

Annex to
the Communication of the
Minister for Economic Affairs
of...
(item...)



Republic of Poland
Minister for Economic Affairs

REPORT

including an analysis of the implementation of quantitative targets
and the results achieved in the production of electricity from renewable energy
sources

Warsaw, March 2006

EXPLANATORY MEMORANDUM

to the communication of the Minister for Economic Affairs on the publication of a report including an analysis of the implementation of quantitative targets and results achieved in the production of electricity from renewable energy sources

This communication was prepared pursuant to Article 9f(5) of the Energy Law Act of 10 April 1997 (*Journal of Laws* 2003, No 153, item 1504, No 203, item 1966; *Journal of Laws* 2004, No 29, item 257, No 34, item 293, No 91, item 875, No 96, item 959, and No 173, item 1808; *Journal of Laws* 2005, No 62, item 552, No 163, item 1362, and No 175, item 1462) pursuant to which the Minister responsible for economic affairs shall publish a *report including an analysis of the implementation of quantitative targets and results achieved in the production of electricity from renewable energy sources* in the form of a communication in the Official Gazette of the Republic of Poland “*Monitor Polski*”.

The “*Report including an analysis of the implementation of quantitative targets and results achieved in the production of electricity from renewable energy sources*” was adopted on 14 April 2006 by the European Affairs Committee of the Council of Ministers of Poland, acting on a proposal of the Minister for Economic Affairs.

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1. Legal basis

The report complies with the provisions of Article 9f (4) of the Energy Law Act of 10 April 1997 (*Journal of Laws* 2003, No 153, item 1504, as amended), as well as with the obligations pursuant to Article 3(3) of Directive No 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market. Pursuant to Article 3 of this Directive, Member States of the European Union are required to publish, for the first time not later than 27 October 2003, and thereafter every two years, a report including an analysis of the progress in meeting the national indicative targets for the production of electricity from renewable energy sources.

2. Objectives of the report

The objective of the present report is to analyse and assess the results of the measures implemented to promote the production of electricity from renewable energy sources (RES), including measures taken as a result of commitments on climate change.

The most important objectives of Poland's energy policy are to ensure a reliable supply of fuels and energy, strengthen economic competitiveness and minimise the harmful effects of the energy sector on the environment. One of the elements contributing to the achievement of these priorities is an increase in the use of renewable energy sources, which results in a decrease in the country's dependence on imported energy and reduces air pollution by preventing emissions of pollutants that are produced when conventional energy carriers are used.

The strategic objective of Poland's energy policy is to increase the use of RES so that electricity produced from RES accounts for 7.5% of the country's gross electricity consumption by 2010. This objective is to be achieved in such a way that the use of specific types of RES contributes to competition, promoting the most cost-effective sources, but without resulting in an unreasonable increase in energy prices for consumers. This should constitute the basic principle for the balanced development of the use of renewable sources. The projected share of electricity produced from RES is in line with the indicative quantitative target established for Poland in Directive 2001/77/EC of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market.

The data used in this report is taken from a publication by the Polish Central Statistical Office (*Główny Urząd Statystyczny*).

3. Indicative targets

Table 1 shows the percentage share of Polish gross electricity consumption which must be produced from RES in order to achieve the indicative target for 2010 in accordance with Directive 2001/77/EC.

Table 1

Targets set for the share of electricity from RES in Poland's gross electricity consumption

Year	Share of electricity from RES, %
2001	1.9
2002	2.0
2003	2.2
2004	2.3
2005	2.5
2006	3.0
2007	3.9
2008	5.0
2009	6.2
2010	7.5
2011	7.5
2012	7.5
2013	7.5
2014	7.5

4. Electricity production from renewable sources

The document *Energy policy of Poland until 2025* puts forward biomass (energy crops; firewood; waste from agriculture, industry and forestry; biogas), wind power and hydropower as the sources offering the greatest potential for use in Poland, given the current energy prices and conditions for State aid. Due to its low cost-effectiveness for electricity production, solar energy technology can play an important role mainly in heat generation, as well in electric power grids on islands which are not connected to the national grid. Next in line is the use of geothermal sources. However, due to lack of experience of electricity production from such sources, implementation of geothermal prototype projects in the immediate future is foreseen only in local CHP plants.

Table 2 shows the installed capacity for different RES technologies for the period 2002–2004.

Table 2

Installed capacity at RES power plants 2002-2004

Installed capacity (MW)	2002	2003	2004
Biogas	15.0	18.0	22.0
Agricultural biogas	N/A	1.0	2.0
Landfill gas	15.0	15.0	17.0
Sewage gas	N/A	2.0	3.0
Biomass	1.1	16.6	51.9
Industrial power plants and industrial CHP plants	N/A	15.5	50.5
Other power plants	1.1	1.1	1.4
Hydropower	840.0	873.0	881.0
Large-scale (>10 MW)	630.0	637.0	638.0
Small-scale (< 10 MW)	210.0	236.0	243.0
Wind power	59.0	60.0	65.0
RES, total	915.1	967.0	1019.6
RES, excluding hydropower	75.1	94.0	138.6

The share of RES electricity in total electricity consumption in Poland increased from approx. 1.68% in 2000 to approx. 2% in 2004. In 2005 the RES electricity share in gross electricity consumption increased to approx. 2.6%.

Table 3 shows the quantity of electricity produced from RES and its share in gross electricity consumption for the period 2000–2004.

Table 3

Share of electricity from RES in Poland's gross electricity consumption

	2000	2001	2002	2003	2004
Electricity production from RES (GWh)	2 331	2 782	2 767	2 250	2 893
Gross electricity consumption (GWh)	138 810	138 886	137 057	141 463	144 831
Percentage electricity from RES	1.68%	2.00%	2.02 %	1.59%	2.00%

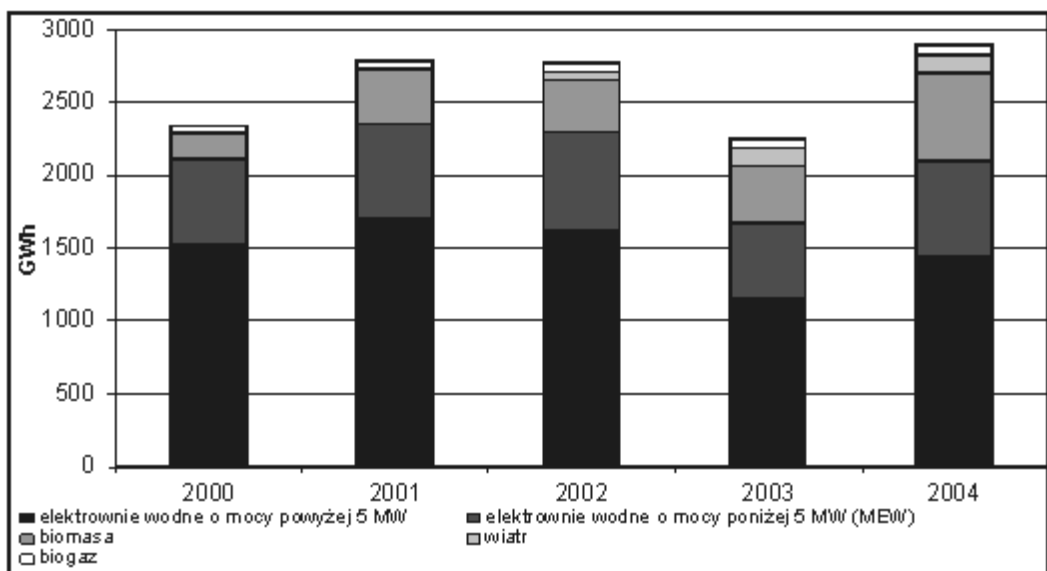
The share of RES electricity in Poland's total electricity consumption has increased from 2000, however not evenly during the five years. In 2003, less RES electricity was produced than during the other years, in spite of the increased installed capacity. The reason was meteorological conditions, causing a decrease in electricity production at hydropower plants. They currently account for the bulk of electricity production from renewable sources. The drop in 2003 was followed in 2004 by an increase in electricity production at all plants using RES. In addition, the use of co-firing of biomass and fossil fuels increased at commercial and industrial power plants.

Table 4 and figure 1 show the quantity of electricity generated from different RES for the period 2000–2004.

Table 4

Quantity of electricity produced from different types of RES 2000–2004 (GWh)

Type of RES	2000	2001	2002	2003	2004
Biogas	31	41	48	56	66
Biomass	190	402	379	398	604
Wind power	6	14	61	124	142
Hydropower, total	2 105	2 325	2 279	1 672	2 081
Capacity <5 MW	596	606	701	547	638
Capacity >5 MW	1 509	1 719	1 578	1 125	1 443
Electricity production from RES (GWh)	2 331	2 782	2 767	2 250	2 893



Text on the left axis: GWh

Hydropower plants with capacity >5 MW
Biomass
Biogas

Hydropower plants with capacity <5 MW
Wind power

Fig. 1. Quantity of electricity produced from different types of RES 2000–2004 (GWh)

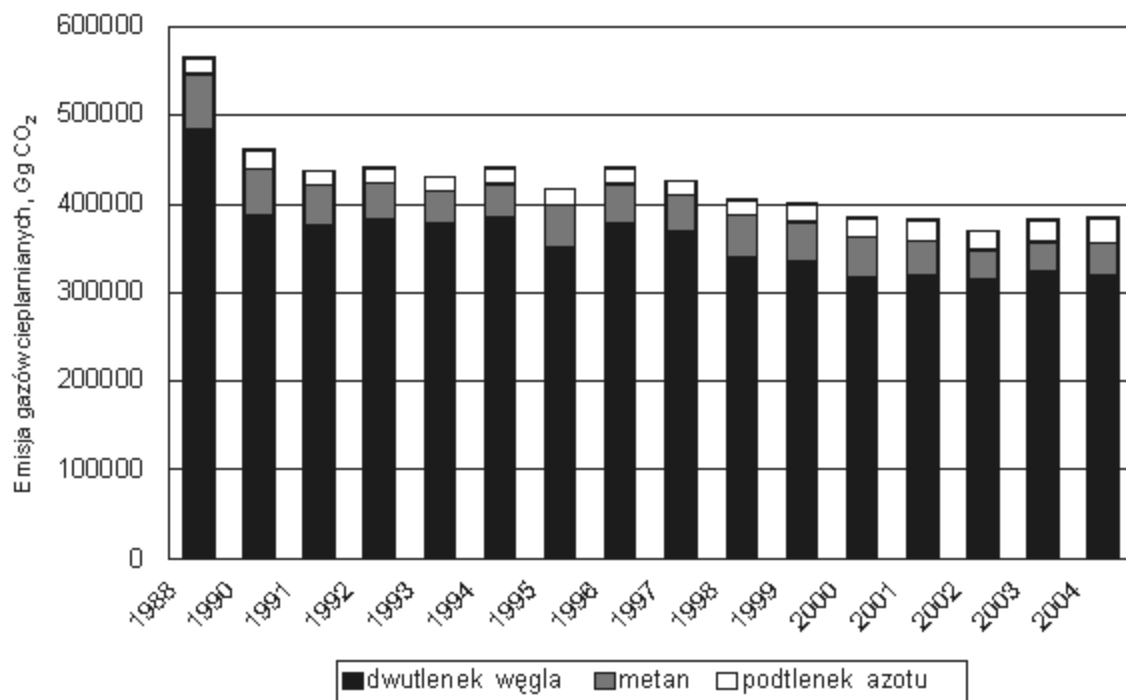
The structure of electricity production from RES in 2000–2004 shows that hydropower has the largest share, followed by biomass, wind and biogas, which play significant roles. An analysis of data on electricity production from RES during 2000–2004 reveals the dynamic development of technologies for the use of biomass – including biogas and the co-firing of biomass with fossil fuels – and wind power, as well as hydropower in small-scale hydropower plants with a capacity up to 5 MW.

In the Accession Treaty, Poland accepted an indicative target of 7.5% for the RES electricity share in the country's gross electricity consumption by 2010, and priority is therefore given to measures for promoting the increased use of renewable energy with a view to achieving this target.

5. Emission prevention by using renewable energy sources within the framework of Poland's commitments in the area of climate change

Poland has long been reducing its emissions of greenhouse gases. The main factor bringing down such emissions has been the decrease in consumption of primary energy in the economy (by approx. 28% from the reference year 1988). At the same time, the structure of fuel use has changed towards less use of coal and increased use of RES.

Figure 2 and Table 5 show the quantities of greenhouse gases emitted in Poland in the period 1988–2004.



Text on the left axis: Emissions of greenhouse gases, Gg CO₂

Carbon dioxide

Methane

Nitrogen oxides

Fig. 2. Total emissions of greenhouse gases in Poland 1988–2004, expressed in CO₂ equivalents

Table 5

Total emissions of greenhouse gases in Poland 1988–2004

Greenhouse gas	1988	1999	2000	2001	2002	2003	2004
	(Gg)						
Carbon dioxide	477 584	329 739	314 812	317 844	308 277	319 082	315 232
Methane	3 141	2 250	2 183	1 849	1 800	1 794	1 858
Nitrogen oxides	70	75	77	77	73	77	96 81
Halogenated hydrocarbons:							
HFC _s	0.013	0.377	0.603	0.846	0.786	1.035	1.176
PFC _s	0.121	0.115	0.107	0.130	0.039	0.038	0.039
SF ₆	0.0001	0.001	0.001	0.001	0.001	0.001	0.002
	Expressed in CO ₂ equivalents (Tg):						
Carbon dioxide	477.6	329.7	314.8	317.8	308.3	319.1	315.2
Methane	66	47.3	45.9	38.8	37.8	37.7	39.0
Nitrogen oxides	21.8	23.3	23.9	23.9	22.6	23.9	30.0
Halogenated hydrocarbons:							

HFC _s	0.02	0.56	0.89	1.28	1.26	1.66	1.78
PFC _s	0.82	0.78	0.72	0.88	0.27	0.26	0.27
SF ₆	0.002	0.02	0.02	0.02	0.02	0.02	0.04
Total (Tg CO₂)	566.24	401.66	386.23	382.68	370.25	382.64	386.29

The major greenhouse gas emitted in Poland is carbon dioxide, coming mainly from the combustion of fossil fuels (96.9%). According to data for 2004, the largest industrial emissions of CO₂ caused by fuel combustion come from the commercial energy sector (56.8%), followed by the textile and construction industries (14.5%), transport (9.6%), and remaining sectors (16.0%).¹

Generation of electricity in conventional power plants results in the emission of many pollutants. By replacing electricity produced by burning fossil fuels with electricity from RES, it will be possible to avoid emissions of those pollutants.

Table 6 shows the quantity of emissions of CO₂ which were avoided during 2000–2004 by replacing conventional power plants and CHP plants with RES.

Table 6

Avoided CO₂ emissions 2000–2004

Year	Avoided quantity of emissions (Mg)
2000	2 331 000
2001	2 782 000
2002	2 767 000
2003	2 250 000
2004	2 893 000

6. Specific RES technologies

6.1 Hydropower

Hydropower is the dominant renewable energy source in Poland today. The installed capacity at hydropower plants is growing steadily, particularly at small-scale plants. However, electricity

¹ The data are taken from the following publication of the Polish National Centre for Emission Inventory (*Krajowy Centrum Inwentaryzacji Emisji*): "Fulfilment of the tasks of the Polish National Centre for Emission Inventory regarding inventory of air emissions during 2004. Phase III" ("Realizacja zadań Krajowego Centrum Inwentaryzacji Emisji w zakresie inwentaryzacji emisji do powietrza w roku 2004. Etap III").

production from RES in 2003 was lower than in preceding years due to the fact that precipitation was low and unevenly distributed over the year. In 2004, electricity production at hydropower plants was 20% higher than in 2003.

Table 7 shows the installed capacity at hydropower plants in the period 2002–2004. Table 8 shows the quantity of electricity produced, and Figure 3 provides a graphical representation of the same data.

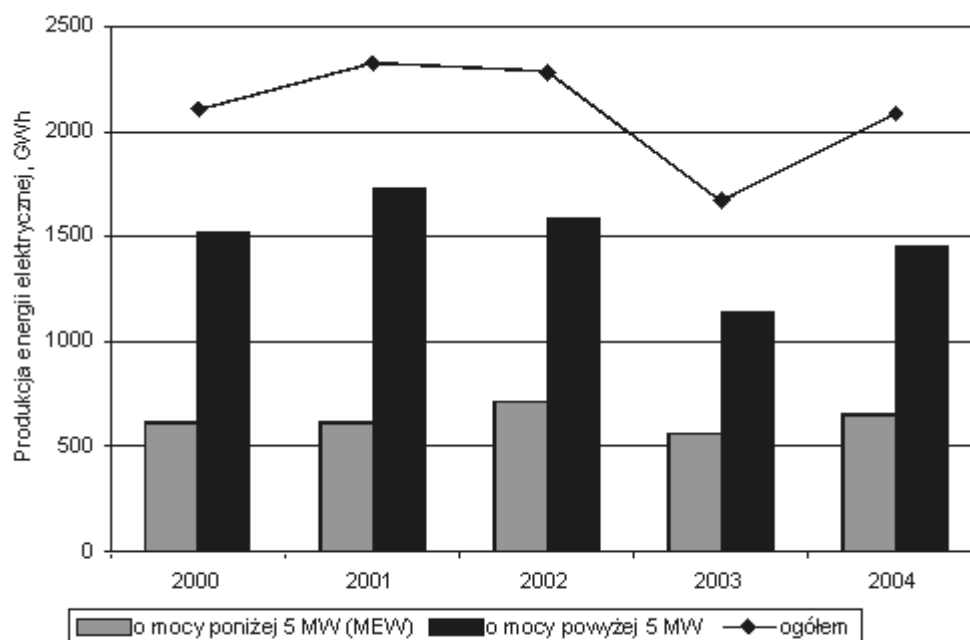
Table 7

Installed capacity at hydropower plants 2002–2004

Hydropower plants	2002	2003	2004
Installed capacity (MW)	840	873	881
plant capacity <10 MW	210	236	243
plant capacity >10 MW	630	637	638

Electricity produced at hydropower plants 2000–2004

Hydropower plants	2000	2001	2002	2003	2004
Electricity production (GWh)	2 105	2 325	2 279	1 672	2 081
Plant capacity <5 MW	596	606	701	547	638
Plant capacity >5 MW	1 509	1 719	1 578	1 125	1 443



Text on the left axis: Electricity production (GWh)

plant capacity <5 MW (Small-Scale Hydropower, SHP) plant capacity >5 MW total

Fig. 3. Electricity production at hydropower plants in Poland 2000–2004

6.2 Wind power

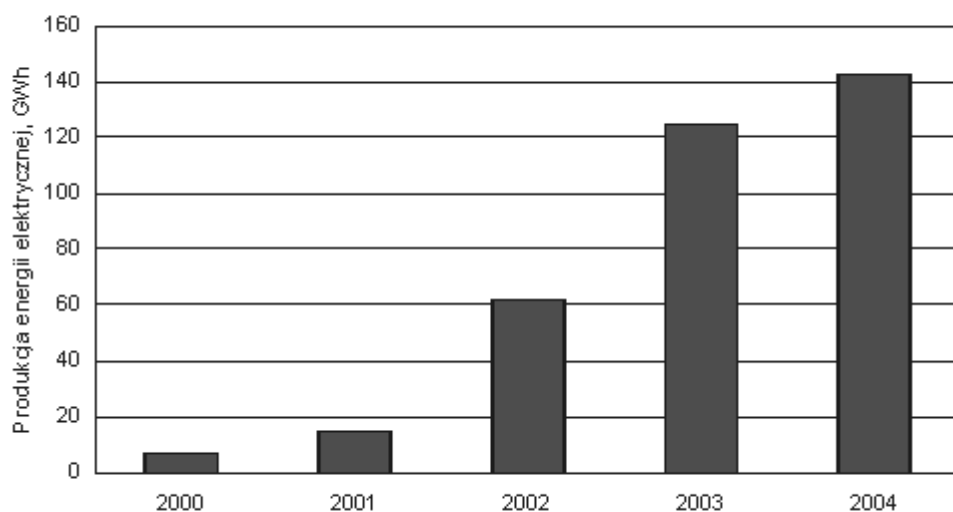
During 2001–2004, electricity production at wind power plants increased by 136 GWh compared with 2000. In 2004, wind power plants generated 142 GWh, which corresponded to 4.9% of the electricity produced from RES, and 0.1% of the country's gross electricity consumption. Analyses indicate a continued dynamic growth of wind power. The building of more wind farms began in 2004-2005, and they will contribute to an increase in installed capacity.

Table 9 and Figure 5 show the quantity of electricity produced and the installed capacity at Polish wind power plants.

Table 9

Electricity production and installed capacity at Polish wind power plants

	2000	2001	2002	2003	2004
Electricity production (GWh)	6	14	61	124	142
Installed capacity (MW)	4	18	59	60	65



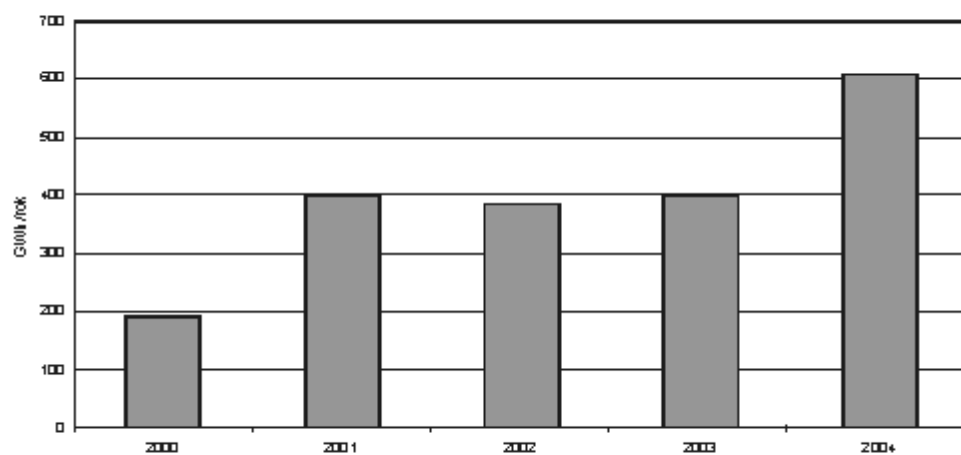
Text on the left axis: Electricity production (GWh)

Fig. 5. Electricity production at Polish wind power plants

6.3 Biomass

604 GWh of electricity was produced from biomass in 2004. This was 414 GWh more than in 2000, i.e. an increase of around 200%. Over the next few years, electricity production from biomass, including the co-firing of biomass and other fuels, is expected to continue to grow. However, it should be noted that forest biomass is primarily intended for use in the wood industry, the pulp and paper industry and the wood panel industry. In view of this, mechanisms are being developed to promote the use of biomass from energy crops, as well as from waste and residues from agriculture and industrial agro-processing, by introducing a minimum percentage for the biomass used in co-firing processes that is to come from energy crops, which is set to increase gradually.

Figure 5 and Table 10 below show the quantity of electricity produced and the installed capacity at biomass power plants in Poland.



Text on the left axis: GWh/year

Fig. 5. Electricity production from biomass in Poland (GWh)

Table 10

Electricity production and installed capacity at biomass power plants 2000–2004

Biomass	2000	2001	2002	2003	2004
Electricity production (GWh)	190	402	379	398	604
Installed capacity (MW)	N/A	N/A	N/A	16.6	51.9

6.4 Biogas

Biogas is considered an attractive and relatively cheap energy source. In addition, disposal of biogas by combustion is absolutely necessary to protect the environment, in particular to protect the atmosphere against emissions of unburned methane contained in biogas. Biogas can be used in gas-powered electricity generators, gas boilers and CHP systems. A gradual increase in the use of biogas, particularly landfill gas is beginning. Construction of plants using agricultural biogas, as well as biogas from sewage treatment plants, started in 2003. However, the installed capacity of those plants is still low. Electricity production from biogas increased more than twofold, from 31 GWh to 66 GWh, during 2000–2004. Since biogas has a relatively great potential, a further increase is expected.

Table 11 shows the installed capacity of biogas power plants and the quantity of electricity produced.

Table 11

Electricity production and installed capacity at biogas power plants in Poland 2002–2004

	2002	2003	2004
Electricity production (GWh)	48.0	56.0	66.0
Landfill gas	48.0	45.0	50.0
Agricultural biogas	N/A	9.0	10.0
Biogas from sewage treatment plants	N/A	2.0	6.0
Installed capacity (MW)	15.0	18.0	22.0
Landfill gas	15.0	15.0	17.0
Agricultural biogas	N/A	1.0	2.0
Biogas from sewage treatment plants	N/A	2.0	3.0

6.5 Photovoltaics

The installed capacity of photovoltaic cells was around 120 kWp at the end of 2003, and around 234 kWp in 2004. Of this, about 165 kWp was not connected to the grid. An increase in the installed capacity of photovoltaic cells has been recorded but, owing to high investment costs, widespread use is not envisaged, except for special purposes.

7. Promotion of renewable energy sources

In the legislative field, the basic mechanism promoting electricity production from RES has been the obligation for enterprises which sell electricity to end-users to purchase electricity produced from renewable sources.

The revised Polish Energy Law Act, which was adopted on 4 March 2005, introduced a range of rules which strengthen and improve the mechanisms for promoting the development of renewable energy. These mechanisms create more favourable conditions for investors and provide considerable impetus for the development of RES.

Another important factor in the growth of RES comprises rules under which grants and preferential credits for investments in RES may be obtained from the Polish National Fund for Environmental Protection and Water Management (*Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej*), as well as from the corresponding regional (*voivodship*) funds. Pursuant to the Energy Law Act of 27 April 2001 (*Journal of Laws*, item 627, as amended), these funds are, in particular, intended to support activities promoting the use of local RES, as well as to assist the introduction of more environmentally friendly energy carriers. Resources from the EcoFund Foundation (*Fundacja Ekofundusz*) are also intended for investments in this area.

Additional support for renewable energy is provided by the implementation of the National Development Plan 2004–2006, under which public resources from the structural funds and the Cohesion Fund have been committed. These measures will be followed up by implementing the *Infrastructure and Environment* operative programme which is included in the *National Strategic Reference Framework 2007–2013*, a document which will define the priorities and scope of the use of EU funds, as well as the system for implementing them.

Poland has decided to promote renewable energy by means of market mechanisms allowing competition between producers of this kind of energy. A market-oriented support system has been introduced in form of tradable “green certificates”, i.e. certificates stating that the energy originates from RES. It is expected that the market will allow optimum development of the use of RES and thereby make it possible to select the most efficient, and at the same time cheapest, technologies. Rational use of RES is one of the essential elements of balanced development. The RES share in Poland’s fuel and energy balance is expected to increase further during the forthcoming years