



**Report on progress in the promotion and use of energy
from renewable sources in Poland in 2009-2010**

(pursuant to Article 22 of Directive 2009/28/EC)

Warsaw, 2012

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Introduction

Article 22(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*, hereinafter referred to as Directive 2009/28/EC, requires Member States to submit a report to the Commission on progress in the promotion and use of energy from renewable sources by 31 December 2011, and every two years thereafter.

Member State reports will be important for the European Commission for monitoring overall renewable energy policy developments and Member State compliance with the measures set out in Directive 2009/28/EC and the National Renewable Energy Action Plans. The data included in these reports will also serve to measure the impacts referred to in Article 23 of Directive 2009/28/EC.

In order to ensure that the reports are complete, the Commission has issued this template, which covers all requirements laid down in Article 22 of the Directive. Much of the template draws on the template for the National Renewable Energy Action Plans¹.

Due to the fact that some instructions laid down in Directive 2009/28/EC will be implemented when the new Act on renewable energy sources enters into force, it was not possible to complete the report in full. On 23 December 2011, the draft Act on renewable energy sources, which includes *inter alia* a proposal to transpose Directive 2009/28/EC, was sent for interministerial arrangements and public consultation. The adopted timeline for the works on the abovementioned Act will allow more complete reports to be drawn up on progress in the promotion and use of energy from renewable sources in Poland. Poland has also stepped up efforts aimed at constant development of the methodology and forms of collecting data necessary to monitor the implementation of the objectives of Directive 2009/28/EC.

The data included in this report refer to the period of two years preceding the reporting year 2011, i.e. 2009-2010. Moreover, the report contains information on legislative activities taken up by the end of 2011 which have direct impact on the development of renewable energy.

The discussed data suggest that the share of renewable energy is growing. As a result, there is currently no threat to the achievement of the intermediate targets or the final objective of Directive 2009/28/EC. It is expected that optimising support schemes for the producers of electricity from RES, deregulation proposals and administrative facilitation proposed in the new Act on RES will encourage further development of renewable energy.

It should be emphasised that decisions of the European Commission and legal provisions adopted at EU level concerning *inter alia* sustainable development are important for further development of renewable energy sources in Poland. In order to stimulate the development of RES, it is essential to ensure a level playing field and compliance with the requirements applicable in the European Union under the Common Agricultural Policy and environmental policy concerning, among other things, biomass from third countries.

As regards the provisions of Article 22(3) of Directive 2009/28/EC, it should be pointed out that the single administrative body responsible for processing authorisation, certification and licensing business activity *inter alia* of energy production (Article 32 of the Energy Act) is the President of the Energy Regulatory Office. Moreover, automatic approval of planning and permit applications for renewable energy installations is not planned, as such approval in Poland requires initiation of administrative proceedings and issuance of a relevant decision, and thus is subject to the provisions of the Code of Administrative Procedure. The Code ensures integrity and transparency of the decision process in administrative proceedings. Moreover, given that the local governments have exclusive competence regarding spatial planning at local level, they are fully responsible and autonomous as regards the preparation

¹ COMMISSION DECISION 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; notified under document number C(2009) 5174; Text with EEA relevance; 2009/548/EC

of documents relating to planning, which may cover the development of renewable energy sources within the areas under their control.

1. Sectoral and overall shares and actual consumption of energy from renewable sources in the preceding 2 years (2010 and 2009) (Article 22 (1)(a) of Directive 2009/28/EC).

Table 1 contains data on actual share and actual consumption of energy from renewable energy sources in the reporting period 2009-2010. Since no trajectory (minimal share calculated based on Annex I to Directive 2009/28/EC) was indicated for this period, the table does not include the share from cooperation mechanism. The table corresponds to Table 3 of the National Renewable Energy Action Plans (NREAPs).

Table 1: The sectoral (electricity, heating and cooling, and transport) and overall shares of energy from renewable sources

	2009	2010
RES-H&C ² (%)	11.9	12.0
RES-E ³ (%)	5.9	6.7
RES-T ⁴ (%)	4.8	5.9
Overall RES share ⁵ (%)	8.9	9.5
Of which from cooperation mechanism ⁶ (%)	-	-
Surplus for cooperation mechanism ⁷ (%)	-	-

Source: Central Statistical Office

Table 1a contains figures in ktoe⁸ corresponding to renewable energy consumption of each sector and gross final consumption. The table corresponds to Table 4a of the NREAPs.

Table 1a: Calculation table for the renewable energy contribution of each sector to final energy consumption (ktoe)⁹

	2009	2010
(A) Gross final consumption of RES for heating and cooling	4,199	4,636
(B) Gross final consumption of electricity from RES	752	894
(C) Gross final consumption of energy from RES in transport	662	887
(D) Gross total consumption of energy from RES ¹⁰	5,613	6,417
(E) Transfer of RES to other Member States	-	-
(F) Transfer of RES from other Member States and third countries	-	-
(G) RES consumption adjusted for target (D)-(E)+(F)	5,613	6,417

Source: Central Statistical Office

Table 1b contains figures in MW corresponding to the installed capacity of specific electricity technologies. The table contains as well figures in

² Share of renewable energy in heating and cooling: gross final consumption of energy from renewable sources for heating and cooling (as defined in Articles 5(1)(b) and 5(4) of Directive 2009/28/EC) divided by gross final consumption of energy for heating and cooling. The same methodology as in Table 3 of the NREAPs applies.

³ Share of renewable energy in electricity: gross final consumption of electricity from renewable sources for electricity (as defined in Articles 5(1)(a) and 5(3) of Directive 2009/28/EC) divided by total gross final consumption of electricity. The same methodology as in Table 3 of the NREAPs applies.

⁴ Share of renewable energy in transport: final energy from renewable sources consumed in transport (cf. Article 5(1)(c) and 5(5) of Directive 2009/28/EC) divided by the consumption in transport of 1) petrol; 2) diesel; 3) biofuels used in road and rail transport and 4) electricity in land transport (as reflected in row 3 of Table 1). The same methodology as in Table 3 of the NREAPs applies.

⁵ Share of renewable energy in gross final energy consumption. The same methodology as in Table 3 of the NREAPs applies.

⁶ As a percentage of overall RES share.

⁷ As a percentage of overall RES share.

⁸ ktoe (kilotonne of oil equivalent) one thousand tonnes of oil equivalent, 1ktoe = 4,1868 GJ

⁹ Facilitates comparison with Table 4a of the NREAPs

¹⁰ According to Article 5(1) of Directive 2009/28/EC, gas, electricity and hydrogen from renewable energy sources shall only be considered once. No double counting is allowed.

GWh corresponding to RES consumption in electricity. The table corresponds to Tables 10a and 10b of the NREAPs.

Table 1b: Total actual contribution (installed capacity, gross electricity generation) 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 sources in electricity¹¹

	2009		2010	
	MW	GWh	MW	GWh
Hydro¹²:	945.210	2,355.574	937.042	2,390.262
non pumped				
< 1 MW*	88.077	-	90.119	-
1 MW – 10 MW*	184.653	-	174.443	-
> 10 MW*	672.480	-	672.480	-
pumped	-	-	-	-
Mixed ¹³	-	-	-	-
Geothermal	0	0	0	0
Solar:	0.001	1.328	0.033	1.672
<i>photovoltaic</i>	0.001	1.328	0.033	1.672
<i>concentrated solar power</i>	0	0	0	0
Tide, wave, ocean	0	0	0	0
Wind:	724.657	1,164.180	1,180.272	1,700.290
<i>onshore</i>	724.657	1,164.180	1,180.272	1,700.290
<i>offshore</i>	0	0	0	0
Biomass¹⁴:	323.378	5,223.353	439.074	6,303.590
<i>solid biomass**</i>	252.490	4,904.113	356.190	5,905.210
<i>biogas</i>	70.888	319.240	82.884	398.380
<i>bioliquids</i>	0	0	0	0
Bioliquids (co-incineration)	-	2.967	-	0.9
TOTAL	1,993.246	8,747.402	2,556.421	10,396.710
<i>of which in CHP</i>	-	4,663.807	-	5,592.500

Source: Central Statistical Office (as regards generated electricity, excluding solar energy – MWh) and Energy Regulatory Office (as regards the installed capacity of all technologies – MW, and generated electricity from solar energy – MWh)

*Given standardisation calculations, it is currently not possible to provide more detailed data concerning hydro energy.

**Installed capacity for solid biomass concern only units generating electricity using exclusively biomass as fuel. Such cases enable to determine the installed capacity of a given source. In Poland, apart from electricity generation in units dedicated exclusively to incineration of biomass, there are large systemic installations generating electricity in the process of co-incineration of biomass with other fossil fuels, e.g. coal. In this case, in accordance

with applicable regulation of the Minister of Economy of 14 August 2008 *on the detailed scope of obligations in respect to obtaining certificates of origin and submitting them for redemption, payment of a substitute 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 and 2010 No 34, item 182), energy produced from renewable energy sources includes a portion of electricity or heat corresponding to the share of chemical energy of biomass or biogas in chemical energy of the fuel used to generate energy, calculated on the basis of real calorific values of these fuels. Since the composition of the mixture of biomass and another fuel differs in individual installations and can vary in different periods, it is impossible to calculate and provide the rated installed capacity for such units.

Table 1c contains figures in ktoe corresponding to renewable energy consumption in heating and cooling divided into specific technologies. The table corresponds to Table 11 of the NREAPs.

¹¹ Facilitates comparison with Table 10a of the NREAPs.

¹² Normalised in accordance with Directive 2009/28/EC and Eurostat methodology.

¹³ In accordance with new Eurostat methodology.

¹⁴ For bioliquids and biofuels, taken into account are only those complying with applicable sustainability criteria, cf. Article 5(1) last subparagraph of Directive 2009/28/EC.

Table 1c: Total actual contribution (final energy consumption¹⁵) 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 (ktoe)¹⁶

	2009	2010
Geothermal (excluding low temperature geothermal heat in heat pump applications)	14.3	13.4
Solar	2.0	2.4
Biomass ¹⁷ :	4,164.6	4,599.5
<i>solid biomass</i>	4,121.6	4,554.2
<i>biogas</i>	42.9	45.3
<i>bioliquids</i>	0.1	0.0
Renewable energy from heat pumps:	18.1	21.2
- of which aerothermal	0.3	0.8
- of which geothermal	12.6	13.4
- of which hydrothermal	5.2	7
TOTAL	4,199.0	4,636.5
<i>Of which DH</i> ¹⁸	-	-
<i>Of which biomass in households</i> ¹⁹	2,488.2	2,692.9

Source: Central Statistical Office

Table 1d contains figures in ktoe corresponding to renewable energy consumption in transport divided into specific technologies. The table corresponds to Table 12 of the NREAPs.

Table 1d: Total actual contribution 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 (ktoe)^{20, 21}

	2009	2010
Bioethanol/ bio-ETBE	195	189
<i>Of which biofuels</i> ²² Article 21(2)	0	0
<i>Of which imported</i> ²³	103	84
Biodiesel	468	698
<i>Of which B100</i>	80	212
<i>Of which biofuels</i> ²⁴ Article 21(2)	0	0
<i>Of which imported</i> ²⁵	139	365
Hydrogen from renewable resources	0	0
Renewable energy	16	19
<i>Of which road transport</i>	0	0
<i>Of which non-road transport</i>	16	19
Others (as biogas, vegetable oils, etc.) – please specify	0	0
<i>Of which biofuels</i> ²⁶ Article 21(2)	0	0
TOTAL	679	906

Source: Central Statistical Office

*In order to avoid double calculation of energy from RES in transport, the figures referring to non-road transport have been included in this Table and excluded from Table 1a.

2. Measures taken in the preceding 2 years or planned at national level to promote the growth of energy from renewable sources taking into account the indicative trajectory

¹⁵ Direct use and district heat as defined in Article 5(4) of Directive 2009/28/EC.

¹⁶ Facilitates comparison with Table 11 of the NREAPs.

¹⁷ For bioliquids take into account only those complying with applicable sustainability criteria, cf. Article 5(1) last subparagraph of Directive 2009/28/EC.

¹⁸ District heating or cooling from total renewable heating and cooling consumption (RES-DH).

¹⁹ From the total renewable heating and cooling consumption.

²⁰ For biofuels take into account only those compliant with the sustainability criteria, cf. Article 5(1) last subparagraph.

²¹ Facilitates comparison with Table 12 of the NREAPs.

²² Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

²³ From the whole amount of bioethanol / bio-ETBE.

²⁴ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

²⁵ From the whole amount of biodiesel.

²⁶ Biofuels that are included in Article 21(2) of Directive 2009/28/EC.

for achieving the national RES targets as outlined in your National Renewable Energy Action Plan. (Article 22(1)(a) of Directive 2009/28/EC)

Table 2 covers only the measures which were not in force or foreseen while drawing up the NREAP.

Table 2: Overview of all policies and measures

Name and reference of the measure	Type of measure*	Expected result**	Targeted group or activity***	Existing or planned**** *	Start and end dates of the measure
1. Abolition of the obligation of an entity applying for grid connection to submit an expert's opinion on the impact of the source on the grid. In accordance with Article 7(8e) of the Energy Act, an undertaking whose activity consists in the transmission and distribution of electricity is responsible for submitting an expert's opinion on the impact of devices, installations and grids connected directly to a grid of a rated voltage higher than 1 kV, except for the production units of not more than 2 MW of installed capacity, or final customer's units of not more than 5 MW of connection power.	regulatory	facilitation of grid connection process	undertakings applying for grid connection	existing	since 2010
2. Introducing an obligation of an undertaking whose activity consists in the transmission and distribution of electricity to collect certain information. In accordance with Article 7(8l) of the Energy Act, energy undertakings whose activity consists in the transmission and distribution of electricity are required to collect information concerning: 1) entities applying for connection to the grid of sources of a rated voltage higher than 1 kV, location of connections, connection power, installation type, issuance date of connection terms and conditions, conclusion of grid connection agreements and commencement of electricity supply, 2) total available connection power for the sources, as well as planned changes in this regard within 5 years from the day of publication of this information, for an undertaking's whole grid of a rated voltage higher than 1 kV divided into electrical substations or groups thereof being part of a grid of a rated voltage of 110 kV and higher; the power under issued and valid terms and conditions of connection of source to the grid is deducted from total connection power – pursuant to regulations on protection of classified and other legally protected information. An undertaking shall update such information at least once a quarter, taking account of expansion and modernisation of the grid, both completed and in progress, and publish the information on its website.	regulatory	facilitation of grid connection process	undertakings applying for grid connection	existing	since 2011
3. Optimisation of the support scheme based on certificates of origin through diversification of the amount of support depending on the technology and installed capacity of the production unit.	regulatory/ financial	sustainable supply of energy from RES to final customers, reduction of macroeconomic costs of supply, optimal use of locally available raw materials	producers of electricity from renewable energy sources	planned	2012-2013
4. Introducing a definition of microinstallations and stimulation of	regulatory/ financial	sustainable supply of energy from RES to	producers of electricity from	planned	2012-2013

prosumer activity (prosumer activity consists in households and agricultural holdings producing energy from RES for their own needs and selling all potential excess energy to the grid)		final customers, reduction of macroeconomic costs of supply, optimal use of locally available raw materials, increase in share of RES, increase in energy security, reducing the demand for regulatory services, limiting transmission losses	renewable energy sources		
5. Introducing premiums for prosumers for electricity generation in microinstallations	regulatory/ financial	sustainable supply of energy from RES to final customers, reduction of macroeconomic costs of supply, optimal use of locally available raw materials, increase in share of RES, increase in energy security, reducing the demand for regulatory services, limiting transmission losses	producers of electricity from renewable energy sources	planned	2012-2013

Source: Our study

*Indicate if the measure is (predominantly) regulatory, financial or soft (i.e. information campaign).

**Is the expected result behavioural change, installed capacity (MW; t/year), energy generated (ktoe)?

***Who are the targeted persons: investors, final customers, public administration, planners, architects, installers, etc.? or what is the targeted activity / sector: biofuel production, energetic use of animal manure, etc.)?

****Does this measure replace or complement measures contained in Table 5 of the NREAPs?

2.a Please describe the progress made in evaluating and improving administrative procedures to remove regulatory and non-regulatory barriers to the development of renewable energy. (Article 22(1)(e) of Directive 2009/28/EC)

Administrative procedures relating to the use of renewable energy are sufficient, given the development of large-scale (industrial) energy sector, which is reflected in newly developed installations. The procedures currently in place ensure safe development of RES sector, taking into account its impact on the society, economy and environment as well as safety of the National Electricity System. However, procedural facilitation and deregulation proposed in the draft Act on RES is aimed to encourage dynamic development of RES in Poland with respect to distributed low power sources.

It is assumed that the sector will grow through increased stability of conditions for business activity consisting in energy production from RES.

2.b Please describe the measures in ensuring the transmission and distribution of electricity produced from renewable energy sources and in improving the framework or rules for bearing and sharing of costs related to grid connections and grid reinforcements. (Article 22(1)(f) of Directive 2009/28/EC)

Relevant provisions of Polish law ensure priority transmission and distribution of electricity produced from renewable energy sources in Poland. In accordance with Article 9c(6) of the Energy Act of 10 April 1997 (Journal of Laws 2006 No 89, item 625, as amended), within the field of its activity, the electricity system operator shall be obliged to ensure that all the entities have priority in transmission or distribution of electricity generated from renewable energy sources and high-efficiency cogeneration, at the same time ensuring the reliability and security of the National Electricity System.

As for improving the framework or rules for bearing and sharing of costs related to grid connections and grid reinforcements, in accordance with the NREAP sent, under the Energy Act (Article 7(81)) the energy undertakings are required to collect and publish information concerning particularly:

- entities applying for connection to the grid of sources of a rated voltage higher than 1 kV, location of connections, connection power, installation type, issuance date of connection terms and conditions, conclusion of grid connection agreements and commencement of electricity supply,
- total available connection power for the sources as well as planned changes in this regard within 5 years from the day of publication of this information, for an undertaking's whole grid of a rated voltage higher than 1 kV divided into electrical substations or groups thereof being part of a grid of a rated voltage of 110 kV and higher; the power under issued and valid terms and conditions of connection of source to the grid is deducted from total connection power.

The aforementioned information shall be published pursuant to regulations on protection of classified and other legally protected information. An undertaking shall update such information at least once a quarter, taking account of expansion and modernisation of the grid, both completed and in progress, and publish the information on its website.

The published information enables all potential applicants to assess the possibility of connection at individual points of the grid and hence to select the location for the investment which is advantageous from the point of view of the grid and connection possibilities. The above data do not provide information concerning the costs of possible connection. This is due to the fact that the actual cost of connection to the grid is always determined on a case by case basis, since it depends on the costs of the connection borne by individual operators, and hence it is strictly related to technical details of the connection. The actual connection cost depends not only on the voltage level to which the connection is planned, but also on the alignment of the switching station and its technology. In the case of connection to the grid of the Transmission System Operator, the connection fee does not include the expenditure on expansion of the grid, necessary to transmit the power out.

Pursuant to Article 7(1) of the Energy Act an energy undertaking whose activity consists in the transmission and distribution of gaseous fuels or electricity has an obligation to conclude a grid connection agreement with entities requesting connection to the grid, on terms of equal treatment, if it is technically and economically feasible to supply energy or fuels and the applicant meets the requirements for being connected to the grid and taking supply. Should the energy undertaking reject concluding a grid connection agreement, it shall be obliged to notify the President of Energy Regulatory Office and the entity requesting the connection in writing of the refusal without delay, stating the reasons for the refusal.

The data sent by the President of ERO suggest that the undertakings which provide electricity transmission and distribution services refuse connection to the grid in some cases. Disputes concerning grid connection refusal are settled by the President of Energy Regulatory Office upon request of a party.

The above suggests that every new grid connection should be a sustainable and stable process in order not to threaten the safety of the National Electricity System or overburden the final customers with the cost of grid connection.

3. Please describe the support schemes and other measures currently in place that are applied to promote energy from renewable sources and report on any developments in the measures used with respect to those set out in your National Renewable Energy Action Plan. (Article 22(1)(b) of Directive 2009/28/EC)

By introducing provisions of law, the Minister of Economy encourages investors to take action in the field of development of energy from renewable sources in Poland. The basis of the abovementioned activity is to ensure optimal conditions for business activity in energy production from RES. The Energy Act provides for an indirect support scheme for undertakings which produce energy from renewable sources. The scheme consists in compulsory purchase by an ex officio seller of electricity generated by these undertakings, as well as issuance of certificates of origin for that electricity by the President of ERO. The certificates of origin entitle to property rights, which are subject to trade, i.a. at Polish Power

Exchange. At the same time undertakings whose business activity consists in electricity generation or trade in electricity, which sell that electricity to the final customers, as well as other entities specified in Article 9a(1a) of the Energy Act are obliged to present a relevant number of certificates of origin to the President of ERO for redemption or to pay a substitute fee. It should be noted that the scheme of certificates of origin constitutes sufficient support to producers of electricity from renewable sources and introduces market mechanisms which favour optimal and cost-effective development of renewable energy. The abovementioned mechanisms have been strengthened by a scheme of fines imposed on energy undertakings in case of failure to meet the abovementioned obligations. The funds obtained through substitute fees and fines are paid to the National Fund for Environmental Protection and Water Management and constitute financial support of investments relating to renewable energy sources and cogeneration.

Alongside the abovementioned indirect support, there is a possibility to obtain direct support in the form of grants and low-interest investment loans. Direct support is mainly provided through competitions for projects in the area of RES investment, construction and reinforcement of transmission grids which enable connection of new production units, as well as production of equipment for renewable energy purposes. The abovementioned support may be obtained under the Operational Programme “Infrastructure and Environment”, Operational Programme “Innovative Economy”, Regional Operational Programmes, Rural Development Programme, as well as from the National Fund for Environmental Protection and Water Management, Provincial Funds for Environmental Protection and Water Management, and Bank Ochrony Środowiska (Environment Protection Bank).

It should be emphasised that the above described support schemes for producers of energy from renewable sources existing in Poland do not constitute a burden to the State Budget.

At the same time it should be mentioned that Article 30(1) of the Excise Duty Act provides for an exemption from excise duty on electricity produced from renewable energy sources based on a document confirming redemption of a certificate of origin within the meaning of the Energy Act.

Modification of the mechanism of certificates of origin, which was proposed in the draft Act on renewable energy sources, will contribute among others to economic optimisation of the support schemes, which will, on the one hand, stimulate the development of RES in Poland and, on the other hand, reduce financial burden to the final customers which is the case under RES support schemes currently in place.

The Polish authorities expect as well that the new budget of the European Union will take into account the need for additional financing for renewable energy sources.

Table 3: Support schemes for renewable energy

2011 support schemes for renewable energy (since the data for 2011 are being collected and analysed, the table contains the data on final annual production for each technology in accordance with the information in the National Renewable Energy Action Plan (Tables 10a, 10b, 11, 12))		Per unit support	Total (PLN million)*
A. Hydro (electricity) - 2,311 GWh*			
Instrument (provide data as relevant)	Obligation/quota (%)**		100%
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	195.32	451.38
	Average certificate price ****	274.92	635.34
	Tax exemption/refund (PLN)*****	20.00	46.22
	Investment subsidies (capital grants or loans) (€/unit)		*****
	Production incentives		not applicable
	Feed-in tariff		not applicable
	Feed-in premiums		not applicable
Tendering		not applicable	
B. geothermal (electricity) - 0 GWh			
Instrument (provide data as relevant)	Obligation/quota (%)**		100%
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	195.32	0
	Average certificate price ****	274.92	0
	Tax exemption/refund (PLN)*****	20.00	0
	Investment subsidies (capital grants or loans) (€/unit)		*****

	Production incentives		not applicable
	Feed-in tariff		not applicable
	Feed-in premiums		not applicable
	Tendering		not applicable
C. solar (electricity) - 2 GWh			
Instrument (provide data as relevant)	Obligation/quota (%)**		100%
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	195.32	0.39
	Average certificate price ****	274.92	0.55
	Tax exemption/refund (PLN)*****	20.00	0.04
	Investment subsidies (capital grants or loans) (€/unit)		*****
	Production incentives		not applicable
	Feed-in tariff		not applicable
Feed-in premiums		not applicable	
Tendering		not applicable	
D. tide, wave, ocean (electricity) - 0 GWh			
Instrument (provide data as relevant)	Obligation/quota (%)**		100%
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	195.32	0
	Average certificate price ****	274.92	0
	Tax exemption/refund (PLN)*****	20.00	0
	Investment subsidies (capital grants or loans) (€/unit)	*****	
	Production incentives		not applicable
	Feed-in tariff		not applicable
Feed-in premiums		not applicable	
Tendering		not applicable	
E. wind (electricity) - 3 255 GWh			
Instrument (provide data as relevant)	Obligation/quota (%)**		100%
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	195.32	635.77
	Average certificate price ****	274.92	894.86
	Tax exemption/refund (PLN)*****	20.00	65.10
	Investment subsidies (capital grants or loans) (€/unit)		*****
	Production incentives		not applicable
	Feed-in tariff		not applicable
Feed-in premiums		not applicable	
Tendering		not applicable	
F. solid biomass (electricity) - 6 700 GWh			
Instrument (provide data as relevant)	Obligation/quota (%)**		100%
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	195.32	1,308.64
	Average certificate price ****	274.92	1,841.96
	Tax exemption/refund (PLN)*****	20.00	134.00
	Investment subsidies (capital grants or loans) (€/unit)		*****
	Production incentives		not applicable
	Feed-in tariff		not applicable
Feed-in premiums		not applicable	
Tendering		not applicable	
G. biomass - biogas (electricity) - 410 GWh			
Instrument (provide data as relevant)	Obligation/quota (%)**		100%
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	195.32	80.08
	Average certificate price ****	274.92	112.72
	Tax exemption/refund (PLN/MWh)*****	20.00	8.20
	Investment subsidies (capital grants or loans) (€/unit)		*****
	Production incentives		not applicable
	Feed-in tariff		not applicable
Feed-in premiums		not applicable	
Tendering		not applicable	
H. geothermal (heat) - 24 ktoe			
Instrument (provide data as relevant)	Obligation/quota (%)		not applicable
	Penalty/Buy out option/ Buy out price (PLN/MWh)		not applicable
	Average certificate price		not applicable
	Tax exemption/refund (PLN/MWh)		not applicable
	Investment subsidies (capital grants or loans) (€/unit)		*****
	Production incentives		not applicable
Feed-in tariff		not applicable	
Feed-in premiums		not applicable	
Tendering		not applicable	
I. solar (heat) - 45 ktoe			
Instrument (provide data as relevant)	Obligation/quota (%)**		not applicable
	Penalty/Buy out option/ Buy out price (PLN/MWh)***		not applicable
	Average certificate price ****		not applicable
	Tax exemption/refund (PLN/MWh)*****		not applicable

	Investment subsidies (capital grants or loans) (€/unit)	*****
	Production incentives	not applicable
	Feed-in tariff	not applicable
	Feed-in premiums	not applicable
	Tendering	not applicable
J. solid biomass (heat) – 3 871 ktoe		
Instrument (provide data as relevant)	Obligation/quota (%)**	not applicable
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	not applicable
	Average certificate price ****	not applicable
	Tax exemption/refund (PLN/MWh)*****	not applicable
	Investment subsidies (capital grants or loans) (€/unit)	*****
	Production incentives	not applicable
	Feed-in tariff	not applicable
	Feed-in premiums	not applicable
	Tendering	not applicable
K. biomass - biogas (heat) - 98 ktoe		
Instrument (provide data as relevant)	Obligation/quota (%)**	not applicable
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	not applicable
	Average certificate price ****	not applicable
	Tax exemption/refund (PLN/MWh)*****	not applicable
	Investment subsidies (capital grants or loans) (€/unit)	*****
	Production incentives	not applicable
	Feed-in tariff	not applicable
	Feed-in premiums	not applicable
	Tendering	not applicable
L. heat pumps (heat) - 98 ktoe		
Instrument (provide data as relevant)	Obligation/quota (%)**	not applicable
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	not applicable
	Average certificate price ****	not applicable
	Tax exemption/refund (PLN/MWh)*****	not applicable
	Investment subsidies (capital grants or loans) (€/unit)	*****
	Production incentives	not applicable
	Feed-in tariff	not applicable
	Feed-in premiums	not applicable
	Tendering	not applicable
M. bioethanol (transport) - 299 ktoe		
Instrument (provide data as relevant)	Obligation/quota (%)**	explanations in the table below
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	
	Average certificate price ****	
	Tax exemption/refund (PLN/MWh)*****	
	Investment subsidies (capital grants or loans) (€/unit)	
	Production incentives	
	Feed-in tariff	
	Feed-in premiums	
	Tendering	
N. biodiesel (transport) – 755 ktoe		
Instrument (provide data as relevant)	Obligation/quota (%)**	explanations in the table below
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	
	Average certificate price ****	
	Tax exemption/refund (PLN/MWh)*****	
	Investment subsidies (capital grants or loans) (€/unit)	
	Production incentives	
	Feed-in tariff	
	Feed-in premiums	
	Tendering	
O. electricity (transport) - 17 ktoe		
Instrument (provide data as relevant)	Obligation/quota (%)**	not applicable
	Penalty/Buy out option/ Buy out price (PLN/MWh)***	not applicable
	Average certificate price ****	not applicable
	Tax exemption/refund (PLN/MWh)*****	not applicable
	Investment subsidies (capital grants or loans) (€/unit)	not applicable
	Production incentives	not applicable
	Feed-in tariff	not applicable
	Feed-in premiums	not applicable
	Tendering	not applicable
Total annual estimated support in the electricity sector (includes cost borne in relation to compulsory purchase of electricity at an average price, payment of the substitute fee and costs of exemption from excise duty on electricity produced from renewable energy sources)		6,215.25

Total annual estimated support in the heating sector		not applicable
Total annual estimated support in the transport sector	explanations in the table below	
Total annual estimated support in all sectors	no exact data available	

Source: Our work based on the data from the NREAP, ERO information and national legislation

*NREAP forecasts concerning energy produced in 2011.

**In Poland, 100% of electricity produced from renewable energy sources is covered by collection obligation.

***Price paid to RES installations for generated energy received by the grid (the price stems from the average electricity selling price on the competitive market in 2010 and was published by the President of ERO in information No 8/2011).

****Substitute fee applicable in 2011, published by the President of ERO in information No 3/2011; the financial value of certificates of origin corresponds to their market value.

*****In Poland, all electricity produced from renewable sources is exempt from excise duty, which amounts to PLN 20 per MWh.

*****There is no predefined level of support scheme for any of the technologies; specific projects may apply for support independently and with no limitations; in the case of most programmes, a competition procedure applies.

Support for biocomponents and liquid biofuels until 30 April 2011:

Until 30 April 2011, State Aid scheme N 57/08 “Pomoc operacyjna w zakresie biopaliw”, approved by the European Commission on 18 September 2009, was in effect in Poland. The scheme included exemption from excise duty on liquid biofuels with biocomponents and biocomponents as pure fuels as well as exemption from fuel charge on biocomponents as pure fuels.

The support scheme for biocomponents and liquid biofuels provided for lower rates of excise duty on:

- products made by blending motor fuels falling within CN codes 2710 11 45 or 2710 11 49 with biocomponents, containing over **2%** biocomponents, produced in tax warehouses and complying with quality requirements specified in separate provisions - by PLN **1.565** per litre of biocomponents added to these fuels,
- products made by blending diesel oils falling within CN codes 2710 19 41 with biocomponents, containing over **2%** biocomponents, produced in tax warehouses and complying with quality requirements specified in separate provisions - by PLN **1.048** per litre of biocomponents added to these oils,
- biocomponents as pure fuels, produced in tax warehouses and complying with quality requirements specified in separate provisions, intended for combustion engines, regardless of CN codes - in the amount of PLN 10.00 per 1,000 litres. (**1 gr/l**).

Moreover, biocomponents as pure fuel were exempt from fuel charge (fuel charge rate - PLN 239.84 per 1,000 litres).

Support for biocomponents and liquid biofuels after 30 April 2011:

The Act of 26 November 2010 *amending certain acts* connected with the implementation of the Budget Act (Journal of Laws No 238, item 1578) includes provisions which change the rules of providing support for biocomponents and liquid biofuels in the form of excise duty reliefs. The criteria concerning the minimum content of biocomponents in liquid biofuels entitled to reliefs have been tightened and the period of possible relief application was limited.

In accordance with Article 37 of the Act amending certain acts connected with the implementation of the Budget Act, lower excise duty rates could have applied from 1 May 2011 to 31 December 2011 provided the European Commission issued a positive decision concerning the compatibility of the aid under Article 37 of the abovementioned act with the common market. Moreover, these rates could only be applied to liquid biofuels containing over 80% biocomponents (bioethanol or fatty acid methyl esters) and to biocomponents as pure fuels.

As of 31 December 2011, excise duty reliefs on biocomponents and liquid biofuels no longer apply. Given that since then the European Commission has not issued any positive

decision concerning the compatibility of aid under Article 37 of the Act amending certain acts connected with the implementation of the Budget Act with the common market, no support was provided for the producers of liquid fuels or biofuels.

The abovementioned mechanism was sent to the European Commission for notification under the modified scheme N 57/2008. The scheme extends the exemption from the fuel charge granted for biocomponents used as pure fuels until 31 December 2013 as well.

Given the fact that excise duty reliefs on biocomponents and liquid biofuels were granted until 31 December 2011, the European Commission was requested to cancel the notification of the abovementioned mechanism.

Therefore, the aid scheme which is currently being notified covers only fuel charge exemption on biocomponents as pure fuels (until 31 December 2013).

In 2009-2010, the Minister of Science and Higher Education financed research projects in accordance with the provisions of the *Act of 8 October 2004 on rules of financing science (the act was repealed by the new Act on rules of financing science, Journal of Laws 2010 No 96, item 615)* and its implementing measures. Since 1 October 2010, research projects have been financed by the National Science Centre, whereas applied research projects – by the National Centre for Research and Development. Funds are granted on the basis of a competition. The subject matter is specified by the applicants. Financed projects include projects in the field of renewable energy. Summary 1 presents selected research projects financed in 2009 and 2010. In turn, summary 2 presents financed projects in the field of biogas and biofuels.

**Summary 1. Selected research projects in the field of renewable energy funded by the Ministry of Science and Higher Education
(in 2009-2010)**

Item	Project title	Implementing entity	Total input	Commencement date	Completion date
Renewable energy					
1	Technological and economic conditions of thermal water management in Uniejów	AGH University of Science and Technology, Faculty of Drilling, Oil and Gas	58,500	03 Oct 2007	02 Apr 2009
2	Geological analysis and assessment of geothermal water and energy resources of Mesozoic formations in the Szczecin Trough	AGH University of Science and Technology, Faculty of Geology, Geophysics and Environment Protection	49,600	29 Oct 2007	28 Oct 2009
3	New methods of shaping low-head water turbine flow systems	Gdansk University of Technology, Faculty of Mechanical Engineering	228,135	16 Jun 2008	15 Jun 2011
4	Analysis and assessment of opportunities of using new methods to improve effectiveness of power plants and heat and power plants powered on low enthalpy geothermal water	West Pomerania University of Technology Szczecin, Faculty of Mechanical Engineering and Mechatronics	387,000	21 Apr 2008	20 Apr 2011
5	Research and development study of propeller turbine design methods	Szewalski Institute of Fluid-Flow Machinery of Polish Academy of Sciences	300,000	27 Aug 2008	26 Aug 2011
6	Study of manufacture and application of renewable emulsion fuel oils for heating devices of low and average power	Technical University of Radom, Faculty of Materials Science, Technology and Design	242,600	30 Sep 2008	28 Sep 2010
7	Study of high-temperature fuel cells powered by biofuels	Warsaw University of Technology, Faculty of Power and Aeronautical Engineering	153,530	16 Oct 2008	15 Oct 2009
8	Analysis of the co-combustion process of coal-water slurries and biomass	Czestochowa University of Technology, Faculty of Mechanical Engineering and Computer Science	178,260	16 Oct 2008	15 Oct 2010
9	Analysis of opportunities of using thermal waters from the Polish Lowlands for balneological and recreational purposes	AGH University of Science and Technology, Faculty of Geology, Geophysics and Environment Protection	358,700	08 Oct 2008	07 Apr 2011
10	Macro- and microeconomic effectiveness of energy production at small hydroelectric power stations	Warsaw University of Life Sciences, Faculty of Economic Sciences	25,000	16 Apr 2009	31 Mar 2010
11	Parametric identification as a diagnostic method for hybrid renewable energy systems	Warsaw University of Life Sciences, Faculty of Production Engineering	339,000	08 May 2009	07 May 2012

12	Development of automated methods to assess the condition of wind turbines	AGH University of Science and Technology, Faculty of Mechanical Engineering and Robotics	393,000	20 May 2009	19 Feb 2011
13	Optimisation of the effectiveness of silicon thin-film solar cells	Lublin University of Technology, Faculty of Fundamentals of Technology	159,200	23 Apr 2009	22 Apr 2012
14	Use of renewable fuels for clean and high-efficiency energy generation in fuel cells	Czestochowa University of Technology, Faculty of Environmental Protection and Engineering	398,000	02 Jul 2009	01 Jul 2012
15	Construction of energy processing and storage systems in small home wind power plants	University of Warmia and Mazury in Olsztyn, Faculty of Technical Sciences	367,350	22 Sep 2009	21 Sep 2011
16	Identification of vibroacoustic properties of vertical-axis wind turbines in urban areas	Poznan University of Technology, Faculty of Mechanical Engineering and Management	49,586	15 Oct 2009	02 Feb 2011
17	Study of the production process of thin-film solar cells based on silicon lateral layers.	Lublin University of Technology, Faculty of Fundamentals of Technology	40,200	01 Oct 2009	13 Aug 2010
18	Analysis of operation conditions of electrical power safety automatics in wind power plants	Wroclaw University of Technology, Faculty of Electrical Engineering	234,000	21 Sep 2009	20 Jul 2011
19	Experimental and numerical studies of energy buoys for capturing wave energy	Gdansk University of Technology, Faculty of Ocean Engineering and Ship Technology	450,000	09 Oct 2009	08 Feb 2012
20	Study of effectiveness of hybrid solar energy systems in the climate conditions of Lublin region	Lublin University of Technology, Faculty of Fundamentals of Technology	29,600	30 Sep 2009	06 Aug 2010
21	New electrode materials for hydrogen power engineering	AGH University of Science and Technology, Faculty of Electrical Engineering, Automatics, Computer Science and Electronics	367,810	17 Sep 2009	16 Mar 2012
Total:			PLN 4,809,071		

Summary 2. Funding of research and R&D projects in the fields of biogas and biofuels in 2009-2010

Biofuels	
In 2009-2010, around PLN 34.5 million was allocated from the State Budget to research and R&D projects in the field of biofuels under the following three funding streams:	<ul style="list-style-type: none"> - 18 projects implemented by scientific entities, mainly higher education institutions – the total value of the projects was PLN 6.5 million; - 2 projects financed from structural funds implemented by 2 undertakings – the total value of the projects was PLN 20.3 million; - 7 development projects implemented by scientific entities – the total value of the projects was PLN 7.7 million.
In 2010, the National Centre for Research and Development opened competitions for 4 research tasks, including “ <i>Developing integrated technologies of fuel and energy production from biomass, agricultural wastes and other resources</i> ” within the framework of the strategic programme “ <i>Advanced Technologies for Energy Generation</i> ”. This will be implemented by the Institute of Fluid-Flow Machinery until 2013 (total amount of funding - PLN 70 million).	
R&D activities in the field of biofuels or other renewable fuels in 2009-2010 covered the following areas:	<ul style="list-style-type: none"> - operating properties of engines, including impact on their durability and reliability; - economic analyses; - production of components from raw materials of plant origin; - production technology; - production in small agricultural holdings.
Biogas	
In 2009-2010, the Ministry of Science and Higher Education financed 5 research and R&D projects in the field of biogas.	<ul style="list-style-type: none"> - Study of photocatalytic conversion of organic matter to useful hydrocarbons. Development of fundamentals of a new biogas production technology (research project); - Intensification of production processes of high-energy biogas from organic waste using psychrophiles (research project); - Opportunities for retaining or increasing soil fertility and nutrition, as well as crop productivity while using straw for energy purposes (research project); - Development of thermal conversion of biomass and municipal waste to gas fuels based on a two-phase reactor for gasification (development project); - Effective biomass production systems on agricultural land and biomass conversion to liquid and gas fuels (development project).

The Ministry of Science and Higher Education is the intermediate body for three operational programmes managed by the Ministry of Regional Development, namely the Operational Programme “Innovative Economy” (OP IE), Priority Axis I “Research and development of new technologies” and Priority Axis II “R&D infrastructure”. Support under the OP IE can be provided regardless of the sector or branch. Projects cofinanced by the

Ministry of Science and Higher Education include projects in the field of renewable energy. Summary 3 presents selected projects financed from PO IE funds.

Summary 3. Selected projects in the field of renewable energy within the framework of Priority Axes I and II of the Operational Programme “Innovative Economy”

Project title	Implementing entity	Commencement date	Completion date	Total project value	European Union contribution	State Budget contribution
Zero-emission energy management in sustainable development conditions in Poland until 2050	Central Mining Institute	01 Apr 2008	31 Jan 2011	2,293,480.00	1,949,458.00	344,022.00
Model agro-energy complexes as examples of distributed cogeneration based on local and renewable energy sources	Szewalski Institute of Fluid-Flow Machinery of Polish Academy of Sciences	28 Apr 2008	30 Jun 2013	39,169,873.77	33,294,392.70	5,875,481.07
Foresight methods as an energy sector development strategy in Lower Silesia	Wrocław University of Technology	01 Jul 2009	31 Jul 2011	1,170,800.00	995,180.00	175,620.00
New efficient luminophores for lighting and solar concentrators	W. Trzebiatowski Institute of Low Temperature and Structural Research of Polish Academy of Sciences	01 Jan 2010	31 Dec 2014	16,412,920.00	13,950,982.00	2,461,938.00
Advanced technologies of manufacturing functional materials for energy conduction, processing and storage	Institute of Non-Ferrous Metals	01 Mar 2009	31 Dec 2013	18,116,234.00	15,398,798.00	2,717,436.00
Development of preparation methods of agricultural biomass for energy use	Institute of Building, Mechanisation and Electrification of Agriculture	01 Apr 2009	31 Dec 2011	999,700.00	849,745.00	149,955.00
Bio for Eco. Closing the ecological cycle by disposal of waste from biofuel production	Skotan S.A.	10 Mar 2009	30 Apr 2013	17,303,358.05	5,645,387.06	6,641,631.84
Innovative production of synthetic fuels from bioethanol	Ekobenz sp. z o.o	01 May 2009	01 Jul 2011	2,930,339.95	1,374,904.20	1,617,534.35
Construction and manufacture of innovative aerating hydro power turbines	AIRON INVESTMENT Anna Niemczewska	01 Jul 2009	31 Dec 2013	7,370,325.58	2,347,000.66	2,761,177.25
Development of new generation connectors for distribution of average voltage electricity	Tele and Radio Research Institute	01 Mar 2009	10 Jan 2013	4,665,200.00	3,965,420.00	699,780.00
Industrial and development research in the implementation of energy-efficient heat pumps	WSK KRAKÓW Spółka z ograniczoną odpowiedzialnością	01 Nov 2008	30 Apr 2009	440,546.08	374,464.17	66,081.91
Innovative elements of construction and containment of modern, energy-efficient buildings	ADAMIETZ Spółka z ograniczoną odpowiedzialnością	01 Jan 2010	30 Sep 2010	413,000.00	351,050.00	61,950.00
	111,285,777.43	80,496,781.79	30,788,995.64			

Moreover, in 2010, the National Centre for Research and Development opened competitions for 4 research tasks, including “*Developing integrated technologies of fuel and energy production from biomass, agricultural wastes and other resources*” within the framework of the strategic programme “Advanced Technologies for Energy Generation” opened by the Minister of Science and Higher Education. This research task will be implemented until 2013 and financed with a total amount of PLN 70 million. A list of other selected renewable energy projects cofinanced by the National Centre for Research and Development is presented in summary 4.

Summary 4. Renewable energy projects cofinanced by the National Centre for Research and Development

Item	Project number	Project title	Implementing entity	Project implementation period	Contribution of National Centre for Research and Development [PLN]
Research tasks implemented under the strategic research and development programme <i>Advanced Technologies for Energy Generation</i>					
1.	SP/01/E/4/65786/5179	Developing integrated technologies of fuel and energy production from biomass, agricultural waste and other resources	Leader - Szewalski Institute of Fluid-Flow Machinery of Polish Academy of Sciences <u>Composition of research and industrial consortium:</u> ENERGA S.A.	60 months	70,000,000
Research tasks implemented under the strategic research and development programme <i>Integrated System for Reducing Energy Consumption in the Maintenance of Buildings</i>					
2.	SP/03/B/3/76469/5266	Increase in the use of renewable energy in civil engineering	Leader: Silesian University of Technology; Faculty of Energy and Environmental Engineering, Institute of Thermal Technology <u>Composition of research and industrial consortium:</u> - University of Silesia in Katowice; Faculty of Earth Sciences, Euro Centrum Science and Technology Park, - Central Mining Institute, Silesian University of Technology; Faculty of Electrical Engineering, Institute of Power Systems and Control, - Institute of Innovative Technologies "EMAG"	36 months	5,920,000
Technology Initiative II					
3	18/72077	"Production of electricity from biomass in an integrated system of steam boilers and gas turbines"	Consortium: Leader - European Silicon Sp. z o.o.	48 months	7,970,000.00
4	14/67054	"Technical design of a high-efficiency installation for biogas production and management"	Consortium: Leader - UNISERV Budownictwo Przemysłowe SA	30 months	4,650,000.00
ERA-NET BIOENERGY					
5.	ERA-NET-BIOENERGY/01/2009	Future low emission biomass combustion systems	Institute of Power Engineering	03 Nov 2009 - 31 Oct 2012	1,215,000
ERA-NET MATERA					
6	NCBiR/ERA-NET-MATERA/6/2008/2009	Corrosion resistant materials and corrosion monitoring systems for geothermal installations	AGH University of Science and Technology, Faculty of Foundry Engineering	28 Apr 2008 - 27 Apr 2011	449,160
7	NCBiR/ERA-NET-MATERA/8/2008/2009	Corrosion resistant materials and corrosion monitoring systems for geothermal installations	Warsaw University of Technology, Faculty of Materials Science and Engineering	28 Apr 2008 - 27 Apr 2011	587,600
R&D projects					
8	N R01 0012 04	Solar energy powered equipment for ozonisation of air, water and soil	Lublin University of Technology; Institute of Electrical Engineering and Electrotechnologies	1 July 2008 - 31 Dec 2010 30 months	702,900
9	N R01 0006 04	Innovative low investment river power station with Archimedes screw type turbine	Institute of Electrotechnology	1 June 2008 - 31 May 2010 24 months	1,030,000
10	N R01 0021 06	System of optimal power regulation of wind farms in limited transmission powers of electrical grids	Lublin University of Technology, Faculty of Electrical Engineering and Computer Science	01 Oct 2009 - 30 Sep 2012 36 months	780,000
11	N R01 0015 06	Complex small changing rotation wind power plant with an energy storage module for distributed energy applications	Warsaw University of Technology, Faculty of Electrical Engineering	01 Oct 2009 - 30 Sep 2012 36 months	1,136,000

3.1. Please provide information on how supported electricity is allocated to final customers for the purposes of Article 3 (6) of Directive 2003/54/EC. (Article 22(1)(b) of Directive 2009/28/EC)

In accordance with Article 5(6a) of the Energy Act, an electricity seller shall inform their consumers about the structure of fuels used or other energy carriers used for generation of electricity sold in the previous calendar year as well as provide reference to existing reference sources where information on the environmental impact, in terms of at least emissions of CO₂ and the radioactive waste, is publicly available. Pursuant to Article 5(6b) in the case of electricity bought on a commodity exchange or imported from the energy system of non-EU members, information about the structure of fuels used or other energy carriers used for generation of electricity may be drawn up based on aggregate data concerning the share of specific types of electricity sources used for electricity generation in the previous calendar year.

In Poland, all electricity from renewable sources which is covered by the national support scheme belongs to the energy volume supplied to the final customers. The share of electricity produced from renewable sources in the electricity volume supplied to the final customers may be calculated, for example, as the ratio of electricity with certificates of origin issued as per the data from the President of ERO to gross final energy consumption as per the data from PSE Operator S.A. In 2009 and 2010, this share amounted to 5.9% and 6.7% respectively (according to the information of the Central Statistical Office) in accordance with the data in Table 1.

4. Please provide information on how, where applicable, the support schemes have been structured to take into account RES applications that give additional benefits, but may also have higher costs, including biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material? (Article 22 (1)(c) of Directive 2009/28/EC)

The support schemes currently in place in Poland to a limited degree take into account RES applications that give additional benefits, but may also have higher costs.

Works are being conducted in Poland aimed at changing the support mechanisms for the market for biocomponents and liquid biofuels. The planned solutions include, *inter alia*, support for R&D works in the scope of used and new, advanced technologies for biofuel production and support for construction of installations for their production. Another factor promoting the use of second-generation biofuels will be to create, pursuant to the provisions of Directive 2009/28/EC, the possibility of double inclusion of the input of those biofuels to implementation of objectives regarding the share of energy from renewable sources in transport. Innovative technologies based on renewable energy sources may count on promotion and funding under direct support schemes with a competition procedure. These matters are covered by the Operational Programme “Innovative Economy”.

Moreover, part of the electricity produced by means of thermal conversion of municipal waste is in Poland regarded as energy from renewable sources (42% of recovered energy).

5. Please provide information on the functioning of the system of guarantees of origin for electricity and heating and cooling from RES, and the measures taken to ensure reliability and protection against fraud of the system. (Article 22(1)(d) of Directive 2009/28/EC)

The support mechanism for producers of electricity from renewable sources currently in place in Poland to some extent corresponds to the requirements concerning guarantees of origin pursuant to Article 15 of Directive 2009/28/EC despite the fact that there is no legal basis to accept guarantees of origin issued in other Member States. The scheme of certificates

of origin based on property rights ensures that a certain portion of electricity consumed by the final customers is generated from renewable energy sources. Property rights stemming from certificates of origin are tradable goods and may be traded at Polish Power Exchange. This means that any interested party, having registered at Polish Power Exchange, may purchase property rights whose value corresponds to the amount of electricity produced from renewable energy sources. However, in order to highlight the information which would constitute a proof for a final customer that a certain portion or amount of electricity was produced from renewable energy sources in accordance with the requirements laid down in Article 3(6) of Directive 2003/54/EC as regards certificates of origin under the national support scheme, the draft Act on renewable energy sources will introduce a new electronic document, i.e. guarantees of origin. Detailed proposals on the implementation of guarantees of origin are covered in Articles 50 to 56 of the draft Act on RES.

6. Please describe the developments in the preceding 2 years in the availability and use of biomass resources for energy purposes. (Article 22(1)(g) of Directive 2009/28/EC)

Table 4 contains data concerning supplies of biomass for energy purposes in Poland. Currently, it is not possible to fill out Table 4 in more detail. Among others, no detailed data are available as regards the nature of supplies (indirect/direct) and their origin (import). No biofuel production (energy crops) from grass and short rotation trees cultivated on agricultural land was registered.

Table 4a presents current domestic agricultural land use for the production of crops dedicated to energy production (ha)²⁷. It was not possible to complete Table 4a in full. Information on current domestic agricultural land use for the production of crops dedicated to energy production was collected by the Agency for Restructuring and Modernisation of Agriculture. As of 1 January 2010, the provisions of Council Regulation (EC) No 1782/2003 of 29 September 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers ceased to apply - the Regulation was repealed by Council Regulation (EC) No 73/2009 of 19 January 2009 *establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers, amending Regulations (EC) No 1290/2005, (EC) No 247/2006, (EC) No 378/2007 and repealing Regulation (EC) No 1782/2003*. As a result of the above, there are no detailed statistics available concerning energy crops and their surface for the period following 31 December 2009.

This item of the report was completed with Summary 1, containing data on the acquisition and sale of wood in State Forests.

²⁷ ha – hectare = 10,000 m²

Table 4: Biomass supply for energy use

	Plant species / type of biomass	Amount of raw material (*)		Primary energy in domestic raw material (ktoe)		Amount of imported raw material from EU (*)		Primary energy in amount of imported raw material from EU (ktoe)		Amount of imported raw material from non EU (*)		Primary energy in amount of imported raw material from non EU (ktoe)	
		2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Biomass supply for heating and electricity:													
Direct supply of wood biomass from forests and other wooded land for energy generation (fellings etc.)**	-	11,122,842***	11,987,385***	3,994***	4,304***	-	-	-	-	-	-	-	-
Indirect supply of wood biomass (residues and co-products from wood industry etc.)**	-												
Energy crops (grasses, etc.) and short rotation trees (please specify)	-	102,267	81,716	30	24	-	-	-	-	-	-	-	-
Agricultural by-products / processed residues and fishery by-products **	-	877,261	1,256,406	307	440	-	-	-	-	-	-	-	-
Biomass from waste (municipal, industrial etc.) **	-	2,555,407	3,261,275	859	1,096	-	-	-	-	-	-	-	-
Others (please specify)	-	-	-	-	-	-	-	-	-	-	-	-	-
Biomass supply for transport:													
Common arable crops and biomass for biofuels (please specify main types)****	Agricultural raw materials, of which:	126,930.07 t	315,432.28 t	83	100	-	-	-	-	-	-	-	-
	Maize	112,165.57 t	306,844.71 t										
	Rye	4,581.00 t	2,494.00 t										
	Wheat	0.00 t	231.69 t										
	Triticale	0.00 t	68.00 t										
	Barley	0.00 t	30.00 t										
	Cereals	733.00 t	98.31 t										
	Molasses	9,450.50 t	5,665.57 t										
	Biomass, of which:	95,238.63 t	64,940.78 t										
	ethyl alcohol	89,101.11 t	33,298.74 t										
distillate of agricultural origin	0.00 t	24,059.10 t											

	Residual fractions from alcohol rectification	5,934.20 t	7,301.11 t										
	Fusel oils	112.88 t	61.00 t										
	alcohol slops	90.44 t	41.83 t										
	Distillation forerunnings	0.00 t	179.00 t										
	Other	802.69 t	194.77 t										
	Agricultural raw materials:	289.00 t	252.00 t										
	Rapeseed	289.00 t	252.00 t										
	Biomass, of which:	374,696.80 t	369,573.16 t										
	rapeseed oil	371,200.64 t	363,341.23 t	328	331								
	vegetable fats	2,144.10 t	2,353.20 t										
	animal fats	1,347.66 t	1,379.78 t										
	esters for processing	4.40 t	1,246.13 t										
	biocomponents	0.00 t	894.00 t										
	free fatty acids	0.00 t	358.82 t										
	REM												
	Other	33,797.90 t	25,631.13 t										
Energy crops (grasses,etc.) and short rotation trees for biofuels (please specify main types)	-	-	-	-	-	-	-	-	-	-	-	-	-
Others (please specify)	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: Central Statistical Office, Agricultural Market Agency, calculations of the Ministry of Economy

*Amount of raw material if possible in **m³** for biomass from forestry and in **tonnes** for biomass from agriculture and fishery and biomass from waste

**The definition of this biomass category should be interpreted in accordance with Table 7 item 4.6.1 of Commission Decision establishing a template for National Renewable Energy Action Plans under Directive 2009/28/EC (notified under document number C(2009) 5174).

***It is not possible to specify whether the supply of this biomass type is direct or indirect.

****The above data come from quarterly reports only (DPE – 4.1 form) submitted by producers to the Agricultural Market Agency in 2009-2010. Producers do not differentiate in the reports between raw materials in terms of their origin (domestic, intra-Community acquisition, import), and therefore the the data refer to all raw materials used by the producers for the production of biocomponents.

Table 4a. Current domestic agricultural land use for production of crops dedicated to energy production (ha)

Land use	Surface (ha)	
	2010*	2009
1. Land used for common arable crops (wheat, sugar beet etc.) and oilseeds (rapeseed, sunflower etc.) (Please specify main types)	-	36,061.82
- rapeseed	-	33,954.57
- maize	-	1,227.84
- rye	-	419.46
- triticale	-	209.56
- oats	-	180.94
- wheat	-	46.32
- cereal blends	-	14.70
- barley	-	8.43
2. Land used for short rotation trees (willows, poplars). (Please specify main types)	-	5,650.81
- willow	-	5,213.55
- birch	-	16.22
- alder	-	17.51
- black locust	-	1.99
- poplar	-	398.10
- multiflora rose	-	3.44
3. Land used for other energy crops such as grasses (reed canary grass, switch grass, Miscanthus), sorghum (Please specify main types)	-	2,997.23
- perennial and annual grasses	-	1,104.41
- miscanthus sinensis	-	1,744.18
- sida hermaphrodita rusby	-	64.59
- reed canary grass	-	71.69
- cordgrass	-	0.49
- jerusalem artichoke	-	11.87

Source: Agency for Restructuring and Modernisation of Agriculture - from energy crops

* As of 1 January 2010, the provisions of Council Regulation (EC) No 1782/2003 of 29 September 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers ceased to apply - the Regulation was repealed by Council Regulation (EC) No 73/2009 of 19 January 2009 *establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers, amending Regulations (EC) No 1290/2005, (EC) No 247/2006, (EC) No 378/2007 and repealing Regulation (EC) No 1782/2003*. As a result of the above, there are no detailed statistics available concerning energy crops and their surface for the period following 31 December 2009.

Summary 5. Acquisition and sale of wood in State Forests

DESCRIPTION	Acquisition	Sale		Average
	thousand m ³	in PLN million	in PLN million	price per 1 m ³ in PLN
2009				
TOTAL	33,104.2^a	33,308.8^a	4,557.8	136.83
large timber	31,188.1	31,398.9	4,466.5	142.25
thinnings	1,916.0	1,909.7	85.6	44.81
stump wood	0.150	0.180	0.004	21.23
woodchip	79.7	78.7	5.7	73.03
2010				
TOTAL	33,769.1^a	33,731.3^a	5,283.7	156.64
large timber	31,882.3	31,877.1	5,189.0	162.78
thinnings	1,886.7	1,854.1	87.4	47.16

stump wood	0.070	0.066	0.002	35.47
woodchip	120.3	120.2	7.3	60.50

Source: data of Directorate General of State Forests

a – without woodchip

7. Please provide information on any changes in commodity prices and land use within your Member State in the preceding 2 years associated with increased use of biomass and other forms of energy from renewable sources.

No detailed analyses were conducted in Poland dedicated to impact assessment of increased use of biomass and other forms of energy from renewable sources. Therefore, no detailed data are available concerning the impact of using biomass for energy purposes on prices of goods and changes in land use.

The data presented in Summaries 2, 3, 4, 5 and 6 suggest that average prices of agricultural products (cereals and rapeseed) increased in the reporting period, while the use of land for agricultural purposes decreased and forest area grew. The recorded price growth of agricultural products in the reporting period stems from general growth of prices in the world, rather than from increased use of agricultural biomass for energy purposes.

Summary 6. Average prices of raw materials / products

Commodities [PLN/tonne]	2009	2010
wheat	482.6	598.4
barley	408.0	489.8
rapeseed	1082.4	1277.6
wood*	-	-
pellets*	-	-

Source: Central Statistical Office 2010 – “Source materials – Buying-in and prices of agricultural products”

*no data collected

Summary 7. Basic land use structure in Poland

Land [thousand ha]	2009	2010
Forests	9,272.6	9,329.1
cultivated land (arable land - agricultural land)	12,113.6	10,945.5
uncultivated land (arable land not kept in good agricultural condition)	495.0	899.7

Source: Central Statistical Office - “Agricultural Census 2010 - Land use”

Summary 8. Land use in agricultural holdings as per type of arable land

Description	Total area	Arable land										Forests and forest land	Other land
		total	in good agricultural condition							other			
			total	sown land	fallow land	permanent crops		home gardening	permanent meadows		permanent pastures		
						total	of which orchards						
in ha													
2009	18,401,144	16,119,584	15,624,634	11,505,487	498,424	373,253	331,373	67,783	2,463,069	716,618	494,950	1,170,559	1,111,001
2010	18,069,772	15,502,969	14,603,238	10,427,711	449,849	397,959	374,163	44,190	2,629,234	654,295	899,731	1,293,539	1,273,264

Source: Central Statistical Office

Summary 9. Area of fast growing trees and shrubs used for energy purposes in 2009 and 2010

Description	on arable land		on forest land		TOTAL	
	total	of which	total	of which	area of fast growing trees and shrubs	area of energy willow
		hybrid willow		hybrid willow		
	in ha					
2009	5,206.65	5,031.75	357.04	108.90	5,563.69	5,140.66
2010 acc. to AC ²⁸ insufficient data	6,163.27	5,816.62	4,309.44	2,717.75	10,472.71	8,534.37

Source: Central Statistical Office

Summary 10. Area of crops used for energy purposes in 2009 and 2010

Description	Annuals	of which					Perennials	of which						
		cereals	sugar beets	rapeseed and turnip rape	soya	other		Rosa multiflora	Sida hermaphrodita	Miscanthus giganteus	Jerusalem artichoke	Sakhalin knotweed	reed canary grass	other
	2009	22,411.28	5,695.12	114.42	16,331.15	17.33	253.25	1,646.03	3.46	27.60	1,157.62	58.61	0.00	236.86
2010 acc. to AC insufficient data	14,643.48	3,448.17	4,540.22	5,365.51	140.46	1,149.13	2,487.82	5.48	79.97	1,929.93	38.07	1.00	214.95	218.42

Source: Central Statistical Office

²⁸ AC – Agricultural Census

8. Please describe the development and share of biofuels made from waste, residues, non-food cellulosic material, and lingo cellulosic material. (Article 22(1)(i) of Directive 2009/28/EC)

Table 5 contains information on production and consumption of the so-called second generation biofuels, discussed in Article 21(2) of Directive 2009/28/EC. Pursuant to the information received from the President of Energy Regulatory Office the abovementioned biofuels were not produced or consumed in Poland in 2009-2010. This corresponds to the data provided in the NREAP (Tables 4b and 12).

Table 5: Production and consumption of Article 21(2) biofuels (ktoe)

Article 21(2) biofuels ²⁹	2009	2010
Production – Fuel type X (Please specify)	0	0
Consumption – Fuel type X (Please specify)	0	0
Total production of Article 21(2) fuels	0	0
Total consumption of Article 21(2) fuels	0	0
% share of Article 21(2) fuels from total RES-T	0	0

Source: Our work based on the reports of the President of ERO

9. Please provide information on the estimated impacts of the production of biofuels and bioliquids on biodiversity, water resources, water quality and soil quality within your country in the preceding 2 years.

The Institute of Soil Science and Plant Cultivation - State Research Institute in Pulawy is a Polish body which collects information on estimated impacts of agriculture on environment, biodiversity, water resources, water quality and soil quality. The Institute gives recommendations as regards sustainable agricultural activities as well.

A detailed impact assessment of the production of biofuels and bioliquids pursuant to Directive 2009/28/EC has not been carried out so far. Necessary action will be taken in accordance with Articles 58 and 59 of the draft Act on renewable energy sources, which stipulate detailed monitoring of achievements of objectives and progress in the promotion of energy from RES in Poland. These provisions will take account of legal regulations under Common Agricultural Policy (CAP) and environmental policy.

In accordance with information from the Ministry of Agriculture and Rural Development, the CAP principles of good agricultural and environmental condition, cross-compliance and various pro-environmental activities, currently applicable in all Member States, ensure biodiversity and sourcing of raw materials for biofuels in Poland in accordance with the criteria laid down in Directive 2009/28/EC.

Cross-compliance principles include:

- environmental protection against pollution from agricultural activities,
- agricultural production which does not jeopardise human, animal and plant health,
- ensuring conditions for animal welfare,
- use of land which does not cause deterioration of its quality.

The following EU acts constitute the legal basis for the principles of cross-compliance: Council Regulation (EC) No 73/2009 establishing common rules for direct support schemes for farmers under the common agricultural policy, Commission Regulation (EC) No 796/2004 laying down detailed rules for the implementation of cross-compliance, modulation and the integrated administration and control system, Council Regulation (EC) No 1698/2005 on support for rural development.

²⁹ Biofuels made from waste, residues, non-food cellulosic material, and lignocellulosic material.

Moreover, agricultural production in Poland complies with environmental requirements, stipulated in domestic law and resulting from the implementation of the following EU acts:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, aimed to ensure biodiversity through conservation of natural habitats and of wild fauna and flora in the EU, and in particular specifying measures taken in order to ensure the maintenance or restoration of natural habitats and species of wild fauna and flora,
- Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds, aimed to ensure protection and maintenance of birds, their eggs, nests and habitats.

It should be emphasised that environmental provisions in the EU lay down the rules for maintenance of forest resources and areas of great natural interest, pointing out the need to restore them, and therefore effectively prevent changes in methods of land use and in biodiversity preservation.

This is confirmed by the data provided by the Central Statistical Office, which suggest that the area of arable land in Poland decreased from 20.3 mln ha to 16.1 mln ha in the last several dozen of years (1960-2009). In turn, during the same period the area of land of great natural interest increased, including forest areas, woodland and scrubland, which expanded from 7.7 mln ha in 1960 to 9.3 mln ha in 2009. Summing up, the Ministry of Agriculture and Rural Development has not noted any negative impact of biofuels and bioliquids on biodiversity, water resources, water quality or soil quality.

10. Please estimate the net greenhouse gas emission savings due to the use of energy from renewable sources. (Article 22 (1)(k) of Directive 2009/28/EC)

The following methodology described in the “Report from the European Commission to the Council and the European Parliaments on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling”³⁰ was used to estimate the net greenhouse gas emission savings due to the construction of new RES installations (electricity, as well as heating and cooling):

- 1 MJ of electricity produced from conventional sources corresponds to emission of 198 g of CO₂ (1 ktoe = 8,291.46 t CO₂),
- 1 MJ of heat produced from conventional sources corresponds to emission of 87 g of CO₂ (1 ktoe = 3,643.21 t CO₂),

The following general methodology under Annex V to Directive 2009/28/EC (Annex V, letter C, item 19) was used to estimate emission savings due to the use of biofuels:

- 1 MJ of renewable energy used in transport in the form of biofuels corresponds to emission of 83.8 g of CO₂ (1 ktoe = 3,509.12 t CO₂),

Table 6 contains figures in tonnes of CO₂ corresponding to carbon dioxide emission savings due to increased use of renewable energy sources in Poland.

Table 6: Estimated GHG emission savings from the use of renewable energy (t CO₂eq)

Environmental aspects	2009	2010
Total estimated net GHG emission saving from using renewable energy ³¹	23,856,054	27,415,076
- Estimated net GHG saving from the use of renewable electricity	6,235,178	7,412,565

³⁰ The report is available

at: http://ec.europa.eu/energy/renewables/transparency_platform/doc/2010_report/com_2010_0011_3_report.pdf.

³¹ The contribution of gas, electricity and hydrogen from renewable energy sources should be reported depending on the final use (electricity, heating and cooling or transport) and only be counted once towards the total estimated net GHG savings.

- Estimated net GHG saving from the use of renewable energy in heating and cooling	15,297,839	16,889,922
- Estimated net GHG saving from the use of renewable energy in transport	2,323,037	3,112,589

Source: Our work based on Table 1a and adopted assumptions.

11. Please report on and estimate the excess/deficit production of energy from renewable sources compared to the indicative trajectory which could be transferred to/imported from other Member States and/or third countries, as well as estimated potential for joint projects until 2020. (Article 22 (1)(l), (m) of Directive 2009/28/EC)

Table 7 contains figures in ktoe corresponding to the excess or deficit production of energy from renewable sources compared to the indicative trajectory for Poland specified in Directive 2009/28/EC and the estimates included in the NREAP. Figures in column “2010” constitute a difference between Table 1a (column “2010”) of this Report and figures in Table 4a (column “2010”) of the NREAP. There was no reference for the year 2009 in Directive 2009/28/EC or the NREAP.

It is not possible to estimate the excess or deficit per specific sector. The excess for 2011-2012 was estimated based on the data included in the NREAP. The indicated excess constitutes a difference between estimated forecast consumption of energy from renewable sources (Table 4a of the NREAP, row G) as an average for the two-year period and minimum RES trajectory [ktoe] (Table 3 of the NREAP) calculated based on Annex I letter B to Directive 2009/28/EC. Since Directive 2009/28/EC does not specify the indicative trajectory for 2019, the excess for that year has not been estimated.

Table 7: Actual and estimated excess and/or deficit (-) production of renewable energy compared to the indicative trajectory which could be transferred to/from other Member States and/or third countries in Poland (ktoe)^{32, 33}

Actual/estimated excess or deficit production (Please distinguish per type of renewable energy and per origin/destination of import/export)	2009 *	2010 **	2011 ***	2012 ***	2013 ***	2014 ***	2015 ***	2016 ***	2017 ***	2018 ***	2019 *	2020 ***
heating and cooling	-	656	-	-	-	-	-	-	-	-	X	-
electricity	-	-19	-	-	-	-	-	-	-	-		-
transport	-	-94	-	-	-	-	-	-	-	-		-
TOTAL	-	543	1,050		1,182		1,074		968			587

Source: Our work based on the data of the Central Statistical Office and the National Renewable Energy Action Plan

*No reference period available

**Calculation based on the difference between the figures in Table 1a (column “2010”) of this report and figures in Table 4a (column “2010”) of the *National Renewable Energy Action Plan*. Positive numbers indicate surplus for cooperation mechanism. Negative numbers indicate energy deficiency as opposed to the achievement of the adopted trajectory.

***Calculations based on the difference between negative figures in Table 4a of the NREAP (row G) as an average for the two-year period and figures in Table 3 of the NREAP (minimum RES trajectory [ktoe]); currently, it is not possible to draw up estimates per specific sector of renewable energy.

³² Please use actual figures to report on the excess production in the two years preceding submission of the report, and estimates for the following years up to 2020. In each report Member State may correct the data of the previous reports.

³³ When filling in the table, for deficit production please mark the shortage of production using negative numbers (e.g. -x ktoe).

11.1. Please provide details of statistical transfers, joint projects and joint support scheme decision rules.

The details of statistical transfers have been specified in the draft Act on renewable energy sources. It is assumed that respective provisions enabling such transfers will enter into force on 1 July 2012.

12. Please provide information on how the share for biodegradable waste in waste used for producing energy has been estimated, and what steps have been taken to improve and verify such estimates. (Article 22 (1)(n) of Directive 2009/28/EC)

In accordance with Article 2(1) of Regulation of the Minister of Economy of 14 August 2008 *on the detailed scope of obligations in respect to obtaining certificates of origin and submitting them for redemption, payment of a substitute 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)*, biomass is defined as biodegradable solid or liquid matter of animal or plant origin from products, waste and residues from agriculture, forestry and related industries, as well as the biodegradable portion of other waste, or cereals not complying with quality requirements for cereals for intervention laid down in Article 4 of Commission Regulation (EC) No 687/2008 of 18 July 2008 establishing procedures for the taking-over of cereals by intervention agencies or paying agencies and laying down methods of analysis for determining the quality of cereals (OJ L 192, 19.7.2008, p. 20), and cereals not admitted for intervention.

This means that the energy from waste which complies with the definition of biomass may be fully regarded as energy from a renewable source. In turn, as regards waste containing biodegradable fractions, a relevant part may be regarded as energy from a renewable source only in the case of mixed municipal waste, pursuant to Regulation of the Minister of the Environment of 2 June 2010 on detailed technical conditions of qualifying parts of energy recovered from thermal conversion of municipal waste (Journal of Laws No 117, item 788).

The share of biodegradable waste in waste used for energy production was estimated based on obligatory tests laid down in Article 4(1)(6) and (7) of the Annex “Methods of testing actual share of chemical energy of biodegradable fractions in the total amount of energy from thermal conversion of mixed municipal waste” to the abovementioned Regulation of the Minister of the Environment.

The method adopted to calculate the share of energy from renewable sources in the amount of heat generated through thermal conversion of waste is based on a flat-rate value. A uniform value for the whole country was adopted to indicate the share of chemical energy in biodegradable fractions in chemical energy of the whole mass of waste undergoing thermal conversion.

For Poland, the adopted flat-rate value of energy from renewable sources in thermal conversion of waste amounted to 42%. This figure was proposed, taking into account:

- average material composition of waste from various Polish cities,
- average data concerning humidity, hydrogen content and gross calorific value of specific material fractions of waste, excerpted from results of waste tests in Polish cities and from the literature.

Summary 11 presents the results of calculations of the share of renewable energy in the total energy generated from thermal conversion of 100 kg of household waste with the assumed average composition and properties.

Summary 11. Physical and fuel properties of waste ingredients

Material fraction	Share in waste [% mass]	in _{RES} -	Humidity [% mass]	Hydrogen [% sm]	Gross calorific value [MJ/kg sm]	Net calorific value [MJ/kg]	Energy [MJ]	Energy RES [MJ]
Fraction < 10 mm	8.0	1.0	18.9	2	6.8	4.7	37.6	37.6
Fraction 10-20 mm - biogenic group	4.3	1.0	58.0	6	15.1	5.2	22.4	22.4
Fraction 10-20 mm - non-biogenic group	2.8	0.0	25.0	7	20.0	20.6	57.7	0.0
Plant or animal origin kitchen waste, garden and landscape waste	24.5	1.0	61.7	6.1	16.1	5.1	125.0	125.0
Wood	0.6	1.0	20.6	6	18.2	13.0	7.8	7.8
Paper and cardboard	16.9	1.0	36.6	6.7	14.3	7.6	128.4	128.4
Plastics	14.5	0.0	20.0	10	35.7	26.4	382.8	0.00
Textiles	3.7	0.5	30.0	6.4	19.3	12.0	44.4	22.2
Composite waste, including hygiene maintenance waste	5.4	0.4	10.0	8	21.5	17.5	94.5	37.8
Total							900.60	381.2

Source: Regulation of the Minister of the Environment of 2 June 2010 on detailed technical conditions of qualifying parts of energy recovered from thermal conversion of municipal waste (Journal of Laws No 117, item 788).

Fraction <10 mm actually contains only around 30% of biodegradable ingredients, which are marked in research as ignition loss (or as biomass). Due to the difficulty in quantitative division of this fraction into biodegradable and non-biodegradable ingredients, average values are marked for the whole fraction and it is assumed that hydrogen content and gross calorific value apply only to the biodegradable fraction. The results, however, are given on the basis of the whole mass of the fraction.

The fraction of biodegradable ingredients, calculated from mass share of these ingredients, equals to: $8.0 \times 0.3 + 4.3 + 24.5 + 0.6 + 16.9 + 3.7 \times 0.5 + 5.4 \times 0.4 = 52.7\%$.

The fraction of energy from renewable sources (biodegradable ingredients) is lower and amounts to: $(381.2 / 900.6) \times 100 = 42.3\%$.

The lower value of this indicator stems from the fact that biodegradable waste has considerably higher humidity and lower net calorific value than non-biodegradable ingredients, the most frequent of which is plastic.