



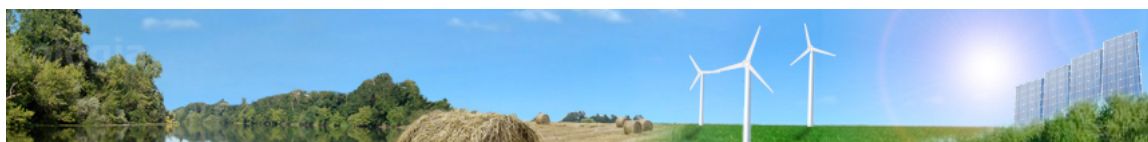
Renewable Energy Policy Action Paving  
the Way towards 2020



## REPAP2020 Renewable Energy Policy Action Paving the way towards 2020

### NATIONAL ROADMAP for RENEWABLE ENERGY SOURCES

the case of Poland  
15% until 2020



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## I. THE OBJECTIVE OF THE RENEWABLE ENERGY SOURCES ROADMAP

The main objective of the Roadmap is to facilitate the process of implementation on a national level the 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.

## II. CURRENT SITUATION IN RES MARKET

### II.1. The market of RES and the current support system

Energy from renewable energy sources (RES) in Poland is developing too slowly in relation to the EU trends. Current trends are represented in Figure 1, showing that in the last decade there was no mentionable increase in the share of energy from renewable sources in the final energy consumption.

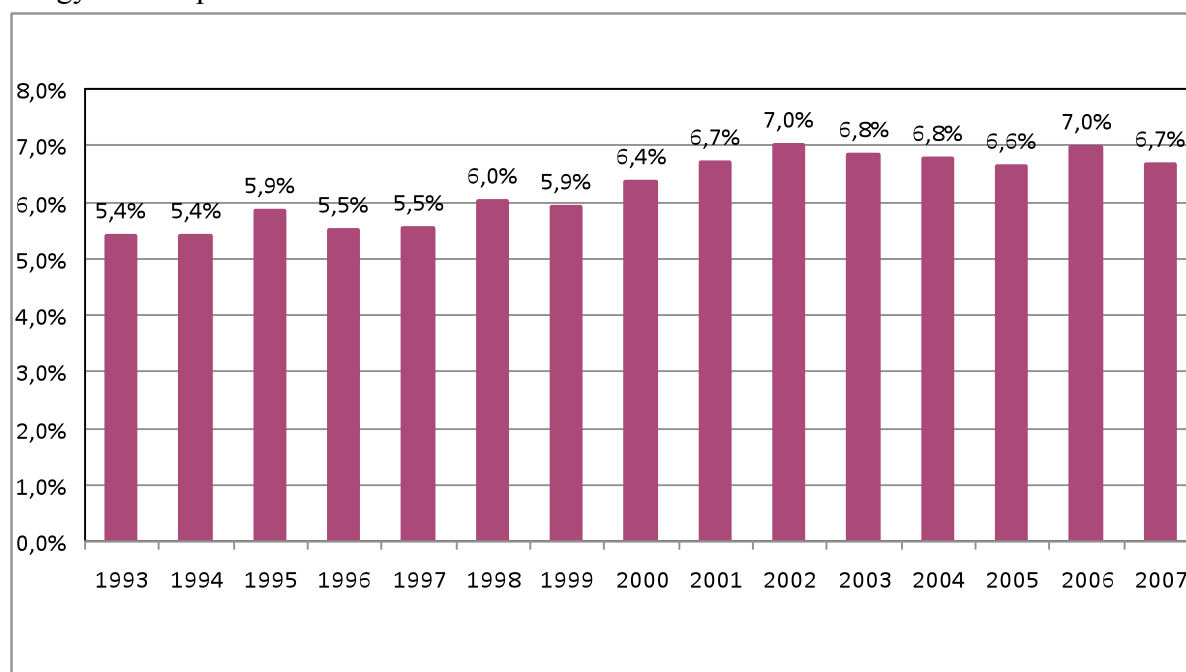


Figure 1. The share of RES energy in the final energy consumption in Poland (Eurostat<sup>1</sup>).

Eurostat data, especially covering the 2001-2007 span, agree to a large extent with the figures of the Polish Central Statistical Office (GUS), but it is worth mentioning that both sources present the share of the RES energy on a lower level than calculated according to the methodology used in Directive 2009/28/EC on the promotion of the use of energy from renewable sources. According to Eurostat and GUS, the share of RES in the final energy consumption in the year 2005 (base year for the 15% by 2020 target) amounted to 6.6%, while the result calculated according to the Directive methodology was 7.2%.

A more detailed analysis of available data, which will be described in detail in the further part of this paper, leads to a conclusion that in Poland not a development of RES as a whole energy sub-sector is observed but rather there is a shift in use of renewable energy sources at final consumption. These changes resulted in an increase of biofuels and the consumption

<sup>1</sup> More at: [http://ec.europa.eu/energy/publications/doc/statistics/part\\_2\\_energy\\_pocket\\_book\\_2010.pdf](http://ec.europa.eu/energy/publications/doc/statistics/part_2_energy_pocket_book_2010.pdf)

of electricity from RES, while the consumption of heat decreased, and at the same time the total share of RES in the energy balance has practically not increased since 2001.

The main share in the structure of energy generation from renewable energy sources still belongs to the green heat, followed by the electricity and biofuels. RES sector is not governed by a separate law, and the majority of regulations are included in the Law on Energy (LoE) of 10<sup>th</sup> April 1997, with amendments, and its executive decisions (ordinances) – which apply mainly to the electricity, and to a smaller extent to the green heat. The biofuels market is governed by the Law on Biocomponents and Liquid Biofuels of 25<sup>th</sup> August 2006.

Under the influence of the Directive 2001/77/EC, adopted on 23<sup>rd</sup> April 2009, many regulatory issues (including the support mechanisms) in Polish law are directed mainly at the green electricity sector. One has to bear in mind that the provisions of the new Directive on the promotion of the use of energy from RES (which is based on a more holistic, supra-sectorial approach to the promotion of RES) will make it necessary to introduce some more legislative changes, going much further than the last amendment of the Law on Energy (which have changed rules concerning the connection of a RES-electricity units to the grid, and on the biogas production).

## II.2. Electricity and heat

The obligation to purchase the electricity from RES rests with the official supplier (energy company) in whose area of activity the RES unit has been connected to the grid. The obligation to purchase the RES-generated heat rests with the heat dealer. The guarantee purchase is given to a licensed producer generating energy from renewable sources who is connected to the grid. This purchase is made – in case of electricity – at the average price of electricity on the competitive market from the previous year. In case of heat – the price of RES-heat cannot cause the increase of heat prices for end-users. All amount of electricity produced in RES is under the obligation, but the amount of heat purchased should not exceed the total demand of distributor's customers. The cost of obligatory energy purchase is included in the tariffs (presented to all energy recipients) of the official distributors<sup>2</sup>.

In order to benefit from these regulations, a RES unit has to be connected to the grid/network. It is worth to stress that the electricity from both RES and high-efficiency CHP unit, connected to the grid, have priority of transmission, but there is no guarantee of connection. The refusal to connect issued by the distributor/operator can take place only if there are no technical or economic conditions for connection. The main barriers for the development of RES in Poland, especially in the electric energy sector, are the poor condition of the grid infrastructure and the lack of its development plans, resulting in the lack of access to the information about the connection possibilities. In addition, an investor is obliged to pay a fee for connection to the grid/network. According to the regulations included in the amended Law, in order to connect a RES-E, the applying entity has to pay a deposit (of PLN 30 for each kW) and submit a feasibility plan describing the feasibility of establishing a RES in a given area. However, there is no guarantee of deposit return if the applying entity does not accept the connection requirements issued by the distributor/operator. It is a serious problem, as there is no clearly set amount for the connection fee. In case of biomethane, the supplier must fulfill the quality requirements for the gas introduced

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<sup>2</sup> Unfortunately, even though in case of electricity and heat there is, under certain conditions, an obligation of purchase by the official supplier for a fixed price, in case of biomethane of agricultural origin there is only a guarantee of purchase by the distribution network operator (no minimum price guarantee).

into the network, which parameters have to be adequate to the parameters of the natural gas. The quality requirements for the biomethane will be set out in a decision (Ordinance) prepared by the Ministry of Economy.

As of today, Poland has only a support mechanism for electricity generated in a renewable energy source (introduced in 2000 and reshaped after the amendment of the Law on Energy in 2005). It is based on green certificates issued on the request of the generating entity, via the grid operator, by the President of the Energy Regulatory Office (URE). On one hand the certificate confirms that the electricity was generated in RES, and on the other hand the property rights resulting from the certificates are marketable and are an exchangeable commodity after recording them on the evidence e.g. by the Polish Power Exchange. Thus additional income from selling the certificates is provided for RES producers. In case of biomethane introduced into the network (pursuant to the amended law, as of 1<sup>st</sup> January 2011), any amount introduced into the grid will be recalculated into an equivalent in electricity and then be subject to the green certificate support mechanism (recalculation algorithm of biomethane into the electricity equivalent is not yet known from the legislative point of view). The trade in property rights to the green certificates on the domestic market allows the RES suppliers to gain additional income from RES-E generation (apart from the direct income from the sale of electricity – the product). The purchase of a set amount of green certificates is obligatory for the entities that sell electricity to end-users. Alternatively, the above-mentioned entities can pay a substitute fee (a fee for each MWh of electricity is published annually by the President of URE). Usually the amount of the substitute fee matches the maximum price for a green certificate in a given year. The amount of the substitute fee in 2009 is PLN 258.89 per MWh (approx. EUR 62), with the guaranteed price amounting to PLN 155.44 (around 37 Euro) per MWh. Energy companies that did not fulfill their obligation to purchase the certificates or pay the substitute fee are subject to penalties. Substitute fees and penalties are transferred to the account of National Fund for Environmental Protection and Water Management (NFOSiGW), and until the end of 2009 were then spent on supporting the investments in renewable energy sources only<sup>3</sup>. The obligation to purchase the certificates or pay a substitute fee resting with a company for any given year constitutes a required percentage share of the green electricity in the total energy amount supplied by the energy company to end users. Pursuant to the decision (ordinance) of the Minister of Economy of 14<sup>th</sup> August 2008 on the green certificates, this share amounts to as follows:

- 8.7% for 2009
- 10.4% for 2010
- 10.4% for 2011
- 10.4% for 2012
- 10.9% for 2013
- 11.4% for 2014
- 11.9% for 2015
- 12.4% for 2016
- 12.9% for 2017

The support scheme outlined above is the same for all renewable energy sources and applies to electricity both introduced into the grid and used privately by the generating entity. In order to receive green certificates, the entity has to be licensed. Pursuant to the amended regulations, only the entities generating electricity from agricultural biogas or producing agricultural biogas to supply gas network can do so basing on the registration in the registry

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<sup>3</sup> Last year's amendment to the Law on Environmental Protection allows for use of the proceedings from the substitute fees and penalties also for other purposes, not related to renewable energy.

of energy companies generating agricultural biogas, performed by the President of the Agricultural Market Agency.

### II.3. Biofuels

Biofuels market in Poland is regulated by the Law on Biocomponents and Liquid Biofuels of 25<sup>th</sup> August 2006. The Law provides, i.a., for the rules of carrying out an economic activity in biocomponent production, including liquid biofuels for own use by farmers, and of trading biocomponents and liquid biofuels. The executive decision to this law (Decision of the Council of Ministers of 15<sup>th</sup> June 2007 on the national indicative targets for the years 2008-2013) stipulates a minimum amount of biocomponents and other renewable fuels in the total transport fuel consumption for a given year, which amounts to, respectively:

- 3.45% (2008)
- 4.60% (2009)
- 5.75% (2010)
- 6.2% (2011)
- 6.65% (2012)
- 7.10% (2013).

Entities obliged to realise the National Indicative Targets pursuant to the Law on Biocomponents and Liquid Biofuels are the entrepreneurs who undertake economic activity consisting in production, import or purchase within the EC market of liquid fuels or liquid biofuels, who sell or put them on the market in another form in the territory of Poland, or use them for own purposes.

In Poland, within the frames of biofuel regulations, there is no support for the use of biogas as a substitute for biodiesel or bioethanol, nor for green electricity in transport as alternative forms of use RES-generated fuel and energy.

### II.4. Current share of RES and recent trends in development

Polish energy sector is based predominantly on national system power units for hard coal or lignite combustion. In the primary energy consumption structure in 2007, the share of RES was around 5%. In Table 1 the total gross energy demand is presented for total market and the RES. In the Tables no. 2-4, the structure of RES share in the final energy consumption in the last years is presented, according to the Eurostat data, and broken down by sectors and individual technologies respectively.

Table 1. The total gross demand for energy in Poland [ktoe].

	2005		2006		2007	
	total market	RES	total market	RES	total market	RES
Electricity (E)	12 396.6	403.1	12 878.6	423.1	13 191.1	481.0
Heat (H)	36 531.4	3 872.9	37 386.4	4 238.8	36 424.9	4 096.5
Transport fuels (T)	12 083.0	48.0	13 432.0	89.0	14 803.0	96.0
<b>Total</b>	<b>61 011.0</b>	<b>4 324.0</b>	<b>63 697.0</b>	<b>4 750.9</b>	<b>64 419.0</b>	<b>4 673.5</b>

Table 2. Production of electricity and installed power in RES. Data normalized according to the Directive 2009/28/WE.

	2005	2006	2007

	GWh	MWel	GWh	MWel	GWh	MWel
Biogas	111.0	30.0	160.0	32.0	195.0	40.0
Solid biomass	1 719.0	25.0*	1 851.0	25.0*	2 360.0	33.0*
Hydro large-scale	1 660.2	669.0	1 623.7	672.0	1 583.1	672.0
Hydro small-scale	995.4	246.0	965.2	253.0	933.3	250.0
Wind onshore	202.6	121.0	320.4	172.0	522.4	306.0
<b>Total RES-E</b>	<b>4 688.2</b>	<b>1 091.0</b>	<b>4 920.3</b>	<b>1 154.0</b>	<b>5 593.9</b>	<b>1 301.0</b>
RES-E share on gross electricity demand	3.3%		3.3%		3.6%	

<sup>\*)</sup> Co-firing units are not included

The most recent statistical data of the Energy Regulatory Office for the years 2005-2009 shows that the biggest increase in the power installed took place in the wind energy sector. The biggest share in the production of electricity was observed in biomass in co-firing technology, which – due to the low efficiency of the primary energy conversion and the biomass use sustainability criteria – is not a preferred technology for the Directive 2009/28/WE.

Table 3. Generation of heat in Poland from renewable energy sources [ktoe].

	2005	2006	2007
Biogas (grid)	10.0	14.0	9.0
Solid biomass (grid)	88.0	92.0	113.0
Biowaste (grid)	18.0	40.0	44.0
Geothermal heat (grid)	8.9	12.8	10.5
Solid biomass (non-grid)	3 748.0	4 080.0	3 920.0
<b>RES-H total</b>	<b>3 872.9</b>	<b>4 238.8</b>	<b>4 096.5</b>
RES-H share on gross heat demand	10.6%	11.3%	11.2%

Table 4. Structure of consumption of biofuels in transport [ktoe].

	2005	2006	2007
Bioethanol	34.0	55.0	72.0
Biodiesel	14.0	35.0	25.0
<b>RES-T total</b>	<b>48.0</b>	<b>89.0</b>	<b>96.0</b>
RES-T share on diesel and gasoline demand	0.4%	0.7%	0.6%

Tables 3 and 4 show that in case of green heat and biofuels the current support schemes are the most undependable, and they are weaker than in case of green electricity, the production of which consumes increasing amounts of available biomass – the main raw material for RES heat and fuel generation in Poland so far.

### III. TARGETS AND TRAJECTORY

The data included in the scenarios shown in REPAP2020 project were prepared by the Fraunhofer Institute and the Energy Economics Group (EEG), by applying the Green-X model (2009). More about the model and scenarios' assumptions can be found at [www.repap2020.eu](http://www.repap2020.eu) or at [www.pigeo.pl](http://www.pigeo.pl). After an in-depth analysis of all the scenarios, PIGEO stands by the realisation of the proactive support/realisable deployment scenario –

ACT. It streamlines the energy policy based on an active support of renewable energy sources, and abolishing of all barriers for development of the whole renewable energy sector. The indicative targets for RES share on energy market set in the Directive are shown in Table 5.

Table 5. Indicative targets resulting from Directive 2009/28/EC for the share of RES-generated energy in the gross final energy consumption in Poland.

2005	Average 2011-2012	Average 2013-2014	Average 2015-2016	Average 2017-2018	2020
7.2 %	8.76 %	9.54 %	10.71 %	12.27 %	15 %

Targets and trajectories, broken down by sector, are presented in Table 6. According to the official nomenclature and calculation methodology, RES share = a share of renewable energy sources in the gross energy consumption; RES-E (RES-H) share – share of electricity (heat) generated in renewable energy sources in the gross electricity (heat) consumption; in case of transport, the export is included and the RES-T share is calculated against the mineral transport fuels (oil and petrol).

Table 6. Targets and trajectories for total energy system and renewable energy sources in Poland. Source: Green X Model 2009. Data for 2005 and 2007 are based on Eurostat.

Expected gross final energy consumption	unit	2005	2007	11/12	13/14	15/16	17/18	2020
Electricity	ktoe	12 397	13 191	13 210	13 424	13 708	14 207	14 854
Heat	ktoe	36 531	36 425	39 827	38 930	38 335	38 592	38 929
Transport	ktoe	12 083	14 803	14 890	15 423	15 852	15 919	16 004
<b>Total</b>	<b>ktoe</b>	<b>61 011</b>	<b>64 419</b>	<b>67 926</b>	<b>67 777</b>	<b>67 896</b>	<b>68 718</b>	<b>69 787</b>
Oil and petrol	ktoe	9 969	12 213	12 099	12 508	12 836	12 891	12 960
<b>RES share</b>	<b>%</b>	<b>7.2</b>	<b>7.3</b>	<b>9.8</b>	<b>12.0</b>	<b>14.4</b>	<b>16.4</b>	<b>18.7</b>
RES-E production	ktoe	403	481	1 215	1 922	2 805	3 501	4 050
RES-E share	%	3.3	3.6	9.2	14.3	20.5	24.6	27.3
RES-H production	ktoe	3 873	4 097	4 896	5 452	6 098	6 805	7 687
RES-H share	%	10.6	11.2	12.3	14.0	15.9	17.6	19.7
RES-T production	ktoe	48	96	534	747	856	990	1 296
RES-T share	%	0.5	0.8	4.4	6.0	6.7	7.7	10.0

The share of RES, according to the presented scenario, amounts to 18.7%. The realisation of this scenario allows for achieving the obligatory quantitative target for the year 2020 with a 3.7% surplus, which will allow Poland to sell the extra amount on the EU market to those countries that would score a deficit amount in the realisation of their plans, improving energy balances and supporting the achievement of CO<sub>2</sub> emission reduction targets. It should be noted that the share of each sector was calculated in relation to the demand for energy for a model that assumes a very efficient energy use. In case of a demand of energy higher than 69787 ktoe in 2020, the RES share in energy balance will be lower. The further part of this paper contains detailed results of a simulation for individual sectors of renewable energy market, broken down by technologies.

### III.1. RES Electricity

Tables 7 and 8 include information on the electricity production and the installed power of RES.

Table 7. Contribution of RES-E in the achievement of the Directive 2009/28/EC target for Poland in 2020. Data based on the Green-X Model (2009). Data for 2005 are based on Eurostat.

	2005	2011-2012	2013-2014	2015-2016	2017-2018	2020
	TWh					
Biogas	0.11	2.11	3.98	6.45	8.07	8.81
Solid biomass	1.72	4.81	6.43	8.16	10.06	13.06
Biowaste	0.00	0.58	0.93	1.28	1.40	1.48
Geothermal electricity	0.00	0.00	0.00	0.00	0.02	0.05
Hydro large-scale	1.66	1.40	1.40	1.40	1.40	1.40
Hydro small-scale	1.00	1.32	1.55	1.76	1.93	2.09
Photovoltaics	0.00	0.05	0.13	0.21	0.35	0.65
Wind onshore*	0.20	3.67	7.63	12.88	16.71	18.19
Wind offshore*	0.00	0.18	0.29	0.48	0.77	1.37
<b>Total</b>	<b>4.69</b>	<b>14.13</b>	<b>22.35</b>	<b>32.63</b>	<b>40.71</b>	<b>47.11</b>

\*) A forecast for the wind energy, with the general support for RES does not include any special activities for the acquisition of funds (including EU funds) for the development of wind power network for the years 2014-2020 from the point of view of onshore wind farms, small wind farms (less than 100 kW) and considerable restrictions for the development of the potential of offshore sector.

Table 8. Installed capacity in RES-E. Data based on Green-X Model (2009). Data for 2005 are based on Eurostat.

	2005	2011-2012	2013-2014	2015-2016	2017-2018	2020
	MWeI					
Biogas	30.0	342.5	659.1	1 132.7	1 482.0	1 653.4
Solid biomass	25.0*	1 025.8	1 346.1	1 682.5	2 044.8	2 602.2
Biowaste	0.0	88.5	143.3	196.9	215.0	227.1
Geothermal electricity	0.0	0.0	0.0	0.7	3.3	8.6
Hydro large-scale	677.4	689.1	689.1	689.1	689.1	689.1
Hydro small-scale	246.0	334.1	393.6	446.5	488.2	532.5
Photovoltaics	0.0	65.3	152.2	256.1	423.8	785.8
Wind onshore	121.0	1 446.8	3 111.8	5 484.1	7 356.9	8 101.1**
Wind offshore	0.0	56.3	91.9	150.2	237.0	408.5**
<b>Total</b>	<b>1 650.2</b>	<b>4 048.4</b>	<b>6 587.1</b>	<b>10 038.6</b>	<b>12 940.1</b>	<b>15 008.4</b>

\*) Co-firing is not included

\*\*) Taking into account the Vision of the development for wind energy in Poland in 2020 perspective report prepared by the Renewable Energy Institute and the guidelines adopted in the report that were not used in the REPAP2020 model, one can assume that the level of installed capacity in the wind energy sector can even exceed 12,000 MW in 2020 in Poland.

### III.2. RES Heat

Table 9 includes information about the green heat generation.

Table 9. Contribution of the RES-generated heat to the achievement of 15% target for Poland until 2020. Data based on Green-X Model (2009). Data for 2005 are based on Eurostat.

	2005	2011-2012	2013-2014	2015-2016	2017-2018	2020
	ktoe					
Biogas (grid)	10.0	50.1	66.1	80.0	82.4	92.4
Solid biomass (grid)	88.0	439.8	645.9	857.1	1 099.9	1 462.4
Biowaste (grid)	18.0	95.1	150.1	203.5	221.8	234.3
Geothermal heat (grid)	8.9	25.0	48.9	93.3	171.4	329.9
Solid biomass (non-grid)	3 748.0	4 196.2	4 356.5	4 583.4	4 835.8	4 980.5
Solar thermal heating and hot water <sup>*</sup>	0.0	40.9	90.6	141.2	205.0	318.9
Heat pumps	0.0	48.6	94.0	139.4	188.6	269.2
<b>Total</b>	<b>3 872.9</b>	<b>4 895.9</b>	<b>5 452.0</b>	<b>6 097.9</b>	<b>6 804.9</b>	<b>7 687.5</b>

<sup>\*</sup>) So far the Eurostat (and GUS) data do not include the information about the heat generation in solar collectors. In 2009, according to the data of the Renewable Energy Institute, the heat production in solar collector amount to around 17 ktoe (in 2009) and rapidly increases.

### III.3. Biofuels

Biofuel consumption in transport is presented in Table 10.

Table 10. Biofuel-based energy consumption in transport. Data based on Green-X Model (2009). Data for 2005 are based on Eurostat.

	2005	2011-2012	2013-2014	2015-2016	2017-2018	2020
	ktoe					
Bioethanol <sup>*</sup>	34.0	795.7	1 084.7	1 144.7	1 205.0	1 281.2
Biodiesel <sup>*</sup>	14.0	410.3	479.7	478.2	476.6	474.8
2 <sup>nd</sup> generation biofuels	-	0.0	0.0	54.3	54.3	162.8
Net biofuel import <sup>**</sup>	-	-672.2	-817.5	-821.6	-745.9	-622.8
<b>Total</b>	<b>48.0</b>	<b>533.8</b>	<b>746.9</b>	<b>855.5</b>	<b>990.0</b>	<b>1 296.0</b>

<sup>\*</sup>) calculated basing on the domestic resources of the raw material

<sup>\*\*</sup>) negative values indicate the export of biofuels

The data presented shows that the biggest share in reaching the target will belong to the heat sector (over 60%), and especially solid biomass which fulfills the environmental sustainability criteria pursuant to the Directive 2009/28/EC. The realisation of 18.7% RES share target allows for, and increases the chances of, development of non-emission sources for energy generation, especially electricity. In addition the realisation of the target can help fulfill the whole climate package 3x30% for Poland, especially the reduction of CO<sub>2</sub> emission which

is the most sensitive to the changes in emission certificate prices – the power and energy sector.

In case of electricity, the biggest share is expected for a dynamically growing sector of wind energy. Offshore wind energy should also be developing. Apart from the wind energy, there will be a fair share of biomass, especially the biomass-generated electricity.

In the analysis of the biofuels sector, the above-mentioned scenario suggests relatively high amounts of biodiesel for 2020. Taking into account the conditions for the development of biofuels in Poland, the results achieved apply predominantly to 1<sup>st</sup> generation biofuels, due to not high level of development of 2<sup>nd</sup> generation biofuels yet. And EU regulations clearly allow for the development only 2<sup>nd</sup> generation biofuels after 2017 in the calculation of target achievement. Therefore we suggest that the values of energy consumption of these fuels be substituted by electricity in transport, which are not included on the scenario, basing on conservative assumptions stemming from the Energy Policy for Poland until 2030.

Comparing the results of simulation with the statistical data of RES sector for the years 2005-2007, one can notice a considerable boost in the green electricity generation in the pipeline, which – together with the green heat – will constitute around 20% of respective end market (heat and electricity). The biofuel market will reach the required 10% share, also including the real export (not only in statistical transfer). Potential problems with the development of 2<sup>nd</sup> generation biofuels (from non-food crops) or their excessive export in comparison to the assumed 10% consumption on the domestic market should lead to the promotion of a green electricity in transport, and an automatic increase of energy share in wind power plants, as the cheapest RES technology for storing energy for transport.

## **IV. MEASURES FOR ACHIEVING THE TARGETS**

### **IV.1. Policy measures**

Below are the suggestions for actions and changes in legal regulations and administrative procedures that would boost the momentum of development of the RES market towards the target set for 2020. The issues presented, as well as the dispersed character of the regulations unanimously stress the need to create transparent set of legal regulations, included in a single legal act about the renewable energy sources (as of today, such document does not exist and is not even in a draft phase).

#### **IV.1.1. Measures on administrative procedures, regulations and codes**

##### **Who are the administrative bodies responsible for authorization, certification and licensing procedures on national/or regional and local level?**

Depending on what type of RES is the subject of a given activity, various licenses and permits are required and, in consequence, various administrative decisions and procedures. The basic condition for the delivery of an investment project is to present it in a study of local spatial development guidelines and conditions – the introduction of the investment plan into the local spatial development plan or defining the location for future investment as the public goal, by the decision of community authorities. In addition, required are, first and foremost:

a decision about the environmental conditions (issued by the head of the commune<sup>4</sup> - wójt, town mayor or city mayor pursuant to the procedures set out in the Law on Environmental Protection, on the request of the investor; in extraordinary cases this decision is issued by the head of province - wojewoda), and the decision about the conditions of land development (issued by the head of the commune, town or city mayor), and construction permit (issued by the head of district – starosta). Within the frames of the procedure for assessment of the environmental impact of the planned project, in special cases it will be necessary to obtain an opinion from the wojewoda, starosta, the provincial sanitary inspectorate and the regional director for environmental protection. Moreover, the construction and operation of a water power plant requires a water permit (issued by the starosta). Another key licence for units generating power from renewable energy sources is a permit for generating power from renewable energy sources, which is issued by the President of the Energy Regulatory Office (URE), on the request of the investor. The competencies are described in numerous laws (Law on Urban Planning and Development, Construction Law, Law on Environmental Protection, Law on Enabling Information about the Environment and its Protection, Participation of the Society in Environmental Protection and on Environmental Impact Assessments, Law on Energy). Apart from a procedure for assessing the environmental impact, in which the decision-making body undertakes consultations with other purposeful organs and institutions, and thus coordinates the whole procedure, the coordination of all the stages of project development is the responsibility of the investor. The one-stop-shop servicing of such projects does not exist in Poland.

### **Should authorization procedure take into account the specificities of different renewable energy technologies? If yes, how?**

Desirably, a departure point for the study of procedures and the decisional grounds for them should be the characteristics of a technology and the source type, stemming from the sustainable development doctrine, which bases on the list of services available under a given technology, rendered for the society and the environment, and benefitting the robustness of the investment. The need to treat various technologies separately stems from various conditions in which any given technology can and should be used, as well as from the environments it will conflict with. Due to the fact that the legal regulations on the renewable energy sources are dispersed, the introduction of a separate act of law on renewable energy sources is purposeful.

### **Should the renewable energy potential be taken into account in spatial planning?**

Currently, the majority of communes in Poland do not have a local zoning plan, and if it does, the plan seldom takes into account the location for a RES unit. In such cases, the condition for obtaining a construction permit is to obtain the decision about the conditions for development. Local governments should be obliged to prepare and accept their plans basing on the national energy policy, and to develop the grid infrastructure with an account of the obligatory RES component, in this - the account of the unrestricted provisions, such as: "the whole area of a commune, apart from residential zones, may be devoted to RES", "all riverside zones may be utilised as locations for small water hydros". It is also desirable to have the RES installations qualified as objects to which the decision about the RES localization can be taken by the Public Goal Investment.

### **Should timetables for processing applications be communicated in advance?**

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<sup>4</sup> Polish administrative system bases on a three-level structure of self-government: Poland is divided into 16 provinces (województwo), 379 counties (powiat), and 2,478 communes (gmina), with different scopes of power (trans).

YES. They should include: types of required permits and decisions (depending on a RES technology), the procedural path, deadlines and maximum duration of individual procedures, especially if they form a critical path and/or are interdependent. Such a timetable would facilitate the coordination of works for the investor, and would spur the administrative bodies in administrative proceedings.

### **For which small scale projects, should there be simplified and less burdensome authorization procedures?**

For small-scale projects (< 5 MW), simplified procedures should exist. Such simplifications facilitate the development of small installation, and thus the diversification of energy sources. Due to the only minor levels of disruption and inconvenience for the environment and neighborhood, such projects should be accepted faster, without the need to perform the full procedure of environmental impact assessment. Also, private RES initiatives should be supported. A simplified procedure should be also implemented for upgrades and development of existing objects, e.g. for small hydros if it doesn't change the water level and does not conflict with the existing water permits.

#### **IV.1.2. Measures concerning buildings**

Currently, we could demand the preparation and implementation of a ministerial decision on the obligatory use of renewable energy sources in buildings within the building heating and insulation standards, and/or regulations implementing the directive on the energy profile of buildings and regulations on energy efficiency (especially within the example-setting role of the public sector). The decision should apply to all new buildings, as well as existing buildings undergoing thermal upgrading, including various building in the following categories: residential, public, offices, hospitals, leisure centres, sports centres etc. The decision will set the minimum annual share of renewable energy in the demand for energy in buildings; it will be changing with time, depending on the development of relevant technologies. The ministerial decision on RES should be a part of a whole support program/system for renewable energy sources, with the simultaneous backing for R&D activities, the results of which should be taken into account on an ongoing basis in planning the future development of the RES sector.

#### **IV.1.3. Measures on information**

### **How should specific information be targeted at different groups, as end consumers, builders, property managers, property agents, installers, architects, farmers, suppliers of equipment using renewable energy sources, public administration?**

Information on RES should be directed to individual groups in a most individually effective way. Individual receivers of RES equipment constitute a dispersed group of investors, including:

- real estate owners and landlords,
- construction sector (developers and investors), represented by Polish Chamber of Construction Engineers and the Polish Association of Construction Engineers and Technicians,
- real estate agents, represented by the Real Estate Entrepreneurship Association,
- owners of tourist locations (hotels, camping grounds, B&Bs) represented by e.g. Polish Tourist Organization or Polish Camping and Caravanning Association,

- farmers, including agritourism farms, farmer associations and agricultural chambers, among them the Agricultural Chambers National Council,
- schools, especially middle schools, high schools and vocational schools,
- suppliers of power/heat generating equipment basing on all the branches of renewable energy sector, represented by the Polish Coordination Board of Renewable Energy Sources, including PIGEO,
- suppliers of solar collectors and solar heating systems, and the installers of heating systems represented by the Panel of Solar Energy Systems Equipment Manufacturers and Installers,
- architects, represented by the Polish Architects Association and the Chamber of Architects of the Republic of Poland,
- local government administration, represented by the Association of Polish Cities and the Association of Polish Counties,
- Governmental administration, including the Ministry of Economy, Ministry of Environment, Ministry of Agriculture, Ministry of Infrastructure, environmental funds and institutions implementing operational programs.

Such groups should be addressed with the general informational campaign, including the dissemination of information on:

- the opportunities to use RES in various sectors,
- advantages, individual (cost reduction in fuel and energy procurement) and environmental,
- systems construction costs and sources of financing, including new support systems.

The campaign should be addressing, first and foremost, the end users (building owners, investors) and should be implemented via the mass media. Festivals, events, seminars including the International Renewable Energy Congress Green Power, educational programs in schools and participation of local governments in various actions for shaping the awareness and to disseminate information should also be an important part of the campaign.

### **How will you ensure that certification schemes or equivalent qualification schemes become or are available by 2012 for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps?**

The initiative to set up panels for renewable energy equipment manufacturers to promote the implementation of 2009/28/EC Directive should be intensified. For example, the Panel of Solar Energy Systems Equipment Manufacturers and Installers has prepared a declaration and accepted a motion to prepare, jointly with scientific units, a training program. As the preparatory stage, training systems in other EU countries should be revised, as these countries have more experience, as well as national certified training systems that are in accordance with the new Directive. Also, a new procedure of acceptance and certification of training programs should be created. Trainings should be conducted according to a unified training program, confirmed by the Ministry of Economy. Open and independent trainings that are compliant with the stipulations of the Directive and that are certified should be financed from environmental funds. A national Internet database of certified installers should be created.

### **How should guidance for planners and architects be provided to help them 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?**

The manufacturers of appropriate technological solutions for RES would also play a major role, directing their offers and promotional actions towards the professional groups mentioned above. Apart from the series of trainings for installers and designers, these groups should also be supplied with guidance tips through:

- setting up of a national website for certified heating and cooling systems and appliances (pursuant to art. 13 par. 6 of the 2009/28/EC Directive),
- preparation of a manual recommended and certified by the Minister responsible for construction, addressed to designers and installers of heating and cooling systems,
- introduction of the topics concerning appliance design into curricula of appropriate university courses,
- preparation of guidelines on RES use in residential, utility and industrial construction, and disseminating them among construction-related organizations, chambers and associations.

### **What should be the role of regional and local actors in the design and management of programmes for information, awareness raising and training programmes for citizens on the benefits and practicalities of renewable energy sources?**

Due to the dispersed nature of the sector, especially of the branches of solar energy, geothermal generation, heat pumps - the key role belongs to regional and local actors, because they know the resources and potential for RES use in their respective regions, and can raise awareness of their citizens in terms of RES advantages. A major role should belong not only to local authorities, but also to energy agencies, agricultural restructuring and modernization agencies, as well as the local media, promoting the use of RES. That is why it is absolutely necessary to support these units in their activities.

#### **IV.1.4. Measures on certification of installers**

##### **Are certification schemes / qualifications already available? Please, describe them.**

Each RES generating unit supplying the power to the grid is required to obtain a licence from the President of the Energy Regulatory Office, or is required to register in the registry of agricultural gas-generating energy companies by the President of the Agricultural Market Agency. However, currently in Poland there are no qualification/accreditation/certification systems for installers of small-scale renewable energy systems and equipment, in the meaning of *Regulation (EC) No 765/2008* and *Definition from Commission of the European Communities, Brussels, 8 July 2006 SEC (2005) 957 – Commission staff working paper: Towards a European Qualification Framework for Lifelong Learning* which allow for assessment of the quality of the product and the actual green energy generated and operated. The installers are trained basing on training courses that vary in scope and content, organized by individual equipment manufacturers and installer networks that cooperate with them. In order to provide a proper level of service of their collectors, the manufacturers secure trainings of the installers.

##### **Are there specific trainings for case handlers in the different authorisation bodies?**

Trainings for installers are organized by equipment manufacturers and associations of manufacturers and installers. Further training efforts should be undertaken with due account of the requirements of the training program of the Directive, and should be organized by other independent units without direct ties to the manufacturers, such as scientific centers or employer's associations, consumer organizations, regional and local energy agencies.

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

Currently this information is not available yet and should be definitely provided.

#### **IV.1.5. Measures on electricity infrastructure development**

At the moment there are 3 main problems pertaining to the integration of RES with the power grid in Poland:

- bad state of infrastructure and lack of grid development plans, or realizations,
- a rare commodity – the requirements for connection of a RES generating unit - that everybody could apply for results in blocking the access to the grid, due to a large number of application for the issuance of the requirements and low capabilities of the electric power system,
- Article 7 of the Law on Energy do not give a definite description of the connection fee, collected by the operator - the fees can differ at present (even by two orders of magnitude per 1 MW for different plant) for the same RES source.

Therefore, in this area the following needs to be prepared as soon as possible:

- strategic plan for modernization and development of the transmission/distribution grids should be set out by 2020, and it has to be included in the executive actions of the National Action Plan,
- a transparent market mechanism for the acquisition of the requirements for connection, describing the rules of collecting and distributing fees from connecting new RES generating units to the national grid, by making relevant amendments in the Law on Energy.

The grid development plan, previously consulted with the organizations bringing together RES entrepreneurs, including the organizations from the Polish Coordination Board of Renewable Energy Sources, should stipulate the obligatory roadmap for the future investment of the transmission grid operator (OSP) and the distribution grid operators (OSD).

The grid development plan should include:

- line and point investments,
- division into regions,
- deployment timetables broken down by year, at least until 2020,
- the number of generating powers reserved for the connection of units in individual RES branches, according to the presented development scenarios of REPAP2020 project and/or National Action Plan,
- specification for RES connection, depending on the nominal voltage of the grid and the source of power generation,
- the remarks of investor associations - future generators of RES power, applying for connection to the grid,
- intelligent grid technologies for balancing energy generated in dispersed systems, especially wind farms, should be taken into account.

Grid operators shall update their grid development plans already in 2010, after the European Commission accepts the National Action Plan, and will execute investment processes according to the timetable. Both types of operators (OSP and OSD) should be subject to fines, should they fail to fulfill the obligation, and the fines would go into a fund for financing the grid development.

In order to work out transparent mechanisms for acquisition of connection requirements and to enable the execution of the Directive's goal, one needs to ensure the introduction of regulations guaranteeing the issuance of connection requirements above all for the RES projects that are ready for realization. Timetables for connection procedure and fee payment must be set out. The most important issue will be the introduction of regulations that would allow for transparent breakdown and separation of costs into those related to electricity generation and those related to its transmission/distribution. It will allow for a just sharing of costs between the applying generating unit and the operator. It will also allow to define the grid development cost and the cost of construction of RES generating units in the energy transmission fees, presented in the transmission fee tariff for the end user connected to a given transmission grid operator. The division of costs should be regulated by the President of the Energy Regulatory Office, who will set out - according to the timetables - which connection-related costs apply directly to the connection of a new unit, and which are linked with the grid upgrade process (which should be carried out regardless). The costs related to the integration of RES with the grid should be pooled and divided equally between all end users in the country in their transmission fee, and the costs related to the grid modernization should be divided among the end customers of a given distribution company operator. The rule of collecting half the fee based on real cost of connection should be maintained on the time-unlimited basis (as it is in case of small units) also for RES units of over 5 MW installed capacity. The amount of the fee based on the real connection cost should be calculated on the connection cost only up to the point of connection to the distribution/transmission grid.

In order to do away with the situation of blocking the power by potential generators, the supply/demand for connection requirements should be balanced by allowing the issuance first and foremost to reliable entity that:

- will pay the deposit for issuance of grid connection requirements. The deposit of PLN 30 for each kW of connection power would be paid into one pool fund, with interest bearing according to the annual interest rates for the Polish State Treasury bonds,
- will submit, together with the request form, the extract and map extract from the local zoning plan including RES unit, or - in case of lack of such a plan - a decision about the conditions for development of the real property on which the RES unit is to be constructed.

Moreover, the following periods for the issuance of connection requirements should be implemented (from the date of submittal of the complete request for issuance of connection requirements):

- 30 days (nominal voltage of the grid no more than 1 kV),
- 90 days (nominal voltage of the grid higher than 1 kV and below 110 kV), apart from generating units for connection of a joint installed power not higher than 2 MW, in which case the 60 day period applies,
- 120 days (nominal voltage of the grid of 110 kV or higher).

After the issuance of the connection requirements, the applicants would have 14 days to decide whether they accept the requirements. In case of non-acceptance, the deposit less the costs of procedure of issuance of connection requirements is returned to the investor. After the acceptance the connection requirements are valid for 2 years. In the period of 2 years after obtaining the connection requirements, the investor carries out the projects to acquire a relevant construction permit. Connection contract (confirmed by the President of the Energy Regulatory Office), which has the same template regardless of the distribution company, enters into force after the generating unit acquires the construction permit (max. 2 years after the connection requirements are issued). In such case, the deposit for the connection

requirements is returned to the investor increased by the interest accrued or is passed on connection fee. Should the investor fail to secure a construction permit during 2 years since the issuance of the connection requirements, they become null and void, the connection contract is not signed, and the deposit is allocated to the fund for grid development.

These mechanisms will allow for fully transparent rules of obtaining connection requirements and power grid access, giving equal chances for RES units. They will also allow for transparency of the fee collection procedure (equal treatment regardless of distribution operator one has to cooperate with), and to minimize the costs to be borne by a potential RES power generating unit for connection, and – most of all – for deciding on a location of RES basing on available energy sources, and not on the availability of national power grid. Another important element is a clear and transparent presentation of costs related to electric power grid modernization, which is necessary for security reasons, which also cover the development of RES in the country.

It is important to note that access of RES to the grid will be adjusted to the transmission and distribution grids development plans that the operators will announce by publishing the information about the plans for grid development and grid access, the capacity and specifications of given RES source under given connection requirements etc. This information has to be updated at least monthly. Moreover, the operators of transfer and distribution systems should supply the grid users and operators of other power systems that their system is connected with, with the information about the terms of service for power transmission and about the operation of national electric power system, especially on conditions of trans-border trade, grid management and electric power balancing, planned and unplanned shutdowns and shut-offs of generating units connected to the distribution and transmission grids with nominal voltage of 15kV and above. The last amendment of the Law on Energy takes into account only the possibility of sharing information about the grid of 110 kV or higher, which is a dead letter for RES, in case of which over 90% of new generating units are being connected to the distribution grid (grid voltage below 110 kV).

Moreover, the following should be realised:

- strengthening trans-border transmission lines,
- simplification of administrative and legal procedures for investment projects related to the grid development, especially line infrastructural investment, by:
  - in the short term – preparation and adoption of a *special law* for the development of grid systems that will include simplified rules for founding infrastructural investment in energy sector, bringing to minimum the number of procedures and requirements necessary to carry out such investment,
  - in the long term – implementation of a series of changes to respective legal acts in order to eliminate detrimental provisions, preventing the development of grid infrastructure, and preparation to introduce line infrastructure investment to local spatial development plan also to the supra-regional studies of spatial development conditions.

#### **IV.1.6. Priority/Guaranteed access to the grid**

##### **Should priority or guaranteed access be ensured? Explain.**

A guaranteed access to the grid for RES power generating units must be ensured, no less than the applicable amount of power depending on RES technology and the grid development plans, and in accordance with the ACT scenarios. Currently, the Law on Energy (LoE) burdens power companies that deal with transmission or distribution of gas fuels or energy with the obligation to connect generating units if there are only technical and economic conditions for this (Article 7 par. 1). The Law should stipulate precisely what are technical conditions within which a unit can be refused connection by the operator to which we apply for issuing the connection requirements. The applicant has no access to the expertise (of potential impact of connecting unit on electric power system), and the dispute may be solved only by the President of the Energy Regulatory Office. A more complex issue is the problem of access to gas distribution network for biomethane. The source of the problem lies in the definition of gas fuels (Article 3 p. 3a, LoE), where they are described as relevant types of gasses supplied via gas network. In the last amendment of LoE, the gas fuels are defined as relevant types of gases supplied via gas network and the agricultural biogas. This regulation, included in the amendment, narrows the definition and the importance of biogas for gas network energy sector to agricultural biogas only, absolutely omitting any biogas generated in any other technology (landfill, sewage). The Directive of the European Parliament and Council 2009/28/EC of 23<sup>rd</sup> April 2009 in Article 2 p. e) contains the definition of biomass that treats equally the “agricultural” and “non-agricultural” biomass.

##### **How should it be ensured that transmission system operators, when dispatching electricity generating installations give priority to those using renewable energy sources?**

The Law on Energy should be supplemented with the provision that will give priority of connection to those generating units that generate energy from RES.

##### **How should the transmission and distribution of electricity from renewable energy sources be guaranteed by the transmission and distribution system operators?**

Provisions of Art. 9c par. 6 of LoE puts the obligation on the electric power system operator, thanks to which, in his business area, he is required to secure the priority of transmission to all entities that generate power from RES. This provision should be retained.

##### **What grid and market related operational measures should be taken to minimise curtailment of electricity from renewable energy sources?**

Above all, introduction of mechanisms of power grid development and connecting RES to the grid as stipulated in previous chapter. Also, the following:

- RES investments should be considered public goal investments,
- shortening of the period between the submittal of a complete application and the issuance of the connection requirements for RES by the grid operator, as described above. The periods for issuance of connection requirements should not be 150 days for all types of sources, especially for small units that are connected to average voltages, for which, according to the LoE, the preparation of expertise on the impact of new unit on the system is not required,
- the procedures to obtain the environmental decision and to change the local spatial development plan should be simplified,
- RES investment location should be by law taken into account in local spatial planning,

- procedures for investment project delivery and operation of a plant should be simplified for micro-cogeneration CHP and micro-generation based on RES, as well as the procedures for obtaining the land for line infrastructure development.

#### **IV.1.7. Biogas integration into the natural gas network**

The procurement and purchase of biomethane should be based on the same terms as the procurement and transmission/distribution of electricity generated in renewable energy sources, by guaranteeing purchase of biomethane at a given price, not discriminating biomethane against the natural gas prices. First though regulations must be put in place, that guarantee obligatory procurement and purchase of biomethane, regardless of the technology used to generate it. Also, a support system should be put in place for biomethane introduced into the network, such as e.g. green certificate for an equivalent amount of electricity, taking into account applicable algorithm for recalculating biomethane into electricity that would not be discriminating against the biogas power generation in a high-efficiency cogeneration unit.

#### **IV.1.8. District heating and cooling infrastructure development**

No relevant plans. The assessment was made within the frames of RES-H project (the materials were passed to the participants of RES-H workshops that took place on 24<sup>th</sup> September 2009 in PJCEE in Warsaw).

#### **IV.1.9. Compliance of biofuels and other bioliquids with sustainability criteria**

As of today, the European Commission did not offer any official unified scheme of action that would lead to the introduction of sustainable development criteria to the biofuels and bioliquids production. The basic activities in this respect that should be undertaken in Poland should be:

- informative and promotional actions on various levels,
- change of legal regulations that would allow and simplify the implementation of sustainable development criteria,
- introduction of tools supporting the production in accordance with sustainable development criteria: Subsidies and obligatory quantities,
- certification of biofuels and bioliquids.

To ensure that the production of biofuels and bioliquids satisfies the criteria of sustainable development, two data pieces need to be verified:

- the raw material(s) for biofuel,
- where and how were the substrates farmed and processed.

Such verification will be possible due to the introduction of certification of biofuel production that will screen all the stages of this production process. The following entities should be included in the setting of certification rules and procedures: producers, processors and users of biomass, public administration and entities, scientists, NGOs. The certification process should cover all stages of production process of biofuels and bioliquids. The first stage should consist in controlling the area where the biomass was farmed, from the point of view of compliance with the biodiversity criterion. Integration of Polish classification system of protected areas with international systems has not yet been concluded, but in many

respects these systems are consistent. Until full integration, Polish classification of protected areas should be used, as it is more detailed. It consists of 4 types of areas, varying from the point of view of protection aims and regimes. The second criterion related to the farming area should be the amount of carbon contained in the soil, as, according to this criterion, the soils with high carbon content are excluded from biomass production. The procedure of changing the category of the area include, in this case: Identifying the current status of the plot, excluding the possibility of status change for soils with high carbon content (forested marshlands, peat bogs), the assessment of carbon content before the change of status and after. The change of status of any given area should be introduced not more often than once every 5 years. Another element to be assessed should be the compliance with the biomass farming and harvesting practices with the Code of Good Agricultural Practice, especially in relation to the use of fertilizers, pesticides and farming systems. If all the above criteria are satisfied, such biomass should be awarded a certificate of origin. This would be the first step of the certification process. The second stage of the certification process will be the assessment of the reduction of greenhouse gas emissions that will cover the whole production process of biofuels and bioliquids, starting from biomass production, to distribution and to utilizing biofuel. The method of assessment of emission reduction is presented in Annex V to the 2009/29/EC Directive. Biofuels and bioliquids that have the certification of origin and fulfill the criterion of reducing the greenhouse gas emission will be awarded an appropriate certificate, confirming that they were produced in accordance with the sustainable development criteria. Certification system is a vitally important instrument allowing for simple and transparent assessment whether any given batch of biofuel or bioliquid was produced in a way that secures the fulfillment of sustainable development principles or not. The certification system will also allow for setting transparent rules of extending financial support for biofuel and bioliquid production. In the first period of introduction the certificates will be voluntary. The long-term goal is the obligatory certification of biofuels and bioliquids - entering the market will require a certificate.

## **IV.2. Financial support**

### **IV.2.1. Support schemes for renewable electricity**

#### **What further improvements could be implemented to ensure reaching the target in the electricity sector?**

First of all, a stability of legislation should be ensured. Below we suggest selected solutions to improve the existing green certificate system:

- currently, the obligation resting on the entrepreneurs, who are obliged to buy the green certificates, is set only until 2017, which is a barrier for new investors who fear that the system will be abolished after that date. As new sources, constructed in 2018-2020 will also contribute to the target, such units should be guaranteed income and capital reimbursement for a period of at least 15 years.
- RES power generating units sell the energy in accordance with the Law on Energy, i.e. at average price of electricity from the previous year. As the energy market is very dynamic and we observe a steady growth of energy prices, RES energy producers sell their energy at prices that do not follow the situation in the market. Therefore, we urge that the sale price of RES-generated energy in any given quarter of the year is calculated basing on the average price from the previous quarter,

- the issue of taxation on income of energy producing enterprises earned from the sale of green certificates, mentioned in Art. 9e par. 1 of Law on Energy (green certificates) and Art. 9L par. 1 (cogeneration) and in Art. 9o par. 1 (network biogas) should be clearly defined and settled. We suggest to introduce a provision that such income is subject to taxation according to the laws on income tax from economic activity,
- energy producers who generate their power in a plant that uses renewable energy source and fulfils the criteria for a high-efficiency cogeneration should be supported by enabling them the acquisition of two types of certificates (green and cogeneration). The last amendment of Energy Law introduced such a solution, but we need to secure the long-term profits of such a policy by prolonging the functioning of this system (the biomass support system is valid for the energy generated until the end of 2012, and the introduced system of cogeneration certificates for biogas is to be working between 1.01.2010 and 31.12.2018) by guaranteeing the high-efficiency CHP unit cogeneration certificates for the period of at least 15 years. Moreover, a set amount of substitute payment - a set amount for units combusting biogas, at the level of 240 PLN/MWh. The amount of substitute payment, suggested in the amendment of LoE, is to be dependent on the price of energy on the competitive market and can achieve the value between 30% and 120% of the price proposed above. The President of the Energy Regulatory Office is to set the amount annually. Such solutions bring about instability and unpredictability of income from power production for the interested parties. Currently, even the value of substitute payment, hypothetically 120%, does not guarantee the profitability of biogas plant investment, especially in case of small units of electric power below 500 kW.

#### **IV.2.1.1. Investment aid**

##### **What investment aid should be granted by the scheme? (subsidies, capital grants, low interest loan, tax exemption or reduction, tax refund). Who could benefit from this scheme?**

Investment aid should be based on subsidies, loan/credit funding and low interest loans. Public aid in the form of partial subsidies of qualified costs should be rendered from national sources - the National Fund for Environmental Protection and Water Management (NFOŚiGW) - pooled from fines and substitute payments paid by the energy companies that supply electricity the end users and that didn't fulfill the obligation of buying a given number of green and cogeneration certificates in a given year, as well as from the European funds within the EU Cohesion Policy. The system of funding division should be managed by a single entity (e.g. NFOŚiGW), not dispersed among many implementing institutions. Every investor should have a right to use such aid. Moreover, the RES electricity producers should be exempt from income tax during the first 5 years of operation of the generating unit.

##### **Should applications be continuously received and granted or are there periodical calls? If it is periodical, what should be the frequency, conditions?**

RES development should ensure that the grants are given out on a continuous basis, with access to the information on how much more is left for a given action, and:

- the amount of funding for public aid funded projects should not exceed 35% in case of biogas plants and photovoltaics and 20% in case of all other sources. Increasing the ceiling of public aid will in effect lead to a situation in which

- a number of investment projects that will receive public aid will decrease, and this in return will cause a smaller number of successfully implemented projects and smaller amount of energy,
- the funding pool prepared for a given action in the Aid Program should be split between individual types of RES. Each type of RES has not only a unique mode of operation and power generation, a different cost of 1 MWh generation, but also differing costs of construction and deployment. Also, the rules of financing the investment projects by commercial banks basing on various technologies vary greatly,
  - moreover, no limits should be imposed in terms of total investment costs in order to avoid a trick consisting in unnatural division of a project into several sub-projects,
  - the criteria for application assessment should be as objective as possible, by addressing first of all the requirement to submit relevant documents from authorities (e.g. construction permit), and private entities, issued by professional and reputable market players (e.g. credit agreement with a bank or MoA on future crediting).

#### **IV.2.1.2. Operational aid – tradable certificates system**

##### **Should there be an obliged share of total supply? Who would have the obligation?**

Currently, the Law on Energy forces energy companies that sell electricity to the end user to obtain from RES-E producers a relevant amount of certificates and pass them for remittance to the President of Energy Regulatory Office. According to Law on Energy, Art. 9a par. 9 the obligation (the certain share on electricity sell to end users for a given year) is presented with only 10 years advance. This period should be prolonged to at least 15 years.

##### **Should there be technology specific bands?**

We stress the need for additional support for entities generating RES electricity in a high-efficiency unit, in the form of cogeneration certificates (the functioning of this mechanism was described earlier).

##### **Which technologies should be covered by the scheme?**

All renewable energy sources should be covered by the scheme. Low-efficiency power generation in co-combustion technology should be eliminated from the aid scheme.

##### **Should an international trade of certificates be allowed? What would be the conditions?**

With regards to EU goal, it would be advisable to enable the trade green certificates on the international market. However, we find the introduction of this mechanism unfounded, for the following reasons:

- only a few member states follow the certificate-based support system
- representatives of the government, public administration, sectoral organizations in Poland increasingly voice the need to move on to feed in tariff system.

##### **Should there be a floor / bottom price?**

Today the systems shows the ceiling price (the amount of substitution fee), and when we deal with the supply of green certificates, there seems to be no need to introduce a bottom price. A

minimum price should be definitely introduced on the level allowing for achieving at least 8% IRR.

#### **Should there be a penalty for non-fulfilment?**

Initially, the system in Poland was based on regulations that didn't stipulate penalties, and in effect provisions about the support systems were dead letters. Then, Law on Energy was amended with Article 56 that introduced penalties up to 1.3 of substitution fee for a given year. These provisions should be retained.

#### **How long should a plant be able to participate in the scheme?**

#### **What start and end dates (duration) are foreseen for the whole scheme?**

The support system is functioning in Poland since 2005. According to the decision of the Minister of Economy, resulting from Law on Energy, Art. 9a, par. 9, the obligation to purchase the green certificates lies with the energy companies until 2017. This decision should be amended as soon as possible, to make it compliant with Art. 9a par. 9 of the Law on Energy. As the RES investment process takes up to 5 years in Poland, the functioning of the system must be secured with 20 years advance. The producer should be supported for at least 15 years. In case we move on from green certificates to the feed in tariff system, the new system must guarantee income no less than the one the state is abandoning.

#### **Should the scheme be periodically revised? Who should be managing the scheme?**

The system is verified by the President of the Energy Regulatory Office at the moment (pursuant to the Law on Energy).

### **IV.2.2. Support schemes for renewable heating and cooling**

We urge for taking up the following actions in the next two years:

- widening the group of beneficiaries of environmental fund subsidies (especially by individual clients),
- urgent launching of legal and general support for individual investors setting up house water and room heating systems and cooling systems, through tax concessions (PIT),
- introduction of a provisional 0% VAT rate on solar collectors sold in Poland,
- introduction an adequate support mechanism during the RES operation.

### **IV.2.3. Support schemes for renewable resources in transport**

Making a decision, whether obligatory annual targets, diversification and support for transport fuels should be analyzed for individual types of fuel or for given category of technology, must be closely tied with the analysis of the state of development of Polish market of transport fuels.

At the early stage of market development (the biofuel segment does not exceed 10% of the total production of fuels for transport), in case like Poland, setting annual goals and awarding support should address the technology category. At this stage, the market is still too underdeveloped to secure a sustainable development of technology, which results both from the progress in work on individual technology groups and on economic conditions. Setting goals and distributing support by technology category will allow developing all categories, also those that are currently in the early phase of development process.

When the market reaches the stage of advanced development (expected to take place in Poland around 2020-2030), setting annual goals and dividing the support should switch to fuel type. Thanks to the improvement of market climate and progress on scientific and technological research, some of the biofuels will be established on the market well enough not to need any support anymore.

### IV.3. Increasing biomass availability

The biomass resources in Poland, broken down by category in 2020 perspective in the primary energy units are presented below, in the Table 11.

Table 11. Resources of primary biomass energy in Poland including import. Import applies to the future shipments of biomass from outside the EU.

Biomass category		Total 2015	Imports 2015	Total 2020	Imports 2020
Agricultural products	ktoe	2 517	241	2 902	389
Agricultural residues		2 071		4 411	
Forestry products		4 122		4 482	
Forestry residues		2 080	18.3	2 292	26,9
Biowaste		1 031		1 391	
Total biomass availability			12 079.0		15 893.4

The highest capacity of using biomass for energy purposes lies in the forest resources, as well as in agricultural biomass. The capacity of increasing the amount and use of biomass for energy purposes is presented in the discussion below.

#### What measures could best encourage the use for energy purposes of unused arable land, degraded land, etc. planned?

It is estimated that degraded soils in Poland – salty ones or those with low levels of organic content – take up around 2.7% of the country. Therefore, in order to encourage energy plant farming on such areas (a low productivity per hectare), financial support per hectare should be introduced for such purpose. Currently, subsidies for energy plant farming are extended to farmers on EU terms by the Agency for Agricultural Restructuring and Modernization only until the end of 2009. Therefore it is advisable to prolong the subsidies per ha program for degraded soils and introduction of additional subsidies per ha for energy plant farming, or per unit of biomass produced (per tone, per sq. m.) in case of intensive farming (aided by intensive agricultural procedures, such as fertilization, to even up the adverse balance of elements in the soil) that would allow for reimbursement of cost of intensive farming in such areas. What concerns heavily contaminated soils, these are soils contaminated with heavy metal elements, located in the vicinity of large industrial agglomeration in southern Poland. In such areas, a subsidy for energy plant farm established per hectare would be sufficient. We recommend that the payment should be dependent on the conclusion of agreement between the biomass producer and the purchaser. Such conditions guarantees, on one hand, that the biomass will be put to energy generation uses, but on the other hand may become a barrier for development of energy plant farms due to the difficulties in signing bilateral agreements. Currently, such activities have not been taken up in Poland.

### **What measures could ensure a higher productivity of currently used lands or harvesting more than once on the same land per year – if applicable- planned?**

The following activities encourage the intensification of productivity per hectare:

- encouragement to introduce good agricultural practices on large scale, as locally organized trainings,
- a wide information campaign both on national and regional/local levels on the methods and ways to improve productivity,
- introduction of new species and varieties of high-output plants – by introduction of subsidies, partial reimbursement of farming costs, including full/partial reimbursement of cost of cuttings/seeds,
- introduction of guaranteed prices for purchase, purchase priority and other instruments for the biomass that have exceeded certain assumed value per annum per species farmed.

### **What measures could improve forest management techniques in order to maximise the extraction of biomass from the forest in a sustainable way?**

The most important factor in Polish conditions is the increased mechanization in forestry, especially in relation with lumber acquisition, due to purchase of multi-functional machines, like harvester and forwarders. The productivity per hectare will increase due to acquisition also of those parts that were left unused until now (branches, tops, stumps), and wood from thinning.

### **How could the impact of energy use of biomass on other sectors based on agriculture and forest be detected?**

The best indicator revealing the impact of biofuel and bioenergy market on other branches of the economy is the change of prices and quantity of raw materials available in the market, including wood and agricultural products.

### **What kind of development is expected in other sectors based on agriculture and forest that could have an impact to the energy use? (Are there possible positive impacts, like more efficiency might result in more biomass available for energy, or negative impacts, like more efficiency, might also result in fewer by-products available for energy?)**

The wood industry sector which is the main, apart from the energy sector, recipient of the wood raw materials in Poland, recently noted a substantial increase in business, which was greatly influenced by the development of construction sector, to which it is strongly linked both directly and indirectly. The targets introduced by Directives 2009/28/EC and 2009/30/EC put significant stress on environmental protection aspect, which forces changes in technological processes of the wood industry. The need for restructuring of wood processing plants and necessary investments in this process will, in short-term perspective, lead to the weakening of the momentum in the wood industry. However, focus on the development of new, more efficient technologies will in the long run probably yield a positive effect, resulting in lowering of costs of production, and thus can lead to the development of the market. The development of new, more efficient technologies will result in weakening of the competition for raw material with the energy sector, but will also mean that new, more effective technologies will leave less cuts and waste for use in energy generation.

What concerns the agricultural market – over-production of food and low prices of purchase cause a part of agricultural areas to be redirected towards energy production. It still should be noted that food production must not be jeopardized and that energy plantations should be located on lower quality soils (category IV and V). The new, ever growing market of biofuels

can also cause changes in the types of plantations, e.g. a return to long straw variations of cereals.

#### IV.4. Flexibility mechanisms / joint projects / European perspective

In the above-mentioned scenario, Poland reaches the Directive target. According to the target, the demand for RES-generated energy will amount to, after deduction of biofuel export, 13,034 ktoe, which allows to overachieve the RES target by 3,7% by 2020. Table 12 shows how the biofuel trade (in case of Poland – export) and flexibility mechanisms influence the RES market in individual years up to 2020.

Table 12. The influence of biofuel trade and flexibility mechanisms on the shape of the RES market in Poland.

<b>Output</b>	<b>unit</b>	<b>2011-2012</b>	<b>2013-2014</b>	<b>2015-2016</b>	<b>2017-2018</b>	<b>2020</b>
Default (purely domestic) RES deployment	ktoe	7 464	9 135	10 701	12 334	14 045
Default RES share on gross final energy demand	%	11.0	13.5	15.8	17.9	20.1
Default policy cost - consumer expenditures	M€	3 522	4 114	4 423	5 176	6 020
<b>Impact of Intra-European biofuel trade (incorporated in results named as "national RES deployment")</b>	<b>unit</b>	<b>2011-2012</b>	<b>2013-2014</b>	<b>2015-2016</b>	<b>2017-2018</b>	<b>2020</b>
Adapted RES deployment	ktoe	6 645	8 121	9 759	11 296	13 034
Adapted RES share on gross final energy demand	%	9.8	12.0	14.4	16.4	18.7
Adapted policy cost - consumer expenditures	M€	3 109	3 706	4 305	5 078	5 891
<b>Impact of Intra-European biofuel trade &amp; cooperation mechanisms</b>	<b>unit</b>	<b>2011-2012</b>	<b>2013-2014</b>	<b>2015-2016</b>	<b>2017-2018</b>	<b>2020</b>
Adapted RES deployment	ktoe	6 643	8 119	9 759	11 296	13 032
Adapted RES share on gross final energy demand	%	9.8%	12.0%	14.4%	16.4%	18.7%
Adapted policy cost - consumer expenditures	M€	3 108	3 705	4 305	5 078	5 889

The above data shows that Poland can become a serious player on the biofuel export market, reaching the targets set both for the whole RES market and for biofuels.

## V. ESTIMATED COSTS & BENEFITS OF THE RES SUPPORT MEASURES

### Expected consumption of RES-generated energy

It is estimated that the production of RES-generated energy in Poland in 2020 will amount to 13,034 ktoe in our scenario, of which 1296 ktoe belong to the biofuel energy. It should be noted, however, that the scenario assumes that over 30% of all domestic biofuel production is exported. The scenario assumes the share of green heat in the total energy production in renewable energy sources in 2020 on the level of 60%

### Estimated reduction of greenhouse gas emissions (biofuel export is included)

In 2007, thanks to renewable energy sources, 2.5 million tons of CO<sub>2</sub> were not emitted to the atmosphere. It is estimated that in 2020 Poland will avoid, thanks to RES, emitting of 59.8 million tons of CO<sub>2</sub> over the year (average). In total, in the years 2006-2020 the emission reduction stemming from RES application will amount to 389.1 million tons. A significant contribution in reduction of greenhouse gas emissions is noted in the electricity sector (70%).

### Avoided consumption of fossil fuels

Due to the domestic production of energy in renewable energy sources (with biofuel export accounted for), the total demand for fossil fuel energy in the years 2006-2020 will be reduced by 109,902 ktoe, especially in the electricity sector. For comparison: in 2007, RES-generated energy decreased the total demand for fossil fuel by 678 ktoe.

### Costs and benefits in working towards the 2020 target

Costs and benefits resulting from the actions directed at achieving the targets provided in the ACT scenario (assuming the model in which the energy consumption is very efficient) is presented in Figure 2. The data presented shows that the highest costs related to the RES support schemes are proposed for the electricity sector, but they result in a considerable decrease in greenhouse gas emissions, as well as reduction in fossil fuel consumption in comparison to other sectors. The expenses of consumers related to RES implementation will be minimised by applying the flexibility mechanisms to biofuels. These mechanisms will bring an average annual income of EUR 57 million from the international sale of biofuels.

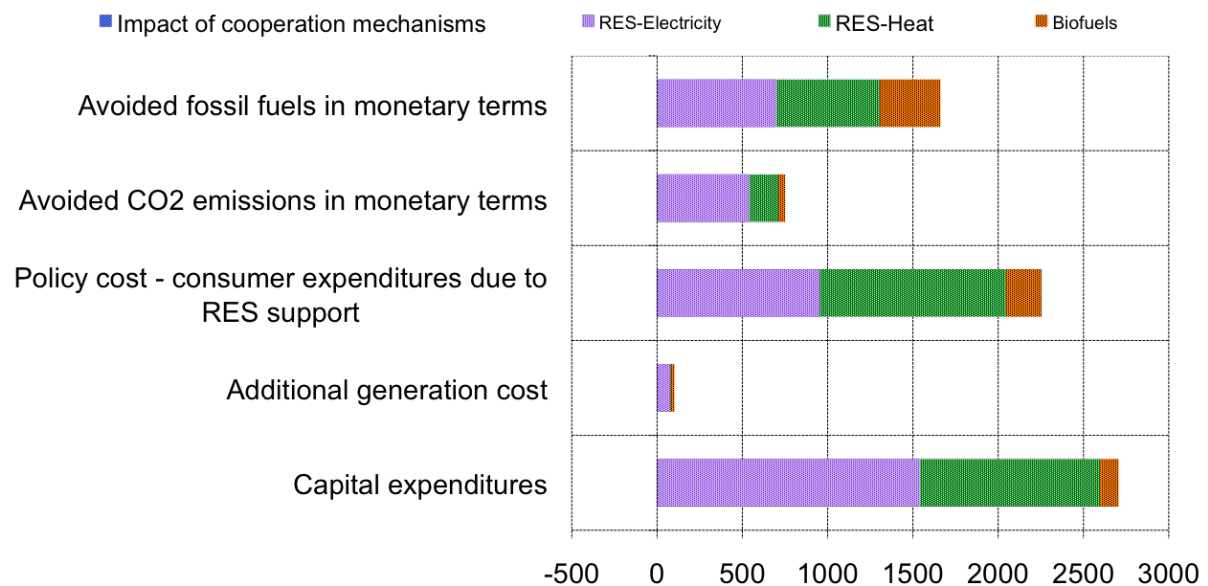


Figure 2. Costs and benefits (on average per year) with regard to new RES installations (2006 to 2020) [M€/year]. The impact of cooperation mechanisms on the consumer expenditures for RES support is at around EUR -0.5 million per annum.

## VI. CONCLUSIONS

The RES share target for Poland basing on the 2009/28/EC Directive is 15%. We propose to develop renewable energy sources in Poland in accordance to ACT-scenario, which allows to reach the target with excess of 3.7 percentage points above. The suggested scenario, as well as a diversified *green energy mix*, will lead to increased security of reaching the national target for 2020, and for an active use of flexibility mechanisms for the implementation of the Directive (statistical transfers) in order to obtain additional resources. The completion of this scenario will bring numerous benefits, but at the same time it requires an active support and streamlining of development of RES sector from the very beginning of Directive 2009/28/EC implementation in Poland.