



Renewable Energy Policy review Poland

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POLAND

1. GENERAL INFORMATION

1.1. Population and geography

Poland is one of the larger European countries, situated in the middle of the continent and at the crossroads of important transit routes. It borders Germany to the west, the Czech Republic and Slovakia to the south, and Russia, Lithuania, Belarus and the Ukraine to the east. The Baltic Sea defines its northern border. The total area of the country amounts to 312,685 square kilometres and include a land area (including inland water) of 311904 square kilometres as well as an area of internal waters - 781 square kilometres. Population of the country amounts to 38.6 million inhabitants. Warsaw is the capital city of Poland.

Table1: Poland voivodeships and their area and population

Voivodeship	Area square kilometres	Population	Capital
Silesia (Dolnoslaskie)	19,948	2,977,611	Wroclaw
Cuiavia and Pomerania (Kujawsko-pomorskie)	17,970	2,100,771	Bydgoszcz
Lublin (Lubelskie)	25,114	2,234,937	Lublin
Lubusz (Lubuskie)	13,984	1,023,483	Zielona Góra
Lódz (Lódzkie)	18,219	2,652,999	Lódz
Lesser Poland (Malopolskie)	15,144	3,222,525	Kraków
Mazovia (Mazowieckie)	35,579	5,067,344	Warszawa
Opole (Opolskie)	9,412	1,088,272	Opole
Sub-Carpathia (Podkarpackie)	17,926	2,126,001	Rzeszów
Podlassia (Podlaskie)	20,180	1,222,709	Białystok
Pomerania (Pomorskie)	18,293	2,192,268	Gdansk
Silesia (Slaskie)	12,294	4,865,512	Katowice
Kielce (Swietokrzyskie)	11,691	1,325,380	Kielce
Varmia and Masuria (Warminsko-mazurskie)	24,203	1,465,577	Olsztyn
Greater Poland (Wielkopolskie)	29,826	3,355,332	Poznan
Western Pomerania (Zachodniopomorskie)	22,902	1,732,838	Szczecin,
TOTAL			

Source: Concise Statistical Yearbook of Poland , 2003

1.2. Political system and economical figures

Since 1989, Poland has undergone great political, social and economic changes. Poland is a centralised state composed of different levels of power. The highest level of legislative system the Polish Parliament consists of two legislative bodies. The lower house is called Sejm, and Senate is the upper house. The Polish Parliament performs a predominantly legislative function, creating laws that bind all Polish citizens.

The lowest organisational unit of local government is the *gmina* - a municipal (urban) or rural administrative district. The next administration level are an intermediate level called the *powiat*, and the major territorial unit province called the voivodeship (*województwo*). There are 16 voivodeships (see table 1) recognised also as official NUTS-2 units in enlarged Europe. Local government's decision-making and supervisory bodies are the councils (*rada*), which operate at all three levels. The councils make basic decisions on matters affecting their respective jurisdictions. They set local regulations, pass budgets and inspect their execution, set local taxes and charges (on the grounds of existing national legislature) and adopt resolutions on matters of property rights.

After crisis in the 80's caused by the collapsed communistic system in Poland, in 90's Poland economy start to develop. From beginning of 90's gross domestic product has been growing and in the year 2002 GDP amount to 771,112.8 million PLN¹. Coal mining, steel and chemical industry, shipyards and mechanical engineering are the main industries.

Rural areas are a vital element in the Polish economy. Agricultural lands occupy 60% of the Poland territory. About 38% of the population live in the rural areas. Forests cover 29 % of Poland, i.e. 9.1 million hectares. Area covered by forests varies from voivodship to voivodship from 11% to 48%. Agriculture and forestry give only 4% of GDP but 28% of the employed in Poland work in agriculture (0.4% in forestry). Rural areas have a very high unemployment rate reaching even more than 40% in some gminas.

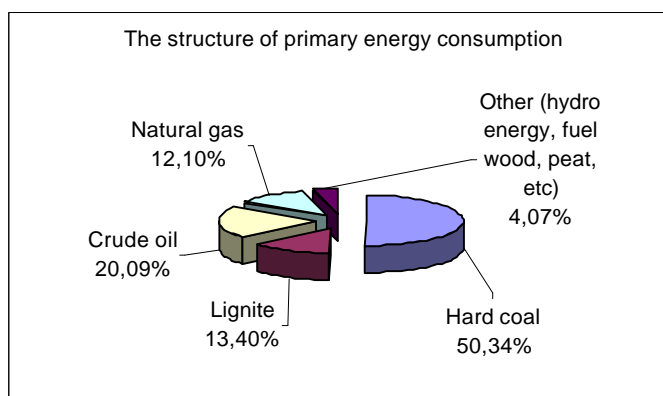
¹ 1 Euro = approx. 4.5 PLN

2. RENEWABLE ENERGY POLICY

2.1 Energy Country Profile

Table 2: Main Energy Figures

Total Primary Energy Supply	90.157	Mtoe
TPES of renewables	4.067	Mtoe
Electricity Production	145.616	TWh
Electricity Consumption	138.887	TWh
Electricity Exports	11.035	TWh
Electricity Imports	4.306	TWh



Source: GUS Energy Statistics 2001-2002

The energy sector in Poland is still dominated by the hard coal and lignite industries which provide most of the country's energy needs. The share of hard coal in primary energy consumption amount to 50,34%, lignite – to 13,40%, oil – 20,09%. Gas amounted to 12,1% of primary energy consumption is imported from Russia. Current energy policy intends to increase utilisation of natural gas. At the last years the share of the other energy sources (peat, fuel wood, solid waste fuels, hydro energy, etc) has been growing slowly though still does not exceed 5% of total primary energy consumption. The new energy sources such as wind power and biogas are appearing among the renewable energy sources.

Poland is relatively self-sufficient with indigenous energy sources (mainly coal) to cover its demand for heat and power. However, much of older energy infrastructure is often less efficient than in the EU. Many power plants and other elements of the grid systems already need refurbishment and upgrading.

Poland is a net exporter of electricity with 4.306 TWh of electricity imports and 11.035 TWh electricity exports.

An important feature of the Polish energy system is significant role of district heating, which supplies centralised heat to around 50% of the population in Poland. Almost 50% of this centralised heat is produced by CHP units. Total thermal energy produced in DHP and CHP in 2001 installations exceeded 570 PJ. However, due to refurbishments of municipal DHP networks and thermo-renovation of buildings actual consumption of centralised heat has decreased by around 4-5% since 1989. And yet, despite overcapacity in the heat sector, much of the installations especially in smaller towns and rural areas require urgent refurbishment or even replacement with new much more efficient heating systems.

2.2 Status Of Resource Exploitation

a) National definition of RES

According to 'Energy Act' (1) a renewable energy source is defined as: "a source that use in the process of transformation energy of wind, solar radiation, geothermal, water waves, sea water flow and tides, river slops and energy from biomass, landfill gas, biogas from waste water treatment and biogas from decayed residues of plants and/or from animals". More detailed definition of renewable energy is expected to be stipulated in a Renewable Energy Act, currently under preparation in the Polish Ministry of Environment since July 2003.

b) General RES exploitation

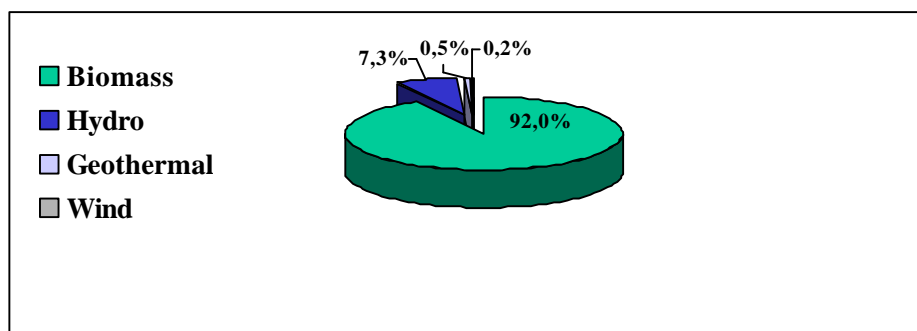
One of the crucial factors enhancing development of renewable energy sector is availability of renewable energy sources (RES). According to the analyses made for the expert appraisal 'Economic and Legal Aspects of the Utilisation of Renewable Sources in Poland' (2) prepared by the EC Baltic Renewable Energy Centre EC BREC for the Minister of Environment, the actual technical potential of renewable energy sources in Poland is around 2,514 PJ/year, this being almost 60% of the domestic primary energy requirement. In the beginning of 2004, group of experts from EC BREC made an actualisation of above mentioned study taking into consideration the RES sector development in last few years. In this work the total technical potential of RES in Poland corrected to about 1750 PJ/year (about 47% of the domestic primary energy consumption in 2002). The result is presented in table 3.

Table 3 Technical potential of renewable energy sources in Poland

Energy source	Technical potential of renewable energy source in Poland, [PJ/year]	Share of renewable energy source in total RES technical potential [%]
Biomass	755	43,1
Hydro energy	49	2,8
Geothermal energy	220	12,6
Wind energy	281	16,1
Solar energy	445	25,4
Total	1750	100,0

In 2002 in Poland the RES provided 2646.4 GWh of electric energy and 102,619 TJ of heat (see table 4). The share of RES (not including hydro above 5 MW) in primary energy balance did not exceed 2,75 %. Vast majority of this energy – 92% was produced at energy installations using biomass as a source of energy (see figure 2). The share of RES-e in total electricity in was about 1.3% and came mainly from hydro, wind, biogas installations and CHP from pulp & paper and furniture industry.

Figure 2. Structure of RES sector in Poland, 2002



Source: EC BREC data for the Polish Statistical Office, 2002

Table 4. Renewable energy in Poland in 2002

Source of energy	ITEMS	Number of installations	Installed capacity MW	Energy production	
				Electric energy GWh	Heat TJ
TOTAL		116166	7130,7	2646,4	102619
Biomass ^{e)}	CHP on biomass waste from pulp and paper industry and furniture industry	3	330,0	250,0 ^{a)}	5 300,0 ^{a)}
	Wood chips fired district boilers (>500 kW)	180 ^{a)}	450,0 ^{a)}	-	6750 ^{a)}
	Straw fired district heating plants (>500 kW)	65 ^{a)}	92,0 ^{a)}	-	920,0 ^{a)}
	Wood chips fired boilers (<500 kW)	110 000 ^{a)}	5 500,0 ^{a)}	-	88 308,0 ^{a)}
	Straw fired boilers (<500 kW)	150 ^{a)}	23,0 ^{a)}	-	230,5 ^{a)}
	Municipal biogas installations	32	61,5	38,0 ^{a)}	447,3 ^{a)}
	Landfill gas installations	25	15,4	22,3 ^{a)}	100,0 ^{a)}
	Solar	Solar collectors ^{c)}	3 809	17,0 ^{a)}	-
	Photo-voltaic systems	240 ^{a)}	0,08 ^{a)}	0,05 ^{a)}	-
Geothermal	Geothermal district heating plants	4	55,75 ^{d)}	-	371,2 ^{d)}
	Other installations ^{f)}	1000 ^{a)}	33,4 ^{a)}	-	154,8 ^{a)}
Wind	Wind plants connected to the grid	42	28,5	60,4	-
Hydro	Hydro plants	12 ^{g)}	339,2 ^{g)}	1 578,0 ^{h)}	-
	Small hydro plants ⁱ⁾	604	184,9	697,6	-

a) estimated data. c) water and air solar collectors together. d) only geothermal installation without peak load e) without use of liquid biofuels, f) including also balneologic installations, pools, etc., g) Flow hydro plants with capacity above 5 MW. h) electric energy productions from natural flow form the all hydro plants with capacity above 5 MW. i) Flaw hydro plants with capacity up to 5 MW.

Source: EC BREC data for the Polish Statistical Office, 2002

In general, with limited support from the Governmental policies, renewable energy projects in 90-ties were typically developed as bottom-up initiatives by local enthusiasts, who could see multi-beneficiary features of the utilisation of locally derived renewable sources of energy. In the past few years the most significant dynamics (how do you explain this increase) among renewable energy technologies have been observed particularly in the case of straw-fired

installations and wind energy although when counting actual installed capacities these have been still relatively small increases.

Table 4. Increase of installed capacity in Renewable energy sector in Poland since 1999

Type	Capacity MW in 1999	Capacity MW in 2002	Growth MW	Growth Rate %/year
Wood district heating	350	450	100	8,7
Straw-fired district heating	13	92	79	92,0
Small scale straw-fired boilers	7	23	16	48,7
Sewage biogas	38,9	61,5	22,6	16,5
Landfill gas installations	9	15,4	6,4	19,6
Solar collectors	6,5	17	10,5	37,8
Geothermal	26,8	55,75	28,9	27,6
Wind energy	4	28,5	24,5	92,4
Small hydro plants (<5 MW)	156	184,9	28,9	5,8
Total	611,2	928,05	316,8	Average 15

Source: Wisniewski G., *Renewable Energy in Poland: State-of-the-Art, Legal and Institutional Framework and Market Opportunities, Materials to the International Conference and EU Parliamentary Info Day on 'Promotion of European Experience in Renewable Energy Sources Development and Climate Change Commitments in the New Member States and Candidate Countries*, 16 January 2003, Polish Ministry of Environment, Warsaw

c) Sectors approach (last update: January 2004)

Hydro

Among the various methods of electricity generation, hydro power has the longest tradition in Poland. The Polish hydro power resource is small due to the limited and unfavourably distributed rainfall, high soil permeability and relative flatness of the country. In Poland small hydro includes facilities with an installed capacity below 5000 kW. The total installed capacity of large hydro-electric power stations (without pumped-storage plants) is around 339,2 MW, and of the small ones (< 5MW) - 185 MW. Total technical potential of hydro energy amount to 49 PJ/year from that 6 PJ/year is a technical potential of small hydro. As for the small hydro plants (< 5MW) about 1000 plants could be build with total capacity 200 MW and estimated electric energy production 1000 GWh/year (2) . As it was mentioned above in Poland small hydro it is installations of capacity below 5000 kW. However, due to limited water resources in Poland, the installed power of a considerable part of small hydro plants is below 100 kW. Such power stations offer a chance of improving a very poor runoff coefficient, particularly on small rivers. What is also important is the local retention of water. Small hydro takes advantage of the local possibilities of electricity generation thus providing a source of income to a group of people, usually in areas with a high unemployment rate.

Biomass

Biomass is the most promising renewable source of energy. Technical potential of biomass amount to 755 PJ/year. The greater opportunities for biomass technology implementation has been recognised in forestry, wood processing and agriculture sectors. In short term perspective it can be forecasted the great development of fuel wood (logs) and straw utilisation in individual dwellings especially because of it's profitability in comparison with fossil fuels. In 2002 energy production from biomass (solid, biogas and liquid biofuels) amount to 104,243 TJ. The vast majority of energy from biomass 88,308 TJ was produced as heat at over 100,000 small and medium scale boilers utilising wood pieces, saw dust and wooden shavings with the total estimated capacity of over 5000 MW. Other sources of energy are combined heat and power plants utilising organic waste from pulp and paper (and wood waste from furniture industry (250 GWh of electricity and 5300 TJ of heat), straw-fired and wood heating plants with installed capacity above 500 kWt (7670 TJ). Concerning biogas utilisation, there were about 25 landfill gas installations producing 22,3 GWh electric energy and 100 TJ of heat in the year 2002. Biogas from municipal waste water treatment plans in the year 2002 produced 38 GWh electricity and 447,3 TJ of heat.

Wind

Wind power only began to develop in Poland at the beginning of the 1990's, mainly on the Baltic seaside. The most privileged areas in terms of availability of wind power resource are the Baltic coast, Suwalki area and Mazovian lowland plain. Till the year 2002 as many as 42 wind turbines with a total power over 28,5 MW had been connected to the grid and placed in service. There are also a number of small scale wind installations. Investors take keen interest in wind power installations, especially in north-western Poland, where over 10 projects of the total power exceeding 600 kW each are currently prepared. In 2003 Zagorze wind farm with capacity 30 MW was put into operation. Some of the project has just begun and investors are in the phase of measuring wind speed other projects come to the final phase of purchasing and installing of wind turbines. The most projects take place in Zachodniopomorskie and Pomorskie voivodeships. Wind velocity measurements has also been taken in Southern part of Poland, in higher parts of mountains and in Suwalki region (North-Eastern Poland).

Solar

Poland has a very uneven distribution of solar radiation throughout the year, with around 80% of the total annual insolation falling within six months in spring and summer. The distribution of density of a solar radiation flux and its structure show that opportunities of its utilisation are somewhat limited, especially in winter. Air collectors are most frequently used at farms for crop drying. The total number of air collectors is estimated at 50-60 units, and their surface area at 6,000 m². They are operated for 300-600 hours per year on average. Liquid solar collectors are mainly used for heating water in homes, camping and summer cottages, sports and recreation facilities, livestock buildings and fodder stores. Also, liquid solar collectors heat up water in tanks and swimming pools as well as process water in small industrial plants. To date, around 4,000 solar installations for the heating of usable water have been installed in Poland. The work is carried out to introduce solar thermal applications for space heating in Poland.

PV technology it is relatively new and not wide spread in Poland. To the year 2002 about 240 PV applications was installed in Poland with total installed capacity amounts to about 77 kW. Most of the applications can be defined as off-grid non-domestic (applications for traffic light, maritime navigation signs, yachts). There are also several demonstration projects with PV applications installed on the roofs or walls of buildings.

Geothermal

Geothermal waters have been used in Poland for a long time for therapeutic purposes. Concerning energy - space heating is the main area of geothermal energy use. At the moment, 4 geothermal installations are working in Poland with total installed capacity of 55,7 MWth (Is this electricity) . They are located in Banska at the Tatra Foothills, and in Pырzyce near Szczecin, in Mszczonów (the Polish Lowland) and in Uniejów (the Polish Lowland). Another installation in Slomniki (Fore-Carpathians province) is in a starting phase (7.3 MWth) At the existed geothermal plants usually the geothermal water energy as a heat source is exploited in a closed system of doublet wells. Heat pumps with total installed capacity of 23.4 MWth work in three of them. There are about 700-1000 medium and small scale heat pumps based on ground or ground water heat installed by individual consumers or in office buildings. At present, use of geothermal energy for electricity generation in Poland remains at the stage of research.

2-3. Past And Current Renewable Energy Policies

a) National and regional RES policies

Political support for renewable energy development in Poland and law regulation for this area was initiated in 1999. "**Resolution on Increase of Renewable Energy Sources Utilisation**" from 8 July 1999 was approved by the Parliament and can be considered as a milestone. The Parliament called the Council of Ministers to prepare the RES development strategy and point out the necessity of preparing Acts on renewable energy utilisation.

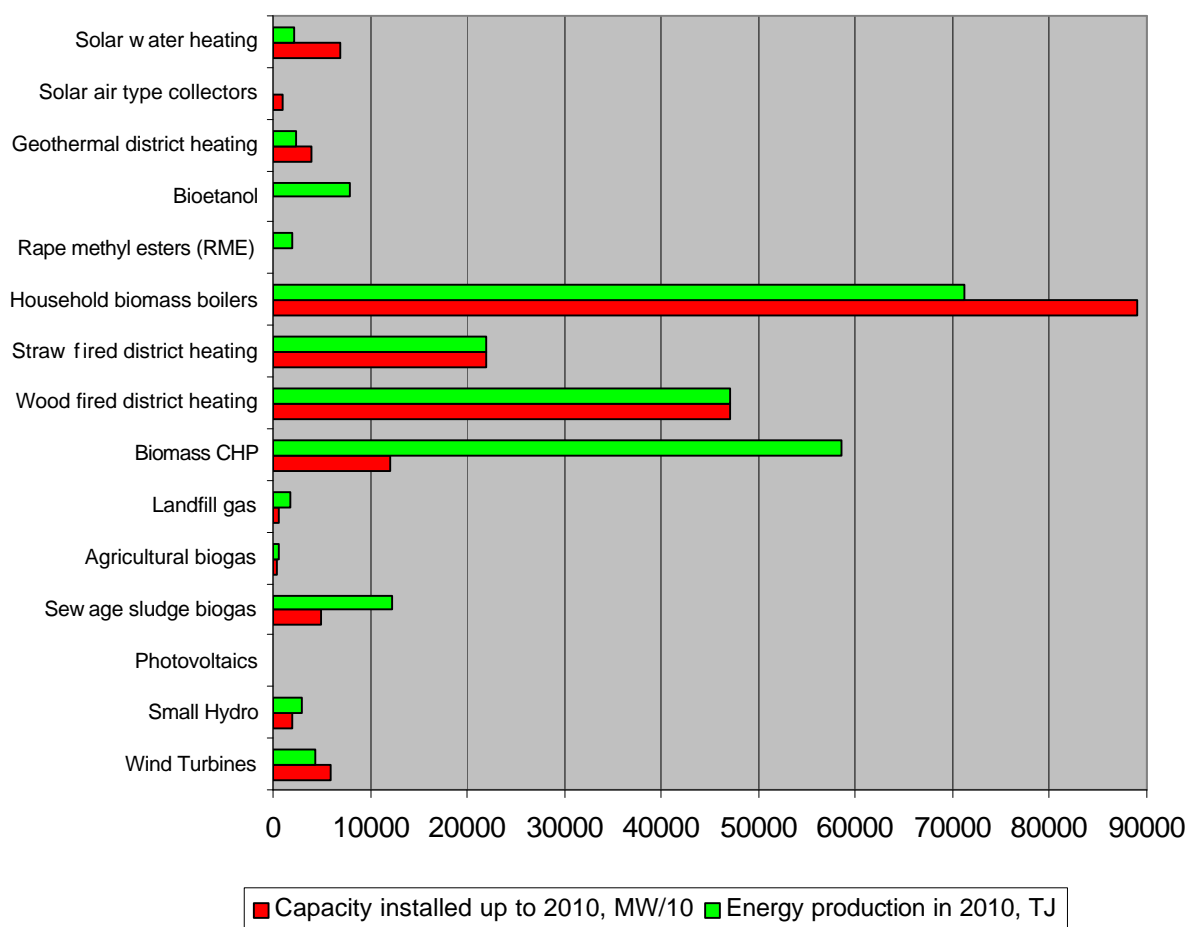
In response to the Parliamentary resolution the Minister of Environment prepared the "**Development Strategy of RES**" (4). The Strategy was approved on the 5 September 2000 by the Council of Ministers and endorsed by the Polish Parliament (Sejm) on the 23 August 2001. Setting out of the indicative targets has been of historic importance not only for the RES industry itself, but also for the whole energy industry in Poland. However, implementation of the Strategy and realisation of the objectives still require harmonisation of the inter-ministerial policies and introduction of new support mechanisms.

The "**Strategy**" has set the targets **of 7.5% RES energy share in the total primary energy balance by 2010 and 14% by 2020**. Such an increase in RES utilisation would require the annual energy production amounting to 340 PJ of green energy in 2010, i.e., the growth by 235 PJ in comparison with the 1999 level, assuming that in 2010 the overall demand for primary energy in Poland would be to reach 4570 PJ.

The following aspects of new opportunities, especially for the local authorities, have been underlined in the "**Strategy**": creation of local energy policy, regional development, employment growth, environmentally friendly infrastructure modernisation, diversification and decentralisation of the Polish energy industry. It has been estimated that the success in the realisation of Strategy objectives would contribute to reduction of greenhouse gases' emission by 18-24 million tonnes of CO₂ equivalent and creation of 30,000-40,000 new jobs (direct employment) annually (5).

The targets have been recognised both by the various ministries and by energy industry as very ambitious. Increasing the share of RES in the primary energy consumption in Poland from 2,5% in 1999 to 7.5% in 2010 means tripling it within this decade (the white paper target is anyway a EU overall target), it is believed to be a "realistic" way to reaching certain EU standards in this field. Obviously, some problems such as lack of wider experience in utilisation of renewable energy systems, existing overcapacity in the energy sector using fossil fuels (especially coal), financial problems of the state budget and hesitation of the conventional power utilities result in significant barriers for the implementation of the "**Strategy**". However, the accession to the EU and harmonisation with EU renewable energy policy is expected to enforce more and more favourable legal and economic conditions for the practical growth of the RES sector in Poland.

Additional RES capacity to be installed and Additional energy produced in Poland up to 2010, "RES Strategy"



Source: Council of Ministers of the Republic of Poland. 2000. Development Strategy of Renewable Energy Sector in Poland.

Activities aimed at securing dynamic development of renewable energy in Poland constitute an integral part of the Strategy of Renewable Energy Sector, the most important ones are the following:

- formal and legal activities facilitating access to renewable energy sources; *iter alia* introduction of an *Act on Renewable Energy* into the legislative framework;
- economic instruments increasing the feasibility of renewable energy sources utilisation and supporting the development of new systems, e.g. Tradable Green Certificates, that would complement the system of quotas for RES-e for energy utilities;
- educational and promotional activities for renewable energy sources and international co-operation.

The Ministry of Environment of Poland with the Inter-ministerial Group on Renewable Energy has been in the process of preparation of the **RES Act** since July 2003. This high-level legislation which will eventually be endorsed by the Parliament is expected to create a solid long-term legal framework for the investments in the RES. Basic issues that should be regulated through the RES Act include:

- Polish law transposition according to the Directive 2001/77/EC: RES definition, creation of the RES support mechanisms
- Statistics on renewable energy resources on the local and regional level,
- Introduction and harmonisation of the principles of the data collection on the existing RES installations,
- Better focusing of the financing system of RES development through the creation of an earmarked fund.

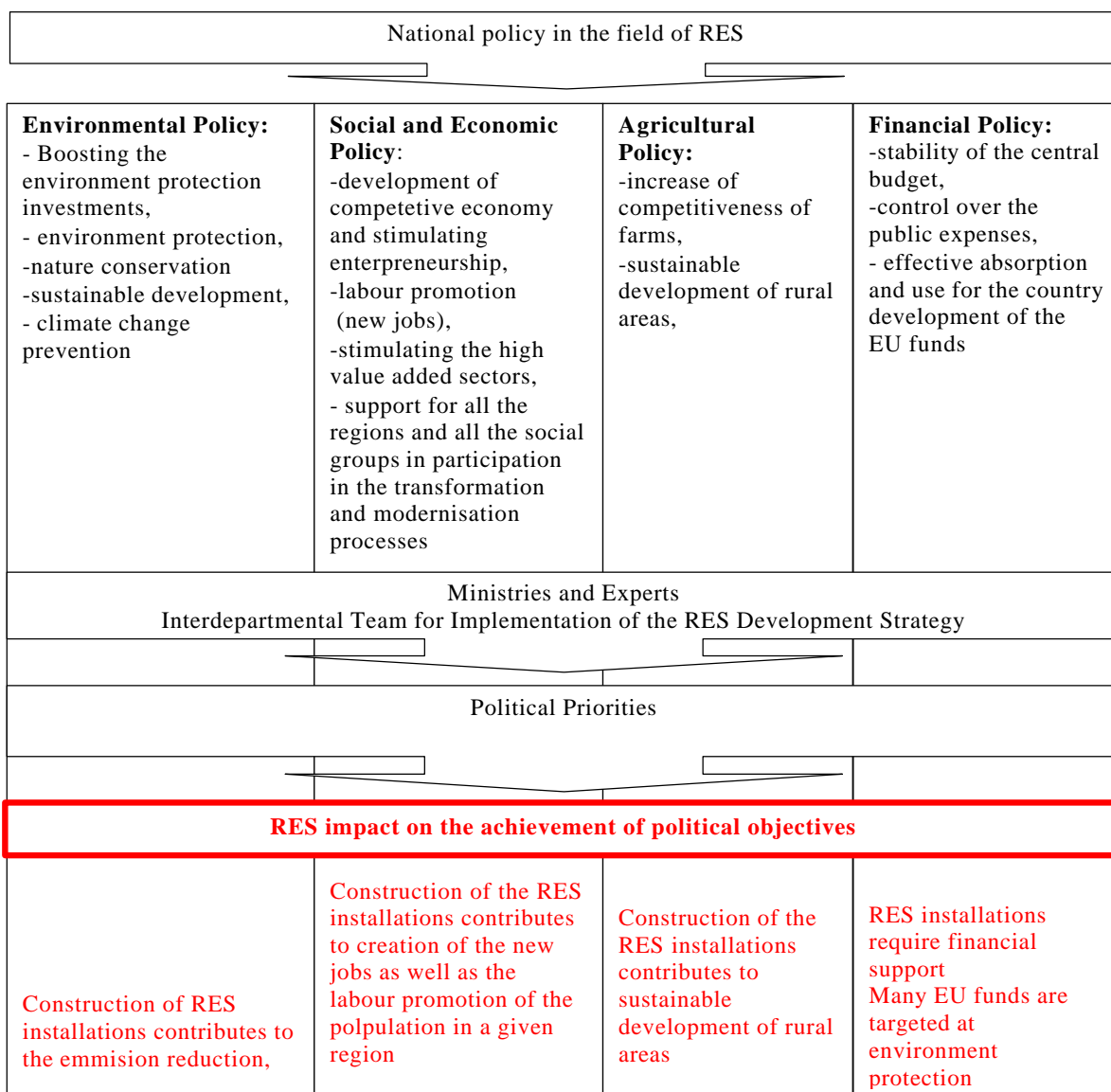
Recent Governmental initiatives for the creation of a favourable legal environment for the development of the renewable energy sector in Poland:

- 2004 – amendment of the Energy Law (expected)
- 2004 – Regulation of the Council of Ministers on bio-components on liquid biofuels in 2004
- 2003 – The Parliament of the Republic of Poland (Sejm) passed an Act on the Organisation of the Market for Liquid Biofuels.
- 2003 – The Ministry of Environment initiated works on a high-level *Act on Renewable Energy*
- 2003 – The Minister of Environment officially recognised renewable energy as one of the 10 key priorities of this Ministry
- 2003 – The Ministry of Economy, Labour and Social Policy amended regulation on the obligation for power purchase from renewable sources of energy and initiated works on the introduction of certification of green electricity
- 2002 – The Government of Poland in the negotiations on the Accession Treaty as regards the EU Directive 2001/77/EC acknowledged indicative targets for Poland in RES-e by 2010 (7,5%)
- 2002 – the Minister of Environment established and Inter-ministerial Group for the Implementation of the Polish national RES Strategy

b) The RES actors

The problem of RES covers the issues that are traditionally within the scope of responsibilities of several Ministries, including the Ministry of Economy, Ministry of Environment, Ministry of Agriculture as well as other governmental units (Ministry of Finance, Ministry of Science, etc). Thus, the works on the documents referring to various aspects of RES utilisation to various extent have been done at various institutions. Since late 90-ties most important initiatives have been taken at the Ministry of Environment (e.g. National RES Strategy, priorities for national environmental funds) and the Ministry of Economy (the Energy Law, introduction of RES-e obligation) and to smaller extent by the Ministry of Agriculture (Act on Liquid Biofuels).

Figure 2. The allocation of the RES policy in Poland



Source: Oniszk-Poplawska, *Adaptation of The Polish Law to the EU Regulations In the Field of Utilisation of Renewable Energy Sources, EC BREC, 2003*

Among other organisations playing an active role an RES sector are:

Renewable energy associations:

- Polish Geothermal Association
- Polish Biomass Association POLBIOM
- Polish Solar Energy Association
- Association of Small Hydro Plant Development
- Polish Wind Energy Association
- VIS VENTI Association (wind energy in north-west Poland)
- Polish Association of Employers of Renewable Energy and Environmental Protection Sectors

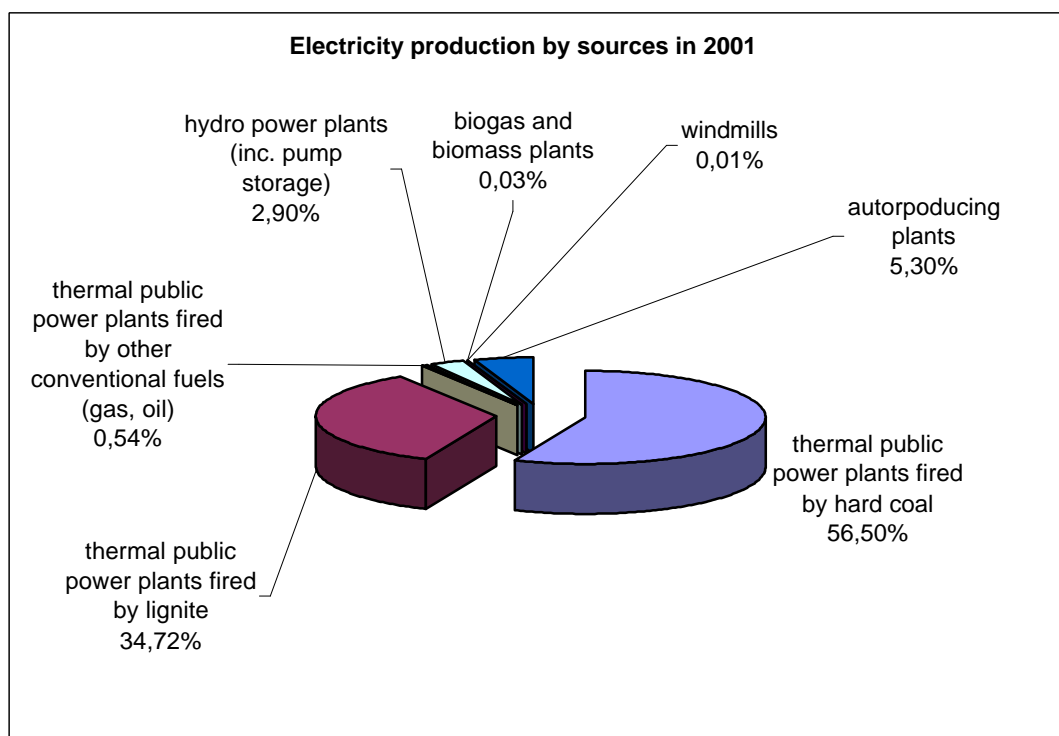
Other RES and Energy Efficiency organisations:

- EC Baltic Renewable Energy Centre EC BREC (Warsaw and Gdansk)
- Energy Market Agency S.A. (ARE)
- National Energy Conservation Agency S.A. (NAPE SA)
- Polish Energy Conservation Agency S.A. (KAPE SA)
- Energy Efficiency Foundation (FEWE)

c) Electricity produced from RES

The electricity market

Most of Poland's electricity is generated at about 80 power and CHP plants. There are also approximately 180 industrial CHP plants. In 2001 total installed electrical capacity was 35 GW. Total electricity production was 145 TWh from which over 90% came from coal (see figure3).



Source: ARE electric energy statistics 2002

The Polish Power Grid Company (PSE S.A.) is responsible for the maintenance and the refurbishment of the power transmission system. It maintains the high-voltage network and controls central and regional dispatch. The company is owned by the State Treasury and is under the supervision of the Ministry of Economy. PSE S.A. buys and sells electricity on the wholesale market, and provides electricity to regional electricity utilities and directly to large industrial customers. On the regional level there are 33 regional electricity utilities (to be merged into 7 companies) mostly undergoing or preparing the process of privatisation. The area covered by a single REC typically reflects the administrative division of Poland into voivodships before 1999. Regional electricity utilities purchase electricity from PSE S.A., local producers and in some cases own production units. Regional utilities operate distribution networks of 110 kV and below and are responsible for modernisation and development of local power systems.

Process of liberalisation and privatisation of electric energy sector in Poland seems to be quite a complicated process. State ownership in the energy sector is still common among all CEE countries. In most of those countries firstly accepted terms for privatisation in this sector wasn't observed. Introduction of free market price for electricity is politically sensitive and as such strongly controlled by the Energy Regulatory Office. Since the beginning of 1999, energy utilities can apply to the Energy Regulatory Office and use electricity tariffs that take into account real costs of production and distribution. Effectively, the Energy Regulation Office only supervises accuracy of calculations presented by energy utilities. And yet market prices for electricity are still somehow distorted due to long-term contracts made by energy utilities with many larger coal-fired power plants. After the European integration these long-term contract will, however, be phased out using some compensation mechanisms.

Many power plants and other elements of the grid systems (especially low voltage transmission) need refurbishment and upgrading. Lack of finance especially for strengthening of the local grid systems in northern and eastern rural regions may in the future cause problems for connection of larger capacities of intermittent renewable energy sources (wind energy, hydro).

Today electricity has already become more expensive especially in the rural regions, where low density of energy users and long distance from generation units is now reflected in the final price. It is likely then that regional electricity utilities in less urbanised regions will be more interested in purchasing/producing electricity from locally available renewable energy sources, including biogas, landfill gas and other biofuels. With the European integration prices of electricity in Poland are expected to grow to reach average price levels in neighbouring EU countries. However, excise duty on RES-e is declared to remain 0% will should help to make green electricity to become slightly more competitive.

In the Accession Treaty (AC299/10/02 REV. 10 pages 5-7) reference values for Member States' national indicative targets for the contribution of electricity produced from renewable energy sources to gross electricity consumption by 2010 have been set as:

RES-e TWh in 1999	RES-e % in 1999	RES-e % in 2010
2,35	1,6	7,5

Source: Accession Treaty, Chapter 12 on Energy, AA2003/ACT/Annex II/en 1803

The electricity incentives

Obligation of purchase of electricity produced from RES

In Poland obligation of purchase of electricity produced from RES by energy utilities (quota system) was introduced in December 2000. The key idea of the proposal is gradual stimulation of the demand for RES electricity and on the other hand facilitating the competitiveness among RES energy suppliers to satisfy the demand. Recently updated the Ordinance of the Ministry of Economy, Labour and Social Policy of 30 May 2003 concerning the specified obligation to purchase electric energy from renewable sources and electric energy co-generated with heat confirms quotas of electric energy that should be purchased or produced from renewable energy sources by an energy utility in their total annually energy sale as follows:

Year	2003	2004	2005	2006	2007	2008	2009	2010
Minimum share of RES-e (quotas)	2,65%	2,85%	3,1%	3,6%	4,2%	5,0%	6,0%	7,5%

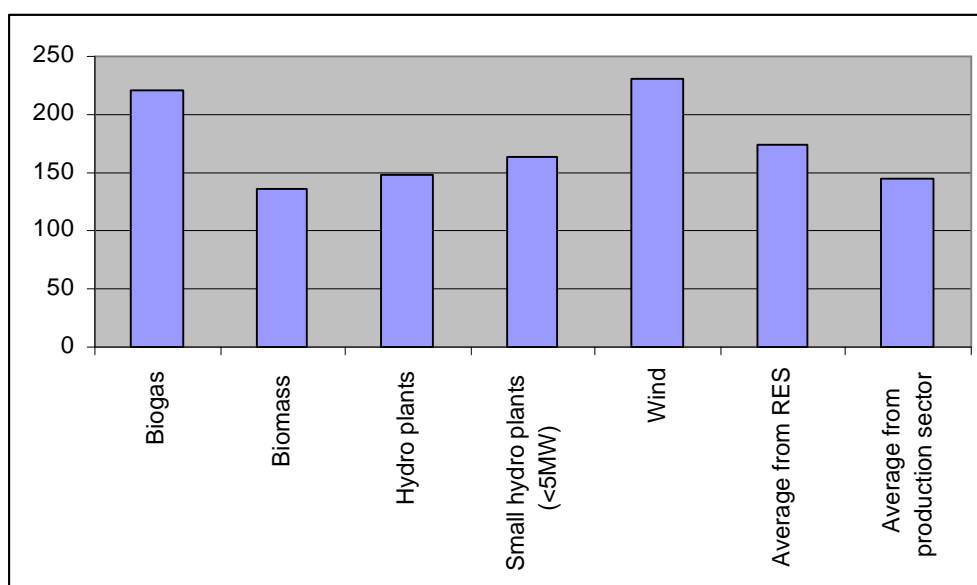
It is expected that from 1 July 2004 the system of quotas will also allow electricity produced from co-firing of RES (biomass, biogas) and fossil fuels taking into account the proportion of chemical energy of used renewable energy fuel. By that time a specific regulation of the Minister of Economy covering the system control for counting green electricity produced from co-firing is to be introduced.

Excise duty on electricity

Electricity price has been burdened with the excise tax in the amounting to 0,02 PLN (in euro)/kWh. **'Ordinance of the Minister of Finance on the Excise Tax'** from year 2002 exempts RES electricity as well as electricity produced from storage-pump hydropower plants, from the excise tax. Since most of the Poland's energy is produced from fossil fuels (especially coal), exemption of RES energy from the excise tax is a form of aid for RES energy producers, (with the external costs, taken into account, the costs of black energy are much higher than the ones of green energy), therefore it is a way to support the RES investments.(8)

The electricity tariffs

Prices of RES electricity in 2002, PLN/MWh



Source: materials of Energy Regulatory Office, 2003, Warsaw

Tariffs for electricity from renewable energy sources is set during negotiations between an independent power producer and an energy utility. After introduction of quota system (obligation for power purchase of RES-e) each company dealing

with trade of electricity normally organises open tenders for suppliers of green electricity on an annual basis in order to fulfil the minimum level of RES-e as required by law.

e) Buildings

In the 'Thermo-modernisation Act' of June 2001, the conversion of installations based on fossil fuels to installations based on renewables along with energy efficiency measures is considered as thermo-modernisation. The Act stipulates principles of financial contribution for investments in this area. Only investment which prove that the savings induced by the introduced measures are bigger than the credit can receive the premium, *i.e.* only investments with better financial feasibility are realised. The thermo-modernisation premium is paid in the amount of 25% of the investment credit, after commissioning of the investment.

f) Environmental policy

In 2002, 10 years after the '**First Environmental Policy**' the '**Second Environmental Policy**' was endorsed, before approved by the Parliament in 2001. This document sets out the environmental goals to 2010 and 2025. The '**Executive Program for the Second Environmental Policy, for the years 2002-2010**' is the operational document, *i.e.* it indicates the institutions responsible, contractors as well as the time-limits for the realisations of tasks or sets of different tasks. The document also estimates the necessary expenses and financial resources.

The attention has been given to the RES utilisation. The following activities are foreseen to be implemented in the years 2003-2006 as a part of the Policy objectives:

- Creation of the mid-term executive program for the 'Strategy of RES industry development', aiming at optimisation of the biomass utilisation, development of the hydro, wind and solar energy, and increase of the geothermal energy utilisation (deadline: 2004)
- **Preparation and endorsement of the RES Act (2004),**
- Preparation of the Implementation plan of the Directive RES electricity 77/2001/EC (2006),
- Preparation of statistics for RES installations as well as the measurement of their performance; annual database updates (2006),
- Valuation of the degree of environmental policy implementation, report on the monitoring process on the RES Development strategy as well as preparation of the improvements' introduction system (2003),
- Carrying out a complex evaluation of the RES resources and infrastructure on the regional level (choosing preferred regions), incorporation of the RES issue into spatial and regional development plans. Identifications of priority project for the EU funds (2004),
- Preparation and implementation of the new cost-effective mechanisms supporting RES development, including Tradable Green Certificate System as well as tax exemption mechanisms, Energy Law amendment (2006),
- Creation of a separate fund within the National Environment Fund supporting pilot projects, development, commercialisation and promotion of the RES installations. The fund would be supplementary to the EU funds,
- Construction of the RES installations in conformity with the Implementation Plans of the RES development strategy (private and public investors).document '**Environmental Policy for the period 2003-2006, with the 2007-2010 long-term perspective**' is an up-dated version of the Second Environmental Policy.

All the major Polish environment-related funds such as The National Fund for Environmental Protection, regional environmental funds and Ecofund have already given high priority to supporting renewable energy projects. There are also some financial organisations and programmes which may support renewable energy projects if these contribute to the development of rural areas. Below detailed information on Environmental Funds supporting RES.

National Fund for Environmental Protection and Water Management

The National Fund for Environmental Protection and Water Management is directed to promote environmental protection and water management. The Fund mainly supports projects, which have been recommended by regional authorities (regional funds of environmental protection). The projects, whose execution results from Poland's obligations to the European Union related to Poland's membership in the European Union, are treated as priorities. From 2004 the Fund will give preference to projects, approved for support from EU structured funds. Renewable energy sources are among the priorities of the Fund. A typical form of provided support are soft loans at the interest rate of 0,1 to 0,6 of the bill of exchange rediscount rate announced by the National Bank² depending from the formal status investor, expected environmental benefits arising from the project and other specific conditions. Crediting time is up to 15 years. Under certain conditions, up to 25% of the loan may be written off. The Fund offers also grants, but mainly for pilot projects, projects of high risk new technologies.

"Use of Renewable Sources for Electricity and Heat Production" programme of National Fund for Environmental Protection and Water Management, operated by Environmental Protection Bank BOS S.A.

Funding targets are following:

- connection to the heat network based on geothermal energy;
- purchase of equipment and installation of small hydro plants up to 5 MW;
- purchase of equipment and installation of solar collectors;

² The bill of exchange rediscount rate announced by the National Bank of Poland is 5,75% (26.06.2003).

- purchase and installation of biomass boilers (furnaces; using straw, waste wood, etc.) up to 5 MW;
- purchase of equipment and installation of heating systems with heat pumps;
- local installations for production of biomass fuels

The maximum credit provided by the Bank is up to 3 million PLN (680000 EUR) and could not exceed 70% of investment's costs. The interest rate is 0,5 of the bill of exchange rediscount rate announced by the National Bank. Investment realisation period cannot exceed 18 months from the date of giving the credit, crediting time up to 5 years. There are no limits related to the formal status of the investor.

Regional Funds for Environmental Protection and Water Management

The Regional Funds for Environmental Protection and Water Management are aimed to support sustainable development in the regions (provinces). Renewable energy is among priorities of their activities. Conditions for financial support may differ from region to region.

EcoFund

EcoFund administers the money derived from the conversion of a part of the foreign debt of Poland into a fund intended to support environmental protection projects. To date, decisions to join the Polish-debt-for-environment-swap scheme have been taken by the USA, France, Switzerland, Italy, Sweden, and Norway.

The EcoFund's task is to provide financial support for environmental protection projects important to the region as well as helping to attain ecological goals recognized by the international community. In the area of energy utilisation, EcoFund supports, first of all, the projects that are aimed at reducing the quantities of energy generated and rationalising the energy use and **promotes the use of renewable energy sources** to the greatest possible extent. In particular, projects may be classified as eligible for such a support if they are related to:

- utilizing the "waste" energy generated at industrial processes;
- replacing coal with fuels that cause far less emission of CO₂ into the atmosphere;
- using renewable energy sources;
- eliminating the methane emission from coal mines and the biogas emission from municipal landfills and sewage treatment plants.

Grants may only be awarded to technical (investment) projects, i.e. projects dedicated to building or making technical facilities directly related to environmental protection (and only at the project implementation stage), except for nature-related projects, where the requirement of building or making a technical facility is not applicable. The projects depending on their category could be granted up to 70%. However, support is available only for projects where the equipment (e.g. biomass boilers) have been produced in EcoFund countries or Poland.

g) Agricultural policy

SAPARD

Due to the accession to the EU much of the funds available for the RES-e projects in Poland are now concentrated in various European programmes and structural and pre-accession funds such as SAPARD may be important. "**Support for Pre-Accession Measures for Agriculture and Rural Development – SAPARD**" EU Programme for accession countries, Scheme 3.5 - Energy supply, operated in Poland by The Agency for Restructuring and Modernisation of Agriculture (AMRA). Funding targets - Utilisation of local renewable energy sources such as wind, water, geothermal and solar energy, as well as energy generated from biomass, including straw, waste wood and biogas combustion.

Entities entitled to apply for financial aid

- a) Financial aid may be granted to single communes (gmina) and associations of communes.
- b) The scope of aid covers the whole territory of Poland in rural areas and in towns with population up to 7 000 inhabitants.

Form of financial aid

The aid is granted in the form of reimbursement of part of the eligible costs incurred by a commune/association of communes, up to the ceiling specified in the contract. Clearance of costs shall be made after completion of the investment, on the basis of documents for the costs incurred (bills, invoices). Reimbursement shall be effected in the form of a transfer to a separate banking account. Support is available for projects up to 100,000 Euro per commune per year.

Programme "Small hydro plants"

Rural Development Foundation purpose loan is available for private persons, including private person's company, church organisations, communities mainly from rural areas that planned to invest to small hydro plant. The maximum loan is up to 200 000 PLN (680 thousand EUR) and not exceeding 50% of investment's costs. Interest rate is 11% annually. Crediting time up to 5 years.

d) Agriculture and Transport

'**Act on Biofuels Market**' was approved by Polish Parliament 2 October 2003 and came into force on 1 January 2004. According to the **Act** in every litre of petrol the percentage of the ethyl alcohol must reach at least 3.5%. The rape seed esters will start to be added to diesel fuels from 2005). Distribution of petrol and diesel fuels containing more than 5% of bio-components will be allowed only from special well marked filling points at petrol stations.(9)

h) R&DD

R&D in the field of renewable energy is financed through state funds from The Ministry of Science and Information Technology, EU RTD framework programs and to smaller extent also by domestic industry. There has been no specific wider domestic research program towards RES in Poland implemented recently. However, the Ministry of Science and Information Technology for example provides co-financing to the Polish organisations taking part in research projects that received financial support from EU 6th RTD Framework Programme. Such support is available up to the level of 60% of eligible costs claimed as co-financing to EU funding.

An recent important initiative of the Ministry of Science and Information Technology of Poland has been related to the creation of specialised Centres of Excellence in sustainable energy sector. The Centres have been selected as units or organizational structures involved in scientific research and the development of high technology at a world level in terms of measurable scientific effects (including training activities). These centres serve as a hub for teams of scientists with outstanding achievements who cooperate in the areas of common interest and of large significance for national economies. This role supports the innovative activity of the centre and boosts the promotion of research, technology and products at home and abroad. There are several R&D institutions dealing with RES or specific sub-sectors of RES amongst them is the Polish network of Centres of Excellence, which include Renewable Centre of Excellence and Competence in Poland (RECEPOL) established at EC Baltic Renewable Energy Centre (EC BREC).

References

1. Council of Ministers. 1997. 'Energy Act', last amendment - July 2002
2. EC Baltic Renewable Energy Centre (EC BREC). 1999. *Economic and Legal Aspects of Utilisation of Renewable Energy Sources in Poland*. Expert appraisalment for the Ministry of Environment. Warsaw: EC BREC/ IBMER
3. Wisniewski G., Renewable Energy in Poland: State-of-the-Art, Legal and Institutional Framework and Market Opportunities, Materials to the International Conference and EU Parliamentary Info Day on 'Promotion of European Experience in Renewable Energy Sources Development and Climate Change Commitments in the New Member States and Candidate Countries, 16 January 2003, Polish Ministry of Environment, Warsaw
4. Council of Ministers of the Republic of Poland. 2000. *Development Strategy of Renewable Energy Sector in Poland*.
5. EC BREC and ESD. 2001. *Use of SAFIRE Model for Generation of Development Scenarios for Renewable Energy Sources in Poland by 2020*. Study ordered by the Minister of Environment, Warsaw: EC BREC/ IBMER
6. Oniszk-Poplawska, *Adaptation of The Polish Law to the EU Regulations In the Field of Utilisation of Renewable Energy Sources, EC BREC, 2003*
7. ARE electric energy statistics 2002
8. Ministry of Finance. 2002. *Ordinance in the Excise Tax. [Rozporządzenie ministra finansów w sprawie podatku akcyzowego]*. Dz.U. nr 27, poz. 269.
9. Ministry of Economy. 2002. *Draft Act on Organisation of the Market for Liquid Biofuels and their Components [Ustawa o organizacji rynku eko-paliw płynnych I ich składników]*

Some of the Polish www pages concerning RES

- www.ecbrec.pl - EC Baltic Renewable Energy Centre EC BREC
- <http://www.pga.org.pl/> - Polish Geothermal Association
- <http://www.mew.pl/> - Small Hydro
- <http://www.elektrownie-wiatrowe.org.pl/> - Wind Energy
- <http://www.windenergy.pl/> - Wind Energy
- <http://www.eko-energia.com/> - RES
- <http://www.are.waw.pl/> - RES
- <http://www.cire.pl/> - RES