial development of the community shall include their locations. The study is not a local law act, but it is binding to the authorities of the community when drawing up local spatial development plans.

The foundation of the system is a local spatial development plan, which determines the purpose of the area and methods of development and construction, and is a local law act. Depending on the needs, borders of areas on which energy producing equipment based on renewable energy sources with the power exceeding 100 kW together with protection zones are to be marked in the local plan, together with limitations with respect to buildings and space development and use.

In the aforementioned activities, the community has to take into account the national plan, i.e. provisions of the national spatial development concept. The draft *National Spatial Development Concept 2030* prepared by the Ministry of Regional Development, assumes appointing zones for the purposes of the development of wind energy, which are going to be determined at the level of voivodship spatial development plans and are to be reflected in documents drawn up on the local planning level. At the same time, this would result in limiting uncontrolled expansion of wind energy at areas outside the aforementioned zones.

In accordance with Appendix 3 to the *Energy Policy of Poland until 2030* – measure 4.6 point 4, potential sites of wind farms in marine areas of the Republic of Poland would be selected.

Additionally, the concept will include guidelines with respect to the use of geothermal energy and long-term plantations of energy crops (delimitation at the level of voivodship spatial development plans), while limiting their uncontrolled expansion to other areas, especially environmentally valuable areas.

g) How is it ensured that comprehensive information on the processing of authorisation, certification and licensing applications and on assistance to applicants are made available? What information and assistance is available to potential applicants for new renewable energy installations on their applications?

The *Act on conformity assessment system* does not provide for any special procedure for making available information on the application processing to the applicant. However, obtaining the access to such information is possible based on general provisions of the Law, that is the Act of 14 June 1960 – *Code of Administrative Procedure* (Journal of Laws of 2000, No 98, item 1071, as amended) and based on the Act of 6 September 2001 *on access to public information* (Journal of Laws No 112, item 1198, as amended). The information and assistance available to potential applicants for new renewable energy installations on their applications are determined and described in point 4.2.3 a) and d).

h) How is horizontal coordination facilitated between different administrative bodies, responsible for the different parts of the permit? How many procedural steps are needed to receive the final authorisation/licence/permit? Is there a one-stop shop for coordinating all steps? Are timetables for processing applications communicated in advance? What is the average time for obtaining a decision for the application?

Legislation pertaining to issuance of building permits or submission of notifications of new installations and equipment based on RES does not include provisions on the establishment of a comprehensive service point in order to coordinate all steps necessary to assemble or build such installation. To some extent, building supervision inspection authorities can serve as such points. There is no obligation to send the application examination schedules in advance.

In case of making the decision on the building permit, the *Building Act* sets a 65 day deadline for the public administration authority to issue the building permit (Article 35(6)). This deadline runs from the first date of filing the application for issuing such decision, and non-meeting this deadline results in the higher level entity imposing a penalty of PLN 500 for each day of delay. In case of the notification procedure, the building work can start if within 30 days of the date of submitting the notification, the responsible authority does not express objection in form of a decision, but not later than within two years of the start date determined in the notification (Article 30 item 5).

i) Do authorisation procedures take into account the specifics of the different renewable energy technologies? If so, please describe how. If they do not, do you envisage taking them into account in the future?

As already mentioned above, in the Polish law, the authorisation procedure does not apply to undertakings or installations based on renewable energy sources, but to the procedure of a minister or a head of the central office competent taking into account the conformity assessment subject, qualifying the certification unit, control unit or laboratory for the notification process, i.e. notifying a given unit to the European Commission and Member States of the European Union, and as such, it does not take into account the specifics of the different renewable energy technologies (Article 5(12) of the *Act on conformity assessment system*).

j) Are there specific procedures, for example simple notification, for small-scale, decentralised installations (such as solar panels on buildings or biomass boilers in buildings)? If so, what are the procedural steps? Are the rules publicly available to citizens? Where are they published? Is the introduction of simplified notification procedures planned in the future? If so, for which types of installation/system? (Is net metering possible?)

The *Building Act* provides only for one simplified specific procedure for small-scale installations based on the renewable energy technology. In accordance with Article 29(2)(16) in reference to Article (30)(1) of the *Building Act*, the installation of standalone solar panels does not require obtaining a building permit or submitting a notification to the responsible authority.

Currently, as a part of work on the *Act on energy from renewable sources*, the introduction of the obligatory notification on a type of the installed RES, installed power and the amount of energy produced by every, even individual investor, is being considered. The introduction of the declaration system for individual users is taken into account to this end. It will also be necessary to introduce one, consistent system of aggregation of data, including from individual users.

k) Where are the fees associated with applications for authorisation/licences/permits for new installations published? Are they related to the administrative costs of granting such permits? Is there any plan to revise these fees?

As already mentioned in letter a), in accordance with the Polish law, the procedures for granting the authorisations and licences do not apply to the functioning of installations using renewable energy sources.

In case of the certification procedure, the method of determining fees paid by the applicant for activities related, *inter alia*, to obligatory assessment of conformity of products and the certification, is set forth by the minister in charge of public finance, at the request of the minister in charge of economic affairs, based on a regulation. Consequently, the method of determining these fees is announced by its publishing in the Journal of Laws (*Dziennik Ustaw*). Currently, the regulation applying with respect to the above issue is the regulation of the Minister of Finance of 2 April 2004 *on the method of determining fees for activities related to the conformity assessment system and accreditation of certification units, control units and laboratories* (Journal of Laws No 70, item 636).

Meanwhile, in case of issuing a building permit or the notification on the installation or equipment using the renewable energy sources, fees for these activities are set forth in the Act of 16 November 2006 *on stamp duty* (Journal of Laws of No 225, item 1635, as amended), and thus they are also published in the Journal of Laws (*Dziennik Ustaw*). Currently, there are no plans to revise these fees.

l) Is official guidance available to local and regional administrative bodies on planning, designing, building and refurbishing industrial and residential areas to install equipments and systems using renewable energy sources in electricity and heating and cooling, including in district heating and cooling? If such official guidance is not available or insufficient, how and when will this need be addressed?

There is no guidance available to local and regional administrative bodies on planning, designing, building and refurbishing industrial and residential areas to install equipments and systems using renewable energy sources in electricity and heating and cooling, including in district heating and cooling, included in generally binding legal acts. The proceedings in this respect are carried out based on provisions of the limited scope/local law.

The draft new regulation (Act on RES) provides for the introduction of relevant requirements for new and modernised buildings (including public buildings). Additionally, arranging an information campaign targeted at local governments is planned in order to raise awareness on energy from renewable sources.

m) Are there any specific trainings for case handlers of authorisation, certification and licensing procedures of renewable energy installations?

Some organisations ensure trainings on the building energy performance assessment. Such training covers, e.g. using energy certification computer programmes, energy performance certificates, energy audit. No trainings addressed only to persons responsible for generally understood certification of renewable energy installation have been identified.

In order to comply with requirements of Directive 2009/28/EC and to ensure the correctness of installation of new RES equipment and installation, the relevant certification and authorisation system is going to be introduced in new legislation that would cover all installers of RES equipment.

4.2.2 Technical specifications (Article 13(2) of Directive 2009/28/EC)

a) To benefit from support schemes do renewable energy technologies need to meet certain quality standards? If so, which installations and what quality standards? Are there national, regional standards that go beyond European standards?

In order to benefit from financial support schemes, i.e. funds allocated by the National Fund for Environmental Protection and Water Management (*Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej*) and voivodship funds for environmental protection and water management, in each case a given technology (installation or equipment) has to meet technical and quality standards set forth in the specification of a given support scheme. In this case the ecology effect is a ratio of special importance, the methodology of the calculation of which constitutes, e.g. an appendix to the competition procedure regulations pertaining to the support subject. The National Fund for Environmental Protection and Water Management accepts and uses harmonised European standards (these standards are marked as PN-EN, and their lists are published by the President of the Polish Committee for Standardisation in form of announcement in *Monitor Polski*). Summing up, the possibility to benefit from support schemes of the National Fund for Environmental Protection and Water Management depends on meeting requirements of technical and quality standards identified individually for each specific competition or support scheme. As for setting from quality standards that go beyond European standards, it should be concluded that Polish legislation does not set forth such standards.

4.2.3 Buildings (Article 13(3) of Directive 2009/28/EC)

a) Reference to existing national and regional legislation (if any) and summary of local legislation concerning the increase of the share of energy from renewable sources in the building sector

There is no national legislation that would require installing and using RES in newly built or modernised buildings. In order to promote the use of RES, the legislator has introduced the system of incentives and premiums. Main incentives in this area include the thermo-modernisation premium and the renovation premium that the investor can obtain based on the Act of 21 November 2008 *on supporting thermo-modernisation and renovation work* (Journal of Laws No 223, item 1459). The thermo-modernisation premium is available to an investor for reducing an annual demand for energy, reducing annual energy losses, reducing annual costs of heat production, replacement of an energy source with a renewable energy source or using highly efficient co-generation. At the same time, the renovation premium is available to an investor if implementation of a given project results in reducing annual demand for energy supplied to multi-family buildings for the purposes of heating and hot water. Detailed principles for granting and paying the premiums are set forth in the aforementioned Act.

Additionally, the legislator facilitates installing RES in buildings, taking into account their equivalent role with conventional sources of electricity and heat and alternative installation and use opportunities, e.g. in the regulation of the Minister of Infrastructure of 12 April 2002 *on technical conditions to be met by buildings and their location* (Journal of Laws No 75 item 690). The *Building Act* does not explicitly set forth any ratios for increasing the share of energy from renewable sources in the building sector, while legal instruments introduced therein are assumed to be aimed at supporting this objective. Such instruments include, e.g. the regulation of the issue of the use of small-scale photovoltaic systems, in a way favourable to investors. In accordance with Article 29(2)(16) in reference to Article (30)(1) of the *Building Act*, the installation of standalone solar panels does not require obtaining a building permit or submitting a notification to the responsible authority.

The system of assessment of energy performance of buildings arising from provisions of Directive 2002/91/EC on the energy performance of buildings, introduced by amendments to the *Building Act* (and secondary legislation thereto), i.e. the Act of 19 September 2007 on

amendments to the Building Act (Journal of Laws No 191, item 1373); Act of 27 August 2009 *on amendments to the Building Act and the Act on real estate management* (Journal of Laws No 161, item 1279), is another legal instrument promoting the use of renewable energy sources and improvement of the effectiveness of renewable sources used in the building sector.

The energy performance certificate, i.e. a document issued by an authorised person describing the quality of a building, residential premises or a part of the building being an independent technical and usable whole from the point of view of demand for energy necessary to satisfy various needs related to its use, is a key element of the energy performance assessment system. The certificate is issued based on a consistent methodology for determining energy performance, while the demand for energy is adjusted by the ratios the value of which depends on the energy raw material used. Values of these ratios reward the use of energy from renewable sources. The energy performance certificate has to be prepared in the following instances:

- commissioning of the building (the investor encloses the certificate to the notification on completing construction of the building structure or the application for issuing the permit to use);
- conclusion of agreements under which the title to the building, residential premises or a part of the building constituting an independent technical and functional whole is transferred (the seller issues to the purchaser the relevant energy performance certificate);
- conclusion of agreements under which the title to the cooperative flat is transferred (the seller issues to the purchaser the relevant energy performance certificate);
- conclusion of agreements under which the building, residential premises or a part of the building constituting an independent technical and functional whole are leased (the landlord makes available to the tenant the relevant energy performance certificate);
- expiration of the validity period of the building energy performance certificate (the owner of the building is obliged to ensure drawing up the certificate);
- change of the energy performance of the building resulting from reconstruction or renovation of the building (the owner of the building is obliged to ensure drawing up the certificate).

The energy performance certificate for a building, residential premises or a part of the building constituting an independent technical and functional whole can be issued by a person with a proper education and building authorisation (in the field of architecture, structures and buildings or systems) or a person who completed the training and passed the examination before the minister in charge of building affairs, spatial and housing development. Completion of at least one-year post-graduate studies in architecture, construction, environmental engineering, energy sector or similar on the energy audit for thermo-modernisation purposes and building energy performance assessment is considered equivalent to completing the training and passing the examination. Additionally, provisions of Directive 2002/91/EC on the energy performance of building require considering and taking into account the feasibility of renewable energy sources for the purposes of heating or cooling or hot water supply in case of buildings with a total useful floor area over 1,000 m², at the stage of designing the building. This obligation has been imposed in the regulation of the Minister of Infrastructure of 3 July 2003 *on the detailed scope and form of the building design* (Journal of Laws No 120, item 1133, as amended).

Moreover, it should be noted that on 18 May 2010, a recast of the Directive on the energy performance of buildings was adopted, which is primarily aimed at:

- strengthening provision of the current Directive 2002/91/EC;
- more effective utilisation of the potential related to cost-effective activities, resulting in achieving significant energy savings in buildings;

- ensuring that since 2021, all new buildings are near zero energy buildings.

A near zero energy building shall be understood as a building with a very high energy performance. Near zero or very low amount of required energy should be obtained, to a large extent, from renewable sources, including from renewable sources located in or close to the building.

Additionally, in accordance with the recast directive, energy performance certificate can include additional information, such as a percentage share of energy from renewable sources in overall energy consumption.

b) Responsible Ministry(ies)/authority(ies)

In accordance with the Act of 4 September 1997 *on government administration sections* (Journal of Laws of 2007 No 65, item 437, as amended), the economy section includes, *inter alia*, the energy sector (Article 9(1) of the Act). Meanwhile, building affairs are a part of the building, spatial and housing development section.

Taking into account the aforementioned legal regulation, the minister in charge of economic affairs as well as the minister in charge of building affairs, spatial and housing development shall be considered the ministers responsible for increasing the share of energy from renewable sources in the building sector. Based on the so-called attribution regulation, the building, spatial and housing development section is currently the responsibility of the minister in charge of infrastructure.

Identifying the minister or authority competent with respect to specific affairs related to an increase in the share of energy from renewable sources in each case requires identifying the relevant legislation, for instance:

- with respect to financing thermo-modernisation projects, the minister in charge of building affairs, spatial and housing development is a minister supervising activities of Bank Gospodarstwa Krajowego with respect to the support provided;
- the minister in charge of economic affairs is a competent principal governmental administration authority with respect to energy policy matters;
- activities of the National Fund are supervised by the minister in charge of environmental affairs.

c) Revision of rules, if any, planned by...

The draft new regulation (*Act on energy from renewable sources*) provides for the introduction of relevant requirements for new and modernised buildings (including public buildings). The aforementioned Act is going to be passed in 2010.

d) Summary of the existing and planned measures at regional/local levels

Measures promoting the use of energy from renewable sources on the local level involve primarily support with respect to their financing. Currently, the principal measure of support on the local level involves the use of resources of voivodship funds for environmental protection and water management. In accordance with the *Environmental Act*, these resources are allocated for supporting the use of local renewable energy sources and the introduction of more environmentally friendly energy carriers.

Additionally, preferential loans granted by Bank Ochrony Środowiska, bearing the interest rate of 2%, is another instrument available for financing investments in RES. Resources for granting the loans come from voivodship funds for environmental protection and water management, as a result of which conditions for obtaining a loan vary by voivodship. In order

to obtain the loan, an investor is obliged to file a relevant application, which is assessed by the responsible voivodship fund. The lending period equals up to four years and the maximum investment implementation period – up to six months.

Another measure promoting and supporting renewable energy production is the Operational Programme: *Infrastructure and Environment*, which includes a number of activities aimed at supporting production of energy from RES, such as, *inter alia*:

- 9.4 *Production of energy from renewable sources*;
- 9.6 *Networks facilitating reception of energy from renewable sources*;
- 10.3 *Development of industry based on renewable energy sources*.

Small investments are financed based on 16 Regional Operational Programmes that determine, *inter alia*, types of projects which may apply for co-financing and the support level.

Additionally, the Rural Development Programme 2007-2013 may be identified as a measure partially supporting production of energy from RES, at local level. This document sets forth objectives, priorities and principles of supporting certain activities. The scope of financing covers, *inter alia*, production or distribution of energy from renewable sources, in particular wind, water, geothermal energy, sun, biogas or biomass. This scope includes investments costs, in particular purchase of materials and performance of construction and assembly work, and purchase of necessary equipment. Potential beneficiaries of this support include communities or bodies established by communities, and it can cover up to 75% of eligible costs, but not more than PLN 3,000,000 per community during the programme implementation period.

e) Are there any minimum levels for the use of renewable energy in building regulations and codes? In which geographical areas and what are these requirements? (Please summarise.) In particular, what measures have been built into these codes to ensure the share of renewable energy used in the building sector will increase? What are the future plans related to these requirements/measures?

In case of the Polish law system, the *Building Act*, as a legal act governing this area of the law, can be considered a building code.

However, the *Building Act* in force as well as other provisions on building matters (documents at the level of the act and secondary legislation) do not set forth a minimum level of the use of energy from renewable sources in the building sector.

The catalogue of measures included in the legislation pertaining to the building sector is described in point a) of this document. They include, primarily, measures provided for in the *Building Act* and the *Act on supporting thermo-modernisation and renovation work*.

The potential introduction of minimum levels of the use of energy from renewable sources in the building sector within the deadline complying with Directive 2009/28/EC will be considered as a part of work on the new *Act on energy from renewable sources*.

f) What is the projected increase of renewable energy use in buildings until 2020? (If possible differentiating between residential — ‘single-unit’ and ‘multiple unit’, commercial, public and industrial.) (To answer this question you may use a table below. Data could be given yearly, or for selected years. Both heating and cooling and electricity consumption from renewable energy sources should be included.)

In accordance with the trend identified, installations based on renewable energy used in residential buildings will be of principal importance. This energy will be produced, to a large

extent, from biomass, photovoltaic and solar panels installed at private houses. On the other hand, geothermal energy will be used mainly in public buildings. It is difficult to predict the policy of the owners and administrators of commercial and industrial real estates, which will be based on the future profitability analysis, which results in relatively lower forecasts for buildings of this type. It is forecasted that renewable energy supplied to the transmission grid (in particular electricity from co-firing and firing of biomass and from wind power plants) will have the same share in all types of buildings.

Table 6. Estimated share of renewable energy in the building sector

	2010	2015	2020
Residential	11%	14%	16%
Public	10%	13%	15%
Commercial and industrial	9%	12%	14%
TOTAL	10%	13%	15%

Source: Own work. The table structure and headings are consistent with Decision 2009/548/EC.

g) Have obligations for minimum levels of renewable energy in new and newly refurbished buildings been considered in national policy? If so, what are these levels? If not, how will the appropriateness of this policy option be explored by 2015?

The energy policy of Poland, in particular with respect to the promotion of renewable energy, has been defined by the document titled *Energy Policy of Poland until 2030* adopted by the Council of Ministers on 10 November 2009.

It should be emphasised that in the Polish legal system, there is no legislation setting forth the minimum level of renewable energy use in new and newly refurbished buildings. None of the aforementioned documents sets forth the minimum level of the use of energy from renewable sources in the building sector either. Taking into account the above, it is impossible to identify provisions at the level of the use of RES in the building sector.

The *Strategy for renewable energy development* sets only percentage targets for the share of energy from RES in the energy-fuel blend of the country at 7.5% in 2010 and 14% in 2020, in the structure of consumption of primary energy carriers (chapter 4 "Target"). Also, the *Energy Policy of Poland until 2030* provides only for an increase in the share of renewable energy sources in the final energy use, to 15% in 2020 (chapter 5 titled *Development of the use of renewable energy sources, including biofuels*).

Additionally, the analysis of the accuracy level of the use of renewable energy in new and newly refurbished buildings can be performed based on the *Development plan for the use of renewable energy sources*, which is going to be prepared on a basis of the document *Poland 2030 – Development challenges* in recommendations to the *Energy and climate safety* challenge.

h) Please describe plans for ensuring the exemplary role of public buildings at national, regional and local level by using renewable energy installations or becoming zero energy buildings from 2012 onwards? (Please take into account the requirements under the EPBD).

In order to ensure the exemplary role of a public building at national, regional and local level by using renewable energy installations or becoming a zero energy building, the energy conservation programme needs to be implemented. This means applying the following measures with respect to the building:

1. elimination of energy wastage;

2. raising the level of knowledge of administrators;
3. raising the awareness of persons using the building;
4. monitoring of the heat consumption level;
5. obtaining the energy certificate for the building;
6. verifying the power ordered for the building;
7. assessing potential application of the *Act on supporting thermo-modernisation and renovation work* and implementing thermo-modernisation investments;
8. comparison with the others – parameters and organisation.

Point 1 involves:

- identifying areas of energy wastage in buildings;
- identify opportunities for eliminating these areas – without investments;
- collect the information and opinions of the building users;
- liquidate redundant energy sources to the benefit of the increased use of RES.

In this case, it is of particular importance to pay attention to the application of renewable energy sources. This would allow not only for improving energy efficiency, but also for reducing emission of harmful substances. RES can be applied for the purposes of heating the premises, heating hot water and production of electricity for lighting and supplying domestic power receivers. Taking into account renewable energy sources directly related to a given building structure, in Polish conditions, the following can be utilised:

- solar energy – in passive and active heating systems, solutions related to daylight lighting and electrical installations with photovoltaic cells;
- biomass energy – in installations including boilers for firing wooden chips, pellets or straw;
- energy from the environment: aerothermal, geothermal and hydrothermal (the use of heat pumps);
- waste energy (including based on the application of heat pumps, recuperation of heat from ventilation systems, waste water and other).

As for point 2, explaining to the building administrator the fact that heat used for heating the building is the main element of energy consumption is of primary importance. Consumption of this energy can be limited by thermo-modernisation investments and use of renewable energy. The use of renewable energy should be considered in case of the modernisation of the heating system (change in the heating substation, changes to the heating system and the hot water system).

As a part of point 3, it is necessary to ensure that users of the building are provided with the knowledge of elements influencing the reduction of the energy consumption. The following elements should be emphasised:

- correct ventilation;
- building thermal insulation;
- radiator automatic control devices and automatic weather controls;
- elimination of heating of usable premises (or its limitation);

- metering method.

Implementation of point 4 will include various forms of monitoring. They should include economic monitoring (total costs of energy related to operation of the building: square meters, lump-sum), technical monitoring (amount of energy used limited to the power of 29 W/m³), and the monitoring of the use of the power ordered (% use of the power in a given month vs. the power ordered).

The energy certificate (point 5) is a document required by the law, describing energy performance of the building.

Meanwhile, the power ordered (point 6) would be useful to identify effects of activities undertaken in order to reduce energy consumption.

Thermo-modernisation is currently one of the basic tools ensuring the reduction of the energy used. It should be followed by the increase in the use of renewable energy sources, satisfying energy needs of the building. Such sources include solar energy (panels installed usually on the roofs of the buildings), biomass and geothermal energy (mainly at Poland Lowlands).

All the aforementioned activities should move the building closer to the passive building category. Passive building is a building with extremely low energy needed for heating (consumption of energy for heating, hot water supply and supply of electrical equipment) when compared to other categories of buildings. Additionally, a passive building offers thermal comfort ensured by passive heat sources (users, electrical equipment, "solar" heat, heat recovered from the ventilation system). Air used to ventilate the building is also additionally heated in passive buildings. As a result of undertaking the aforementioned activities, it will be possible to ensure the exemplary role of public buildings at national, regional and local level.

The issue of the exemplary role of public buildings in the area of using renewable energy sources or transforming them into zero energy buildings has been taken into account in the bill *on energy efficiency*. The bill assumes that public sector units will play the exemplary role in the field of economical energy management. This will involve, *inter alia*, reduction of energy consumption in public building, as well as notifying the society (individuals and business entities) of activities undertaken as a part of this exemplary role as well as results of activities undertaken. The process of notifying the society will be based on websites, information boards and other communication media.

i) How are energy efficient renewable energy technologies in buildings promoted?

The promotion of energy efficient renewable energy technologies in buildings may be considered in two dimensions. The first one involves financial incentives, the possibility to reward the users of efficient energy sources or financial support to the ones, who plan to implement energy efficient technologies. The second dimension involves the application of energy labels, energy signs and other available relevant certificates or national or Community standards, wherever it is possible, as the encouragement to use such systems or equipment.

With respect to the first dimension, it should be noted that in long term, the application of energy efficient renewable energy technologies in buildings will be rewarded by the opportunity to sell savings in form of so-called white certificates. Currently, certificates of origin – so-called green certificates function as a part of the system for the promotion of RES. Every producer of so-called green energy, meeting relevant formal and legal requirements, is entitled to green certificates that have a certain value and can be traded on the Commodity Energy Exchange (*Towarowa Giełda Energii S.A.*). This is a part of investment incentives for potential producers of energy from RES. Certificates of origin are interesting to energy

companies that did not produce sufficient amounts of renewable energy on their own, but in accordance with the law have to demonstrate its proper share in electricity sold to end users. Energy companies providing services on the territory of Poland can purchase a required number of certificates of origin on the exchange or pay so-called substitution fee. Market mechanisms ensure that the price of certificates of origin is lower than the substitution fee, which ensures marketability of these certificates. Additionally, just the option to obtain co-financing for investments in renewable energy sources is a kind of a reward. Potential sources include:

- National Fund for Environmental Protection and Water Management (*Narodowy Fundusz Ochrony •rodowiska i Gospodarki Wodnej, NFO•iGW*);
- Voivodship Funds for Environmental Protection and Water Management (*Wojewódzkie Fundusze Ochrony •rodowiska i Gospodarki Wodnej, WFO•iGW*):
 - credits (lending period up to 15 years),
 - loans (*inter alia*, in cooperation with Bank Ochrony •rodowiska, bearing the interest rate of about 2%, lending period up to four years and maximum investment implementation period – up to six months);
 - co-financing interest on loans and credits,
 - grants;
- EU funds – Operational Programme: Infrastructure and Environment, which includes a number of activities aimed at supporting production of energy from RES, such as, *inter alia*:
 - 9.4 *Production of energy from renewable sources*,
 - 9.6 *Networks facilitating reception of energy from renewable sources*,
 - 10.3 *Development of industry based on renewable energy sources*;
- European Economic Area EEA (Norwegian Financial Mechanism):
 - grants for institutions from the public and private sector and non-governmental institutions,
 - minimum co-financing value – EUR 250 thousand,
 - co-financing up to 85% (project financed from the state budget),
 - co-financing up to 60% (project financed in cooperation with the private sector);
- 16 Regional Operational Programmes:
 - investments below PLN 20 million.

Additionally, the Rural Development Programme 2007-2013 may be identified as a measure partially supporting production of electricity from RES, at local level. Communities or bodies established by communities can apply for co-financing within the Programme. The maximum value of a project equals PLN 3 million per community during the programme implementation period, while the co-financing level cannot exceed 75% of eligible costs.

In order to benefit from basic support schemes, i.e. funds allocated by the National Fund for Environmental Protection and Water Management and voivodship funds for environmental protection and water management, in each case a given technology (installation or equipment) has to meet technical and quality standards set forth in the specification of a given support scheme.

As a part of the second dimension, the Polish legislator has introduced building energy performance certificates. The energy performance certificate is a document issued by an authorised expert, including basic data and ratios describing the building thermal protection and consumption of energy by the building, as well as reflecting the assessment of the level of the building energy performance based on the scale adopted. Recommendations pertaining to

potential improvement of the energy performance level, i.e. guidelines for potential thermo-modernisation, should be an important element of the certificate.

The obligation to use energy certificates has been imposed by the Act of 19 September 2007 *on amendments to the Energy Act* that came into force as at 1 January 2009. It requires energy certificates for:

- a building commissioned into use;
- building, premises in the building, residential premises or a part of the building constituting an independent technical and functional whole in case of agreements on the title transfer, sale of the title to the cooperative flat, lease.

The energy performance certificate, presenting the amount of energy required to meet various needs related to using the building in kWh/m²/year, remains valid for 10 years.

Legislation imposing the obligation to have the energy certificate does not apply to buildings:

- protected based on provisions on protection of monuments and guardianship of monuments;
- used as objects for religious worship and activities;
- designated for use for not more than two years;
- non-residential used for agricultural purposes;
- industrial and utility ones with the demand for power not exceeding 50 kWh/m²/year;
- residential, designated for use for not more than four months a year;
- standalone ones with the usable floor area below 50 m².

Additionally, it should be noted that energy performance certificates for buildings with the floor area over 1,000 m², used by public administration authorities or for the purposes of providing services to a high number of persons, such as:

- railway;
- airports;
- museums;
- exhibition halls;

have to be placed in a place clearly visible to the public. This is also aimed at popularising energy efficient methods. Energy performance certificates are calculated based on the methodology set forth in the regulation of the Minister of Infrastructure of 6 November 2008 *on the methodology of calculation of the energy performance of building and residential premises or a part of the building constituting an independent technical and functional whole and the method of drawing up and template energy performance certificates* (Journal of Laws No 201, item 1240).

Calculations result in the EP index, i.e. calculation value expressed in kWh/m²/year, reflecting estimated primary energy consumption for the assumed way of use and standard boundary conditions (climate conditions, defined method of operations, standard indoor temperature and internal heat gains, etc.).

This value is presented in a line scale and compared with the boundary value determined based on technical and building legislation.

Energy efficiency classes introduced by the aforementioned legislation are presented below.

Klasa efektywności energetycznej	Zużycie energii	Ocena
A	<55%	Niskie zużycie energii
B	55-75%	
C	75-90%	
D	90-100%	Średnie zużycie energii
E	100-110%	
F	110-125%	Wysokie zużycie energii
G	>125%	

Klasa efektywności energetycznej – Energy performance class

Zużycie energii – Energy consumption

Ocena – Assessment

Niskie zużycie energii – Low energy consumption

•rednie zużycie energii – Medium energy consumption

Wysokie zużycie energii – High energy consumption

Additionally, it can be noted that the *Building Act* provides for only one simplified and specific procedure for small-scale installations using renewable energy technology, pertaining to putting in place standalone solar panels, which is exempt from the requirement to obtain a building permit or to submit a notification to the responsible authority.

In general, in case of the Polish law system, the *Building Act* can be considered a building code. However, the *Building Act* as well as other legislation on building matters (documents at the level of the act and secondary legislation) do not set forth a minimum level of the use of energy from renewable sources in the building sector.

4.2.4 Information provisions (Articles 14(1), 14(2) and 14(4) of Directive 2009/28/EC)

a) Reference to existing national and or regional legislation (if any) concerning information requirements according to Article 14 of Directive 2009/28/EC

Taking into account information on support measures made available to all relevant actors, such as consumers, builders, installers, architects, and suppliers of heating, cooling and electricity equipment and systems and of vehicles compatible with the use of energy from renewable sources (Article 14(1) of Directive 2009/28/EC), there are no relevant legal regulations that explicitly refer to a separate information requirement within the aforementioned scope.

As for the information on the net benefits, cost and energy efficiency of equipment and systems for the use of heating, cooling and electricity from renewable energy sources (Article 14(2) of Directive 2009/28/EC) there are no separate (except for harmonised European standards) information procedures in this respect.

Regarding the information on certification schemes or equivalent qualification schemes for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps (Article 14(4) of Directive 2009/28/EC) there is no relevant legislation that would explicitly mention a separate information requirements in this respect.

Work on legislation implementing Directive 2009/28/EC is currently in progress. Suitable provisions will be included in the *Act on energy from renewable sources* that is going to be adopted in 2011.

b) Responsible body/(ies) for dissemination of information at national/regional/local levels

In the Polish legal system, there are no provisions that would explicitly identify institutions responsible for dissemination of information at national/regional/local levels. Work on legislation implementing Directive 2009/28/EC is currently in progress. Suitable provisions will be included in the *Act on energy from renewable sources* that is going to be adopted in 2011.

c) Summary of the existing and planned measures at regional/local levels (where relevant)

Relevant measures aimed at raising social awareness on energy from renewable sources, promotion of installations producing energy from RES and notifying of principles of operations and co-financing production of such energy are described in point g).

d) Please indicate how information is made available on supporting measures for using renewable energy sources in electricity, heating and cooling and in transport to all relevant actors (consumers, builders, installers, architects, suppliers of relevant equipment and vehicles). Who is responsible for the adequacy and the publishing of this information? Are there specific information resources for the different target groups, such as end consumers, builders, property managers, property agents, installers, architects, farmers, suppliers of equipment using renewable energy sources, public administration? Are there information campaigns or permanent information centres in the present, or planned in the future?

Information requirements and information campaigns on supporting measures for using renewable energy sources in electricity, heating and cooling and in transport targeted at relevant actors are listed and described in point g) of this chapter and in chapter 2.4.3, points a) and d). The entity arranging a given information campaign or providing a given support measure (e.g. the National Fund for Environmental Protection and Water Management) is responsible for the adequacy and the publishing of the aforementioned information.

There are no specific information resources or information centres coordinated on the national level, for the different target groups, such as end consumers, builders, property managers, property agents, installers, architects, farmers, suppliers of equipment using renewable energy sources or public administration.

The National Fund for Environmental Protection and Water Management and voivodship funds are a main source of information on supporting measures for using renewable energy sources in electricity, heating and cooling. Resources from the aforementioned funds are allocated, *inter alia*, for ecological education, promotion of pro-ecological activities, supporting the systems for data gathering and processing related to the access to information on the environment, as well as co-financing of research, popularisation of their results and promotion of technical progress in the field of environmental protection. Additionally, funds

for environmental protection and water management are required to announce programmes of support to production of energy from renewable sources and lists of technologies subject to co-financing. Such information can be obtained at registered offices of funds and on their websites. It should be emphasised that the information made available by funds is addressed to all parties interested in putting in place installations based on RES, without separating any professional groups.

e) Who is responsible for publishing information on the net benefits, costs and energy efficiency of equipment and systems using renewable energy sources for heating, cooling and electricity?

There is no public institution that would be responsible for publishing information on the net benefits, costs and energy efficiency of equipment and systems using renewable energy sources for heating, cooling and electricity. Work on legislation implementing Directive 2009/28/EC is currently in progress. Suitable provisions will be included in the *Act on energy from renewable sources* that is going to be adopted in 2011.

f) How is guidance for planners and architects provided to help them to properly consider the optimal combination of renewable energy sources, high efficiency technologies and district heating and cooling when planning, designing, building and renovating industrial or residential areas? Who is responsible for that?

At the level of national legal acts there are no separate legal measures or information resources targeted at planners and architects to help them to properly consider the optimal combination of renewable energy sources, high efficiency technologies and district heating and cooling when planning, designing, building and renovating industrial or residential areas. In particular, provisions of the *Building Act* do not provide for such legal instruments. Requirements with respect to providing the aforementioned guidance have not been imposed on the professional self-governments of architects, civil engineer and town-planners either (Act of 15 December 2000 *on professional self-governments of architects, civil engineer and town-planners* (Journal of Laws of 2001 No 5, item 42, as amended)) or in statutes of the Chamber of Architects, Chamber of Town-Planners or Chamber of Civil Engineer. Activities within the aforementioned scope will be undertaken as a part of work on legislation implementing Directive 2009/28/EC, in agreement with the minister in charge of infrastructure.

g) Please describe the existing and planned information, awareness raising and training programmes for citizens on the benefits and practicalities of developing and using energy from renewable sources. What is the role of regional and local actors in the designing and managing these programmes?

In Poland, there are several campaigns conducted in order to promote responsible and efficient use of electricity. One of the campaign for the rational use of electricity is, e.g. *RWE Conscious Energy* (*•wiadoma Energia RWE*) campaign. The campaign is addressed mainly to households and is promoted in press, on billboards and on mobile media – trams.

In December 2001, during the international conference *Renewable Energy Sources on the Verge of XXI Century*, held in Warsaw, while discussing opportunities and threats related to implementation of energy from renewable sources, special attention was paid, *inter alia*, to social issues. The need for recognising the development of RES technologies as an element of pro-innovation policy of the state and a need for supporting research and development programmes and information and educational campaigns on RES were emphasised.

Information and promotion campaigns on renewable energy sources can be divided into two groups: the campaigns initiated by central administration and local government units, and

campaigns run at the initiative of independent associations and foundations supporting green technologies.

Example 1. Transition Facility 2006/018-180.02.04: *Design and dissemination of regulatory tools and procedures applied with regard to the sector of renewable energy sources and electricity produced in cogeneration*

This project included – taking into account objectives of the energy policy related to increasing the share of electricity produced from environmentally friendly sources and pursuing the principle of building the trust of citizens in state authorities – arranging, *inter alia*, three workshop sessions and three seminars on the procedure of issuing licences for business activities involving production of electricity and principles for functioning of the system of certificates of origin for energy produced from renewable sources and in cogeneration in Poland. The purpose of workshops and seminars was to provide all interested parties that operate or intend to operate on the market of electricity (i.e. future and current investors) with knowledge of the principles of carrying out licensed business activities.

The project involved designing and placing on website of the Energy Regulatory Office an interactive map of Poland featuring installations generating electricity from renewable sources in order to provide better access to “statistical” knowledge on renewable energy sources situated in the territory of Poland. The map provides quick access to data regarding the type and capacity of sources in the area, in the breakdown according to voivodships and poviats. The map was designed with the option to produce summary tables specifying capacity installed in licensed RES installations, among other things.

Example 2. Information campaign of the Ministry of the Environment on the use of energy from thermal waters

In May 2010, the Ministry of the Environment published on its website the information on the potential use of energy from thermal waters.

The information package has included, *inter alia*, the information on legislation on thermal waters, possibility to obtain co-financing for geothermal projects, documents on geothermal energy, links to other websites and related materials.

Example 3. *Time to save energy (Czas na oszcz•dzenie energii)* campaign

Information activities have included the preparation of the strategy to promote sustainable development of the energy sector for Opolskie voivodship. *Time to save energy (Czas na oszcz•dzenie energii)* campaign has been planned with the participation of regional TV, radio, press and Internet centres. The campaign assumes:

- including building fairs in the schedule of fairs promoting renewable energy and energy-efficient buildings and equipment;
- exchange of good practices – seminars for entrepreneurs from the industry, trade and public administration services sector;
- competition for children and young people;
- competition for developers;
- competition for municipal property administrators and housing cooperatives;
- regular assessment of administrator of public facilities of subsidiaries of the City Council.

Example 4. Polish-Danish Branding Energy campaign

The cooperation between Poland and Denmark with respect to the promotion of renewable energy is very close. The Danish Energy Agency and the Polish Ministry of the Environment support the Branding Energy campaign on a regular basis. The campaign, planned for the

years 2008/2009, putting special emphasis on wind energy, was carried out for the sixth time and was a direct continuation of previous editions. The campaign is a partner of the *Partnership for Climate* programme of the Ministry of the Environment. At the same time, the campaign partners include the Polish Ministry of Economy, Danish Energy Authority and six Danish companies having advanced technologies and know-how.

Example 5. *European Funds for Renewable Energies (Fundusze Europejskie na Energetykę Odnawialną)* – information and promotion campaign project

Many communities and poviats promote *European Funds for Renewable Energies – information and promotion campaign* project on their websites. The project is carried out with the support of EU funds granted as a part of the *Competition for subsidies for information and promotion measures on European funds (Konkurs dotacji na prowadzenie działalności informacyjno-promocyjnej dotyczącej funduszy europejskich)*, arranged by the Ministry of Regional Development.

The main objective of the project is to notify potential beneficiaries of the possibility to obtain co-financing for investments in the sector of renewable energy sources (RES) from European resources, as well as to encourage potential investors to use European funds in implementation of such investments, and to notify on binding procedures related to drawing up the application for co-financing and implementation of the RES investment project. The project includes, *inter alia*, the guide *European Funds for Renewable Energies* and the website www.funduszeeuropejskie.gov.pl.

Example 6. *Energy from the sun – saving idea (Energia ze Słońca – pomysły na oszczędność)* Solar Campaign

Another project is *Energy from the sun – saving idea* Solar Campaign, co-financed from resources of the Voivodship Fund for Environmental Protection and Water Management in Rzeszów. The Solar Campaign was carried out on the territory of Podkarpackie voivodship, from 1 September 2009 until the end of November 2009. The project was organised by Podkarpacka Agencja Energetyczna Sp. z o.o. with its registered office in Rzeszów. The purpose of the programme educational part is to present basic matters related to solar energy to the participants, to identify electricity and heat saving opportunities at home and to popularise solutions based on solar energy.

The seminar and wide information in media are aimed at promoting environmentally friendly behaviours based on the use of solar energy. The long-term objective of the campaign targeted at all citizens of Podkarpacie is to achieve a positive ecological effect resulting from a growth in the number of solar installations in Podkarpackie voivodship.

The campaign will also be focused on educating the media of the main information broadcaster. The special information package to be used in disseminating the information and knowledge on this field will be prepared for them.

Example 7. *The Countdown (Wielkie Odliczanie)* campaign

In March 2008, during the *Wind Energy Market in Poland* conference of the Polish Wind Energy Association (*Polskie Stowarzyszenie Energetyki Wiatrowej, PSEW*) in Ożarów Mazowiecki, *The Countdown* social campaign was launched, the purpose of which is to introduce RES matters to the society. The dedicated website also came up online at the moment of campaign start.

As a result of various activities within *The Countdown* campaign, the Polish Wind Energy would like to:

- increase the interest and awareness of the society concerning RES;
- convince the society to ecological and socio-economic benefits stemming from RES use and notify on opportunities related to the development of alternative energy sources;
- present the dynamics of the development of renewable energy in Poland;
- influence the decision makers by presenting the degree of the achievement of the target related to renewable energy production in order to undertake activities for the development of RES in Poland.

Example 8. *Waste to the dump, Christmas trees to the forest (•mieci do •mietnika, choinki do lasu) campaign*

On 7 January 2009, the first *Waste to the dump, Christmas trees to the forest* campaign was launched in Poland. The purpose of the campaign was to popularise Christmas tree collection after Christmas and to raise the society awareness on renewable energy sources (RES). The objective of the campaign was also to convince Polish people that renewable energy sources are human- and environmentally friendly. The campaign was organised by the producer of wood and agro biomass Poli Trade Polska Sp. z o.o. and MPGK Katowice.

Example 9. *Young Polish Energy (Młoda Polska Energia) campaign*

This activity included implementation of *Young Polish Energy* campaign popularising electricity efficiency and Renewable Energy Sources. The campaign is carried out, *inter alia*, in Warsaw and in Lublin.

The campaign is run by non-governmental organisations on their websites.

Example 10. Information campaign on the justification and effectiveness of the use of more energy efficient products

In Q4 2007, the Ministry of Economy launched the information campaign for the rational energy use. The scope of the campaign includes the presentation of issues related to principles and cost-effectiveness of the application of energy-saving solutions and to introduce the issues, reflected in activities of the Ministry of Economy for increased energy efficiency of the Polish economy and resulting from the sustainable development policy pursued by the European Union, to the Polish society.

As a part of the campaign run in 2007, the following materials were designed and distributed on the territory of the whole Poland:

- information brochures: *User manual (Poradnik użytkownika)* and *Guide for manufacturers, distributors and sellers of white goods and consumer electronics (Poradnik dla wytwórców, dystrybutorów i sprzedawców urządzeń AGD i RTV)*;
- package promoting rational use of energy.

Additionally, the logo of energy efficiency and the slogan promoting the *Time to save energy (Czas na oszczędzanie energii)* information campaign were designed.

In 2008, the *User manual* was updated and additional 1 million copies were printed to be distributed to end users through entities issuing invoices for electricity transmission and distribution services. Additionally, designing and printing 200 thousand copies of the information brochure for pre-school children and their parents was ordered, aimed at promoting issues related to the rational energy use.

In 2008, the public procurement procedure was carried out with respect to purchase of energy efficient fluorescent lamps for the purposes of the information campaign for the rational

energy use. As a result of the *Time to save energy* (*Czas na oszczędzanie energii*) campaign, communities in Poland received 52,322 energy efficient fluorescent lamps. Remaining fluorescent lamps (i.e. 2,178 pieces) were distributed to editorial offices, children's homes and public benefit organisations as a part of activities promoting the use of energy efficient products and pro-energy saving behaviours. The purpose of the campaign was to make the society aware of benefits resulting from replacement of a standard light bulb with an energy efficient lamp.

4.2.5 Certification of installers (Article 14(3) of Directive 2009/28/EC)

a) Reference to existing national and/or regional legislation (if any) concerning certification or equivalent qualification schemes for installers according to Article 14(3) of the Directive 2009/28/EC

In the Polish legal system there are no separate certification schemes for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps consistent with Article 14(3) of Directive 2009/28/EC. However, the procedure introduced by the regulation of the Minister of Economy, Labour and Social Policy of 28 April 2003 *on the detailed principles of verifying the qualifications held by the persons operating the equipment, installations and networks* (Journal of Laws No 89, item 828, as amended) can be considered an equivalent qualification scheme.

The aforementioned regulation was issued based on the authorisation included in Article 54(6) of the *Energy Act*, which imposes on persons operating the equipment, installations and networks specified in secondary legislation the requirement to have qualifications confirmed with a certificate issued by qualification commissions. The term operation within the meaning of the regulation means not only service, maintenance or repairs of equipment, but also assembly or installation.

It should be emphasised that the aforementioned procedure applies to all energy equipment, installations and networks producing, processing, transmitting and using electricity, heat and gaseous fuels, including energy and heat from renewable sources. As the Polish legal system does not provide for a separate certification scheme for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps, these installers are covered by the procedure set forth by the regulation, subject to satisfying the grounds set therein.

New legislation on the certification and qualification schemes is going to include relevant procedures consistent with Directive 2009/28/EC. This legislation will promote installations satisfying ecological requirements. Entities, institutions and associations providing training to and testing candidates for certified installers can constitute a foundation of the planned system.

b) Responsible body/(ies) for setting up and authorising certification/qualification schemes by 2012 for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps

General conditions for granting professional qualifications to persons operating equipment, installations and networks are set forth in Article 54 of the *Energy Act*. In order to set up a certification/qualification scheme for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps

within existing legislation, it would be necessary to introduce legislation at the level of an act as well as secondary legislation.

One of potential methods to introduce in the legal system a separate certification/qualification scheme only for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps would be to introduce relevant amendments to Article 54 of the *Energy Act* and amendments to the regulation *on the detailed principles of verifying the qualifications held by the persons operating the equipment, installations and networks*. Granting separate authorisation based on an act to issue a secondary legislation on detailed principles of verifying the qualifications held by installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps would also constitute a proper form of legal frameworks for a certification/qualification scheme set forth in Article 14(3) of Directive 2009/28/EC.

In the Polish legal system, the introduction of a separate professional certification/qualification scheme has to be addressed in the legal document at the level of an act. Consequently, its introduction would require initiating and completing a legislative procedure. In this respect, the Council of Ministers and the Parliament are responsible bodies for setting up and authorising certification/qualification schemes for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps.

c) Are such certification schemes/qualifications already in place? If so, please, describe

In the current legal status there is no separate certification/qualification scheme for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. These installers are subject to the obligatory confirmation of professional qualifications based on Article 54 of the *Energy Act*, which applies to all persons operating networks, equipment and installations, and the regulation *on the detailed principles of verifying the qualifications held by the persons operating the equipment, installations and networks*.

In accordance with Article 54 of the *Energy Act*, professional qualifications are confirmed with a qualification certificate issued by qualification commissions appointed for a period of 5 years, in principle, by the President of the Energy Regulatory Office of Poland. Meeting the qualification requirements shall be verified every 5 years.

The detailed principles of verifying the professional qualifications are set forth by the aforementioned regulation of the Minister of Economy, Labour and Social Policy. Users operating small-scale equipment or installations (electrical equipment with the voltage not exceeding 1 kV and rated power not exceeding 20 kW and heat equipment or installations with the installed power not exceeding 50 kW) are exempt from the obligation to verify qualification for operation of equipment and installations.

In accordance with § 3 of the regulation, types of equipment, installations and networks, the operations of which requires holding the qualifications, are listed in appendix no 1 to the regulation. The appendix lists 34 types of energy equipment, installations and networks producing, processing, transmitting and using electricity, heat and gaseous fuels. The professional qualifications are verified by an examination taken at the request of a given person or at the request of this person's employer by a qualification commission. Such request is subject to a fee in accordance with Article 54(4) of the *Energy Act*.

The examination is administered by the examination team comprising at least three persons appointed by the chairman of the qualification commission. It is an oral examination and its

result is decided by the members of the team by a majority of votes. In case of equal number of votes, the chairman of the team shall have a casting vote. The examination is summarised in a protocol. In case of a negative result, the interested person can repeat the examination, subject to repeated application filing and the fee payment.

Based on a positive result of the examination, the qualification commission issues the qualification certificate confirming obtaining professional qualifications, within 14 days of the examination. Template qualification certificate constitutes appendix no 2 to the regulation.

However, it is necessary to take into account the fact that the Polish Corporation of the Sanitary, Heating, Gas and Air-conditioning Technologies (*Polska Korporacja Techniki Sanitarnej, Grzewczej, Gazowej i Klimatyzacji*) has undertaken to implement the certification/qualification scheme for RES installers in Poland, and in order to meet requirements of the Directive and satisfy the needs of the profession, joined SIRET programme together with foreign partners – installer guilds from Germany (ZVSHK) and Bulgaria (NIS). SIRET programme, co-financed from Leonardo da Vinci *Lifelong Learning Programme*, is aimed at the development and testing the programme of training courses for installers that would meet requirements included in annex IV to the Directive.

As a part of the programme, at the end of October and beginning of November 2009, a pilot session for installers was held, designed based on the training programme for *specialists in renewable energies and technologies* for undertaking specialising in sanitary, heating and air conditioning technique, developed by an international team. 24 people participated in the training session: fitters and technicians specialising in installations. The session, which lasted for 100 hours in total, in a theoretical part, enabled the participants to get understanding of the issue of renewable energy sources based on biomass, solar heat energy, photovoltaics, heat pumps and cogeneration in basic and structural modules (specialisation), which was supplemented with a practical part including the course of assembly and adjustment of operating equipment. The basic module was completed by a written examination, while the structural module (specialisations) with written and oral examinations.

After passing the examinations, the participants receive the certificates of *Specialist in renewable energies and technologies for undertaking specialising in sanitary, heating and air conditioning technique*. In addition to the basic details of a participant, the certificate contains a detailed description of the basic and structural modules (specialisations selected by the participant). The certificate remains valid for 5 years from the date of its issuing and is authorised by the professional self-government organisation, i.e. by the Polish Corporation of the Sanitary, Heating, Gas and Air-conditioning Technologies.

The first pilot session has been just a beginning of long-term activities of the Corporation aimed at professional and adequate preparation and certification of installers, who are going to be active in the field of renewable energy sources in the next years. For 2010, next sessions are planned, during which experiences from the pilot session will be taken into account, and which are going to be supplemented with new models of the training process. The Corporation plans obtaining financial resources for subsequent training sessions from the National Fund for Environmental Protection and Water Management.

In accordance with recommendations of the Directive, the certification of installers is carried out based on accredited training programmes or by an accredited training organisation. The programme or the training organisation is accredited by Member States or administration bodies appointed by Member States. Currently, the Corporation is applying for the accreditation of the training programme tested in the pilot session. The accreditation of the programme is expected in 2010 and training sessions planned for that year will be carried out

in accordance with the accredited programme. The Polish Accreditation Centre is an authorised accreditation body in Poland.

As a result of adopting assumptions of Directive 2009/28/EC, an increasing number of Member States have joined in activities related to training of specialists in renewable energy sources. Installer guilds from Denmark and Slovenia expressed their interest in cooperation on the development of the training programme implemented within SIRET programme.

d) Is information on these schemes publicly available? Are lists of certified or qualified installers published? If so, where? Are other schemes accepted as equivalent to the national/regional scheme?

Current information on legislative changes and initiatives related to certification of installers are announced in the Web by professional organisations acting in the field of renewable energy. In the professional press, i.e. installation profession monthly *Polski Instalator (Polish Installer)*, in this year's October and November editions, two articles prepared by the Polish Corporation of the Sanitary, Heating, Gas and Air-conditioning Technologies were published, on training sessions on RES for installers, within SIRET Programme.

The list of certified installers – participants of the pilot session within SIRET programme – will be announced on the website of the Polish Corporation of the Sanitary, Heating, Gas and Air-conditioning Technologies at the address www.sggik.pl.

Currently, except for the one implemented by the Polish Corporation of the Sanitary, Heating, Gas and Air-conditioning Technologies, there are no other qualification schemes for certified installers within the meaning of Directive 2009/28/EC.

Information on professional qualification schemes related to operation of equipment, installations and networks is made publicly available. Information on the access to the profession, training and examination is made available primarily on websites of professional organisations, such as, e.g. Association of Polish Power Engineers (*Stowarzyszenie Energetyków Polskich*).

Professional authorisations granted based on qualification schemes of Member States of the European Union or member states of the European Free Trade Association (EFTA) – parties to the agreement on the European Economic Area – have been considered equivalent to national qualification certificates. However, such qualifications are considered equivalent provided that persons being citizens of the aforementioned states obtain qualifications required for operating equipment, installations and networks, which are confirmed in accordance with the legislation on the principles of recognition of qualifications to practice regulated professions acquired in Member States of the European Union.

e) Summary of the existing and planned measures at regional/local levels (where relevant)

In the Polish legal system, the introduction of a regulated profession (which undoubtedly is the profession of an installer of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps) can be regulated only based on an act, which would cover all levels of public administration. Work on legislation implementing Directive 2009/28/EC is currently in progress. Suitable provisions will be included in the Act *on energy from renewable sources* that is going to be adopted in 2011.

4.2.6 Electricity infrastructure development (Article 16(3) and Article 16(3) to (6) of Directive 2009/28/EC)

a) Reference to existing national legislation concerning requirements related to the energy grids (Article 16)

National legislation on the requirements for energy grids has a hierarchical structure and includes the following legislation prioritised below from the most fundamental one to the legislation clarifying provisions of higher level documents. These are:

1. *Energy Act* (Journal of Laws of 2006 No 89, item 625, as amended);
2. secondary legislation issued by the Minister of Economy to the *Energy Act*. They include, in particular: regulation of 4 May 2007 *on detailed conditions for the electricity system functioning* (Journal of Laws No 93, item 623, as amended) and regulation of 2 July 2007 *on detailed principles for defining and calculating tariffs and principles for settlements in electric energy trading* (Journal of Laws No 128, item 895, as amended);
3. licences for electricity transmission or distribution, granted by the President of the Energy Regulatory Office of Poland to operators of energy grids. They set forth the operators' duties with respect to the development and maintenance of energy grids;
4. Operating and Maintenance Instructions of the Transmission and Distribution Grids drawn up by the energy grid operators based on the aforementioned legislation. The President of the Energy Regulatory Office of Poland approves the whole instruction, in particular requirements pertaining to connection to and use of energy grids. The instructions set forth detailed requirements with respect to connection of producers and end users, and ensuring secure cooperation of devices connected with the operator's energy grid. They are published on websites of the operators and made available in their registered offices.

b) How is it ensured that transmission and distribution grids will be developed with a view to integrating the targeted amount of renewable electricity while maintaining the secure operation of the electricity system? How is this requirement included in the transmission and distribution operators' periodical network planning?

In accordance with the *Energy Act*, the development of transmission and distribution grids with a view to integrating the targeted amount of renewable electricity while maintaining the secure operation of the electricity system is the responsibility of energy companies responsible for energy transmission or distribution. These companies are appointed by the President of the Energy Regulatory Office of Poland as operators of energy systems in the area of the grid based on which their business activities are carried out in accordance with the transmission or distribution licence granted by the President of the Energy Regulatory Office of Poland. The President of the Energy Regulatory Office of Poland appoints the operators at the request of the grid owners.

These companies are obliged to prepare the development plans in regard to meeting the current and the future demand for energy in the area of their activities. The development plans take into account local special development plans or directions of the development of a community set forth in the study of conditions and directions of spatial development of the community. They cover a period not less than three years and include, in particular, projects involving modernisation, extension or construction of grid, as well as targeting potential new sources of gaseous fuels, electricity or heat, including renewable sources. The plans also include projects involving modernisation, extension or construction of connections to energy systems of other countries. These plans present the expected investment financing method,

expected revenues necessary for executing the plans and expected investment implementation schedule. In accordance with the *Energy Act*, draft plans are agreed with the President of the Energy Regulatory Office of Poland, as they influence the level and calculation of transmission and distribution tariffs, which allow for obtaining financial resources for the development of transmission and distribution grids. Development plans should ensure minimising outlays and costs incurred by energy companies. Outlays and costs in particular years should not result in an excessive increase in prices and rates of tariff fees for electricity, while ensuring continuity, reliability and quality of supply.

While appreciating the need for the development of grid infrastructure for the purposes of electricity transmission, including energy from RES, in Poland there is advanced legislative work in progress aimed at facilitating the extension of the grid as necessary by operators of energy systems. New legislation will intensify the development of the infrastructure, which will improve the access to the system also for distributed RES installations.

Legislation facilitating the access for RES producers in accordance with provisions of Directive 2009/28/EC is also planned.

c) What will be the role of intelligent networks, information technology tools and storage facilities? How will their development be ensured?

Recently, special attention is paid to the development of intelligent networks and related IT tools. Work on adjusting IT systems to challenges created by "*intelligent networks*" has been started by some operators of distribution grids. PSE Operator S.A. also appointed its own team to prepare the concept and assumptions for the development of "*intelligent networks*."

On 3 June 2009, the Energy Regulatory Office of Poland, Polish Consumer Federation (*Federacja Konsumentów*), Association of Polish Consumers (*Stowarzyszenie Konsumentów Polskich*), Polish National Energy Conservation Agency (*Krajowa Agencja Poszanowania Energii*) and the Forum of Electricity and Gas Recipients (*Forum Odbiorców Energii Elektrycznej i Gazu*) signed the *Declaration concerning the introduction of smart metering into the Polish energy system (Deklaracja w sprawie wprowadzenia inteligentnego opomiarowania do polskiego systemu elektroenergetycznego)*. Signatories of the declaration, representing institutions and organisations protecting interests of consumers and users of energy, have expressed their explicit support for the general introduction of smart metering technologies into the Polish energy system, while emphasising benefits for all market participants stemming from implementation of solutions based on advanced technologies. Signatories of the declaration have undertaken to monitor implementation of the smart metering system in order to ensure maximum benefits for energy users, and to implement any possible measures supporting interests of users. Signatories also have emphasised a need for distributing the costs of the implementation of the system in a way generating benefits to all electricity market participants. In accordance with their recommendation, this system should be ultimately used in the same way by the gaseous fuel, heat and water sectors. At the same time, organisations – signatories of the declaration – have called all institutions, organisations and undertaking, especially the ones related to the Polish electricity sector, to effectively support and actively popularise the idea of this solution, as well as its implementation. They have emphasised that the declaration is open, while encouraging interested parties to cooperate for the effective implementation of qualitative changes in the Polish energy system.

General installation of "*smart*" meters is expected to enable sellers to introduce price offers adjusted to the needs of customers measured by energy consumption level, which would translate into increased activeness of energy use. This would further result in rationalisation of energy consumption and its improved effectiveness. In case of distributors, implementation of this project would result in a reduction of costs of meter reading and commercial losses, and

ultimately, in limiting costs of operations of energy grids. Consequently, the replacement of metering and billing devices with electronic meters with remote data transmission would result in benefits for the users and for the energy sellers. It is also impossible to underestimate benefits resulting from reduced energy consumption for the environment.

Direct benefits for the users, stemming from the replacement of meters, include, first of all:

- reduction of energy supply prices – sellers will minimise differences between planned and actual energy consumption, which are currently covered by end users. Costs of commercial balancing of users will be reduced;
- adjustment of the tariffs to individual needs of customer groups;
- precise billing of energy consumption – the existing system of regular meter reading results in forecast errors, which to a great extent reduce the trust to energy suppliers and cause payment difficulties experienced by consumer with low income;
- reduction of energy consumption – invoices will be issued for shorter periods than today, based on actual use, which would motivate the users to save energy. Experiences of EU countries indicate that more frequent data reading and invoicing allow for savings of 6-10%.

Benefits resulting from installation of new metering devices for operators include, first of all:

- limitation of the balance difference (technical and commercial losses in the distribution grid);
- reduction of losses resulting from thefts of technical infrastructure and energy;
- limitation of costs related to the participation in the balancing market;
- benefits resulting from higher precision of measurements;
- limitation of costs of site operational work and costs of customer service – traditional meter reading will be replaced by remote reading, allowing for more precise allocation of work of operational staff in accordance with the needs of the grid and the users.

Due to the initial stage of the development of road transport based on electric engines and recent opening of the first public points for battery charging in such cars in Warsaw, electricity storage in this form is planned for the next years, in line with the development of already started production of “electric” cars in the country and an increase in their imports.

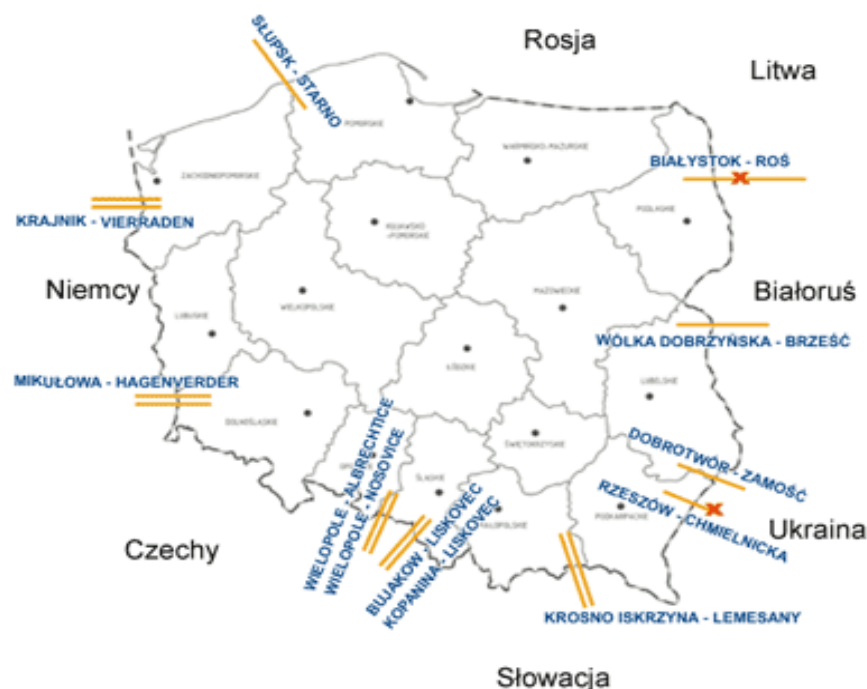
d) Is the reinforcement of the interconnection capacity with neighbouring countries planned? If so, which interconnectors, for which capacity and by when?

Poland has currently the following cross-border interconnections with neighbouring countries:

- At the border with Germany:
 - Krajnik – Vierraden: voltage of 400 kV, permissible load of 778 A and 296 MW, 2 circuits.
 - Mikułowa – Hagenverder: voltage of 400 kV, permissible load of 2,000 A and 1,385 MW, 2 circuits.
- At the border with Czech:
 - Wielopole – Albrechtice: voltage of 400 kV, permissible load of 2,000 A and 1,385 MW, 1 circuit.

- Wielopole – Nošovice: voltage of 400 kV, permissible load of 2,000 A and 1,385 MW, 1 circuit.
- Bujaków – Liskovec: voltage of 220 kV, permissible load of 1,050 A and 400 MW, 1 circuit.
- Kopanina – Liskovec: voltage of 220 kV, permissible load of 1,050 A and 400 MW, 1 circuit.
- At the border with Slovakia:
 - Krosno Iskrzynia – Lemšany: voltage of 400 kV, permissible load of 1,200 A and 831 MW, 2 circuits.
- At the border with Sweden:
 - Słupsk – Stårno: voltage of 450 kV (direct current), 600 MW, 1 circuit.
- At the border with Belarus:
 - Białystok – Roś: voltage of 220 kV, permissible load of 608 A and 231 MW, 1 circuit. The line has been disconnected since 30 June 2004.
 - Wólka Dobrzyńska – Brześć: voltage of 110 kV, permissible load of 120 W, 1 circuit. Private line connected to the 110 kV distribution grid of PGE LUBZEL.
- At the border with Ukraine:
 - Dobrotwór – Zamość: voltage of 220 kV, permissible load of 660 A and 251 MW, 1 circuit. The line operates in a radial system.
 - Rzeszów – Chmielnicka: voltage of 750 kV, permissible load of 1,500 A and 1,300 MW, 1 circuit. The line has been disconnected since 1993.

Figure 1. Cross-border interconnections of the Polish energy system



Source: Own work based on Development Plan for meeting the present and future electricity demand, 2010-2025. Summary. Konstancin-Jeziorna, March 2010

Rosja - Russia

Litwa – Lithuania

Ukraina – Ukraine

Słowacja – Slovakia

Czechy – Czech

Niemcy – Germany

There is a need for the development of cross-border interconnection coordinated with the development of the national transmission system and extension of systems in neighbouring countries, meeting requirements set forth by the EU with respect to the capacity at the level of 10% of national electricity production.

In theory, cross-border interconnections of the Polish National Energy System meet the EU requirements with respect to the capacity at the level of 10% of national electricity production. Actual transmission capacities are lower as a result of developments in internal transmission grids of Poland and neighbouring countries. Cross-border grids in Central Europe are often busy due to the priority for energy from renewable sources. Germany has over 20 GW of power installed in wind power plants, which impacts contract energy exchange opportunities, because the Polish Transmission System Operator limits the transmission capacity availability, as it reserves the capacity for sudden increases in energy production from wind farms, taking into account lack of the possibilities to use it in the neighbouring country. This situation can be assessed as ensuring sufficient level of capacity within interconnections between the countries for renewable energy production on the territory of Germany. Additionally, the Transmission System Operator reserving transmission capacities for so-called “*circular flows*” of energy occurring in Central Europe often results in occupying the whole capacity and thus is a serious barrier for implementation of planned, contractual energy flows.

The plan of the development of cross-border interconnections of energy company PSE Operator S.A. for the years 2010-2015 includes preparatory work with respect to:

- construction of the energy bridge to connect the Polish and Lithuanian energy systems;
- re-commissioning of the interconnection with Ukraine via the 750 kV line between Rzeszów and Chmielnicka;
- connection with Belarus and installing a new 400 kV Narew-Ro• line with two circuits;
- construction of the third cross-border interconnection between Poland and Germany.

Operators of distribution systems, especially in the north part of the country, plan various investments involving modernisation or construction of the infrastructure aimed at connecting new users to the grid, improvement of the grid access to renewable sources and increasing the reliability of supply, including interconnections with neighbouring countries.

Closing so-called “Baltic Ring” – transmission grid connecting Norway, Sweden, Finland, Denmark, Poland with Russia and Baltic States is one of the projects discussed and prepared for a dozen or so years by international Baltrel Working Group. This project could result in establishing the largest global synchronised energy system, supporting over 700 million users. The diversification of sources, in particular ensuring the access to renewable energy sources

in wind farms and hydro power plants in Sweden, Norway and Denmark, would also ensure unprecedented security of electricity supply.

The document *Energy Policy of Poland until 2030* provides for the development of cross-border interconnections coordinated with extending the domestic transmission system, as well as the systems in neighbouring countries, which will allow exchanging at least 15% of electricity used in Poland by 2015, 20% by 2020 and 25% by 2030.

e) How is the acceleration of grid infrastructure authorisation procedures addressed? What is the current state and average time for getting approval? How will it be improved?

In accordance with the regulation of the Minister of Economy of 4 May 2007 *on detailed conditions for the electricity system functioning* (Journal of Laws No 93, item 623, as amended), in order to obtain necessary information on allocated costs of connection and technical adaptations, and the estimated schedule of connection to the grids from the operator of the transmission or distribution system, the producer of energy from RES has to file the application for issuing the so-called “*connection conditions*.” In the application, the producer presents to the operator his data as an entrepreneur and characteristics of his generating installation, as well as needs with respect to characteristics of the connection.

To the application for the connection conditions, the producer has to enclose the document confirming his title to the facility, in which the equipment, installations or networks to be connected will be used, and the expert opinion on the impact of equipment, installations or networks connected on the operations of the energy system.

The expert opinion should be prepared within the scope and on terms agreed with the operator on the activity area of whom the connection would take place. The requirement to prepare the aforementioned expert opinion applies to entities applying for connecting to the energy grid of a source with rated voltage over 1 kV, except for generating units connected with total installed power not exceeding 2 MW and end users with total connection power not exceeding 5 MW.

The connection fee is determined in accordance with principles binding until now, i.e. based on actual outlays incurred for installing the connection, while for renewable energy sources with installed power not exceeding 5 MW and cogeneration units with power not exceeding 1 MW, this fee is determined as a half of actual outlays. Connection conditions are issued to the producer together with draft agreement for connection to the grid.

Connection conditions remain binding for two years from the date of their issuance and during that period, the operator, when issuing technical conditions to other producers, is obliged to take them into account in determining necessary changes in the network related to a new connection, including the extent of usage of the lines making up the common grid and power of transformer and switching stations that connect grids with various voltages.

During the last years, operators noticed that only a small group of investors, who received the connection conditions, concluded the agreement for connection. Due to a high number of connection conditions issued to investors, many investors were not able to target sources of financing for their energy generating installations. Some of them obtained connection conditions for speculative purposes, in order to sell them to other investors. Such situation resulted in non-implementing individual designs of generating installations, and thus non-implementation of potential grid investments by operators, included in these conditions.

After amendments of 8 January 2010, the *Energy Act* includes provisions protecting against blocking the access to the grid to reliable producers by investors of poor financial reliability.

Entities applying for connecting to the energy grid of sources with rated voltage over 1 kV are obliged to pay advances on account of the connection fee. This advance equals PLN 30 for each kilowatt of the connection power set in the application for connection conditions. However, the amount of the advance cannot exceed the amount of expected grid connection fee and PLN 3,000,000. If the amount of the advance exceeds the amount of the grid connection fee, the difference between the amount of the advance paid and the amount of this fee shall be returned together with statutory interest calculated from the date of paying the advance. The advance shall be paid within seven days from the date of submitting the complete application for defining connection conditions, under pain of leaving the application unexamined.

Deadlines for issuing connection conditions to producers run from the date of paying the advance on account of the grid connection fee. In case of an applicant connecting the generating sources with the rated power not exceeding 1 kV to the grid, the energy company responsible for electricity transmission or distribution is obliged to issue the connection conditions within 30 days of paying the advance. In case of connecting to the grid of the source with the rated power over 1 kV, the deadline for issuing connection conditions is 150 days from paying the application by the applicant.

f) How is coordination between grid infrastructure approval and other administrative planning procedures ensured?

In order to rationalise investment projects, when drawing up the development plans, energy companies transmitting or distributing energy are obliged to cooperate with entities connected and communities on the area of which they carry out their activities.

Such cooperation shall include, in particular:

- providing connected entities with the information on planned projects to such extent that such projects would impact operations of equipment connected to the grid or result in changing connection conditions or conditions of energy delivery;
- ensuring consistency between plans of energy companies and draft assumptions of the community plan of heat, electricity and gaseous fuel supply drawn up by the borough leader (*wójt*) (mayor or president of the city). To this end, energy companies appointed by operators provide – free of charge – the persons defining draft assumptions with their development plans in regard to meeting the current and the future demand for energy, within the scope applicable to the area of the community, together with proposals necessary to define draft assumptions.

Draft assumptions defined by the community are to be approved by voivodship local government in order to ensure coordinated cooperation with other communities and compliance with the national energy policy. It is made available to the public for a period of 21 days, while notifying of making it available to the public in a common way used in a given locality.

Persons, business entities and organisational units interested in supplying heat, electricity and gaseous fuels on the area of the community are authorised to file motions, reservations and comments to draft assumptions. Then the community council passes assumptions of the community plan of heat, electricity and gaseous fuel supply, with the consideration of motions, reservations and comments filed during the period for which the plan is made available to the public.

If the operators' plans are inconsistent with assumptions set by the community, in accordance with the Act, the borough leader (*wójt*) (mayor or president of the city), draws up the draft

plan of heat, electricity and gaseous fuel supply for the area of the community or its part based on assumptions enacted by the community council. The plan should be consistent with these assumptions. The draft plan should include propositions pertaining to the development and modernisation of individual heat, electricity and gaseous fuel supply systems together with economic justification, propositions with respect to the use of renewable energy sources and highly efficient co-generation, schedule of the task implementation, expected costs of implementation of proposed projects and their financing source.

The supply plan drawn up as above is passed by the community council. For the purposes of its implementation, the community can conclude agreements with energy companies – operators of the transmission and distribution grids. If the plan of the community cannot be implemented based on agreements with operators, the community council – in order to ensure heat, electricity and gaseous fuel supply – can determine – based on a resolution – the part of the plan that has to be fulfilled by the activities carried out on the territory of the community. Coordination between grid infrastructure approval and other administrative planning procedures is ensured in the aforementioned way.

g) Are priority connection rights or reserved connection capacities provided for new installations producing electricity from renewable energy sources?

In accordance with Article 7(1) of the *Energy Act*, an energy company responsible for transmission or distribution of gaseous fuels or electricity is obliged to conclude the agreement for connection to the grid with entities applying for connection to the grid, in accordance with equal treatment principles. This obligation is imposed on energy companies provided that there are technical and economic conditions for connection to the grid and supply of these fuels or electricity, and the entity applying for concluding the agreement meets conditions of connection to the grid and delivery. If the energy company refuses to conclude the agreement for connection to the grid, it is obliged to immediately notify the President of the Energy Regulatory Office of Poland and the interested entity of such refusal, together with reasons of such refusal.

h) Are any renewable installations ready to come online but not connected due to capacity limitations of the grid? If so, what steps are taken to resolve this and by when is it expected to be solved?

As already mentioned in point (g), the main preference for RES with respect to connection to the energy grid refers to the priority in connection to the grid of new installations producing electricity from renewable energy sources and reduced connection fee – for connecting sources cooperating with the grid and grids of energy companies involved in transmission or distribution of gaseous fuels or electricity the fee is collected determined based on actual outlays incurred for installing the connection, while for renewable energy sources with installed power not exceeding 5 MW and cogeneration units with power below 1 MW, this fee is determined as a half of actual outlays.

Taking into account the above, the producer of energy from RES can request connecting to the grid (concluding the agreement for connection) if he agrees to cover a half of actual outlays for installing this connection and provided that this is an energy source with the power not exceeding 5 MW or a cogeneration unit with installed power below 1 MW and there are technical and economic conditions for connecting to the grid and delivery of these fuels or electricity, and the producer meets conditions of connection to the grid and delivery.

Except for the procedure arising from Article 7 of the *Energy Act*, i.e. filing the application for determining connection conditions, obtaining connection conditions and concluding the

agreement for connection to the energy grids, there are no other options for connecting sources of electricity to the grid.

i) Are the rules on cost sharing and bearing of network technical adaptations set up and published by transmission and distribution system operators? If so, where? How is it ensured that these rules are based on objective, transparent and non-discriminatory criteria? Are there special rules for producers located in peripheral regions and regions with low population density?

Rules on cost sharing and bearing of network technical adaptations are set up in the *Energy Act* and secondary legislation to this Act. These documents are published in Journals of Law of the Republic of Poland. Based on these legal regulations, operators of the transmission system and distribution system draw up *Operating and Maintenance Instructions of the Transmission Grid and Distribution Grids*. The so-called general part of these instructions, which currently does not require approval of the President of the Energy Regulatory Office of Poland, together with transmission and distribution services tariffs approved by the President of the Energy Regulatory Office of Poland are published by operators of the transmission and distribution systems on their websites and are available for review at their registered offices. They include general rules pertaining to filing application for connection conditions and descriptions of procedures of obtaining these conditions from operators. Detailed rules on cost sharing with respect to specific connection to the grid and bearing of network technical adaptations are included in the draft agreement for connection issued to the investor together with connection conditions. If the investor has doubts pertaining to the basis of costs included in the presented agreement for connection, he can appeal to the President of the Energy Regulatory Office to settle the dispute related to the content of the agreement and the basis of costs.

Producers located in peripheral regions and regions with low population density are subject to the same procedures pertaining to cost sharing and bearing of network technical adaptations, but can obtain financial support facilitating implementation of their investments.

The possibilities to separately present costs incurred by the investor as well as by operators of energy systems with respect to connecting RES units are being considered.

j) Please describe how the costs of connection and technical adaptation are attributed to producers and/or transmission and/or distribution system operators? How are transmission and distribution system operators able to recover these investment costs? Is any modification of these cost bearing rules planned in the future? What changes do you envisage and what results are expected?

In accordance with Article 7(8)(3) of the *Energy Act*, for connecting sources cooperating with the grid and grids of energy companies involved in transmission or distribution of gaseous fuels or electricity, the fee is collected determined based on actual outlays incurred for installing the connection, except for renewable energy sources with installed power not exceeding 5 MW, for connecting which a half of the fee determined based on actual outlays is collected.

Meanwhile, in accordance with Article (7)(5) of the aforementioned act, the energy company transmitting or distributing electricity is obliged to ensure implementation and financing of the grid construction and extension projects, including for the purposes of connecting entities applying for connection, on terms determined in the regulation of the Minister of Economy *on detailed conditions for the electricity system functioning* and in assumptions or development plans for meeting the present and future energy demand drawn up by communities.

However, the method for attributing costs of the investment implementation should take into account balancing of interests of energy companies and users of electricity, and should not result in adverse changes in prices or rates for electricity supplied, i.e. should not result in so-called cross-subsidisation.

Work on facilitating connection of new RES units is expected to result in separate presentation of costs to be incurred by the investor and the operator of the energy system to which a given RES unit is to be connected.

k) Are there rules for sharing the costs between initially and subsequently connected producers? If not, how are the benefits for subsequently connected producers taken into account?

Because in the energy sector, each subsequently connected producer covers the costs of his connection and does not use connection of other producers – grid users, no sharing of costs between initially and subsequently connected producers takes place. However, subsequently connected producers can benefit from previously installed connections, in particular from construction and extension of the common grid of the operator. These benefits can stem from the following circumstances:

- the operator of the energy grid extending his grid for the purposes of connecting previous investors, and thus making it closer to the production installation of the next producer. Consequently, the length of the connection to the new producer and costs of its construction would be reduced;
- if there are no technical and economic conditions for connecting a new producer to the common grid, in accordance with provisions of the *Energy Act*, the operator of energy grid can reduce, to a great extent, the connection fee imposed on the investor in the agreement for connection. Consequently, the investor's financial support for the energy company in order to eliminate technical and economic barriers to the installation of the connection can be much lower. For instance, it can include only covering the costs of replacement of a transformer with a one with higher power instead of construction of a new energy line or replacement of the cross-section of cables in the existing line.

l) How will it be ensured that transmission and distribution system operators provide new producers wishing to be connected with the necessary information on costs, a precise timetable for processing their requests and an indicative timetable for their grid connection?

The *Energy Act* includes the obligation of the energy company to compile and publish the information, in particular the information on:

- entities (their registered office or place of residence) applying for connecting to the energy grid with rated voltage over 1 kV, connection point, connection power, date of issuing the connection conditions, conclusion of the connection agreement and start of electricity delivery;
- amount of available connection power for energy stations or their groups making up the grid with rated power equal 110 kV and higher, as well as planned changes of these amounts during the next 5 years after publishing these data;

The aforementioned information is published in keeping with regulations on protection of classified and other legally protected information. Such information is updated by operators at least once a month and published on their websites and made available for review in their registered offices.

In accordance with Appendix 3 to the *Energy Policy of Poland until 2030*, in a part pertaining to implementation of Article 16 of Directive 2009/28/EC, the Ministry of Economy intends to undertake activities to create conditions to facilitate making investment decisions on building offshore wind farms.

The following implementation method is planned, including:

- 1) identification of legal barriers preventing or hindering the construction of offshore wind farms – 2010;
- 2) preparing draft amendments to regulations aimed at lifting the identified barriers, in particular amendments to the *Act on marine areas of the Republic of Poland and maritime administration* – 2010;
- 3) making a decision on Poland's participation in the construction of the international offshore energy cable line (*Supergrid*) of key importance to the development of offshore wind farms – 2010;
- 4) selecting potential sites of wind farms in marine areas of the Republic of Poland – 2010.

State authorities responsible for implementation of the aforementioned activities include:

- minister in charge of the economy (tasks 1-3);
- minister in charge of maritime economy (tasks 2 and 4);
- President of the Government Legislation Centre (task 2);
- field maritime administration bodies (task 4).

From the point of view of the development of RES in Poland, proposing new regulations aimed at earlier notifying the investors interested in construction of RES units of the possibilities to connect to the grid will be of special importance.

4.2.7 Electricity network operation (Article 16(2) and Article 16(7) and (8) of Directive 2009/28/EC)

a) How is the transmission and distribution of electricity from renewable energy sources guaranteed by transmission and distribution system operators? Is priority or guaranteed access ensured?

In accordance with the *Energy Act*, the producer of electricity from renewable sources, in the same way as the user of such energy, has a priority in the services of transmission or distribution of electricity. However, in order to obtain the access to the grid, he has to meet various requirements set forth in the regulation of the Minister of Economy of 4 May 2007 *on detailed conditions for the electricity system functioning*. Conditions that have to be met in order to obtain the access to the network (by the producer of energy from renewable sources as well as users of his energy) include:

- installing the connection to the grid of a given operator of the energy system after satisfying connection conditions received from the operator;
- concluding the agreement for electricity transmission or distribution services, in which the producer should identify the entity responsible for the settlement of unbalanced electricity introduced to or collected from the system;
- concluding the agreements for sales of electricity with recipients of electricity produced;

- providing the operator, in accordance with principles set in the *Operating and Maintenance Instructions of the Transmission or Distribution Grids*, with hourly and daily schedules of implementation of agreements for sales of electricity for the purposes of transmission or distribution of the energy produced via the grid of the operator;
- additionally, in case of the producer it is necessary to obtain the licence for production of energy from renewable sources from the President of the Energy Regulatory Office of Poland.

In case of producers of energy from renewable sources, meeting the condition set in point c) is guaranteed, as in accordance with the Act if no purchasers are interested in purchasing his energy on market terms, a seller *ex officio*, appointed by the President of the Energy Regulatory Office of Poland, becomes a party to the agreement for sales of electricity. The seller *ex officio* is obliged to conclude the agreement for purchase of energy offered by the producer, provided that renewable energy sources are connected to the grid on the area of operation of this seller, and that the producer obtained the licence from the President of the Energy Regulatory Office. At the same time, the producer is not obliged to sell energy if he receives an offer for purchase of his energy at the price higher than the one that has to be offered by the seller *ex officio*. In such case, the price offered by the seller *ex officio* is an average price of energy on the competitive market for the previous calendar year, announced by the President of the Energy Regulatory Office. This price is calculated and announced by the President of the Energy Regulatory Office by 31 March each year.

b) How is it ensured that transmission system operators, when dispatching electricity generating installations give priority to those using renewable energy sources?

In accordance with the *Energy Act*, the operator of the energy system, within the area of his operation, is obliged to ensure the priority to all entities in the provision of services involving transmission or distribution of electricity produced from renewable energy sources, subject to maintaining reliability and security of the energy system.

The priority character of installations producing electricity for operators of transmission systems is strengthened by Article 45 of the Act, which permits the energy companies to take into account, in transmission and distribution services tariffs, their costs of co-financing of projects related to the development of renewable energy sources. Such projects also include connecting producers of energy from renewable sources and adaptation of the transmission grid to their needs.

c) How are grid- and market-related operational measures taken in order to minimise the curtailment of electricity from renewable energy sources? What kinds of measures are planned and when is implementation expected?

Key market curtailment of electricity from renewable sources results from imperfect predictability of its production on the next day, in the next week or month. This especially refers to production of energy from wind farms. As a result, the value of energy from renewable sources for market recipients is lower than of energy from conventional power plants. Additionally, lack of certainty of deliveries of pre-agreed quantities of energy at pre-agreed hours requires incurring an additional cost of non-balancing of energy by purchasing its shortages or selling its surpluses on the balancing market of the Transmission System Operator.

The issue of potential difficulties in identifying a partner to conclude the agreement for sales of energy from renewable sources is addressed by Article 9a(6) of the Act. It requires the seller *ex officio* to purchase energy from renewable sources at the average price of sales of electricity on the competitive market for the previous calendar year.

Meanwhile, limitations resulting from difficulties in forecasting production of energy (primarily in wind farms) were mitigated, to a great extent, by the Transmission System Operator introducing new principles for reporting commercial agreements of these producers for implementation. Currently, it is possible, in practice, “in real time.” In addition to forecasting the production volume one day in advance and reporting daily production plans by 01 p.m. on the previous day, the producers can draw up and report their production plans to the operator two hours in advance. For installations producing renewable energy in wind farms, this time was additionally reduced to one hour. Consequently, the issue of commercial balancing of producers of energy from renewable sources, resulting in a reduction of the market value of their energy, has been ultimately solved. Changes were implemented as of 1 December 2009 as a result of the President of the Energy Regulatory Office of Poland approving and announcing in the Bulletin of the Energy Regulatory Office Update Sheet no B/9/2009 to the *Operating and Maintenance Instructions of the Transmission Grid*.

The regulation of the Minister of Economy *on detailed conditions for the electricity system functioning* imposes on the Operator of the Transmission System to duty to ensure access to grid users to system interconnections within transmission capacities available, on terms agreed with operators from neighbouring countries of the Republic of Poland. This access is ensured using the mechanism satisfying non-discrimination and transparency requirements, i.e. auctions for transmission capacities. However, energy produced from renewable sources does not have a priority and is not privileged in this case. This is due to lack of international arrangements with respect to the possibility to fulfil the obligation to purchase renewable energy based on imports from neighbouring countries and non-exchangeability of certificates of origin functioning in various countries. As a matter of fact, the introduction of the system of certificates of origin of renewable energy resulted in separating energy trading from trading in property rights to certificates of origin. Consequently, actually, energy from renewable sources in market trading does not differ any more from conventional energy and its priority treatment in foreign trade or making available transmission capacities of international system interconnections has no justification.

d) Is the energy regulatory authority informed about these measures? Does it have the competence to monitor and enforce implementation of these measures?

As an authority in charge of energy regulation, the President of the Energy Regulatory Office of Poland not only monitors and enforces implementation of grid- and market-related operational measures taken in order to minimise the curtailment of electricity from renewable energy sources. He actively participates in gathering opinions and complaints of the grid users and producers of energy from renewable sources and is an entity settling potential disputes between producers and grid operators. He is also authorised, based on the Act, to approve parts of operating and maintenance instructions of grids, submitted for approval by operators, pertaining to the transmission system balancing and system limitation management.

The Act authorises the President of the Energy Regulatory Office of Poland to enforce the obligations of transmission and distribution grids operators with respect to supporting energy from renewable sources and to impose financial penalties up to 15% of the revenue of the company penalized earned in the previous fiscal year on the activity subject to the licence. Regardless of the above, the President of the Energy Regulatory Office of Poland may impose a financial penalty on the manager of the energy company, provided that this penalty may not exceed 300% of the manager’s monthly remuneration.

e) Are plants generating electricity from renewable energy sources integrated in the electricity market? Could you please describe how? What are their obligations regarding participation in the electricity market?

Plants generating electricity from renewable energy sources are fully integrated in the electricity market, which means that they are governed by the same rules related to their participation in the energy market, as other entities. Consequently, they are obliged to obtain connection conditions and fulfil these conditions, to conclude the transmission or distribution agreement with the grid operator, to appoint an entity responsible for commercial balancing of energy produced (and the energy collected if any) and to identify a commercial partner to conclude the agreement for sales of energy. Additionally, in direct contacts with operators aimed at implementation of commercial agreements concluded, they have to comply with the same principles for reporting hourly and daily schedules of declared energy, the same rules of settlement of energy actually produced and settlements of unbalanced commercial energy equal the difference between energy declared and actually produced.

Meanwhile, producers who obtained the licence for production of energy from renewable sources from the President of the Energy Regulatory Office of Poland, are additionally entitled to market support that improves their position vs. other participants of the energy market.

This support includes:

- priority in delivery of their energy to the transmission or distribution grids;
- guarantees of sales of energy produced at prices equal at least average prices of conventional energy on the competitive market in the previous calendar year;
- exemption of energy produced from renewable sources from excise duty in case of its sale to end users. Currently, excise duty equals PLN 20 per 1 MWh sold to an end user. As a result of this exemption, the value of a certificate of origin is higher than the value of substitution fee due to NFO• iGW, which translates into its higher market price and thus, higher revenues of producers when selling property rights to certificates;
- additional revenues from sales of property rights to certificates of origin of energy produced by them;
- guaranteed demand for property rights in long-term perspective. The level of obligatory purchase of these rights by obliged entities, i.e. seller of energy to end users has been determined in the regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source* (Journal of Laws No 156, item 969, as amended). In case of their shortage, obliged entities have to pay so-called “*substitution fees*.” Substitution fees constitute revenues of the National Fund for Environmental Protection and Water Management (*Narodowy Fundusz Ochrony •rodowiska i Gospodarki Wodnej*). They are allocated for supporting investments in new installations producing energy from renewable sources and for strengthening distribution grids in preferred areas for locating such installations (coastal areas, areas with significant quantities of agricultural biomass, etc.).

In accordance with the *Energy Act*, producers of electricity from renewable energy sources with total power not exceeding 5 MW are exempt from:

- stamp duty for issuing the licence;
- stamp duty for issuing the certificate of origin;

and they are exempt from the duty to pay annual fee to the state budget for obtaining the licence for energy production from renewable sources.

Additionally, in order to participate in the system of certificates of origin, which is currently a separate and important part of the energy system, ensuring market support for his production activities, the producer has to:

- become a member of the *Register of Certificates* on the Commodity Energy Exchange;
- become a member of the Commodity Energy Exchange (*Towarowa Giełda Energii, TGE*) or to be allowed to operate on Property Right Market through another member of TGE – Brokerage Office.

Producers of electricity from renewable energy sources with total power not exceeding 5 MW are exempt from the fee for registration in the Register of *Certificates of Origin* and for introducing changes to the register.

f) What are the rules for charging transmission and distribution tariffs to generators of electricity from renewable energy sources?

Producers of electricity, including producers of energy from renewable sources, are not charged with transmission and distribution tariffs for energy introduced by them to the transmission or distribution grid. This is due to the assumption that they would include costs of tariff charged in the price of energy sold, which subsequently would encumber the end-users. Due to this reason, in order to simplify settlements, users of energy bear all costs related to the grid maintenance and functioning, and producers are exempt from charges.

The producer of energy from RES can sell his energy to a user located in the area of another distribution grid or transmission grid. In such case, this transaction has to be reported to the transmission grid operator, who will take it into account in his daily coordination plans drawn up on the day preceding the transaction implementation, in order to ensure secure and balanced organisation of the system functioning. At the same time, the commercial and technical operator representing the producer (when the producer has his own schedule unit) or an entity responsible for commercial balancing identified by the producer in the agreement for the provision of distribution services are obliged to pay the transmission grid operator – on behalf of the producer – so-called settlement fee that currently equals 23 groszy net for each MWh of energy included in the transaction reported to the plan. When the recipient of energy is located within the area of the same distribution grid as the producer, there is not need for reporting the transaction to the transmission grid operator and the producer does not pay the settlement fee.

In case of producers of energy from renewable sources, during the installation standstill or startup periods, as a rule they have to purchase energy for internal needs, occasionally or regularly. In such situation they use energy supplied by other sellers and are treated as end users by the operators. Energy collected from the grid is subject to fees arising from transmission or distribution tariffs. These fees include: the fee for the access to the grid adjusted to the level of contractual power agreed in the transmission or distribution agreement, fee for using the grid adjusted to the amount of energy collected from the grid, quality fee for guaranteeing continuity of supplies and their proper parameters, such as voltage and frequency, transition fee on account of compensations for producers after terminating long-term contracts and standing charge for using the operator's metering systems, reading measurements from these systems and for transmission or distribution services billing.

In accordance with Appendix 3 to the *Energy Policy of Poland until 2030*, in a part pertaining to the implementation of Article 16 of Directive 2009/28/EC, the Ministry of Economy intends to undertake activities to create conditions to facilitate direct support to building new renewable energy generation units and power grids that could be connected with the use of European funds and environmental protection funds, including funds gathered in the form of the substitution fee and fine.

The following implementation method is planned, including:

1. Providing assistance for the construction of new RES units, including those which produce bio-components and liquid biofuels as well as infrastructure necessary for their connections from public funds, *inter alia* under:
 - Operational Programme *Infrastructure and Environment* for the years 2007-2013;
 - Regional Operational Programmes for the years 2007-2013;
 - National Fund for Environmental Protection and Water Management (NFO• iGW) programmes for projects in the area of renewable energy sources, high efficiency co-generation units, and biofuels.
2. Analysing procedures in terms of implementing potential solutions facilitating the access to domestic and foreign aid funds through the elimination of excessively stringent requirements and restrictions – 2010.
3. Devising subsequent priority programmes financed with the substitution fee and fines and arranging it with the Minister of Economy – 2010.

State authorities responsible for the implementation of the aforementioned activities include:

- minister in charge of the economy (tasks 1 and 2);
- minister in charge of the environment (tasks 1 and 3);
- minister in charge of regional development (task 1);
- voivodship authorities (task 1);
- National Fund for Environmental Protection and Water Management (tasks 1, 2 and 3).

4.2.8 Biogas integration into the natural gas network (Article 16(7) and Article 16(9) and (10) of Directive 2009/28/EC)

a) How is it ensured that the charging of transmission and distribution tariffs does not discriminate against gas from renewable energy sources?

The Act of 8 January 2010 *on amendments to the Energy Act and certain other acts* (Journal of Laws No 21 item 104), includes some important new provisions on agricultural biogas, as follows:

- The Act includes the definition of agricultural:
agricultural biogas – is gaseous fuel produced from agricultural raw materials, agricultural by-products, animal feces and urine, by-product or waste from agricultural and food industry or forest biomass in the methane fermentation process;
- it has been decided that:

an energy company responsible for transmission or distribution of gaseous fuels or electricity is obliged to ensure the provision of gaseous fuel transmission or distribution to all users and companies selling gaseous fuels or energy, in accordance with equal treatment principles;

- operators of transmission and distribution systems:

(...) may provide services involving adjustment of gaseous fuel to quality standards or technical conditions applicable in the transmission or distribution system, as well as services of gaseous fuel transport using means of transport other than gas networks;

- it has been decided that:

the operator of the gas distribution system, in the area of his operation, is obliged to accept agricultural biogas with the quality parameters set forth in legislation issued based on Article 9a(11), produced in installations connected directly to the network of this operator;

- it has been decided that:

energy companies producing agricultural biogas can obtain certificates of origin of agricultural gas and that business activity involving production of agricultural biogas or electricity from agricultural biogas is a regulated activity within the meaning of provisions of the Act of 2 July 2004 on freedom of economic activity (Journal of Laws of 2007 No 155, item 1095, as amended) and requires registration in the register of energy companies producing agricultural biogas.

b) Has any assessment been carried out on the need to extend the gas network infrastructure to facilitate the integration of gas from renewable sources? What is the result? If not, will there be such an assessment?

Until now, in Poland biogas has not been introduced to the natural gas network, as it was more profitable to use biogas as a fuel for current generators and for electricity production. This referred to biogas from municipal landfills and to agricultural biogas. Adjustment of the natural gas distribution to the need to accept biogas (including agricultural biogas) in localities without natural gas distribution network can be achieved by applying container storage of compressed methane from renewable sources and then transporting the container to the locality, where methane from RES can be introduced to the natural gas distribution network. As a result of the option based on the container transport of compressed agricultural gas, there is no need to extend the natural gas distribution network in order to adjust it to the need to accept agricultural biogas. In short-term perspective, blending natural gas with biogas (after quality adjustment of biogas) is assumed based on the *Energy Act*.

It is expected that the number of entities interested in investing in agricultural biogas production on the market would increase. Such investments (construction of new biogas plants) would require adjusting the natural gas distribution networks to the need to accept agricultural biogas, subsequent blending of both types of gas and their transport.

c) Are technical rules on network connection and connection tariffs for biogas published? Where are these rules published?

In case of processing energy included in biomass to gaseous fuel (agricultural biogas) substituting natural gas, the product obtained can be standardised to the parameters of gas with high concentration of methane and introduced to the distribution (transmission) network. Consequently, agricultural biogas plants are an alternative source of gaseous fuels. In order to adjust parameters of agricultural biogas to parameters of network gas – agricultural biogas,

due to its different chemical composition, has to undergo so-called treatment procedure in the standardisation installation, before introducing to the gas system. It is necessary to achieve quality parameters of gas that can be introduced to the transmission and distribution network. Quality parameters of natural gas have been set in two standards:

- PN-C-04752:2002 – Natural gas. Quality of gas in transmission network.
- PN-C-04753:2002 – Natural gas. Quality of gas supplied to consumers from distribution network.

Conditions for connection to the gas network are published by gas transmission and distribution system operators. Polish operators of transmission and distribution systems are obliged to publish connection tariffs for connecting gas source, including renewable ones. Connection fees are unrestricted information and are announced, *inter alia*, on websites of gas transmission and distribution system operators.

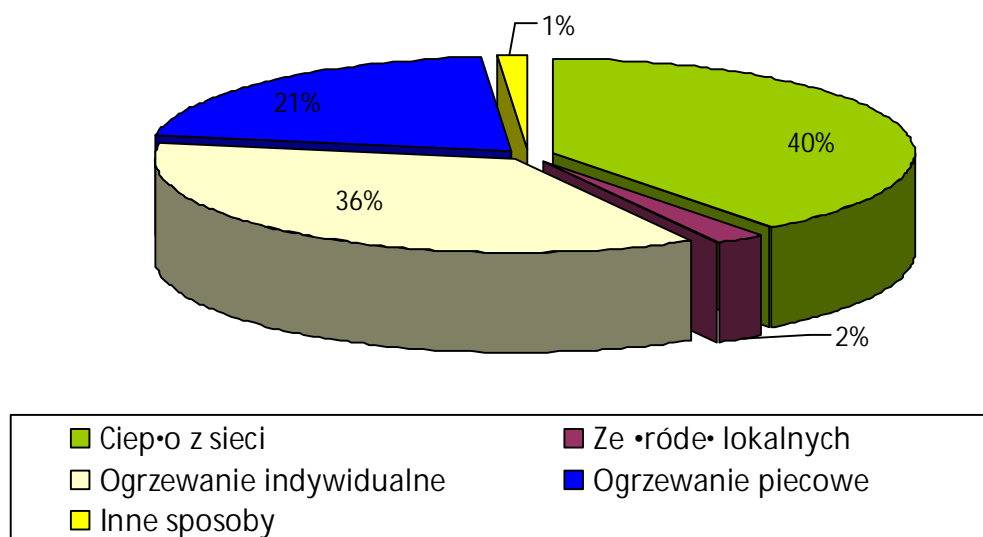
4.2.9 District heating and cooling infrastructure development (Article 16(11) of Directive 2009/28/EC)

a) Please provide an assessment of the need for new district heating and cooling infrastructure using renewable energy sources and contributing to the 2020 target. Based on this assessment, are there plans to promote such infrastructures in the future? What are the expected contributions of large biomass, solar and geothermal facilities in the district heating and cooling systems?

In current operating conditions of entities supplying heat, potential demand for district heating and cooling infrastructure is primarily related to the issue of creating the production base based on renewable energy sources. Poland belongs to few European countries with a significant share of heat supplied from existing district heating systems in total heat supply. It is estimated that about 52% of heat for heating is supplied by heating systems.

The structure of satisfying heating needs by households is presented below, based on statistical data from the last National Census of 2002 and published in the report of the Central Statistical Office titled *Residential premises 2002 (Mieszkania 2002)*.

Figure 2. Structure of satisfying heating needs by households.



Source: Own work based on the data of the Central Statistical Office from report: Residential Premises 2002 (Mieszkania 2002), GUS. Warsaw, August 2003

Ciepłota z sieci – Heat from district heating networks

Ze źródeł lokalnych – From local sources

Ogrzewanie indywidualne – Individual heating

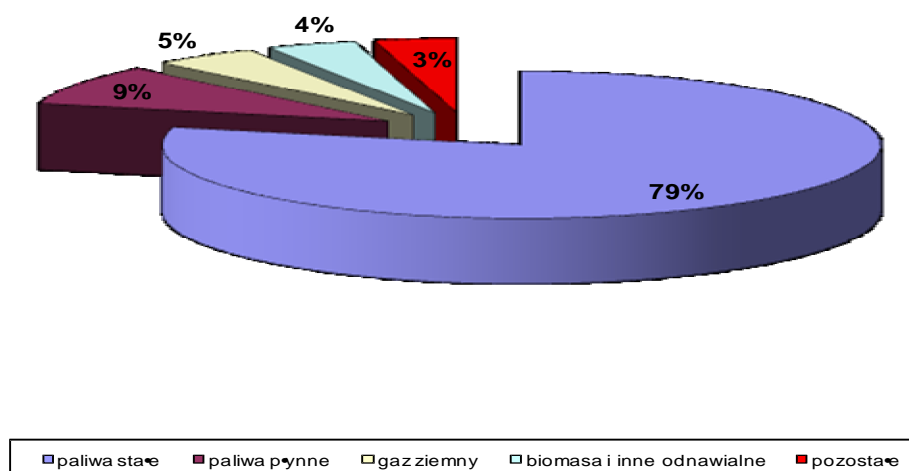
Ogrzewanie piecowe – Furnace heating

Inne sposoby – Other methods

In practice, district heating systems exist in every city agglomeration. In accordance with the data of the Energy Regulatory Office of Poland, in 2008 about 500 energy companies carried out heating activities based on district heating systems with ordered power over 5 MW. They have source of heat power over 61,000 MWt. Annual heat production equals about 400 PJ and the amount of heat supplied to consumer achieves 300 PJ. The length of heating networks for heat transmission exceeds 19 thousand kilometres.

District heating systems have a significant market for heat supply services, but the use of renewable energy is at present on a very low level, which is shown in the figure below.

Figure 3. Structure of covering demand for heat.



Source: Own work based on the data of the Energy Regulatory Office of Poland and the Chamber of Heat Engineering (Izba Gospodarcza Ciepłownictwo Polskie)

paliwa stałe – solid fuels

paliwa płynne – liquid fuels

gaz ziemny – natural gas

biomasa i inne odnawialne – biomass and other renewables

pozostałe – other

The opportunities to use renewable energy in all sources of heat disclosed in figures 2 and 3 include, *inter alia*, biomass with cogeneration, solar panels as a support to hot water systems and monovalent or bivalent heat pumps for the purposes of heating, hot water and cooling at households and district heat networks.

Activities aimed at promoting the district heating and cooling infrastructure using renewable energy sources will be undertaken as a part of work on regulations implementing Directive 2009/28/EC, in agreement with the minister in charge of infrastructure. Potential provisions will be included in the Act *on energy from renewable sources* that is going to be adopted in 2011.

4.2.10 Biofuels and other bioliquids — sustainability criteria and verification of compliance (Articles 17 to 21 of Directive 2009/28/EC)

a) How will the sustainability criteria for biofuels and bioliquids be implemented at national level?

Sustainability criteria for biofuels will be transposed to the Polish legal system by amending the Act of 25 August 2006 *on biocomponents and liquid biofuels* (Journal of Laws No 169, item 1199, as amended). The reference to criteria for biofuels set forth in the aforementioned act will be included in the Act *on energy from renewable sources* that is going to be adopted in 2011.

b) How will it be ensured that biofuels and bioliquids that are counted towards the national renewable target, towards national renewable energy obligations and/or are eligible for financial support comply with the sustainability criteria set down in Article 17(2) to (5) of Directive 2009/28/EC?

The amended Act *on biocomponents and liquid biofuels* will include provisions allowing verifying the information confirming meeting the sustainable development criteria provided by business entities.

c) If a national authority/body will monitor the fulfilment of the criteria, does such a national authority/body already exist? If so, please specify. If not, when is it envisaged to be established?

The establishment of new authorities is not envisaged. Compliance with sustainable development criteria will be verified by existing bodies. Suitable provisions will be included in the amended Act *on biocomponents and liquid biofuels* and the Act *on energy from renewable sources* that is going to be adopted in 2011.

d) Please provide information on the existence of national law on land zoning and national land register for verifying compliance with Article 17(3) to (5) of Directive 2009/28/EC. How economic operators can access to this information?

In accordance with the statutory authorisation arising from Article 26(2) of the *Geodetic and Cartographic Act* of 17 May 1989 (Journal of Laws of 2010 No 193, item 1287, as amended) the Minister of Regional Development and Construction issued the regulation of 29 March 2001 *on land and building registers* (Journal of Laws No 38, item 454), where, in Chapter V, the method and dates of drawing up poviats, voivodships and national summaries of the data subject to recording in land and building registers, were determined. The national summary of land is drawn up based on lists of land that are the catalogues of data describing overall area and value of land located within the registration unit, categorised by their classification to registration groups and subgroups, while divided into usable land classes, by the General Surveyor of Poland until 15 April each year. It is made available to interested top and central authorities at their request.

It is important to distinguish the term “national summary of land” drawn up based on lists of land and the term “land register” that is drawn up for districts. In accordance with § 23 of the regulation *on land and building registers*, the land register is a report drawn up based on registration data listed in § 60, on all registration plots of land within the district, categorised by their classification to individual land registration units.

In accordance with Article 24(2) of the aforementioned Act, the information on land, buildings and premises, referred to in Article 20(1) and Article 20(2)(3) and (4) is unrestricted and is generally available. In accordance with Article 24(3) of the aforementioned Act, a starost (*starosta*) issues the extract from the registration report including personal data referred to in Article (20)(2)(1) and (2) at the request of:

- owners or natural and legal persons holding land, buildings or premises being the subject of the extract;
- public entities or entities that are not public entities, fulfilling public tasks based on separate legislation or as a result of entrusting or mandating them by a public entities, which are related to land, buildings or premises being the subject of the extract;
- entities other than listed in points 1 and 2 that have legal interest related to land, buildings or premises being the subject of the extract.

At the same time, in accordance with Article 24(3a), the extract and outline from the registration report are issued free-of-charge at the request of:

- the public prosecutor’s office;
- courts acting with respect to public matters;
- state control authorities in relation to performance of their statutory tasks;
- public administration authorities and local government units with respect to their activities pertaining to rights to real estate of the State Treasury and local government units.

Additionally, in accordance with Article 24(4) of the aforementioned Act, the starost shall provide free access to the database of land and building registers, without the right to make it available to third persons, to:

- communities and voivodship marshals – for the purposes of keeping the register of waters, land melioration systems and land with melioration system;
- the Agency for Restructuring and Modernisation of Agriculture – for the purposes of establishing and operating the national system for registration of manufacturers, registration of farms and registration of payment applications;

- Director General of Environmental Protection, regional directors of environmental protection and directors of national parks – for the purposes of drawing up protection plans, protection task plans, monitoring and control at Natura 2000 areas.

Taking into account the allocation of land for specific purposes and setting form principles for their management and development, it should be concluded that these issues are governed by the Act of 27 March 2003 *on spatial planning and development* (Journal of Laws No 80, item 717, as amended).

e) As far as protected areas are concerned, please provide information under which national, European or international protection regime they are classified.

Protected areas in Poland are classified in accordance with the *Nature Conservation Act* of 16 April 2004 (Journal of Laws of 2009 No 151, item 1220, as amended). This classification (e.g. with respect to National Parks) overlaps partially with the classification of the International Union for Conservation of Nature and Natural Resources.

f) What is the procedure for changing the status of land? Who monitors and reports at national level on land status changes? How often are the land zoning register updated (monthly, annually, bi-annually, etc.)?

In accordance with Article 22 of the *Geodetic and Cartographic Act* of 17 May 1989, the register of land and buildings, and the soil classifications are kept by starosts. Owners, and in case of state land and land of local governments – other natural or legal persons holding a given land or buildings or their parts, are obliged to notify the competent starost of any changes in the data included in the land and building register within 30 days of the day of these changes. This obligation does not apply to changes in the data included in the land and building register, resulting from decisions of competent authorities. At the request of the starost, persons reporting the changes are obliged to provide surveying, cartographic and other documents necessary to record changes in the land and building register. In accordance with Article 25 of the aforementioned Act, based on the data from the land and building registers, local and national summaries of data included in these registers are prepared. Starosts draw up community and poviats summaries, while voivodship marshals – voivodship summaries of the data included in the land and building register. Based on voivodship summaries, the General Surveyor of Poland prepares national summary of data included in land and building registers.

Pursuant to provisions of the Act of 27 March 2003 *on spatial planning and development* (Journal of Laws No 80, item 717, as amended), before the local spatial development plan (local plan) is passed, it is necessary to draw up the study of conditions and directions of spatial development of the community (study), which includes, *inter alia*, conditions of life of citizens, including protection of their health (Article 10(1)(5)). The study identifies also areas and principles for protection of the environment and its resources, nature conservation, protection of cultural landscape and health resorts (Article 10(2)(3)). The resolution of the community council on initiating preparation of the study is announced in local press, in form of an official announcement as well as in a customary way used in a given locality, while ensuring the possibility to submit comments by all interested parties within not less than 21 days of the day of announcement (Article 11(1)). The draft is submitted to wide consultations with bodies listed in points 5-8 of the Act *on spatial planning and development*, including the regional director of environmental protection. Then, the draft is amended taking into account opinions obtained. Then, in accordance with the procedure applying to the resolution on initiating preparation of the study, making available the study to the public is announced at least 14 days before making available the plan, and the plan is made available to the public together with the environmental impact forecast for a period of at least 30 days and, during that period, the public discussion is arranged on solutions adopted in the draft study.

Irrespective of the above, in the announcement the deadline is set, not less than 21 days from the end of the period of making available the study, by which legal and natural persons and unincorporated organisational entities can submit their comments on the draft study. Based on the study of conditions and directions of spatial development of the community resolved by the community council, the local spatial development plan is prepared, which obligatorily sets, *inter alia*, special development conditions and use limitations, including prohibition on erecting buildings. The procedure applying to the resolution of the community council on initiating preparation of the local plan, submission of comments and motions before starting its preparation and social consultations with respect to the draft local plan are the same as in case of stages and deadlines pertaining to the study (Articles 17 and 18).

The spatial development plan is modified as necessary. It has no predetermined validity date.

g) How is compliance with good agro-environmental practices and other cross-compliance requirements (required by Article 17(6) of Directive 2009/28/EC) ensured and verified at national level?

Since 1 January 2009, in Poland, the cross-compliance principle applies that includes:

- standards pertaining to maintenance of land in good agricultural and environmental condition (GAEC), as determined in Annex III to Council Regulation No 73/2009; and
- statutory management requirements (SMR), as determined in Annex II to Council Regulation No 73/2009.

Cross-compliance means that the amounts of direct payments received and payments within certain non-investment measures of RAP 2007-2013 are linked with the beneficiaries complying with specific requirements and standards.

In accordance with Article 17(6) of Directive 2009/28/EC of the European Parliament and of the Council, agricultural raw materials cultivated and used for the production of biofuels and bioliquids shall be obtained in accordance with the cross-compliance requirements referred to under the heading “Environment” in part A and in points 1-5 of Annex II to Council Regulation (EC) No 73/2009 and standards of good agricultural and environmental condition defined pursuant to Article 6(1) and Annex III to this Regulation.

The aforementioned requirements have been set in the announcement of the Minister of Agriculture and Rural Development of 19 March 2009 *on the list of requirements set in legislation of the European Union taking into account national legislation implementing this legislation* (M.P. No 17, item 224, as amended).

Additionally, in keeping with the cross-compliance principle, at least 1% of farms applying for direct payments should be spot-checked each year, which in case of Poland, means a need to carry out about 15 thousand checks a year. In accordance with the Act of 26 January 2007 *on payments within the framework of direct support schemes* (Journal of Laws of 2008 No 170, item 1051, as amended), the Agency for Restructuring and Modernisation of Agriculture carries out administrative checks and on-the-spot checks with respect to cross-compliance in the area of GAEC. In case of on-the-spot checks, control activities are performed by persons holding individual authorisations issued by the President of the Agency. Before starting control activities, the authorised person is obliged to present the individual authorisation to the farmer if he is present during the check. However, control activities can also be undertaken in the absence of the farmer, even when the farmer has been notified of the check in accordance with Article 27(1) of the Commission Regulation No 1122/2009. Persons authorised to carry out control activities are authorised to:

- enter the farm;

- request written or oral information related to the control subject;
- review documents related to the control subject, draw up their transcripts, excerpts or make copies, and secure these documents;
- take samples for tests;
- request the presentation of and the access to IT data.

In case of non-respecting a cross-compliance obligation, direct payments are reduced proportionally to the violations. The reduction extent arises from the regulation of the Minister of Agriculture and Rural Development of 25 March 2009 *on the number of points allocated to violation detected and percentage reduction of direct payment, sugar payment or tomato payment* (Journal of Laws No 54, item 446). The severity of the sanction for non-compliance with requirements and standards depends on various factors. The first one refers to non-compliance with legislation as a result of:

- the farmer's negligence (non-intentional);
- the farmer's fault (intentional).

Additionally, the following elements are considered when determining the sanction level:

- range;
- severity;
- persistence;
- repeatability.

When the non-compliance determined has resulted from farmer's negligence, the percentage of the reduction equals, as a general rule, 3% of the total amount of direct payment, but the percentage of the reduction can be reduced to 1% or increased to 5%. In case of repeated non-compliance (in subsequent years), the percentage of the sanction calculated will be multiplied by the factor three, but the maximum reduction shall not exceed 15% of the total amount of direct payments. Where the non-compliance determined has been committed intentionally by the farmer, the reduction to be applied to the total amount shall, as a general rule, be 20%. However, the paying agency may, on the basis of the assessment provided by the competent control authority, decide to reduce that percentage to no less than 15% or, where appropriate, to increase that percentage to up to 100% of the total amount.

h) Do you intend to help develop voluntary 'certification' scheme(s) for biofuel and bioliquid sustainability as described in the second subparagraph of Article 18(4) of Directive 2009/28/EC? If so, how?

At present, there are no such plans. In 2010, work will be undertaken aimed at assessing the justification of the activities supporting the development of voluntary "certification" schemes for biofuel and bioliquid sustainability. Suitable provisions will be included in the amended *Act on biocomponents and liquid biofuels* and the *Act on energy from renewable sources* that is going to be adopted in 2011.

4.3 Support schemes to promote the use of energy from renewable resources in electricity applied by the Member State or a group of Member States

Regulation

a) What is the legal basis for this obligation/target?

The support scheme promoting the use of RES in Poland involves the system of certificates of origin (colloquially referred to as green certificates) and the obligation of sellers *ex officio* to

purchase electricity produced from RES. The legal basis for this obligation includes, primarily, provisions of the following legal acts:

1. *Energy Act* of 10 April 1997 (Journal of Laws of 2006 No 89, item 625, as amended);
2. regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source* (Journal of Laws No 156, item 969, as amended);
3. regulation of the Minister of Economy of 4 May 2007 *on detailed conditions for the electricity system functioning* (Journal of Laws No 93, item 623, as amended);
4. regulation of the Minister of Economy of 2 July 2007 *on detailed principles for defining and calculating tariffs and principles for settlements in electric energy trading* (Journal of Laws No 128, item 895, as amended);
5. regulation of the Minister of Economy of 3 February 2009 *on granting public aid for investments involving construction or extension of units producing electricity or heat from renewable energy sources* (Journal of Laws No 21, item 112);
6. regulation of the Minister of Environment of 16 January 2008 *on detailed conditions for granting public aid of projects being investments related to renewable energy sources* (Journal of Laws No 14, item 89, as amended).

Additional support to the use of RES results from excise duty exemption available to certain entities based on the Act of 6 December 2008 *on excise duty* (Journal of Laws of 2009 No 3, item 11 as amended).

b) Are there any technology-specific targets?

The system of certificates of origin, the system based on the obligation to purchase electricity and the aforementioned exemptions are available to all entities, irrespective of the RES type, without setting technology-specific targets.

c) What are the concrete obligations/targets per year (per technology)?

In accordance with provisions of the *Energy Act*, the power company producing electricity or trading electricity and selling it to end users connected to the grid on the territory of the Republic of Poland is obliged to:

- 1) acquire the certificate of origin and present it to the President of the Energy Regulatory Office of Poland (ERO) for cancellation;

or

- 2) pay a substitution fee.

The substitution fee shall be calculated based on the formula:

$$Oz = Ozj \times (Eo - Eu)$$

where individual symbols have the following meaning:

- | | |
|-----|---|
| Oz | substitution fee expressed in Polish zloty (PLN), |
| Ozj | unit substitution fee of PLN 240 per 1 MWh, |
| Eo | the amount of electricity expressed in MWh which is based on the obligation to acquire and present certificates of origin for cancellation referred to in Article 9e(1) or Article 9o(1) in a given year, |

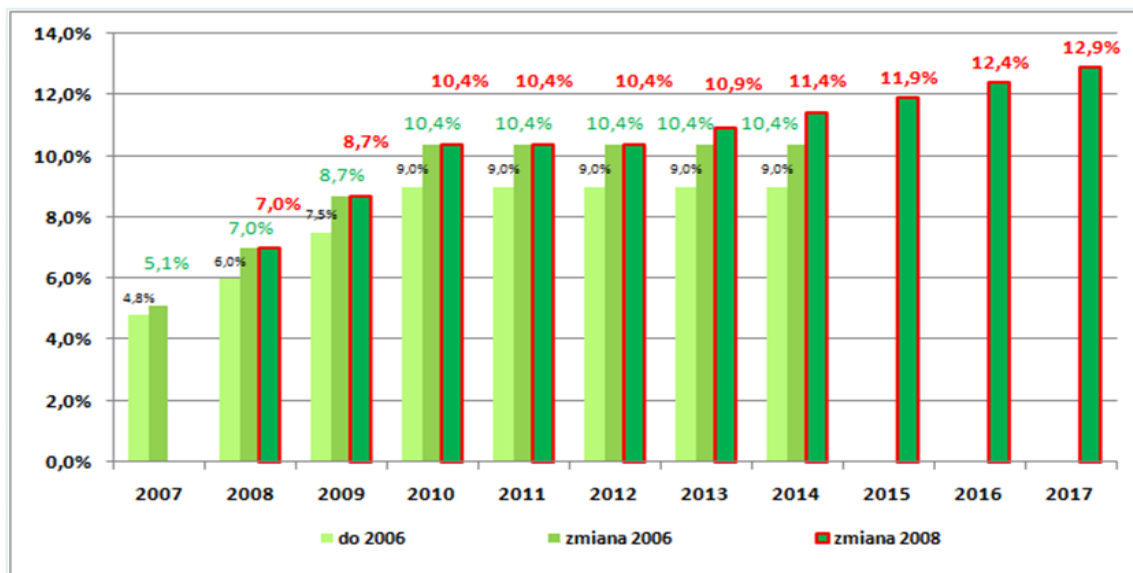
Eu the amount of electricity expressed in MWh which has been documented in the certificates of origin referred to in Article 9e(1) or Article 9o(1), which the entity obliged submitted for cancellation in a given year as referred to in Article 9e(14).

The unit substitution fee Ozj shall be subject to an annual indexation using the average annual total customer goods and services price index (i.e. inflation rate) for the calendar year preceding the year for which the substitution fee is calculated. Taking into account the above, in 2007 Ozj equalled PLN 242.40/MWh, in 2008 – PLN 248.46/MWh, in 2009 – PLN 258.89/MWh, while in 2010, it equals PLN 267.95/MWh (announcements of the President of the ERO).

From the point of view of the promotion of RES, of special importance are provisions in accordance to which the seller *ex officio* is obliged to purchase electricity produced from RES connected to the distribution or transmission grid on the area of operation of this seller, offered by power companies that obtained licence for production of this electricity. The purchase is made at the average price of sales of electricity in the previous calendar year, announced by the President of the ERO. Consequently, in 2009 the purchase price equalled not less than PLN 155.44/MWh, while in this year, the purchase price equals not less than PLN 197.21/MWh (announcement of the President of the ERO).

From the point of view of the project implementation, the fact that producers would benefit from the guaranteed long-term demand for property rights at least until 2017, which results from the regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source* (Journal of Laws No 156, item 969, as amended), is of significant importance. Changes to the obligation, introduced as a result of three subsequent amendments to the regulation, are presented below, in figure 4.

Figure 4. Required volume share of electricity arising from certificates of origin or substitution fee paid in total annual sales of electricity by a given company to end users



Source: Own work based on legal regulation: regulation of the Minister of Economy of 14 August 2008 on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source (Journal of Laws No 156, item 969, as amended)

do 2006 – until 2006

zmiana 2006 – change 2006

zmiana 2008 – change 2008

Modification of the existing system is being considered, in order to link the support to the RES technology type. In accordance with the plan, the modified system would take into account, *inter alia*, the investment rate of return, technical progress, including reduction of costs of the technology application and estimated effective useful life of the installation. At the same time, the modification would simplify the method of calculation of the substitution fee, while eliminating the risk of uncontrolled annual growth of this fee, resulting in an increase in electricity prices. The introduction of the guaranteed minimum income level to the support scheme would be an additional regulation ensuring more effective use of resources and elimination of the barrier in form of the investment risk. The analyses carried out proved that such regulation would significantly stimulate the investor's interest in RES technologies. The issue of stability and long-term character of the support scheme will be of particular importance from the point of view of the development of RES, in order to ensure investment security for entities interested in construction of production units.

d) Who has to fulfil the obligation?

The statutory support to producers of energy from RES includes:

1. The obligation to obtain certificates of origin for electricity from RES or co-generation and submit them for cancellation or to pay the substitute fee imposed on energy companies selling electricity to end users. The *Energy Act* provides a legal basis for this support.

2. Obligation to purchase energy produced from RES imposed on sellers *ex officio*. The *Energy Act* provides a legal basis for this support.
3. Obligation imposed on operators of energy grid to provide a priority access to the grid to energy from RES and co-generation. The *Energy Act* provides a legal basis for this support.
4. 50% reduction of the fee for connection to the grid paid to energy grid operators, determined based on actual outlays incurred for installing the connection for renewable energy sources with total installed power not exceeding 5 MW and cogeneration units with power not exceeding 1 MW. The *Energy Act* provides a legal basis for this support.
5. Exemption of energy produced from renewable sources from excise duty in case of its sale to end users. The *Act on excise duty* provides a legal basis for this support.
6. Special principles for commercial balancing of wind farms. The *Energy Act* and the *Operating and Maintenance Instructions of the Transmission Grid* of PSE Operator S.A. provide a legal basis for this support.

e) What is the consequence of non-fulfilment?

In accordance with provisions of the *Energy Act*, a financial penalty shall be imposed on anyone who does not comply with the obligations to acquire and present a certificate of origin for cancellation to the President of the ERO or does not pay the substitution fee, or does not comply with the obligation to purchase electricity or heat, or on anyone who submits to the President of the ERO applications for issuing certificate of origin or certificate of origin from co-generation containing the data or information inconsistent with the actual status. The financial penalty may not be lower than:

- 1) for non-compliance with the obligation referred to in Article 9a(1), the amount calculated in accordance with the following formula:

$$K_o = 1.3 \times (O_z - O_{zz}),$$

where individual symbols have the following meaning:

K_o – the minimal amount of the financial penalty expressed in Polish zloty (PLN),

O_z – the substitution fee calculated pursuant to Article 9a(2) and expressed in PLN,

O_{zz} – the substitute fee paid expressed in PLN;

- 2) for non-compliance with the obligation referred to in Article 9a(6), the amount calculated in accordance with the following formula:

$$K_{oz} = C_c \times (E_{oo} - E_{zo}),$$

where individual symbols have the following meaning:

K_{oz} – the minimal amount of the financial penalty expressed in Polish zloty (PLN),

C_c – the average electricity sale price in the preceding calendar year referred to in Article 23(2)(18)(b), expressed in PLN per 1 MWh,

E_{oo} – the amount of the electricity offered for purchase produced using renewable energy sources and expressed MWh,

E_{zo} – the amount of the electricity purchased produced using renewable energy sources in a given year, expressed in MWh.

f) Is there any mechanism to supervise fulfilment?

In accordance with provisions of the *Energy Act*, the President of the ERO is an authority supervising fulfilment of the aforementioned obligation and imposing the aforementioned penalties. Tasks of the President of the ERO also include cancellation, at the request of the energy company entitled to property rights arising from the certificate of origin, based on a decision, a given certificate of origin in whole or in a part. A certificate of origin cancelled by 31 March of a given calendar year is taken into account in the course of the verification of the compliance with the obligation in the previous calendar year.

g) Is there any mechanism to modify obligations/targets?

The mechanism to modify obligations and targets involves regular amendments to legal acts imposing relevant obligations in subsequent years and annual indexation of the substitution fee.

Financial support

a) What is the name and a short description of the scheme?

Market support to production and use of energy from renewable sources based on measures promoting economic effectiveness of production of such energy includes the statutory, obligatory system of cancellation of certificates of origin and trading in property rights arising therefrom (colloquially referred to as the green certificate system) and the statutory obligatory guarantee of sale of energy produced at prices at least equal average prices of conventional energy on the competitive market for the previous calendar year, as well as additional revenues of producers from sale of property rights arising from certificates of origin of energy produced by them. The financial support (basic) to RES is based on the aforementioned system of certificates of origin (colloquially referred to as green certificates) and the obligation to purchase electricity produced from RES. Additionally, in accordance with the *Energy Act*, producers of electricity from RES with total power not exceeding 5 MW are exempt from:

- stamp duty for issuing the licence;
- stamp duty for issuing the certificate of origin;
- the duty to pay annual fee to the state budget for obtaining the licence for energy production from RES.

The system of certificates of origin supporting the development of energy from renewable sources was introduced in Poland in 2005, in order to implement Directive 2001/77/EC *on the promotion of the electricity produced from renewable energy sources in the internal electricity market*. Basic legal provisions pertaining to the functioning of the system of issuing certificates of origin for electricity produced from renewable sources are included in the *Energy Act* and the regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source* (Journal of Laws No 156, item 969, as amended). The significance of certificates of origin increased after the *Act on excise duty* came into force on 1 March 2009. The document confirming cancellation of the certificate of origin of energy provides a basis for exemption from excise duty. This exemption applies to the amount of electricity produced from renewable sources, sold to end users by the energy company. It involves the reduction of excise duty due on electricity for the next settlement periods. Currently, excise duty equals PLN 20 per 1 MWh sold to an end user. As a result of this exemption, the value of a certificate of origin entitling to excise duty refund is higher than the

value of substitution fee due to NFO• iGW, which translates into its higher market price and thus, higher revenues of producers when selling property rights to certificates.

Additionally, producers of electricity from agricultural biogas are exempt from the duty to have a licence, but are obliged to register in the register kept by the President of the Agricultural Market Agency.

b) Is it a voluntary or obligatory scheme?

The system of certificates of origin (colloquially referred to as green certificates) and the obligation to purchase electricity produced from RES are obligatory schemes. The exemption from the obligation to obtain certificates of origin and submit them for cancellation to the President of the ERO results from the possibility to pay the substitution fee, while the obligation to purchase electricity produced from RES requires the energy company to have the relevant licence for electricity production.

c) Who manages the scheme?

The President of the ERO is an authority monitoring fulfilment of the obligation. In accordance with provisions of the *Energy Act*, a financial penalty is imposed by the President of the ERO on anyone who does not comply with the obligations to acquire and present a certificate of origin for cancellation to the President of the ERO or does not pay the substitution fee, or does not comply with the obligation to purchase electricity or heat, or on anyone who submits to the President of the ERO applications for issuing certificate of origin or certificate of origin from co-generation containing the data or information inconsistent with the actual status.

d) What are the measures taken to ensure availability of necessary budget/funding to achieve the national target?

Fulfilment of the obligation is the responsibility of obliged entities – sellers of electricity to end users, who – when calculating the price of electricity to end users – take into account the cost of fulfilment of obligations imposed by the Act.

e) How is long-term security and reliability addressed by the scheme?

Trading in property rights arising from certificates of origin, which are tradable and are a commodity that can be traded on the exchange, as mentioned above, is regulated by the Act of 26 October 2000 *on commodity exchanges* (Journal of Laws of 2010 No 48, item 284, as amended). Commodity Energy Exchange (*Towarowa Giełda Energii S.A.*), directly supervised by the Polish Financial Supervision Authority, as an entity operating a commodity exchange within the meaning of the Act *on commodity exchanges*, and arranging trading in property rights arising from certificates of origin on this exchange, established the Register of Certificates of Origin of energy produced from renewable energy sources. The principles for operations of the registration systems and recording certificates of origin constituting the confirmation of production of electricity from a renewable sources and resulting property rights are set forth in the *Regulations of the Register of Certificates of Origin* introduced by the Commodity Energy Exchange (*Towarowa Giełda Energii S.A.*).

In order to participate in the system of certificates of origin, which is currently not only a basic measure to propose the use of energy from renewable sources, but also a separate and important part of the energy system, ensuring market support for the producer, the producer has to:

- become a member of the *Register of Certificates* on the Commodity Energy Exchange;

- become a member of the Commodity Energy Exchange (*Towarowa Giełda Energii, TGE*) or to be allowed to operate on Property Right Markets through another member of TGE – Brokerage Office;
- obtain a licence for energy production.

Producers of electricity from renewable energy sources with total power not exceeding 5 MW are exempt from the fee for registration in the *Register of Certificates of Origin* and for introducing changes to the register as a result of selling property rights to certificates of origin obtained from the President of the ERO.

f) Is the scheme periodically revised? What kind of feed-back or adjustment mechanism exists? How has the scheme been optimised so far?

Except for annual indexation of the substitution fee, there is no mechanism to modify obligations/targets. However, it should be emphasised that the Ministry of Economy is analysing opportunities and the need for modifying RES supporting schemes as a part of its work.

g) Does support differ according to technology?

The system of certificates of origin and the system based on the obligation to purchase electricity, which apply to all RES, do not differ according to technology.

h) What are the expected impacts in terms of energy production?

It is expected that the implementation of the scheme would result in increasing production of electricity from RES which would support achievements of targets set in the EU legislation.

i) Is support conditional on meeting energy efficiency criteria?

Support is not conditional on meeting energy efficiency criteria. However, taking into account fulfilment of the obligation, the annual sales of electricity by the company selling electricity to end user is taken into account, due to which an indirect drop in sales (as a result of measures supporting efficiency) impacts the range of the obligation.

j) Is it an existing measure? Could you please indicate national legislation regulating it?

k) Is this a planned scheme? When would it be operational?

As mentioned above, the legislation regulating the support scheme includes:

1. *Energy Act* of 10 April 1997 (Journal of Laws of 2006 No 89, item 625, as amended);
2. regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source* (Journal of Laws No 156, item 969, as amended);
3. regulation of the Minister of Economy of 4 May 2007 *on detailed conditions for the electricity system functioning* (Journal of Laws No 93, item 623, as amended);
4. regulation of the Minister of Economy of 2 July 2007 *on detailed principles for defining and calculating tariffs and principles for settlements in electric energy trading* (Journal of Laws No 128, item 895, as amended).

The new modified support scheme is planned upon the *Act on energy from renewable sources* coming into force.

l) What start and end dates (duration) are set for the whole scheme?

Taking into account requirements of the *Energy Act*, the regulation of the Minister of Economy of 14 August 2008 has imposed the obligation to acquire certificates of origin and submit them to the President of the ERO for cancellation or to pay the substitution fee during the period from 2008 to 2017.

The new system that would be proposed upon the *Act on energy from renewable sources* coming into force will ensure long-term support to investors and eliminate barriers related to investment risk. The analysis is carried out to make the size and duration of the support dependant on the technology and date of construction of the RES installation, in order to ensure, first of all, construction of new RES production units.

m) Are there maximum or minimum sizes of system which are eligible?

The existing system includes all licensed RES, without making the support dependant on their size (maximum or minimum).

The planned system will differentiate the support to units producing electricity from RES depending on the technology used and date of construction of the RES installation, in order to ensure, first of all, construction of new RES production units.

n) Is it possible for the same project to be supported by more than one support measure? Which measures can be cumulated?

It is possible for the same project to be supported by more than one support measure (refers to the system of certificates of origin and certificates of origin from co-generation).

Additionally, the system support can be cumulated with direct support involving grants from operational programmes, grants from funds and preferential loans.

This support is described in answers to specific questions.

o) Are there regional/local schemes? If so, please detail using the same criteria.

The system of certificates of origin and the system based on the obligation to purchase electricity, which apply to all RES, are neither regional nor local, but national schemes.

When analysing the financial support, it should be additionally emphasised that as far as the support to the use of energy from renewable sources is concerned, the producer can also obtain public aid for investments involving construction or extension of units producing electricity or heat from renewable energy sources, set forth in the regulation of the Minister of Economy of 3 February 2009 *on granting public aid for investments involving construction or extension of units producing electricity or heat from renewable energy sources* (Journal of Laws No 21, item 112).

Answers to specific questions for financial support for investment:

a) What is granted by the scheme? (subsidies, capital grants, low interest loans, tax exemption or reduction, tax refunds)

Key mechanisms of financial support in the area of investments in renewable energy sources include investment subsidies, low interest investment loans and credits.

Major financial resources for supporting investments in renewable energy are guaranteed within systems financed from funds of the European Union, in particular within the Operational Programme *Infrastructure and Environment* (OPI&E) implemented with the participation of the Minister of Economy, regional operational programmes (ROP) managed by local governments of voivodships as well as within activities and financial support of NFO• iGW and WFO• iGW (see table 5).

On the national level, the support within OPI&E is provided based on assumptions included in Priority IX *Environment-friendly energy infrastructure and energy efficiency*. In accordance with the general description setting forth the objectives of Priority IX, support will be granted for initiatives aimed at increasing the share of primary energy use in the energy sector (i.e. increasing the efficiency of production and decreasing losses in the process of transmission and distribution of energy), and for decreasing the energy intensity of the public sector, as well as increasing the amount of energy produced from renewable sources, including biofuels. The aforementioned mechanisms are strengthened by the system of substitution fees and penalties imposed on energy companies for non-fulfilment of obligations related to a need to acquire certificates of origin and to submit them for cancellation to the President of the ERO. Funds from substitution fees and penalties are collected in a sub-fund of NFO• iGW, and then are allocated for financial support to investments in renewable energy sources and co-generation.

Additionally, it should be emphasised that *Action Plan for the years 2009-2012* constituting Appendix no 3 to the *Energy Policy of Poland until 2030*, includes specific measures aimed at fulfilment of assumptions of the development of renewable energy sources, *inter alia*, by *Stimulating the development of the Polish industry which manufactures machinery for the renewable energy sector, also with the use of European funds*.

Works within the aforementioned measure will include:

- *analysing the possibilities to develop production of machinery for renewable energy sector in Poland both for domestic purposes and for export;*
- *exploration of possibilities and creating conditions for investments in renewable energy sources abroad by Polish companies, in particular in developing countries;*
- *supporting the production of machinery for the renewable energy sector from the funds provided by Operational Programme Infrastructure and Environment for the years 2007-2013 and Regional Operational Programmes;*
- *analysing the possibilities to introduce a support system for enterprises pursuing new investment projects in production of machinery for renewable energy production and introducing potential amendments to Polish legislation;*
- *supporting research into new technologies used to produce fuels and energy from renewable sources, taking into account technologies ensuring stability of power supply into the power system, including implementation of tasks stemming from the strategic research and development programme “Advanced Technologies for Energy Generation” by the National Centre for Research and Development (NCBiR).*

Work in this respect is going to be completed by the end of 2012.

Additionally, *Action Plan for the years 2009-2012* provides for *Evaluation of plausibility of using the existing damming structures owned by the State Treasury to generate power by way of taking their inventory, establishing their framework environmental impact, and devising the rules of making them available*, which involves the following activities:

- *taking inventory of damming structures owned by the State Treasury according to criteria devised by the Minister in charge of water economy in cooperation with the Minister in charge of the environment and the Minister in charge of rural development;*
- *analysis of the compensated environmental impact of water power plants (evaluation of existing hydrotechnical facilities, existing and planned nature conservation forms, the condition of the fish population);*

- *selecting the existing damming structures owned by the Treasury which – due to the interests of the Treasury and justified interests of water users – may be used for power generation purposes by entities exercising water ownership;*
- *devising the rules of making the existing damming structures owned by the Treasury available for power generation purposes to entities other than those exercising water ownership.*

Work in this respect is going to be completed by the end of 2012.

b) Who can benefit from this scheme? Is it specified for certain technologies?

Within Priority IX of OPI&E, support can be provided to initiatives aimed, *inter alia*, in particular at:

- increasing the share of primary energy use in the energy sector (e.g. highly efficient co-generation – measure 9.1 *Highly efficient energy generation*;
- increasing production of energy from renewable sources – measure 9.4 *Production of energy from renewable sources*.

Individual activities cover various technologies of production of electricity from RES.

In case of measure 9.1, beneficiaries may include: entrepreneurs, local government units and their groups – unions, associations and federations of local government units, entities providing public services within fulfilment of own obligations of local government units, churches, church legal persons and their associations, and other religious associations.

In case of measure 9.4, beneficiaries may include: entrepreneurs, local government units and their groups – unions, associations and federations of local government units, entities providing public services within fulfilment of own obligations of local government units.

A beneficiary (of measure 9.1 or 9.4) will receive payment from the budget of the European funds in a part reimbursed from the EU budget as reimbursement of incurred and documented eligible costs or as an advance for future eligible costs. The possibility to provide co-financing in form of an advance and the amount of potential advance are considered on an individual basis by the implementing institution, at the stage of concluding the co-financing contract with the beneficiary. When setting forth the principles for granting advances, the implementing institution will follow the regulation of the Minister of Regional Development on outlays related to the implementation of operational programmes, guidelines of the Minister of Regional Development on making payments and settlements, guidelines of the Minister of Regional Development with respect to reporting, and will consider general premises included in the template co-financing contract.

Additionally, providing support for the development of industry for renewable energy sources is planned (measure 10.3). This support is targeted at construction of state-of-the-art technology lines manufacturing equipment used in production of electricity and heat from renewable sources, as well as biocomponents and biofuels.

Meanwhile, in case of ROPs, the group of beneficiaries of support to the use of renewable energy is much larger than in the OPI&E. Beneficiaries of support in ROP include:

- local government units, their associations and unions;
- organisational units of local government units with legal personality;
- entities providing public services at the order to local government units, a majority of shares in which is held by the local government;

- entities, appointed in accordance with the *Public Procurement Act*, providing public services based on the agreement concluded with local government units for the provision of services in a given field;
- National Forestry – *National Forests* and its organisational units;
- companies, including energy companies carrying out business activities with respect to production, processing, transmission and distribution of electricity, heat and gaseous fuels;
- health care centres operating within the public health care system – bound by the contract with the National Health Fund (NFZ);
- national and landscape parks;
- scientific units;
- cultural institutions;
- universities;
- governmental administration bodies;
- legal and natural persons being authorities running schools and centres;
- public finance units with legal personality;
- churches and religious association, as well as legal persons of churches and religious association;
- non-governmental organisations.

c) Are applications continuously received and granted or are there periodical calls? If periodical, could you please describe the frequency and conditions?

In order to achieve targets set in Priorities, using aid funds from the budget of the European Union is planned, the amount of which is known, as well as of funds from the national budget. Taking into account national resources, their allocation to tasks will depend on their availability in the state budget. Projects qualified for the implementation will be selected in a competition procedure, publicly announced by the implementing institution. A part of applications are received continuously throughout the year and a part – throughout certain periods.

Resources from the budget allocated for investments supporting RES are to be used not only for the purposes of investment co-financing and subsidies for energy production, but also for the administrative part of the programme.

Specific questions for tradable certificates understood as certificates of origin

a) Is there an obliged share of electricity produced from renewable sources in the total supply?

In accordance with the regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source*, the obligation to acquire certificates of origin and submit them to the President of the ERO for cancellation or to pay the substitution fee arising from the *Energy Act* are considered fulfilled, when in a given year the share of the amount of

total electricity arising from certificates of origin or substitution fee paid in total annual sales of electricity by a given company to end users equals not less than:

- 1) 7.0% – in 2008;
- 2) 8.7% – in 2009;
- 3) 10.4% – in 2010;
- 4) 10.4% – in 2011;
- 5) 10.4% – in 2012;
- 6) 10.9% – in 2013;
- 7) 11.4% – in 2014;
- 8) 11.9% – in 2015;
- 9) 12.4% – in 2016;
- 10) 12.9% – in 2017.

b) Who has the obligation?

In accordance with provisions of the *Energy Act*, this obligation is imposed on a power company producing electricity or trading electricity and selling it to end users connected to the grid on the territory of the Republic of Poland.

c) Are there technology-specific bands?

In the system of certificates of origin there are no technology-specific bands.

d) Which technologies are covered by the scheme?

In accordance with the definition included in the *Energy Act*, renewable energy source is a source which uses wind power, solar power, geothermal energy, sea wave, sea current and tidal energy, or energy obtained from the fall of rivers and biomass energy, energy from landfill biogas as well as biogas produced in the process of sewage disposal and treatment or decomposition of plant and animal remains. At the same time, in accordance with the regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source*, energy produced from renewable energy sources includes, irrespective of the source power:

- 1) electricity or heat produced in particular from:
 - a) hydropower plants or wind power plants,
 - b) sources generating energy from biomass and biogas,
 - c) solar photovoltaic cells and heat-producing collectors,
 - d) geothermal sources,
 - e) co-generation systems,
 - f) hybrid RES technology systems;
- 2) part of energy recovered from thermal processing of municipal waste in accordance with legislation issued based on Article 44(8) and 9 of the Act of 27 April 2001 *on waste* (Journal of Laws of 2007 No 39, item 251 as amended).

e) Is international trade in certificates allowed? What are the conditions?

The legislation does not regulate potential international trade in certificates. Work on regulations implementing Directive 2009/28/EC are currently in progress. Suitable provisions will be included in the *Act on energy from renewable sources* that is going to be adopted in 2011.

f) Is there a floor bottom price?

The existing support scheme does not determine a floor bottom price. Property rights arising from certificates of origin obtained are traded on market terms on the Commodity Energy Exchange.

Planned legislation will be aimed at including in the support scheme of changes in prices of electricity obtained on the competitive energy market.

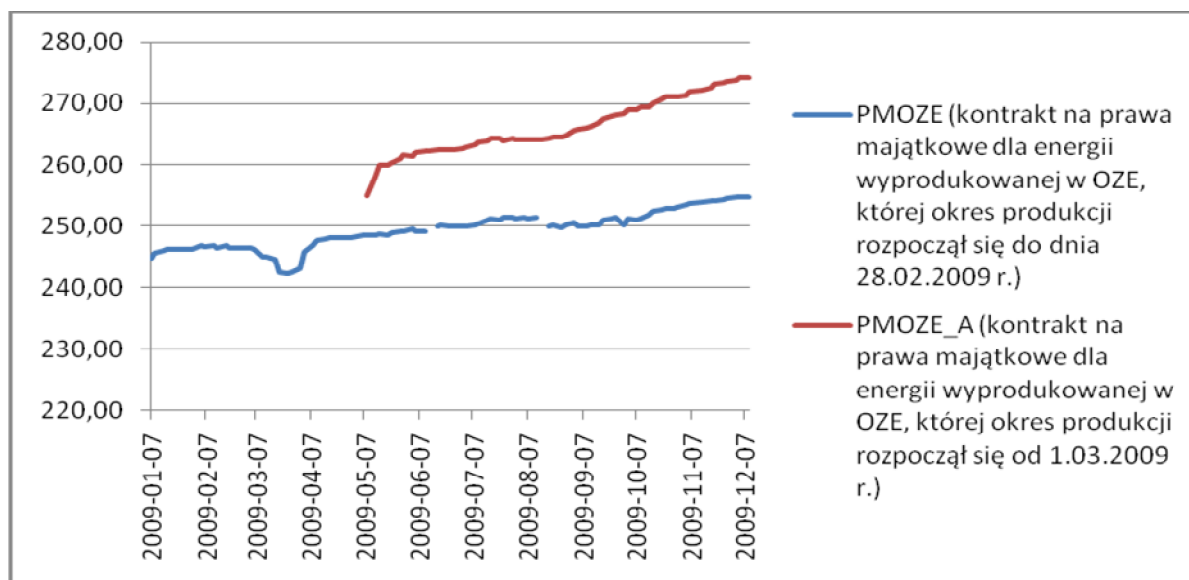
g) Is there a penalty for non-fulfilment?

In accordance with provisions of the *Energy Act*, a financial penalty shall be imposed by the President of the ERO on anyone who does not comply with the obligations to acquire and present a certificate of origin for cancellation to the President of the ERO or does not pay the substitution fee, or does not comply with the obligation to purchase electricity or heat, or on anyone who submits to the President of the ERO applications for issuing certificate of origin or certificate of origin from co-generation containing the data or information inconsistent with the actual status.

h) What is the average price for certificates? Is it made public? Where?

The price of property rights arising from certificates of origin is made public on the website of TGE SA. Results of RPM OZE TGE SA Session for 2009 are presented in summary 12. On the website of TGE SA. there are also all historical data (for the years 2005-2008).

Summary 12. Changes in prices of so-called green certificates traded on the exchange



Source: Own work based on the data of the Commodity Energy Exchange

PMOZE (kontrakt na prawa majątkowe ...) – PMOZE – contract for property rights for energy produced from RES, the production period of which started until 28 February 2009)

PMOZE_A (kontrakt na prawa majątkowe ...) – PMOZE_A – contract for property rights for energy produced from RES, the production period of which started on 01 March 2009)

i) What is the trading scheme for certificates?

In accordance with the *Energy Act*, property rights arising from certificates of origin are tradable and are a commodity traded on the exchange referred to in Article 2(2)(d) of the Act of 26 October 2000 *on commodity exchanges* (Journal of Laws of 2010 No 48, item 284, as amended), while the register of certificates of origin is kept by the entity operating the commodity exchange within the meaning of the aforementioned Act and arranging trading in property rights arising from certificates of origin on this exchange. In Poland, the only entity (as at the end of November 2009) satisfying these requirements is the Commodity Energy Exchange (*Towarowa Giełda Energii S.A., TGE S.A.*). Detailed principles for trading in property rights and types of listings on the market of property rights are available on the website of TGE S.A.

j) How long can a plant participate in the scheme?

A licensed producer of energy from RES can participate in the scheme for the whole period of production of electricity from RES.

Feed-in fixed tariffs

In Poland, there is no feed-in fixed tariff system (fixed tariffs), but only the system of certificates of origin and the system for purchase of electricity by sellers of electricity *ex officio*.

Feed-in premiums

In Poland, there is no feed-in premium system, but only the system of certificates of origin and the system for purchase of electricity by sellers of electricity *ex officio*.

Tendering

In Poland, tendering has not been introduced, but only the system of certificates of origin and the system for purchase of electricity by sellers of electricity *ex officio*.

4.4 Support schemes to promote the use of energy from renewable resources in heating and cooling applied by the Member State or a group of Member States

a) How are the support schemes for electricity from renewable energy sources adapted to encourage the use of CHP from renewable energy sources?

Provisions that support the development of the use of energy from renewable sources are included in the *Energy Act*. In the current legal status, the Act contains provisions transposing Directive 2001/77/EC on the promotion of the electricity produced from renewable energy sources in the internal electricity market.

A very general definition of *energy*, included in the Act, as any form of transformed energy, also includes heat and cold, although the definition of *heat* has also been introduced as thermal energy in hot water or steam or other carrying agents. The Act does not include the definition of *cooling*.

The *Energy Act* additionally includes the definition of *renewable energy source* as a source which uses wind power, solar power, geothermal energy, sea wave, sea current and tidal energy, or energy obtained from the fall of rivers and biomass energy, energy from landfill biogas as well as biogas produced in the process of sewage disposal and treatment or decomposition of plant and animal remains.

The *Energy Act* contains provisions determining the method of promotion of production of heat from renewable sources. In accordance with this provision: *An energy company trading in heat and selling that heat shall be obliged to purchase the heat offered generated using renewable energy sources connected to the grid and located on the territory of the Republic of Poland at the quantity not larger than the demand of the customers of that company connected to the same grid to which the renewable energy sources are connected, in the scope specified by the provisions issued pursuant to point (9).*

Additionally, the regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source* has been issued.

The *Energy Act* also provides for imposing the obligation to include the potential use of heat from renewable sources as a part of fulfilment of statutory planning obligations in the field of energy supply, i.e. drawing up community assumptions for the plans of heat, electricity and gas fuel supply.

No specific annual obligation levels or annual targets for the use of renewable energy in the transmission and distribution system or heat trading have been set in case of heat. These targets were set only indirectly, in provisions referring to “*the quantity not larger than the demand of the customers*” connected to the heating grid (*Energy Act*).

Provisions of the aforementioned regulation provide for the method of “*settlement*” of the obligation introduced by the Act. In accordance with these provisions, the obligation is

considered fulfilled, provided that heat offered was purchased in accordance with rules arising from the act and costs of purchase of this heat *do not result in an increase in heat prices or rates of fees for heat delivered to customers in a given year by more than the average annual consumer price index, in general, in the previous calendar year.*” Additionally, every heat unit sold from the district heating system to which the source of “renewable heat” is connected is equally encumbered with costs arising from the obligation to purchase this heat.

The obligation has to be fulfilled by every “energy company trading in heat and selling that heat” to end users. Provisions of the regulation also determine the method of fulfilment and settlement of the obligation to purchase heat from renewable sources, when more than one company is trading in heat and selling heat from the district heating grid. In such case, these companies fulfil the obligation proportionally to the share of each of them in the total sales of heat from a given grid.

In accordance with the *Energy Act*, in case of non-fulfilling the obligation to purchase heat from renewable energy sources, a financial penalty shall be imposed on the energy company. The penalty is imposed by the President of the ERO. The amount of the financial penalty may not exceed 15% of the revenue of the company penalized earned in the previous fiscal year and if the financial penalty is related to the activity conducted on the basis of a licence, the amount of the penalty may not exceed 15% of the revenue of the company penalised earned on the activity which is subject to the licence in the previous fiscal year. The scheme does not provide for mechanisms of supervision over the achievement of the target pertaining to heat from renewable sources. No mechanism to modify obligations/targets has been set.

The support scheme based on the investment incentive also provides for the possibility to simultaneously obtain – in addition to certificates of origin for renewable energy – so-called certificates of origin from co-generation, which also have a financial value (when producing renewable energy from co-generation). Consequently, production of energy from cogeneration is treated and reworded in a special way. Intensive work on the development of system solutions supporting production of energy in highly efficient co-generation units is currently in progress.

b) What support schemes are in place to encourage the use of district heating and cooling using renewable energy sources?

c) What support schemes are in place to encourage the use of small-scale heating and cooling from renewable energy sources?

d) What support schemes are in place to encourage the use of heating and cooling from renewable energy sources in industrial applications?

The range of financial support schemes in case of heating is very limited. Many of these mechanisms also apply to electricity (based on energy production in the co-generation process), due to which the financial support described below often refers not only to heating and cooling, but to electricity as well. As for the scheme based on the obligation to purchase heat from RES, the support is described in a part of the document on regulatory support.

In the area of heating and cooling, there is no support scheme based on the obligation to cancel property rights arising from certificates of origin (commonly referred to as green certificates), involving guaranteeing purchase price or any premiums. In accordance with provisions of the regulation of the Minister of Economy of 14 August 2008 *on detailed scope of obligations in respect to obtaining certificates of origin and submitting them for cancellation, payment of a substitution fee, purchase of electricity and heat from renewable energy sources, as well as the obligation to confirm the data on the amount of electricity produced from a renewable energy source*, a heat supplier is certain that the price of heat from renewable energy source cannot have an adverse impact on prices of heat offered from

the heat grid to which the renewable energy source is connected. The system is obligatory, but there is no full guarantee of its effective implementation, due to requirements of the aforementioned regulation.

In this case, there is no explicit implementing institution. In theory, it could be the President of the ERO due to his authorisation with respect to approving heat tariffs. In the process of approval of tariffs, the President of the ERO analyses operating costs of energy companies, and thus the impact of costs resulting from the obligation to purchase heat from renewable sources on meeting requirements set in the aforementioned legislation. However, the tariff system does not provide for technology-specific approach to costs of renewable energy.

Typical mechanisms of financial support exist only in the area of investments in renewable energy sources. In our situation (heating and cooling), they include mainly:

- investment subsidies;
- investment loans and credits bearing low interest rate.

Major financial resources for supporting investments in renewable energy are guaranteed within systems financed from funds of the European Union, in particular within the Operational Programme *Infrastructure and Environment* (OPI&E) implemented with the participation of the Minister of Economy and regional operational programmes (ROP) managed by local governments of voivodships.

On the national level, the support within OPI&E is provided based on assumptions included in Priority IX *Environment-friendly energy infrastructure and energy efficiency*. In accordance with the general description setting forth the objectives of Priority IX, support will be granted for initiatives aimed at increasing the share of primary energy use in the energy sector (i.e. increasing the efficiency of production and decreasing losses in the process of transmission and distribution of energy), and for decreasing the energy intensity of the public sector, as well as increasing the amount of energy produced from renewable sources, including biofuels. Only the projects will be implemented that have explicit positive impact on the environment involving ensuring significant quantified energy savings or allowing for an increase in the use of renewable energy sources.

In particular, support can be obtained by initiatives aimed, *inter alia*, at increasing the share of primary energy use in the energy sector (e.g. highly efficient co-generation) – measure 9.1 and increasing the amount of energy produced from renewable sources – measure 9.4. A short description of the scope of activities is presented below.

The support scheme within measures of the Priority is voluntary.

In case of measure 9.1 *Highly efficient energy generation*:

- the managing authority is the Ministry of Regional Development, Department for Coordination of Infrastructural Programmes, Department of Support for Infrastructural Programmes;
- the intermediate body is the Ministry of Economy, Department of European Funds;
- the implementing institution is the National Fund for Environmental Protection and Water Management (*Narodowy Fundusz Ochrony •rodowiska i Gospodarki Wodnej*);
- the certifying authority is the Ministry of Regional Development, Certifying Authority Department.

Meanwhile, in case of measure 9.4 *Production of energy from renewable sources*:

- the managing authority is the Ministry of Regional Development, Department for Coordination of Infrastructural Programmes, Department of Support for Infrastructural Programmes;
- the intermediate body is the Ministry of Economy, Department of European Funds;
- the intermediate body is the Ministry of Economy, Department of European Funds;
- the certifying authority is the Ministry of Regional Development, Certifying Authority Department.

In order to achieve targets set in Priorities, using aid funds from the budget of the European Union is planned, the amount of which is known, as well as of funds from the national budget. Taking into account national resources, their allocation to tasks will depend on their availability in the state budget. Projects qualified for the implementation will be selected in a competition procedure, publicly announced by the implementing institution.

Measure 9.4 in the heating sector involves providing support to investments involving construction of heat-producing units based on renewable sources. The programme does not mention supporting investments pertaining to cold production. The support will include projects pertaining to construction or extension of capacity, construction or extension of heat producing units based on geothermal or solar energy. The measure will also include investments related to energy production from co-generation based on renewable sources, in systems that do not satisfy criteria of highly efficient co-generation. This measure will provide support only to construction of units with co-generation rate (electricity power to heat power) over 0.45. Projects related to co-generation within competition will be assessed in the group of projects pertaining to electricity production, and only the data on electricity are going to be taken into account in their assessment. Investments related to energy production from highly efficient co-generation from renewable sources will be carried out within the framework of measure 9.1, which excludes potential support to:

- technologies of co-burning of fossil fuels and biomass or biogas;
- construction or reconstruction of energy facilities burning municipal waste (to be supported within measure 2.1).

The support will be provided to projects with minimum value of PLN 20 million with the exception of projects related to the production of electricity from biomass or biogas, in case of which the minimum project value is PLN 10 million. The maximum co-financing share is to be determined in accordance with principles for providing public aid set forth in the regulation of the Ministers of Economy of 3 February 2009 *on granting public aid for investments involving construction or extension of units producing electricity or heat at renewable energy sources*. The maximum amount of support cannot exceed PLN 40 million.

Beneficiaries may include: entrepreneurs, local government units and their groups – unions, associations and federations of local government units, entities providing public services within fulfilment of own obligations of local government units, churches, church legal persons and their associations, and other religious associations.

The Programme is complementary to other measures being a part of, *inter alia*:

- Regional Operational Programmes that will provide support for projects involving construction, extension and modernisation of the infrastructure used for production and transmission of renewable energy and projects related to production of energy from renewable sources with the value of up to PLN 20 million;

- *Rural Development Programme* that will provide support with respect to production or distribution of energy from renewable energy sources in localities in rural communities, rural and urban communities and localities of less than 5,000 thousand inhabitants in urban communities;
- *OP Innovative Economy* that will provide support to entrepreneurs with respect to innovative RES technologies for new investments in the manufacturing and service sectors. The differentiation criterion is the level of innovation of the project measured by time of its global application (3 years) or dissemination level of a given technology in the industry all over the world.
- *OP Infrastructure and Environment*:
 - Priority II, measure 2.1 – including support for investments pertaining to municipal waste burning with energy recovery;
 - Priority IV – including the implementation of projects supporting enterprises with respect to air protection (at fuel burning facilities), excluding investments involving construction of energy producing units only from renewable sources and highly efficient co-generation.

Measure 9.4 is, to some extent, related to the area covered by measure 9.1 that is focused on supporting highly efficient energy generation. The measure provides for supporting investments involving construction and reconstruction of energy producing units from co-generation, satisfying the criteria of highly efficient co-generation. The measure will support projects related to production of energy from co-generation from renewable and non-renewable sources. The measure does not include support for construction and modernisation of heat sources at heating plants, but a subsidy for the transformation of such units in co-generation units can be obtained. The Programme is complementary to measures within regional operational projects, in case of which the value of the project involving construction of small and medium electricity and heat producing units from co-generation equals less than PLN 10 million, while for projects related to energy production from co-generation from renewable energy sources at areas covered by RDP, its value equals from PLN 3 million to PLN 10 million. In case of this measure, beneficiaries may include entrepreneurs, local government units and their groups – unions, associations and federations of local government units, entities providing public services within fulfilment of own obligations of local government units. The minimum project value is PLN 10 million, the maximum support value equals PLN 30 million and the maximum co-financing level is to be consistent with maximum level of state aid set in the programme that was determined by the regulation of the Minister of Economy of 26 January 2009 *on granting public aid for investments involving construction or reconstruction of highly efficient energy producing units*.

A beneficiary of measures 9.1 and 9.4 will receive a payment from the budget of European funds in a part reimbursed from the EU budget as reimbursement of incurred and documented eligible costs or as an advance for future eligible costs. The possibility to provide co-financing in form of an advance and the amount of potential advance are considered on an individual basis by the implementing institution, at the stage of concluding the co-financing contract with the beneficiary. When setting forth the principles for granting advances, the implementing institution will follow the regulation of the Minister of Regional Development *on outlays related to the implementation of operational programmes*, guidelines of the Minister of Regional Development on making payments and settlements, guidelines of the Minister of Regional Development with respect to reporting, and will consider general premises included in the template co-financing contract.

Additionally, providing support for the development of industry for renewable energy sources is planned (measure 10.3). This support is targeted at construction of state-of-the-art technology lines manufacturing equipment used in production of electricity and heat from renewable sources, as well as biocomponents and biofuels.

Support for the development of the use of renewable energy in heating is also provided by Regional Operational Programmes, established on the voivodship level within the whole scheme.

The name and the scope of the priority related to supporting the development of renewable energy have been determined in different ways in each voivodship. Tasks to be supported include, *inter alia*:

- construction and reconstruction of heating facilities, and their transformation into co-generation installation, including using renewable energy sources;
- construction and reconstruction of existing coal-fuelled heating plants, and their transformation into plants using renewable fuels;
- use of solar and geothermal energy.

The scope of projects identified within ROPs to be supported in the area of the use of renewable energy in heating is not uniform. The level of resources and financial support is also inconsistent or inadequate taking into account expectations, and often insufficient. Applications for co-financing from Regional Operational Programmes are selected in the competition procedure in form of a closed competition. Managing authorities of ROP are voivodship authorities operating in practice through responsible organisational units within Marshal Offices.

Tasks within ROP are monitoring by Monitoring Committees comprising various stockholders representing managing authorities and state bodies participating in the implementation of operational programmes, local governments, non-governmental authorities, employer and employee organisations, etc.

Programmes of support for investments related to the use of renewable energy are complementary, taking into account rules and expected deliverables and scope, with relevant Priorities of the Operational Programme *Infrastructure and Environment*.

Meanwhile, in case of ROPs, the group of beneficiaries of support to the use of renewable energy is much larger than in the OPI&E. Beneficiaries of support in ROP include:

- local government units, their associations and unions;
- organisational units of local government units with legal personality;
- entities providing public services at the order to local government units, a majority of shares in which is held by the local government;
- entities, appointed in accordance with the *Public Procurement Act*, providing public services based on the agreement concluded with local government units for the provision of services in a given field;
- National Forestry – *National Forests* and its organisational units;
- companies, including energy companies carrying out business activities with respect to production, processing, transmission and distribution of electricity, heat and gaseous fuels;

- health care centres operating within the public health care system – bound by the contract with the National Health Fund (NFZ);
- national and landscape parks;
- scientific units;
- cultural institutions;
- universities;
- governmental administration bodies;
- legal and natural persons being authorities running schools and centres;
- public finance units with legal personality;
- churches and religious association, as well as legal persons of churches and religious association;
- non-governmental organisations.

Additionally, a possibility to obtain co-financing for the investments from national funds in form of preferential loans and borrowings, and subsidies from the National Fund for Environmental Protection and Water Management and the voivodship funds for environmental protection and water management is an important factor supporting the development of renewable energy.

As a part of support for projects related to the use of renewable energy, NFO•iGW launched the programme of support for investments involving the use of renewable energy and co-generation of electricity and heat titled *Program for investments in the field of renewable energy sources and highly efficient cogeneration*. The value of the programme equals PLN 1.5 billion to be used in the years 2009-2012. The programme is to support investments in this field by granting preferential investment loans to investors bearing fixed interest rate of 6% for up to 75% of eligible costs for a period of 15 years with possible write-off of a part of the loan after satisfying conditions set forth in the contract. The programme will provide support to investments in renewable energy sources in a few dimensions:

- Renewable Energy Sources 1 (RES 1) – for projects with the value up to PLN 10 million processed directly by NFO•iGW;
- Renewable Energy Sources 2 (RES 2) – for investments with the value from PLN 1 to 10 million – supported by NFO•iGW, but in cooperation and with direct beneficiary handling by voivodship funds for environmental protection and water management. The budget has been set at PLN 560 million and the implementation period – until the end of 2011;
- Renewable Energy Sources 3 (RES 3) – for natural persons and housing cooperatives investing in projects (e.g. solar panels) with the value not exceeding PLN 1 million. Co-financing can be obtained through selected commercial banks cooperating with NFO•iGW.

RES 1 programme includes support for the following projects:

- heat generation from biomass (dispersed sources with the power below 20 MWt);
- electricity and heat co-generation from biomass (dispersed sources with the power below 3 MWe);

- electricity and/or heat generation from biogas produced in the sewage disposal and treatment or decomposition of plant and animal remains;
- wind power plants with the power below 10 MWe;
- energy production from geothermal waters;
- hydro power plants with the power below 5 MWe;
- highly efficient co-generation without the use of biomass.

It is expected that as a result of the programme, the production capacity of electricity from RES installations launched from the support would reach 300 MWe, and in co-generation – 50 MWe, with electricity production achieving 1000 and 200 GWh/year, respectively. No target for heat has been set in case of co-generation.

RES 2 programme includes support for the following projects:

- heat generation from biomass (dispersed sources with the power below 20 MWt);
- electricity and heat co-generation from biomass (dispersed sources with the power below 3 MWe);
- electricity and/or heat generation from biogas produced in the sewage disposal and treatment or decomposition of plant and animal remains;
- wind power plants with the power below 10 MWe;
- energy production from geothermal waters;
- hydro power plants with the power below 5 MWe;
- highly efficient co-generation without the use of biomass;
- use of heat pumps in heating, technology and industrial installations;
- production of electricity in photovoltaic installations;
- production of heat in solar installations.

In case of this programme, achieving total power from RES and co-generation of 120 MWe with electricity production of 330 GWh/year from RES and 60 GWh/year from co-generation has been assumed. Realisation rates for heating target have not been set.

RES 3 programme includes support for purchase and installation of solar panels for hot water heating in buildings assigned or used for residential purposes. Effects of projects cannot be used in business activities.

The aforementioned part includes providing co-financing for partial repayment of principal of bank loans allocated for purchase and installation of solar panels, for natural persons and housing cooperatives. Co-financing will be provided in form of subsidies for up to 45% of the principal of the bank loan used for financing eligible costs of the project.

It is expected that as a result of the programme, solar panels of about 200,000 m² would be installed, which would allow for heat production of about 356,000 GJ/year. Energy use of geothermal resources (*Energetyczne wykorzystanie zasobów geotermalnych*) is another important financial priority programme of NFO•iGW. The programme is targeted at environmental studies related to exploration and identification of thermal water deposits for the purposes of their use for energy production. The programme will be implemented starting from 31 December 2013. The objective achievement ratio is the total depth of boreholes drilled in order to explore thermal water resources [m] – 12,000. Beneficiaries may include

entities entitled to implement projects involving exploration and examination of deposits of mineral, i.e. holding the licence issued by the Minister of the Environment for carrying out these activities based on provisions of the *Geological and Mining Act* of 4 February 1994 (Journal of Laws of 2005 No 228, item 1947, as amended).

It should be added that there are other support schemes on the level of voivodship, poviast or community funds for environmental protection with local size and number, application and expected results.

Future measures with respect to the use of local heating and cooling using renewable energy sources.

Priority for matters related to the development of the use of renewable energy sources in Poland is one of six primary directions of *Energy Policy of Poland until 2030* adopted by the Council of Ministers on 10 November 2009.

Action Plan for the years 2009-2012 constituting Appendix no 3 to the *Energy Policy of Poland until 2030*, includes specific measures aimed at fulfilment of assumptions of the development of renewable energy sources.

The implementation of tasks being a part of these measures is the responsibility of, inter alia, the minister in charge of economy, minister in charge of public finance, minister in charge of agriculture, minister in charge of environment, minister in charge of tertiary education, minister in charge of regional development, minister in charge of maritime economy, minister in charge of rural development, minister in charge of water management, minister in charge of State Treasury, President of the Government Legislation Centre, field maritime administration bodies, voivodship authorities, National Fund for Environmental Protection and Water Management and local government units.

From the point of view of ensuring suitable support for RES units, of special importance is measure 4.4 *Introducing additional support instruments encouraging more extensive production of heat and cold from renewable energy sources.*

Work within the aforementioned measure will be based on preparing the system to support the use of heat and cold from geothermal resources, heat pumps and solar energy (using solar panels) and analysing plausibility of implementation of additional support mechanisms for district heat and cold energy generated from renewable energy sources (e.g. green certificates from heat from RES). Work in this respect is going to be completed by the end of 2010.

4.5 Support schemes to promote the use of energy from renewable resources in transport applied by the Member State or a group of Member States

Currently, in Poland, the use of biocomponents is promoted by economic incentives, primarily the system of tax exemptions and relieves. In accordance with the Act of 6 December 2008 *on excise duty* (Journal of Laws of 2009 No 3, item 11 as amended), the excise duty rate is as follows:

- 1) products being a blend of petrol with biocomponents, containing more than 2% of biocomponents – excise duty rate for motor petrol (PLN 1,565/1,000 l) is reduced by PLN 1.565 per 1 litre of biocomponents added to this petrol, provided that the amount of excise duty may not be lower than PLN 10.00/1,000 l;

- 2) products being a blend of diesel oil with biocomponents, containing more than 2% of biocomponents – excise duty rate for diesel oils (PLN 1,048/1,000 l) is reduced by PLN 1.048 per 1 litre of biocomponents added to these diesel oils, provided that the amount of excise duty may not be lower than PLN 10/00/1,000 l;
- 3) biocomponents which is fuel in its own right used for fuelling internal combustion engines – PLN 10/1,000 l.

Meanwhile, in accordance with the *Corporate Income Tax Act* of 15 February 1992 (Journal of Laws No 54 item 654 as amended), producers of biocomponents may deduct from their tax for the fiscal years 2007-2014 the amount equal to 19% of the surplus of costs of biocomponent production by the cost of production of liquid fuels with the same calorific value (if such deduction cannot be made in a given fiscal year, non-deducted amount shall be deducted in subsequent fiscal years).

Additionally, biocomponents which is fuel in its own right have been excluded from the group of products subject to the fuel fee referred to in the Act of 27 October 1994 *on paid motorways and National Road Fund* (Journal of Laws of 2004 No 256, item 2571, as amended).

In order to provide additional support for production of biocomponents and liquid biofuels, the *Long-Term Project for the Promotion of Biofuels and Other Renewable Fuels for 2008-2014* (M.P. of 2007 No 53, item 607) have been drawn up, which ensures the implementation of Article 37 of the *Act on biocomponents and liquid biofuels*. The implementation of the arrangements it contains will improve the cost effectiveness of the process as a whole, from the cultivation of the agricultural raw materials through the production of biocomponents and the manufacture of liquid biofuels and liquid fuels blended with biocomponents, and ending with the use of the biofuels. These arrangements should also ensure a stable operating environment for all entities connected with the biocomponents and liquid biofuels market, which is essential for formulating long-term business plans and to the ability of businesses to raise capital for new investments.

The activities referred to in the *Long-Term Project* were divided into two groups: biocomponent and liquid biofuel production (designed to impact on the supply of biocomponents and liquid biofuels) and demand-focused activities.

On the demand side, fiscal arrangements will continue to play a very significant role in ensuring the cost-effectiveness of biocomponent and liquid biofuel production in comparison with fossil fuels. The Project contains the aforementioned arrangements concerning exemptions from excise duty, corporate income tax and the fuel fee.

The scheme also envisages investment aid (as regards the production of biocomponents and liquid fuels) from national public funds and EU funds. It is implemented as part of:

– Operational Programme *Infrastructure and Environment*

Investment projects involving, *inter alia*, the construction of plants producing biocomponents or liquid fuels are assisted under this programme. Projects of this type may be aided under measure 9.5 *Promotion of the production of biofuels from renewable sources*, the main objective of which is to increase biocomponent and biofuel production.

Measure 9.5 sets the minimum value of the project at PLN 20 million. The maximum level of investment co-financing under this measure equals PLN 30 million.

– Operational Programme *Innovative Economy*

Projects involving innovative technology for energy production can apply for co-financing under measure 4.4 of the Operational Programme *Innovative Economy*. The minimum value of a project in this measure has been set at PLN 8 million, and the maximum amount of a grant at PLN 40 million.

– Rural Development Programme 2007-2013

Under the *Rural Development Programme 2007-2013 (RDP)* aid to investments in biocomponent production is provided for under measure 123 “Increasing the Added Value of Basic Agricultural and Forestries Production.” This measure supports, *inter alia*, investments in the processing of agricultural products for energy purposes. The aid takes the form of a refund of part of the project’s eligible costs. The maximum amount of aid awarded to a given beneficiary during the Rural Development Programme is PLN 20 million. The amount of aid awarded for the implementation of a given project may not be lower than PLN 100,000.

The next category of measures forming part of the programme includes projects to increase demand for liquid biofuels. Measures of this type include, *inter alia*, the introduction of ecological public transport areas (in which public transport can be based solely on vehicles using ecological fuel, i.e. liquid biofuels, LPG and CNG, or powered by electric or hybrid engines) and the creation of a system of exemption from parking charges for vehicles which run on these fuels. The duration for which the vehicle is exempt from parking charges is assumed to be proportional to the total biocomponent content of the liquid biofuel used.

The tasks described above (designation of ecological public transport areas in towns and exemption from parking charges) lie within the remit of local authorities, and as such it is extremely important for them to play an active part in implementing the programme.

In addition, the programme provides for exemption from charges for pollution emitted to the environment for entities which use liquid biofuels in vehicles. In order to carry out this action, it was necessary to make appropriate amendments to the secondary regulations to the Environmental Act of 27 April 2001 (Journal of Laws of 2008 No 25, item 150, as amended). The regulation of the Council of Ministers of 14 October 2008 *on environmental charges* (Journal of Laws No 196, item 1217) includes a relief in environmental charges for burning fuels blended with biocomponents (this is because the table presenting unit charge for gases or dust emitted as a result of fuel use in internal combustion engines was supplemented with values allocated to liquid fuels and liquid biofuels containing fatty acid methyl esters or bioethanol). The relief in the charge for gases or dust emitted is proportional to the share of biocomponent in liquid fuel or liquid biofuel.

Another solution included in the programme is the introduction of preferential treatment in the context of public procurement for purchases of vehicles and machinery fitted with engines capable of using liquid biofuels. The objective of the measure is for entities required to apply the *Public Procurement Act* of 29 January 2004 (Journal of Laws 2010 No 113, item 759, as amended) to gradually replace vehicles which run purely on petroleum fuels by vehicles fitted with engines capable of using liquid biofuels.

Another very significant provision of the programme is the requirement that government administration gradually replace their vehicle fleets with vehicles capable of using liquid biofuels. These vehicles should be visibly marked so as to clearly demonstrate to the public that the government is using fuels of this type (with a view to promoting the use of liquid biofuels).

One of the main components of the programme is informational and educational activities on liquid biofuels, including, *inter alia*, the preparation and dissemination of reliable information on the conditions governing the use of liquid biofuels (which biofuel can be used in a given type of engine, what are the benefits to the environment and national oil consumption resulting from the use of liquid biofuels and the economic and financial benefits associated with the use of liquid biofuels) and the introduction of liquid biofuels as a subject in teaching programmes at all levels.

Informational and educational activities targeted on the general public, and on vehicle users in particular, are to include, *inter alia*, the incorporation into training for drivers of technical, economic and environmental aspects of liquid biofuel use in transport and the use of instruments such as advertising, press articles, television programmes and internet platforms to disseminate information on the benefits of using liquid biofuels.

Planned research and development activities to prioritise research into advanced biofuel production technologies form another important component of the programme.

Appropriate legislative measures have been taken to provide funding for actions to promote the use of liquid biofuels. The *Energy Act* of 10 April 1997 (Journal of Laws of 2006 No 89, item 625, as amended) contains provisions enabling funds accruing to the National Fund for Environmental Protection and Water Management by way of fines for non-compliance with provisions of the Act on *biocomponents and liquid biofuels* to be earmarked to support not just the production of biocomponents and liquid biofuels or other renewable fuels, but also measures to promote the use of these fuels.

a) What are the concrete obligations/targets per year (per fuel or technology)?

Pursuant to Article 24(1) of his *Act on biocomponents and liquid biofuels*, every three years, by 15 June of a given year, the Council of Ministers issues, in form of a regulation, National Indicative Target for the coming six years, taking into account the availability of raw materials and production capacity, the potential of the fuel industry and the relevant European Union legislation. In the regulation of the Council of Ministers of 15 June 2007 on *national indicative targets for 2008-2013* (Journal of Laws No 110, item 757), the following NITs have been set:

- 2008 – 3.45%;
- 2009 – 4.60%;
- 2010 – 5.75%;
- 2011 – 6.20%;
- 2012 – 6.65%;
- 2013 – 7.10%.

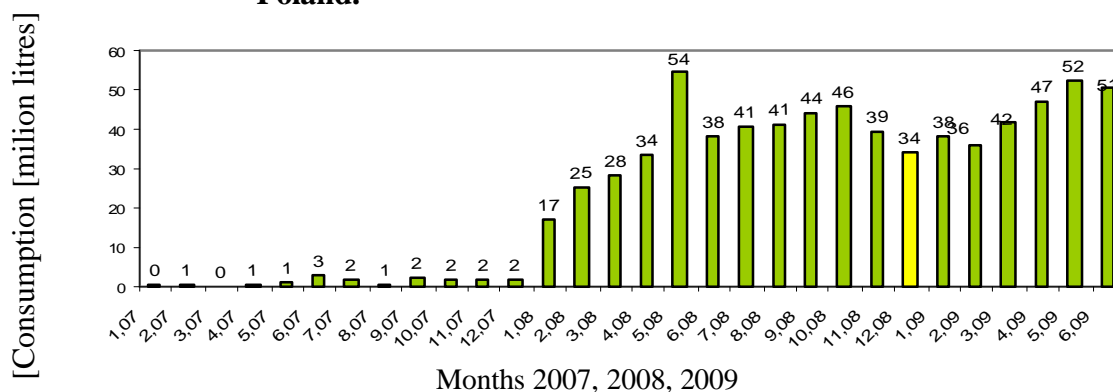
These NITs arise out of Poland's obligations as a member of the European Union. In the period 2008-2010, they will increase linearly from the target of 2.3% set for 2007 to the target of 5.75% specified in Directive 2003/30/EC for 2010. Thereafter, in the 2011-2013 period, National Indicative Targets will continue to increase linearly, albeit at a slower rate. It is assumed that the rate of increase of NITs during that period (and up to 2020) will make it possible to reach 10% in 2020. This is because in accordance with Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 *on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC*, in 2020 the obligatory share of renewable energy in transport is to equal 10%.

However, work is currently in progress on issuing new regulation of the Council of Ministers on National Indicative Targets setting new NIT levels than specified above.

b) Is there differentiation of the support according to fuel types or technologies? Is there any specific support to biofuels which meet the criteria of Article 21(2) of the Directive?

Currently, the support scheme is the same for all types of biocomponent and liquid biofuels. As a result of work on the implementation of Directive *on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC*, Polish legislation will include provisions in accordance to which the quantities of biofuels produced from wastes, residues, non-food cellulosic, and lingocellulosic material will be counted for National Indicative Targets twice. Additionally, to obtain support in any form, biofuels will have to satisfy sustainability criteria. The development of new advanced technologies for production of transport biofuels will also be an important factor.

Summary 11. Monthly use of esters as biocomponents blended with diesel oil in Poland.



Source: Ministry of Finance, 2009

4.6 Specific measures for the promotion of the use of energy from biomass

It is of particular importance to create proper conditions for investing in the establishment of plantations of energy crops, maintaining stable support mechanisms in the area of support for the establishment of energy crop plantations and continuous monitoring of mechanisms applied and their revision, when necessary.

The governmental document *Overall perspective on rural development (Zarys kierunków rozwoju obszarów wiejskich)* presents the concept of multifunctional development of rural areas, which assumes that socio-economic function of rural areas cannot be reduced only to production of agricultural raw materials (in case of agriculture) and ensuring space for this production (rural areas), but, to a growing extent, involves supply of other goods and fulfilment of functions that are significant from the point of view of society and ensuring sustainable social and economic development, taking into account natural, landscape, cultural, human capital and social resources. The aforementioned rural development directions include measures supporting the achievement of the aforementioned vision of rural areas. It is assumed that within the next at least a dozen or so years, the agricultural production space will be, inter alia, used for producing energy from renewable sources. The use of biomass for the purposes of energy production, to a great extent, has positively influenced and will have a positive impact on the improvement of farming and therefore, should be a material component of agricultural policy.

In 2007, Poland joined the integrated system of payments for energy crops,⁵ and in 2007, for the first time, the Agency for Restructuring and Modernisation of Agriculture applied the CARPE measure pertaining to financial support in the energy crop sector.

Additional aid from national fund has also been declared, up to 50% of costs of establishment of long-term plantations of energy crops at areas, where aid to the area of energy crops is available. Co-financing for energy crops have been also granted.⁶

The following are major legal acts supporting biomass production at agricultural areas:

- *Long-term Project for the Promotion of Biofuels or Other Renewable Fuels for 2008-2014* adopted by the Council of Ministers of 24 July 2007;
- Act of 26 January 2007 *on payments within the framework of direct support schemes* (Journal of Laws of 2008 No 170, item 1051, as amended);
- regulation of the Minister of Agriculture and Rural Development of 26 February 2009 *on yields of representative energy crops in 2009* (Journal of Laws No 36, item 283, as amended);
- regulation of the Minister of Agriculture and Rural Development of 6 May 2008 *amending the regulation on conditions to be fulfilled by organisational units that can be entrusted with carrying out checks with respect to payments to agricultural land and sugary payments, and energy crops allocated for energy purposes* (Journal of Laws No 90, item 552);
- regulation of the Minister of Agriculture and Rural Development of 12 March 2007 *on detailed conditions for approval of purchasing entities and first processing units, as well as conditions that should be fulfilled by these entities and units after obtaining the approval* (Journal of Laws No 46, item 304 as amended);
- regulation of the Minister of Agriculture and Rural Development of 12 March 2007 *on additional information that should be included in the application for approval of a purchasing entity and the first processing unit* (Journal of Laws No 46, item 305);

⁵ In November 2008, after the discussion on the Common Agricultural Policy, the European Union Council decided to abolish the system of payments to energy crops starting 2010.

⁶ “Long-term Project for the Promotion of Biofuels or Other Renewable Fuels for 2008-2014” adopted by the Council of Ministers of 24 July 2007, page 16.

- regulation of the Minister of Agriculture and Rural Development of 28 May 2008 *on deadlines for the applicants, purchasing entities and first processing units completing certain activities related to payments to energy crops* (Journal of Laws No 103, item 662);
- regulation of the Minister of Agriculture and Rural Development of 9 March 2009 *on types of plants subject to supplementary payments and detailed conditions and procedure to grant and make payments within the framework of direct support systems* (Journal of Laws No 40, item 326, as amended).

Additionally, it should be emphasised that the *Action Plan for the years 2009-2012* constituting Appendix no 3 to the *Energy Policy of Poland until 2030*, includes specific measures aimed at fulfilment of assumptions of the development of renewable energy sources, *inter alia*, by *Supporting the development of technologies and building installations to obtain renewable energy from waste comprised of biodegradable materials*.

Work within the aforementioned measure has been based on issuing the regulation *on detailed technical conditions for qualifying a part of energy recovered from heat treatment of municipal waste*.

4.6.1 Biomass supply: both domestic and trade

Biomass from forestry

In accordance with estimates of the Directorate General of the State Forests (in 2006), the total technical potential of wood from forestry, that could be used directly for energy purposes, equalled about 6.1 million m³ of wood, which is equivalent to 41.6 PJ of energy.

In 2006, *State Forests National Forest Holding (Państwowe Gospodarstwo Leśne Lasy Państwowe)* offered raw material for energy purposes in two grades: S4⁷ and M2⁸. In case of lack of required quantity of wooden raw material of S4 and M2 grades, consumers supplemented missing grades with S2a grade (so-called pulpwood) with parameters optimal for the pulp and paper industry. Due to a significant share of S2 category in total wooden raw materials obtained from state forests (about 10 million m³), it would be very difficult to estimate, even approximately, the wooden raw material allocated for energy purposes. Based on subsequent years, it could be concluded that in 2006, the level of sales of S2 grade equalled about 27,248 TJ.

The following assumptions for estimating supplies of biomass from forestry in 2006 were adopted:

- sales of wood for energy purposes by *State Forests National Forest Holding* equals about 5,117 thousand m³ (own calculation based on the data of the Central Statistical Office);
- tops, branches, bark and stems will account for 5% of wood obtained;
- cleanings and renovations allow to obtain 6 m³ from 1 ha of tree-covered area;
- calorific value of wet wood was assumed at 7 MJ/kg;
- due to good situation in the wood processing industry in 2006, much more waste reached the market than in previous years. It is estimated that about 5,960 thousand m³ were used for energy purposes;

⁷ In accordance with Polish Standard PN-92/D-95018, roundwood with diameters measured without bark: upper from 5 cm and above and lower – up to 24 cm. Depending on the quality and dimensions, wood is divided into four groups, including *inter alia*, S4 – firewood.

⁸ In accordance with Polish Standard PN-92/D-95019, roundwood with lower diameter measured without bark up to 5 cm and with bark – up to 7 cm.

– in 2006, about 270 thousand Mg of pellets were manufactured.⁹

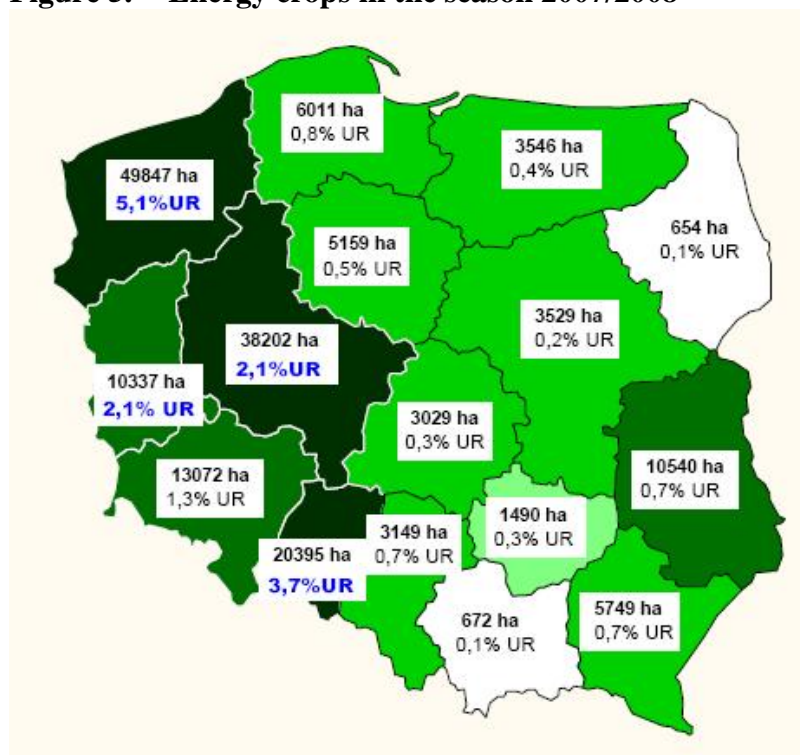
Biomass from agriculture

The primary task of the agricultural sector is satisfying the demand for food. Therefore, only by-products and residues from the agriculture and agricultural and food sector as well as surpluses of agricultural products that would not be needed on the food market will be allocated primarily for energy purposes.

In accordance with the data for 2009, in Poland, for production of energy crop about 500 thousand ha were allocated, which accounts for 3.2% of total arable land. Oil-bearing crops used for biofuel production have the highest share in this production (about 310 thousand ha¹⁰). For maize and cereals the area of 56,738 ha has been assigned. Cereals cover the area of about 150 thousand ha, while permanent crops – the area of about 5 thousand ha.¹¹

The area of energy crops, in 2008 supported within the framework of payment system, equalled 44,791 ha, which accounted for 0.28% of total arable land. In 2009, this area decreased to 16,122 ha. Oil-bearing crops (rape) had the highest share in this production – 15,302 ha. During this period, maize and cereals covered the area of 459 ha. At the same time, the area of permanent crops, grasses, root crops and other crops equalled 459 ha.¹²

Figure 5. Energy crops in the season 2007/2008



Source: IMBER Warsaw, 2008

UR – arable land

⁹ Wach E. Polski i europejski rynek pelet w 2006 r. *Czysta Energia* 6/2007.

¹⁰ Own calculations of the Ministry of Agriculture and Rural Development based on the volume of raw materials used for production of biocomponents in accordance with the data of the Agricultural Market Agency and the data included in quarterly reports of the President of the ERO.

¹¹ Data of the Agency for Restructuring and Modernisation of Agriculture on energy crops reported for granting payments.

¹² In accordance with the data of the Agency for Restructuring and Modernisation of Agriculture.

The following assumptions were adopted to estimate biomass supply from agriculture in 2006:

- about 453.5 thousand Mg of cereals and about 378 thousand Mg of rape were allocated for the purposes of the biofuel industry;
- the average yield from permanent crop has been assumed of about 10 Mg/ha;
- it has been assumed that straw used for energy purposes accounted for 5% of total straw in 2006.

Biomass from waste

The following assumptions were adopted to estimate biomass supply from waste in 2006:

- pellets used primarily at a small scale by the population for heating purposes were the basic product from industrial waste;
- biogas was produced from sewage sludge.

The table below presents biomass supply in 2006.

Table 7. Biomass supply in 2006

<i>Sector of origin</i>		<i>Amount of domestic resource</i>	<i>Imported</i>		<i>Exported</i>	<i>Net amount</i>	<i>Primary energy production</i>
			EU	Non-EU	EU/non-EU		
(A) Biomass from forestry	<i>Of which:</i>						4,173
	1. direct supply of wood biomass from forests and other wooded land for energy generation (thousand m ³)	12,493	-	-	-	12,493	1,894
	<i>Optional — if information is available you can further detail the amount of feedstock belonging to this category:</i>						
	a) fellings (thousand m ³),	9,117	-	-	-	9,117	1,421
	b) residues from fellings (tops, branches, bark, stumps) (thousand m ³),	1,619	-	-	-	1,619	244
	c) landscape management residues (woody biomass from parks, gardens, tree rows, bushes) (thousand m ³),	340	-	-	-	340	51
	d) other (cleaning, wooded land renovation) (thousand m ³)	1,517	-	-	-	1,517	178
	2. indirect supply of wood biomass for energy generation (thousand Mg)	5,930	-	-	-	5,930	2279
	<i>Optional – if information is available you can further detail:</i>						
	a) residues from sawmilling, woodworking, furniture industry (bark, sawdust)						
	b) by-products of the pulp and paper industry (black liquor, tall oil)						
	c) processed wood-fuel – pellets	270	-	-	235	35	13.4

<i>Sector of origin</i>		<i>Amount of domestic resource</i>	<i>Imported</i>		<i>Exported</i>	<i>Net amount</i>	<i>Primary energy production</i>
	(thousand Mg) d) post consumer recycled wood (recycled wood for energy generation, household waste wood) e) other (please define)						
B) Biomass from agriculture and fisheries	<i>Of which:</i>	4,328	9	-	290	550	461
	1. agricultural crops and fishery products directly provided for energy generation	2,164	9	-	290	550	124
	<i>Optional – if information is available you can further detail:</i>						
	a) arable crops (cereals, sugar beet, silage maize) (thousand Mg)	831	9	-	290	550	97
	b) plantations						
	c) short rotation trees (thousand Mg)						
	d) other energy crops (grasses)						
	e) algae	133	-	-	-	133	27
	f) other (please define)						
	2. agricultural by-products/ processed residues and fishery by-products for energy generation (thousand Mg)	1,200	-	-	-	1,200	337
	<i>Optional – if information is available you can further detail:</i>						
	a) straw						
C) Biomass from waste	b) manure						
	c) animal fat						
	d) meat and bone meal						
	e) cake by-products (incl. oil seed and olive oil cake for energy)						
	f) fruit biomass (including shell, kernel)						
	g) fishery by product						
	g) clippings from vines, olives, fruit trees						
	h) other (please define)						
	<i>Of which:</i>	388	-	-	-	388	66
	1. biodegradable fraction of municipal solid waste including biowaste (biodegradable garden and park waste, food and kitchen waste from households, restaurants) (thousand Mg)						0
	caterers and retail premises, and comparable waste from food processing plants) (thousand Mg)	89	-	-	-	89	19
	2. biodegradable fraction of industrial waste, including paper, cardboard, pallets (thousand Mg)	84	-	-	-	84	5
	3. sewage sludge (thousand Mg s.m.)	1,064.7	-	-	-	1,064.7	203

Source: Own work based on the data of: State Forests National Forest Holding, Central Statistical Office, Wood Technology Institute, Polish Economic Chamber of Wood Industry, Association of Polish Papermakers, Institute of Soil Science and Plant Cultivation (IUNG), Demand for food (2008), Fish market (2008), Milk market (2009), Potato market (2009), Poultry and egg market (2009), Meat market (2009), Cereal market (2009), Fruit and vegetable market (2009), IERiGZ, ARR, ARiMR, MRiRW, Ministry of the Environment. The table structure and headings are consistent with Decision 2009/548/EC.

Estimated national biomass supply in 2015 and 2020

Biomass for energy generation can be supplied by three sectors:

- biomass from forestry;
- biomass from agriculture and fisheries;
- biomass from waste.

Possibilities to obtain biomass from forestry

Direct supply of wood biomass from forests and other wooded land for energy generation

Due to establishment of NATURA 2000 areas, total volume of wood would decrease vs. 2009 by over 2.5 million m³ in 2015 and by 2.74 million m³ in 2020. M2, S4 and S2ac¹³ grades are obtained after achieving the main objective of forestry, that is timber. Limitations introduced within NATURA 2000 programme will have a significant impact on availability of biomass from forestry for energy purposes. Taking into account the current process of modification of forest management on areas designated within the framework of NATURA 2000, the ultimate impact on wood production is difficult to determine.

The following parameters and aspects were taken into account in drawing up forecasts of supply of biomass from forestry:

1. Fresh wood density based on the data of Wood Technology Institute in Poznań:

- pine – 800 kg/m³;
- spruce – 800 kg/m³;
- birch – 850 kg/m³;
- beech – 1,070 kg/m³;
- oak – 1,000 kg/m³.

2. Shares of individual wood types in the total weight of energy raw material in accordance with the data provided by *State Forests National Forest Holding* are as follows:

- pine – 43%;
- spruce – 11%;
- birch – 11%;
- beech – 9%;
- oak – 9%.

¹³ Usable cordwood for industrial purposes – energy industry.

For other species accounting for about 16% of the weight of raw material offered by *State Forests* National Forest Holding for energy purposes, the average density of fresh wood of 800 kg/m³ was assumed in the forecast.

3. Moisture content for fresh wood was assumed at 55% (calorific value equal about 7 MJ/kg).

4. Quality grades of wooden raw materials offered for energy purposes by *State Forests* National Forest Holding: M2, S4, S2ac (information provided by *State Forests* National Forest Holding).

5. Limitations introduced within NATURA 2000 programme reduce the importance of biomass from forestry used for energy production.

Indirect supply of wood biomass for energy generation

In Poland, trading in waste from wood processing is not recorded, which to a great extent hinders estimating actual potential of biomass supply from wood-processing industry for energy generation. In accordance with analyses of the Wood Technology Institute (ITD), technical potential of wood waste from the wood-processing industry and other sources can be estimated at about 58.1 PJ.

According to the analyses of ITD, 100 m³ of wood from forest management after processing result in over 60% of waste, including, e.g.: 10 m³ of bark, 15 m³ of smallwood – branches, 20 m³ of wood waste (wood shavings, offcuts), 19 m³ of sawdust and chips. It is estimated that wood processing plants generate about 7.5 million m³ of industrial wood waste, which accounts for 27% of total wooden raw materials produced.

Since a major part of valuable waste from wood processing is utilised by the wood-processing industry, about 2.5-3 million m³ of wood waste remains available.¹⁴

Biomass from agriculture and fisheries

Agricultural crops and fishery products directly provided for energy generation

In Poland, the area of arable land per citizen equals about 0.41 ha, while in so-called “15 old EU Member States”, this is only 0.19 ha. Due to this reason, Poland has been considered a country that could significantly contribute to production of biomass for energy purposes in EU.¹⁵

Enhancing the use of biomass from energy crops requires the establishment of the whole system including production, distribution and use of biomass.

Taking into account raw material and production base, Poland has sufficient potential allowing for biocomponent production on the level arising from NIT by 2020. Agro-climatic conditions and structural factors allow for potential optimal area of rape growing in Poland of about 1.0-1.2 million ha, with crop area in fall 2009 of 880 thousand ha. Further increase of the rape-growing area will depend on the demand and the relationship between the price of rape and wheat.

Rape growing is an important alternative for a group of farmers specialising in cereal production. The demand for rape used for food purposes has remained unchanged for many years and equals about 1.0-1.2 million tonnes per year (at total crop of 2.4 million tonnes in 2009), which in case of yield of 3 t/ha requires the area of about 330-400 thousand ha.

¹⁴ Based on consultations with the Polish Economic Chamber of Wood Industry and Association of Polish Papermakers.

¹⁵ Results of the European Commission REFUEL Project (2007) have indicated that Poland is able to supply 12% of the potential production of biomass for energy purposes in EU (about 17.5 EJ/year).

Ultimately, this means that crops from the area of 600-800 thousand ha could be allocated for fuel purposes without any detriment to the food market.

The structure of crops and level of yields of cereals and rape would guarantee necessary raw materials quantities for biocomponent production (bioethanol and esters). Surpluses of cereals and rape above domestic needs, including generally understood industrial demand, are exported.

Since a few years, cereals in Poland are grown on the area of about 8.5 million ha, and in average soil and weather conditions, crops exceed 27 million tonnes and reached 29.7 millions tonnes in 2009. About 1.3-1.4% of cereals (400-600 thousand tonnes) are used for the purposes of ethanol production. Assuming that ethanol used for fuel purposes in Poland would in whole come from domestic production and would be produced only from cereals, in 2010 about 860 thousand tonnes of cereals would have to be allocated for this purpose, which would correspond to the production on the area of 270 thousand ha. It is estimated that the average cereal yield on the level of the country would increase from the current 3.2 t/ha to 4 t/ha by 2020. In order to produce about 670 thousand tonnes of bioethanol by 2020, which is necessary to meet climate targets (assuming that this product will be produced from domestic raw materials), 2.4 million tonnes of cereal is needed grown on the area of about 600 thousand ha (in case of using maize, the necessary area will be about 200 thousand ha lower). It is forecasted that the yield growth would allow to limit the area of cereal growing without any detriment to food and industrial needs by about 0.7-1.0 million ha that could be allocated for growing energy crops.

Summing up, in accordance with analyses of IUNG PIB, by 2020, the Polish agricultural sector can allocate 0.6 million ha for production of cereals for bioethanol, 0.4 million ha for production of rape for biodiesel and about 1 million ha for production of biomass for the purposes of the professional energy sector.

EU sugar sector restructuring, having an adverse effect on Polish agriculture, will result in releasing significant area of arable land, a part of which could be allocated for energy crops, including rape.

The area of growing of crops that could be potentially used for bioethanol production (cereals, potato, maize, sugar beet) is to some extent limited by natural and organisational factors, since raw materials grown have to meet sustainable development criteria, while economic factors can be a key barrier, since this production has to be located mainly on lower-class land, on which lower yields are achieved, due to which costs of production of distillate of agricultural origin and thus bioethanol have to be high.

The similar situation exists in case of fatty acid methyl esters and bioliquids.

Agricultural by-products/ processed residues and fishery by-products for energy generation

Fishery by-products (waste)

According to the Sea Fisheries Institute, fishery by-products account for about 4% of the fish weight. Until now, fishery by-products have not been used for production of renewable energy. Attempts to use fish oil for production of biofuel were made relatively recently (2008–2009) and probably will be continued. However, it is not expected that by 2020, fishery by-products will start to play a major role as bioenergy raw materials due to their other, traditional applications (pharmaceutical industry, feeds and other), especially because their supply will decrease until 2020.

Agricultural by-products/ processed residues (waste)

Agricultural by-products/ processed residues can be divided into plant and animal ones.

Agricultural by-products/ processed residues in form of manure and liquid animal excrements are described in other sections of the document. Beet leaves as an energy raw material are described in the part on sugar industry residues.

Cereal straw is a key by-product from plant production. Polish agricultural sector produces about 25-28 million Mg of straw every year.¹⁶ Straw surpluses can be used for energy purposes.

Assumptions for the forecast of potential use of straw for energy purposes in 2015 and 2020 are as follows:

- average cereal yield per 1 ha of arable land has been based on actual values for 2000-2008;
- the ratio of straw weight to grain weight of 1:1;
- it was assumed that 10% of straw yield can be used for energy purposes (fragmented farm structure);
- calorific value of straw equals 14 GJ/Mg.

Residues from preparation and processing of animal food products (waste)

The use of animals for slaughter indicates that remains for utilisation account for 27% of their weight. In Poland, collected residues from preparation and processing of animal food products consist mainly of swine remains (62%), poultry remains (13%), feathers (13%) and blood (10%). Since 1997, these remains cannot be used in form of meat-and-bone meal in feeding animals for slaughter. Therefore, their use for energy production is highly recommended and possible (e.g. in biogas plants). Animal fat is one of the most valuable remains from processing.

In general, in the Polish market there is a deficit of animal fat in food production and this valuable group of products cannot be considered meaningful as components of energy biomass. Consequently, waste fats (not used for food purposes), related to utilisation of animal waste in high temperature, could be used for energy production. The volume of waste fat produced in such way in Poland is estimated at about 80-100 million litres.

Plant by-products and residues, including waste fruits, vegetables and edible oil

By-products and residues from fruit processing have the highest share in this group. A majority of by-products and remains from vegetable production remain on the field (e.g. from cauliflower, cabbage) or are sold together with vegetables. In this group of by-products and remains, marc of fruits (use – pellets), stones (for direct burning) or marc used as a substrate for biogas plants or distilleries. Low-value, expired products could also be used for biogas and ethanol production.

Together with the increased use of rape for energy purposes, the potential with respect to the use of middlings for direct burning and in biogas plants will occur, subject to supply of low-cost middlings and covering the demand for feed. In Poland, the system of collection of used cooking oils has been limited until now. Its potential is estimated at about 100 million litres/year. Changes of legal conditions planned in this respect should result in making available such remains, e.g. for production of methyl esters.

By-products and residues from sugar industry

¹⁶ Depending on the cereal yield in a given year.

In case of sugar industry, there are two types of biomass that can be considered for use for energy production: molasses and beet leaves (they are not analysed as an agricultural by-products that can be used for energy production above, so they are considered within sugar industry).

Molasses were an important market product, mainly as raw material for the production of ethyl alcohol (depending on the price relationship to cereals, 10–20% of the total domestic ethyl alcohol is produced based thereon). Molasses had also been applied in animal production as feed supplement. Later on, its importance increased as a result of its application in the yeast sector, for production of citric acid and bioethanol, and currently it is even listed on the commodity exchange. In the Polish market, there were temporary shortages of molasses related, *inter alia*, to their favourable sales on foreign markets. Increased interest in molasses can be expected as a result of Directive 2009/28/EC coming into force.

By-products and residues from dairy industry

The dairy industry could be a source of various energy raw materials, in particular of whey, washings and other raw materials that cannot be used for further processing in a dairy establishment or products not meeting quality requirements (e.g. expired). In particular, whey can be successfully used for production of biogas (or ethanol), provided that large surpluses are available. It is estimated that the volume of whey produced in Poland equals about 2 billion litres/year. The amount of energy that can be generated from whey in our country based on methane fermentation ranges from 198 to 560 GWh/year. Due to economic reasons, biogas plants planned to be used for fermenting remains from the dairy industry should be established at the production place.

Waste from bakery and confectionery industry

Waste from bakery and confectionery industry can be used for energy purposes on a local level. The use of bakery raw materials including expired products returned from stores for the production of pellets as a fuel is a good example.

By-products and residues from the production of alcoholic and non-alcoholic beverages

By-products and residues from the production of non-alcoholic beverages are discussed under fruit processing. In case of alcoholic beverages, remains from the spirit industry (distilleries) have been used for energy purposes the most often. Slops from distilleries, in which distillate is produced (the volume ratio of slops to distillate equals 10:1), constitute the by-product in case of spirit products.

Taking into account relatively stable consumption of ethylene alcohol in Poland, equal about 120 million litres/year¹⁷ about 1.2 billion litres of slops per year are obtained from the production process. The ratio of slops to distillate in case of bioethanol is similar.

Biomass from municipal waste

When forecasting quantities of biodegradable municipal waste, some decrease between 2015 and 2020 was assumed. This is due to demographic forecast that assumed a drop in the number of citizens in the years 2010–2020. It was assumed that wood from direct consumers of wooden products¹⁸ could be a major item in total weight to used wood recoverable from municipal waste. In case of waste assigned for burning, energy from cogeneration or just electricity can be obtained. It is assumed that about 42% of electricity produced from mixed

¹⁷ Translated into 100% alcohol, on average including exports occurring from time to time and with ethanol for wine products.

¹⁸ Wood mainly from used furniture (excluding wood-based elements).

municipal waste would be classified as “green electricity.” It is estimated that this ratio would increase by about 1% per year by 2020.

Biodegradable fraction of industrial waste

It was assumed that wood from the building sector¹⁹ (almost 60%) would be a major item in total weight to used wood recoverable from industrial waste. It is expected that used wood from used pallets would be used for energy purposes to a greater extent than today. It is assumed that from 250 to 300 thousand Mg of printed wastepaper could be allocated for energy purposes in the years 2015-2020.

Sewage sludge

The growth of municipal sewage sludge is forecasted for the years 2010-2020, in line with the implementation of investments involving construction and extension of sewage system and sewage treatment plants. It is estimated that in 2015, the weight of sewage sludge produced would equal about 640 thousand Mg, and in 2020 it would exceed 700 thousand Mg measured as mass of dry matter. It is expected that ultimately, in 2020, over 400 thousand Mg of sludge dry matter would be a subject to thermal processing. The technical potential of the use of biogas from sewage treatment plants for energy purposes is very high. In standard conditions, 10-20 m³ of biogas with methane content of about 60% can be obtained from 1 m³ of sludge (4-5% of dry matter). Due to economic reasons, the production of biogas for energy purposes is justified only in larger sewage treatment plant that receive on average more than 8-10 thousand m³/day.

The table below presents domestic biomass supply in 2015-2020.

Table 8. Estimated biomass domestic supply for the electricity and heating and cooling sectors in 2015 and 2020

Sector of origin		2015		2020	
		Amount of domestic resource thousand Mg	Primary energy production (ktoe)	Amount of domestic resource thousand Mg	Primary energy production (ktoe)
A) Biomass from forestry	1. direct supply of wood biomass from forests and other wooded land for energy generation	6,411	1,071	6,081	1,016
	2. indirect supply of wood biomass for energy generation	5,572	931	6,375	1,065
B) Biomass from agriculture and fisheries	1. agricultural crops and fishery products directly provided for energy generation	1,414	405	4,056	1,156
	2. agricultural by-products/processed residues and fishery by-products for energy generation	5,690	1,358	7,428	1,773
C) Biomass from waste	1. biodegradable fraction of municipal solid waste including biowaste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants)	4,339	932	6,373	1,369

¹⁹ Wood from windows and doors used.

Sector of origin	2015		2020	
	Amount of domestic resource thousand Mg	Primary energy production (ktoe)	Amount of domestic resource thousand Mg	Primary energy production (ktoe)
2. biodegradable fraction of industrial waste (including paper, cardboard, pallets)	645	154	1,127	269
3. sewage sludge	340	65	6,285	120

Source: Own work based on the data of: State Forests National Forest Holding, Central Statistical Office, Wood Technology Institute, Polish Economic Chamber of Wood Industry, Association of Polish Papermakers, Institute of Soil Science and Plant Cultivation (IUNG), Demand for food (2008), Fish market (2008), Milk market (2009), Potato market (2009), Poultry and egg market (2009), Meat market (2009), Cereal market (2009), Fruit and vegetable market (2009), IERiGZ, ARR, ARiMR, MRiRW, Ministry of the Environment. The table structure and headings are consistent with Decision 2009/548/EC.

Due to lack of reliable data on the use of agricultural land for the purposes of producing energy crops in 2006, the data for 2007 are presented. It is estimated that in 2007 the area of growing the crops listed below increased from 5% to 10% vs. 2006.

Table 9. Current agricultural land use for production of crops dedicated to energy in 2007

Agricultural land use for production of dedicated energy crops	Surface (ha)
1) Land used for short rotation trees (willows, poplars)	6,565.8
2) Land used for other energy crops, such as grasses (reed canary grass, switch grass, Miscanthus), sorghum	250.2

Source: Own work based on the data of the Central Statistical Office. The table structure and headings are consistent with Decision 2009/548/EC.

4.6.2 Measures to increase biomass availability, taking into account other biomass users (agriculture and forest-based sectors)

Mobilisation of new biomass sources:

a) Please specify how much land is degraded

The Act of 3 February 1995 *on protection of agricultural and forest areas* (Journal of Laws of 2004 No 121, item 1266 as amended) includes the definition of devastated and degraded land. Degraded land shall be understood as land, the value in use of which in agriculture or forestry decreased as a result of deterioration of natural conditions or owing to changes of environments and industrial activities, as well as inappropriate agricultural activities. Devastated land means land that completely lost its value in use due to the aforementioned reasons.

Summary 12. Devastated and degraded land requiring reclamation²⁰

Year	2005	2006	2007	2008
Area (ha)	64,978	65,143	64,373	63,735

Source: Own work based on the data of the Central Statistical Office

²⁰ Land reclamation means allocation or restoration of usable or natural value to degraded or devastated land by proper shaping of relief, improvement of physical and chemical characteristics, regulation of water conditions, soil restoration, strengthening of slopes and rebuilding or building necessary roads.

In 2008, the area of devastated and degraded land decreased by 1% vs. the previous year and by 2% – vs. 2006.

b) Please specify how much unused arable land there is

Fallows include arable land that do not generate any yield, which have not been cultivated for at least two years, and arable land allocated for afforestation based on the decision of a responsible agricultural body, but not yet afforested. Bare soil includes arable land not sowed until 20 May in a given year and also land prepared for cultivation, but to be sowed in the fall and generating yield in the next year. Since 2007, bare soil and fallows are classified to other land, provided that they are not going to be restored to agricultural use.

In accordance with the *National Agriculture Census 2002*, overall, 2.3 million of arable land was considered bare soil and fallows, which accounted for 17.6% of its total area. By 2004, the area of fallows and bare soil decreased to 1.3 million ha, which – to a great extent – was related to the implementation of the EU Common Agricultural Policy in Poland. Direct payments, made conditional on meeting agricultural standards, and the possibility to obtain resources from structural funds for the development of farms, support the expansion and rationalisation of farming. In 2008, the area of fallows and bare soil equalled only 491.5 thousand ha, i.e. was almost five times lower than in 2002.

Summary 13. Area of fallows and bare soil

Year	2005	2006	2007	2008
Area of fallows and bare soil (thousand ha)	1,028.6	984.0	440.9	491.5
% of arable land area	8.4	7.9	3.5	3.1

Source: Own work based on the data of the Central Statistical Office

c) Are any measures planned to encourage unused arable land, degraded land, etc. to be used for energy purposes?

Taking into account bioenergy production, the development of energy crop growing on fallows and land of low value for food purposes is planned.

d) Is energy use of certain already available primary material (such as animal manure) planned?

The national energy policy and agricultural policy priorities often overlap. For instance, objectives of the energy policy include:

- meeting national demand for energy;
- developing the use of RES;
- mitigating the negative environmental impact of the energy industry;
- enhancing energy security;
- establishing new work places.

These tasks are consistent with the policy assuming:

- ensuring security of food production by using primarily agricultural and food industry by-products and residues for energy purposes;
- increasing the use of agricultural biomass for energy purposes, as a form of diversification of agricultural income;
- mitigating the negative environmental impact of the agriculture;

- developing rural areas.

Taking into account the primary objective, related to securing national demand for food, the Government has emphasised using for energy purposes, first of all: agricultural by-products, industrial waste and by-products from agricultural and food processing, manure and liquid animal excrements and energy crops.

In Poland, there are already agricultural biogas plants that use liquid animal excrements and manure for energy purposes (as a substrate for biogas plant). Animal excrements are to be a substrate in many planned biogas plants, due to their low price and high availability. The use of liquid animal excrements and manure as agricultural remains – substrates for biogas plants is consistent with the national agricultural and energy policy (*Directions of development for agricultural biogas plants in Poland*). Theoretical potential of agricultural biogas production from manure and liquid animal excrements is estimated at about 1.0-3.2 billion m³, of which about 90% refers to manure.

e) Is there any specific policy promoting the production and use of biogas? What type of uses are promoted

The governmental document under the title *Direction of development for agricultural biogas plants in Poland* assumes the establishment of on average one biogas plant in every community by 2020, using agricultural biomass, assuming that the community satisfies relevant conditions for completing such project.

The principal elements of *Directions ...* include optimisation of legal and administration system with respect to establishment of agricultural biogas plants in Poland, as well as identifying possibilities to obtain co-financing for such installations from national and European Union public funds, available within the frameworks of national and regional operational programme.

A set of solutions aimed at facilitating the development processes of the use of renewable energy sources, including agricultural biogas plants, was prepared and included in the Act of 8 January 2010 *on amendments to the Energy Act and certain other acts* (Journal of Laws No 21 item 104).

The Act provides, *inter alia*, the stipulation of the legal basis and the conditions for connecting to the gas distribution network of agricultural biogas installations by energy companies transmitting or distributing gas fuels. This Act includes an instrument for assistance in form of correlating the system of agricultural biogas promotion with the existing system of certificates of origin for electricity from RES that will certainly become a significant incentive for potential investors for the realisation of undertakings in the scope of construction of biogas plants. Agricultural biogas purified to the quality parameters of the high-methane gas or nitrated gas will be pumped into the distribution networks and local installations built at the initiative of local governments. At the same time, the Act foresees the introduction of legislation, in accordance to which economic activity involving agricultural biogas production will be performed on the basis of an entry into the register of producers of agricultural biogas. The President of the Agricultural Market Agency will be the body keeping the register as well as responsible for monitoring and verifying energy companies producing agricultural biogas.

Additionally, the provisions of *Directions ...* impose on individual central and local governments relevant information and educational obligations with respect to construction and operation of agricultural biogas plant installations. The campaign would be targeted, *inter alia*, at entrepreneurs, farmers, agricultural producers and local communities. Performance of these tasks will be based on materials, educational and information programmes, as well as

training courses and seminars. Additionally, scientific and training centres, agriculture advisory centres, research and educational units, as well as media will participate in its implementation.

f) What measures are planned to improve forest management techniques in order to maximise the extraction of biomass from the forest in a sustainable way? How will forest management be improved in order to increase future growth? What measures are planned to maximise the extraction of existing biomass that can already be put into practice?

Forests cover about 29.1% of the area of Poland. They are managed mainly by *State Forests National Forest Holding (Państwowe Gospodarstwo Leśne Lasy Państwowe)* that functions based on traditional, but relatively effective structures since the 80s. Forestry as an organised (sustainable) human activity functioned as early as in the 19th Century. Forests fulfilled a production function, since production of biomass to be used by people is their inherent features. Objectively, they also have the environmental function, which influences and regulates climate, water and soil conditions of the earth's environment. Meanwhile, social functions of forests are of subjective character. They depend on human presence and on human vision of tangible and intangible goods that people would like to obtain from the forest.

In accordance with *Helsinki Resolution* of ministers of forestry of 1993, sustainable forest management has to satisfy the following criteria: continuously develop forest resources and their participation in the global carbon cycle, maintain health and vitality of forest ecosystems, develop the production function of forests, maintain, protect and strengthen biodiversity of forest ecosystems, maintain and strengthen protection function of forests, protect soil and water resources in forests, maintain and strengthen social and economic functions of forests. Implementation of these criteria requires social and professional approval of multifunctional forestry; forest management has to be consistent with ecology and environmental protection principles, and the whole ecosystem should be a subject of forestry activities rather than just forest stand.

Specific methods improving forest management in Poland include:

- due to the advantage of forest stand of coniferous forests over leafy forests – growth in the number of deciduous trees planted;
- complex felling techniques;
- optimisation species research in the context of habitat conditions.

In a majority of Polish forests, the structure of species is inconsistent with habitat conditions. This is a result of forest management in previous centuries, when the species structure of trees planted was simplified in pursuit of profit. Fast growing species, producing high-quality wood, replaced natural forest stand. In the second half of the 20th Century, forestry engineers started to pay attention to consistency of tree species planted with habitat requirements. Consequently, forest reconstruction has been started, i.e. fully-grown trees cut down have been replaced by species adjusted to the habitat.

Impact on other sectors

a) How will the impact of energy use of biomass on other sectors based on agriculture and forestry be monitored? What are these impacts? (If possible, please provide information also on quantitative effects.) Is the monitoring of these impacts planned in the future?

The RES monitoring system (overall and RES sectors) is operated within individual categories/ranges by: Central Statistical Office (overall RES), Energy Regulatory Office of Poland (*inter alia*, biofuels and biocomponents), Agricultural Market Agency (biomass – energy crops, biofuel producers) and partially by the Ministry of Agriculture and Rural Development (share of biomass for energy production in total biomass) or by *State Forests* National Forest Holding (biomass from forestry).

If food prices increased in previous years, as a result of, e.g. growth in the production and use of transport biofuels, this increase did not depend on the supply of Polish energy biomass. Additionally, it should be emphasised that Poland, in practice, already for the second year imports transport biofuels in the amount accounting for about 40%-50% of their domestic consumption. In Poland there are units that analyse the impact of energy use of biomass on other sectors, e.g. on the food sector or forestry. Analyses of various factors influencing the food sector, including the development of the use of agricultural raw materials for energy production, are carried out, *inter alia*, by the Institute of Agricultural and Food Economics (*Instytut Ekonomiki Rolnictwa i Gospodarki • ywno•ciowej, IERiG•*). Work in this field includes also scientific research and analysis of professional associations. If we assume that Polish biocomponents would be used by 2020 (10% share in transport biofuels), this would account for about 75% of rape produced in the country and a significant impact of biocomponents from rape on prices of rape oil could be expected. Experiences of other countries (e.g. Sweden) indicate that the growth in prices of energy biomass (maize, liquid animal excrements) is possible in case of biogas production.

b) What kind of development is expected in other sectors based on agriculture and forest that could have an impact on the energy use? (E.g. could improved efficiency/productivity increase or decrease the amount of by-products available for energy use?)

The following factors related to agriculture and forestry could result in reduction or increase of by-product volume to be used for energy production:

Reduction effect:

- 1) extended shelf-life of vegetables and fruits (e.g. by using GMO and state-of-the-art packaging) • reduced waste volume;
- 2) extended shelf-life of food products • reduced municipal waste volume (biodegradable);
- 3) new-generation packaging and products and new product storage methods;
- 4) new biofuel technologies • better use of raw material in one sector means less waste raw material to be used by the other sector;
- 5) higher effectiveness of use of raw materials in the agricultural and food industry and increasing processing capacities in this sector;

- 6) decreasing role of potato growing as a raw material for bioliquids and biofuels production (which at the same time shows the potential of this crop for production of alcohol and biofuels);
- 7) growing cereals with the lower ratio of straw to grain (and thus reduced volume of available straw);
- 8) support and dynamic development of agriculture and its profitability (typical animal and plant production), which reduces availability of by-products from agriculture (straw, manure, liquid animal excrements and other);
- 9) R&D growth resulting in decreased supply of biological waste;
- 10) maintaining natural forest ecosystems (landscape parks, nature reserves, NATURA 2000).

Increasing effect:

- 1) biofuel (biodiesel) production for own purposes, low-temperature technology ensuring middlings with higher calorific value, e.g. for biogas plant purposes;
- 2) popularisation of new technologies, e.g. technology of biogas production based on sugar beet and beet leaves (high availability of leaves • the raw material that has not been used for energy production until now);
- 3) introduction of the municipal waste management system (separation system, intelligent systems used by households);
- 4) drop in prices of fertilizers • their increased use and thus the overall growth in production of biomass;
- 5) mastering the technology of condensation of diluted substances (increased profitability of long-distance transport of substrates);
- 6) development of the system for collecting waste products from agricultural and food processing plants;
- 7) continuous growth of the energy crop yields;
- 8) development of the technology of production of rootwood and other by-products from forestry;
- 9) increased forest coverage in the country;

10) increased utilisation of bare soil and degraded land.

4.7 Planned use of statistical transfers between Member States and planned participation in joint projects with other Member States and third countries

4.7.1 Procedural aspects

- a) Describe the national procedures (step by step) established or to be established, for arranging a statistical transfer or joint project (including responsible bodies and contact points).
- b) Describe the means by which private entities can propose and take part in joint projects either with Member States or third countries.
- c) Give the criteria for determining when statistical transfers or joint projects shall be used.
- d) What is going to be the mechanism to involve other interested Member States in a joint project?
- e) Are you willing to participate in joint projects in other Member States? How much installed capacity/electricity or heat produced per year are you planning to support? How do you plan to provide support schemes for such projects?

Taking into account RES surpluses estimated in point 4.7.2, Poland does not expect any need for using renewable energy from abroad to meet the objective with respect to its share in final energy consumption. Consequently, the establishment of relevant procedures or starting negotiations on new joint projects with Members States or third countries is not planned as of today. At the same time, steps will be made to establish relevant mechanisms for statistical transfers with other states.

4.7.2 Estimated excess production of renewable energy compared to the indicative trajectory which could be transferred to other Member States

Calculations were made taking into account estimated trajectory in accordance with Appendix I Part B to Directive 2009/28/EC.

Table 9. Estimated excess production of renewable energy compared to the indicative trajectory which could be transferred to other Member States in Poland

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Expected consumption of energy from renewable sources [ktoe]	6,223	6,599	6,934	7,242	7,597	8,098	8,648	9,228	9,917	10,725
RES minimum trajectory [%]	8.76%	8.76%	9.54%	9.54%	10.71%	10.71%	12.27%	12.27%	–	15.0%
RES minimum trajectory [ktoe]	5,414	5,466	6,001	6,048	6,854	6,962	8,110	8,233	–	10,380
Estimated excess in RES minimum trajectory [ktoe]	809	1,133	933	1,194	743	1,136	538	995	–	345

Source: Own work. The table structure and headings are based on Decision 2009/548/EC.

4.7.3 Estimated potential for joint projects

- a) In which sectors can you offer renewable energy use development in your territory for the purpose of joint projects?
- b) Has the technology to be developed been specified? How much installed capacity/electricity or heat produced per year?
- c) How will sites for joint projects be identified? (For example, can local and regional authorities or promoters recommend sites? Or can any project participate regardless its location?)
- d) Are you aware of the potential for joint projects in other Member States or in third countries? (In which sector? How much capacity? What is the planned support? For which technologies?)
- e) Do you have any preference to support certain technologies? If so, which?

RES surpluses estimated in point 4.7.2 could provide a basis for potential joint projects. Until now, neither relevant procedures within the aforementioned respect have been established nor negotiations on new joint projects with Members States or third countries have been started. At the same time, steps will be made to establish relevant mechanisms for statistical transfers with other states.

4.7.4 Estimated demand for renewable energy to be satisfied by means other than domestic production

By 2020 Poland does not expect any need for using renewable energy from abroad to meet the objective with respect to its share in final energy consumption (own production potential is sufficient to achieve the objective). At the same time, steps will be made to establish relevant mechanisms for statistical transfers with other states.

5. Assessments

5.1 Total contribution expected of each renewable energy technology to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity, heating and cooling and transport

Contributions by renewable energy technology to meet the 2020 targets for the shares of energy from renewable resources in electricity, heating and cooling and transport are presented in tables below together with potential future scenario without a need to determine the target or obligation for technology.

In case of electricity, expected (gathered) installed power (in MW) as well as annual production (GWh) were presented by technology. For water energy, producers with installed power below 1 MW, from 1 to 10 MW and over 10 MW were differentiated. In case of solar energy, detailed information was presented separately for photovoltaic energy share and concentrated solar energy. The data for wind energy are presented separately for onshore wind energy, offshore wind energy and small wind power plants, i.e. low-power turbines of 1-10 kW in the cities (usually with vertical-axis rotors) and up to 100 kW at rural areas (usually with traditional horizontal-axis rotors). For biomass, the differentiation was made for solid, gas and liquid biomass used for electricity production.

In case of heating and cooling assessment, estimates for production were presented by technology: geothermal energy, solar energy, heat pumps and biomass (in case of the latter, by solid, gas and liquid biomass). At the current level of knowledge and taking into account existing data inconsistencies, it is impossible to reliably estimate the share of local heating plants using renewable energy sources, share of biomass in households and the increase in the use of certain technologies by region.

Table 10a. Estimation of total contribution (installed capacity, gross electricity generation) expected from each renewable energy technology in Poland to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity 2010-2014

Description	2005		2010		2011		2012		2013		2014	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro:	915	2,201	952	2,279	962	2,311	972	2,343	982	2,375	992	2,407
<1 MW	72	358	102	357	106	371	110	385	114	399	118	413
1 MW – 10 MW	174	504	178	534	184	552	190	570	196	588	202	606
>10 MW	669	1,339	672	1,388	672	1,388	672	1,388	672	1,388	672	1,388
of which pumping	0	0	0	0	0	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0	0	0	0	0	0
Solar:	0	0	1	1	1	2	2	2	2	2	2	2
photovoltaic	0	0	1	1	1	2	2	2	2	2	2	2
concentrated solar power	0	0	0	0	0	0	0	0	0	0	0	0
Tide, wave, ocean	0	0	0	0	0	0	0	0	0	0	0	0
Wind:	121	136	1,100	2,310	1,550	3,255	2,010	4,308	2,520	5,327	3,030	6,491
onshore	121	136	1,100	2,310	1,550	3,255	2,000	4,300	2,450	5,268	2,900	6,380
offshore	0	0	0	0	0	0	0	0	0	0	0	0
small installations	0	0	0	0	0	0	10	8	70	60	130	111
Biomass:	286	1,451	380	6,028	450	7,110	720	8,192	940	8,774	1,180	9,438
solid	268	1,340	300	5,700	350	6,700	600	7,700	800	8,200	1,000	8,700
biogas	18	111	80	328	100	410	120	492	140	574	180	738
bioliquids	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1,091	3,787	2,433	10,618	2,963	12,678	3,704	14,845	4,444	16,478	5,204	18,338
of which CHP	55	1,451	130	1,874	155	2,215	240	2,556	310	2,747	390	2,979

Source: Own work. The table structure and headings are consistent with Decision 2009/548/EC.

Table 10b. Estimation of total contribution (installed capacity, gross electricity generation) expected from each renewable energy technology in Poland to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity 2015-2020

Description	2015		2016		2017		2018		2019		2020	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro:	1,002	2,439	1,012	2,471	1,022	2,503	1,032	2,535	1,042	2,567	1,152	2,969
<1 MW	122	427	126	441	130	455	134	469	138	483	142	497
1 MW – 10 MW	208	624	214	642	220	660	226	678	232	696	238	714
>10 MW	672	1,388	672	1,388	672	1,388	672	1,388	672	1,388	772	1,758
of which pumping	0	0	0	0	0	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0	0	0	0	0	0
Solar:	2	2	2	2	3	3	3	3	3	3	3	3
photovoltaic	2	2	2	2	3	3	3	3	3	3	3	3
concentrated solar power	0	0	0	0	0	0	0	0	0	0	0	0
Tide, wave, ocean	0	0	0	0	0	0	0	0	0	0	0	0
Wind:	3,540	7,541	4,060	8,784	4,580	9,860	5,100	11,210	5,620	12,315	6,650	15,210
onshore	3,350	7,370	3,800	8,550	4,250	9,563	4,700	10,810	5,150	11,845	5,600	13,160
offshore	0	0	0	0	0	0	0	0	0	0	500	1,500
small installations	190	171	260	234	330	297	400	400	470	470	550	550
Biomass:	1,530	9,893	1,630	10,348	1,780	11,008	1,930	11,668	2,230	12,943	2,530	14,218
solid	1,300	8,950	1,350	9,200	1,400	9,450	1,450	9,700	1,500	9,950	1,550	10,200
biogas	230	943	280	1,148	380	1,558	480	1,968	730	2,993	980	4,018
bioliquids	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	6,074	19,875	6,704	21,605	7,385	23,374	8,065	25,416	8,895	27,828	10,335	32,400
of which CHP	505	3,156.5	545	3,334	610	3,614	675	3,894	815	4,481.5	955	5,069

Source: Own work. The table structure and headings are consistent with Decision 2009/548/EC.

Table 11. Estimation of total contribution (final energy consumption) expected from each renewable energy technology in Poland to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in heating and cooling 2010-2020 (ktoe)

RECOMMENDED OPTION	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Geothermal (excluding low temperature geothermal heat in heat pump applications)	23	24	29	35	43	57	70	86	105	107	178
Solar	21	45	83	107	114	176	258	324	406	441	506
Biomass:	3,911	3,969	4,021	4,084	4,151	4,227	4,393	4,570	4,725	5,002	5,089
solid	3,846	3,871	3,890	3,919	3,953	3,996	4,118	4,250	4,361	4,594	4,636
biogas	65	98	131	165	198	231	275	320	364	408	453
bioliquids											
Renewable energy from heat pumps:	25	35	42	51	61	72	85	99	114	130	148
- of which aerothermal											
- of which geothermal											
- of which hydrothermal											
TOTAL	3,980	4,073	4,175	4,277	4,369	4,532	4,806	5,079	5,350	5,680	5,921

Source: Own work. The table structure and headings are consistent with Decision 2009/548/EC.

During the forecast period, no material use of RES in transport from technologies based on the use of hydrogen from renewable sources is expected, but a small share of the use of electricity from renewable sources in transport is possible

Table 12. Estimation of total contribution expected from each renewable energy technology in Poland to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the transport sector 2010-2020 (ktoe)

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bioethanol/ bio-ETBE	28	279	299	308	330	323	334	347	374	398	429	451
<i>of which biofuels Article 21(2)</i>	0	0	0	0	0	0	0	0	44	44	44	44
<i>of which imported</i>												
Biodiesel	15	687	755	835	891	958	993	1,058	1,153	1,229	1,348	1,451
<i>of which biofuels Article 21(2)</i>	0	0	44	88	88	88	88	88	88	88	132	132
<i>of which imported</i>												
Hydrogen from renewables												
Renewable electricity	0	15	17	19	20	22	23	24	25	26	27	50
<i>of which road transport</i>	0	0	0	0	0	0	0	0	0	0	0	20
<i>of which non- road transport</i>	0	15	17	19	20	22	23	24	25	26	27	30
Others (as biogas, vegetable oils, etc.) – please specify					13	13	26	26	26	66	66	66
<i>of which biofuels Article 21(2)</i>					13	13	26	26	26	66	66	66
TOTAL	43	981	1,071	1,162	1,255	1,316	1,376	1,454	1,579	1,719	1,870	2,018

Source: Own work. The table structure and headings are consistent with Decision 2009/548/EC.

The so-called second-generation bioethanol is obtained from lignocellulosic biomass. Technology for production of bioethanol from lignocellulosic material has been developed and is used in industrial plants in Sweden. In Poland, the investment is planned based on the technology purchased and adjusted to lignocellulosic material available in the country. The investment process duration is estimated for 5 to 6 years. Consequently, it was assumed that second-generation bioethanol would be used as biocomponent after 2017.

Biocomponents produced from waste biomass, used in compression-ignition engines (second-generation biofuels) have been a subject of various research works for many years, but their industrial-scale production still remains limited. Industrial-scale technologies that have been mastered include:

- biodiesel (FAME) production from waste and used oils and fats;

- production of bio-DME (bio-dimethylether) from waste biomass in agriculture, agricultural and food industry and paper industry.

FAME production technology from waste and used oils and fats is well recognised. The installation for FAME production based on this technology is already being built in Poland. Used vegetable oils (used cooking oils) collected from catering facilities will constitute the raw material. Based on the analysis of vegetable and animal used oils available on the Polish market, carried out by potential investors, their volume was estimated at:

- used cooking oils (frying) – 60,000-80,000 Mg per year;
- collected animal fats (from slaughter and meat industry) – 40,000-70,000 Mg.

The precise value is very difficult to estimate due to significant fragmentation of potential collection sources, as well as differentiated potential usage (biofuels, biogas plants, feed supplements). The volume of high-quality used cooking oils may increase as a result of intensification of collection from individual households. It has been estimated that the potential recoverable fat volume might equal even about 0.6 kg/person per year, i.e. about 25,000 Mg per year.

The share of fats recovered from individual households will systematically increase together with the development of ecological awareness.

Taking into account the information on investments started in Poland, it was assumed that in 2011 it would be possible to produce 44 ktoe FAME from used cooking oils, while starting 2012, this volume will double.

Biogas and vegetable oils (PVO) have not been used in transport in Poland and in Europe until now. This is due to their characteristics, which are non-competitive to other known biofuels, and a required adaptation of engines and power supply systems in case of biogas. Taking into account the above, it was assumed that biogas and PVO would not be used in significant quantities as transport fuels by 2020.

In the opinion of centres focused on biofuels, including representatives of the European Biofuels Technology Platform, bio-DME is the so-called second-generation biofuel that would occur in the industrial scale in a short time horizon. Assuming that since 2010 the activities targeted at investments in bio-DME would start that require:

- drawing up and issuing the regulation of the Ministry of Economy on quality requirements and test methods for bio-DME;
- supplementing the regulation of the Minister of Economy on storage facilities;
- introduction of tax regulations for this fuel;
- purchase of the technology and adjusting it to raw materials available in the country;
- building the production installation for bio-DME;
- development of the storage and distribution network;
- development of the fleet of vehicles adjusted to use bio-DME;

it has been concluded that in the years 2013-2014, a small bio-DME producing installation will start to operate, with the capacity of 20 thousand Mg/year, in 2015, the capacity would double and in since 2018, production of bio-DME would reach 100 thousand Mg/year.

It has been also assumed that production of synthetic hydrocarbons could be started, e.g. based on HVO or co-HVO technologies (fat hydrogenation). In such case, these biocomponents would partially replace biodiesel (FAME) and the share of biodiesel would decrease correspondingly to the volume of synthetic hydrocarbons.

Bio-CNG is almost pure methane from biogas. Its production from biogas requires the implementation of technologies for biogas cleaning from other components, which is

expensive, requires specialist installations, qualified staff and, which is the most important, increases costs of fuels and increases emission of GHG.

Biogas on its own is used in stationary compression-ignition engines supplying power to electricity generators.

Using biogas or bio-CNG in transport is unfeasible due to technical and economic reasons.

Therefore, neither biogas nor bio-CNG has been included in the forecast.

Currently, there is no basis to forecast any intensive development of electric motor vehicles.

Therefore, we assumed potential minor share of this technology in transport not before 2020.

Taking into account provisions of Directive 2009/30/EC, transport should include railway, air transport and navigation. Considering the fact that railway and additionally a part of city transport are mainly fuelled by electricity, the data resulting from calculations presented below were used as a basis for estimation of RES electricity consumption by 2020.

In accordance with the data of the entity supplying electricity for railway transport, the consumption of electricity for 2009 equalled about 2.2 TWh. It has been assumed that by 2020, the consumption of electricity by railway and other rail-vehicles would decrease to about 1.8 TWh. Assuming an annual increase in the share of “green electricity” in total electricity, the level of annual consumption of energy from RES by non-road transport was calculated.

5.2 Total contribution expected from energy efficiency and energy saving measures to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity, heating and cooling and transport

The activity directly resulting from the *Energy Policy of Poland until 2030*, i.e. *Improving energy efficiency* is one of key elements supporting the improvement of energy efficiency. This priority will be supported by various measures:

- Setting the national objective of enhancing energy efficiency;
- Introducing a systemic mechanism to support measures aimed at attaining the national objective of enhancing energy efficiency;
- Stimulating development of cogeneration through support mechanisms, taking into account cogeneration from sources up to 1 MW and appropriate community policy;
- Using mandatory energy performance certificates for buildings and apartments upon their marketing or renting;
- Determining energy intensity of devices and power-consuming products, introducing minimum standards for power-consuming products;
- Committing the public sector to serve as a role model of economical energy usage;
- Supporting investments in energy saving through preferential loans and grants from domestic and European funds;
- Supporting research and development on new solutions and technologies reducing energy consumption, in all kinds of its processing and use;
- Applying Demand Side Management techniques, stimulated by diversification of distribution prices during the day and of electricity prices on the basis of reference prices as a result of introduction of an intra-day market and sending price signals to customers with the use of remote bilateral communication via electronic meters;
- Informational and educational campaigns promoting efficient energy use.

Detailed estimated savings resulting from promotion of energy efficiency by heating and cooling, electricity and transport in accordance with Article 3(4)(a) of Directive 2009/28/EC are presented in table (1) in chapter 1. In accordance with estimate, achieving the level indicated in the additional energy efficiency scenario is possible.

5.3 Assessment of impacts

When assessing the impact of RES support method applied in Poland in electricity (two other areas are not covered by regulatory method of their promotion), the following key assumptions were accepted:

1. Forecasts are based on fixed prices for 2009.
2. The system of RES support for the whole period 2010-2020 would be maintained.

3. The product of the value of substitution fee for 2010 equal PLN 267.95/MWh and the amount of electricity produced (in MWh), set in table 10, was assumed as support resources. Indexation of the substitution fee by the inflation rate was assumed, although as mentioned above, the introduction of the system based on fixed or declining substitution fee is being considered.
4. Expected greenhouse gas emission reduction was assumed based on emission volume per 1 MWh of electricity production in a state-of-the-art coal-fuelled power plant (highly efficient energy units with the power of 400-1000 MW):
 - CO₂ - 700 kg/MWh,
 - SO₂ - 0.43 kg/MWh,
 - NO_x - 0.43 kg/MWh.

At the same time, it should be emphasised that CO₂ emission level (others have not been disclosed) does not differ from the one presented in *Forecast of the demand for fuels and energy until 2030 (Prognoza zapotrzebowania na paliwa i energi• do 2030 roku)*.

5. Expected costs of purchase of emission rights for 1 Mg CO₂ = PLN 123.
6. Number of FTEs (assuming that the increase in electricity from RES in a great extent would be covered from wind and biomass sources) has been calculated as a sum of products of the number of installed new (during the forecast period) MW and 0.33 FTE per 1 MW and the increase in power installed in the previous year and 9 FTEs per 1 MW.

The assessment of the impacts of the method of RES support applied in Poland is presented below.

Table 13. Assessment of the impacts of the method of RES support applied in Poland

Description	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Expected renewable energy use	ktoe	5,873	6,233	6,614	6,949	7,262	7,617	8,117	8,668	9,255	9,944	10,725
Expected renewable electricity use	ktoe	913	1,090	1,276	1,417	1,577	1,709	1,858	2,010	2,185	2,393	2,786
Expected renewable electricity use	GWh	10,618.0	12,678.0	14,845.0	16,478.0	18,337.5	19,875.0	21,605.0	23,373.5	25,416.0	27,828.0	32,400.0
Expected indexation of the substitution fee	PLN/ MWh	268.0	275.2	282.6	290.2	298.1	306.1	314.4	322.9	331.6	340.6	349.8
Expected balance of resources resulting from the support scheme in form of certificates of origin	PLN million	2,845.1	3,488.8	4,195.4	4,782.7	5,466.1	6,084.3	6,792.5	7,546.9	8,428.0	9,477.0	11,331.9
Expected cumulative balance of resources resulting from the support scheme in form of certificates of origin	PLN million	2,845.1	6,333.9	10,529.3	15,312.0	20,778.0	26,862.4	33,654.9	41,201.8	49,629.8	59,106.8	70,438.7
Expected CO ₂ emission reduction	thousand Mg/year	7,432.6	8,874.6	10,391.5	11,534.6	12,836.3	13,912.5	15,123.5	16,361.5	17,791.2	19,479.6	22,680.0
Expected savings resulting from CO ₂ emission reduction	PLN million	914.2	1,091.6	1,278.2	1,418.8	1,578.9	1,711.2	1,860.2	2,012.5	2,188.3	2,396.0	2,789.6
Expected SO ₂ emission reduction	tonnes/year	4.6	5.5	6.4	7.1	7.9	8.5	9.3	10.1	10.9	12.0	13.9
Expected NO _x emission reduction	tonnes/year	4.6	5.5	6.4	7.1	7.9	8.5	9.3	10.1	10.9	12.0	13.9
Expected job creation	number of jobs		5,748	7,891	8,127	8,557	9,834	7,882	8,566	8,781	10,405	16,371

Source: Own work. The table structure and headings are consistent with Decision 2009/548/EC.

5.4 Preparation of the National Renewable Energy Action Plan and the follow-up of its implementation

a) How were regional and/or local authorities and/or cities involved in the preparation of this Action Plan? Were other stakeholders involved?

The National Renewable Energy Action Plan was published on the website of the Ministry of Economy. Regional authorities expressed their interest in the draft document, including, *inter alia*, provision of the information on local programmes of promotion of the development of renewable energy sources in progress, and confirmed their readiness to implement provisions of the National Action Plan.

b) Are there plans to develop regional/local renewable energy strategies? If so, could you please explain? In case relevant competences are delegated to regional/local levels, what mechanism will ensure national target compliance?

Currently, there are no plans to impose the obligation to develop regional/local renewable energy strategies. However, the national legislation requires voivodship governments to participate in energy and fuel supply planning on the area of the voivodship in cooperation with other communities and in compliance with the national energy policy. Additionally, own tasks of communities pertaining to supply of electricity, heat and gas fuels include:

- planning and arranging for heat, electricity and gas fuel supply on the area of community;
- planning the lighting of public space and roads on the area of the community;
- financing the lighting of street, yards and public roads on the area of the community.

c) Please explain the public consultation carried out for the preparation of this Action Plan

The National Action Plan was submitted for public consultation and interministerial consultations. The procedure adopted enabled active and constructive participation of entities interested in work on the document. As a result of consultations, the National Action Plan is a compromise between all aspects related to the development of renewable energy sources (economic situation, potential of the National Energy System and possibilities to balance additional sources, capacity of the support scheme, environmental conditions).

d) Please indicate your national contact point/the national authority or body responsible for the follow-up of the Renewable Energy Action Plan?

The Ministry of Economy is responsible for following-up the implementation of *the National Renewable Energy Action Plan*.

e) Do you have a monitoring system, including indicators for individual measures and instruments, to follow-up the implementation of the Renewable Energy Action Plan? If so, could you please give more details on it?

Article 9f of the *Energy Act* (Journal of Laws of 2006 No 89, item 625, as amended) contains provisions on the system for reporting on the share of electricity produced from renewable energy sources, while Article 30(4) of the Act of 25 August 2006 on biocomponents and liquid biofuels (Journal of Laws No 169, item 1199, as amended) contains provisions on drawing up summary quarterly reports on the market of biocomponents, liquid fuels and liquid biofuels.

Poland will endeavour to establish a complete and reliable monitoring system, including indicators for individual measures and instruments.