Renewable energy sector in Poland (2008)

Being the largest coal producer in the EU, Poland's energy import dependency is among the lowest in the EU. Coal plays a significant role in the Polish energy mix, with very large shares in electricity generation and also in primary energy supply, resulting in high emissions and CO2 intensity. There are public concerns over security of supply, with Russia being by far the major supplier of gas and oil for Poland. Hydropower is still the dominant renewable energy source in Poland but its potential is limited. Poland has a significant potential especially in terms of biomass due to *inter alia* its high share of arable land per capita and important role of agriculture in the national economy, wind – due to the large country area and large resources of low temperature geothermal.

According to the Directive on the promotion of the use of energy from renewable sources (approved by the European Parliament and of the Council in December 2008), Poland has to achieve 15% share of RES in the final energy consumption in 2020. Whereas, according to the RES-E Directive 2001/77/EC the Indicative Target for Poland is 7.5% share of renewables in gross electricity consumption by 2010. Green energy purchase obligations upon Polish electricity suppliers require annual RES share of 10.4% by 2010 (the relevant quota is higher than national target because it refers to electricity sales not to gross electricity consumption as in the Directive). It is very likely that this target will not be met.

There is no yet agreed national energy policy and national action plan, how Poland should achieve 15% target by 2020. According to several latest studies done by the EC BREC IEO, biomass (including biogas) and wind energy will contribute most. It is expected that the required expenditures (new investment) to meet this target for Poland should amount to 15 billion EUR. Partly (c. 10%) they will be covered by the EU cohesion and structural funds and national environmental funds.

Primary energy

As per the official data of the Central Statistical Office in 2007, in Poland some 208.7 PJ of energy was obtained from renewable energy sources, 6.5 % of the total primary energy balance (3,034.0 PJ). Most of it (91.3%) was obtained from solid biomass, followed by hydroenergy (4.1%), liquid biofuels

(2.2%), biogas (1.3%), wind (0.9%) and geothermal (0.2%). With minor shares of energy from biodegradable municipal solid waste (0.017%) as well as solar energy (0.007%).

Special attention should be given to the use of biomass as the main RES in Poland, most of it is used for heating by individual households in inefficient stoves. In 2007 a slight decrease both in the supply (0.8%) and demand (1.3%) for biomass was noted. This can be associated with an exceptionally warm winter 2006/2007. The industrial utilisation of biomass for heat and electricity production has been steadily growing by some 20% annually, especially for electricity production, from 1,832.7 GWh in 2006 to 2,360.4 in 2007 (28% growth). However, a large portion (c. 90%) consists of co-firing of biomass with fine coal in large power plants. There have been legal actions taken to abridge the use of forest biomass for co-firing, thus, quotas requiring dedicated energy plantations as an obligatory admixture to cofiring were introduced- stepwise increasing from 5% in 2008 to 60-100% in 2017.

Electricity

As a consequence of the EU obligations undertaken by the Polish government, renewable electricity production has in recent years considerably gained on importance. In 2007, according to the Energy Regulation Office (URE), the total RES installed capacity amounted to 1523.8. MW (co-firing excluded), by which 5,429.3 GWh of energy was produced. Most of renewable electricity in 2007 was produced by hydropower plants 43.3% and co-firing 39.2% the rest of it being wind power 9.6% biogas 3.7% and other solid biomass 0.2% . Wind energy has been developing fast in Poland, in 2007 the production of electricity was doubled and amounted to 521.6 GWh, the installed capacity in 2008 reached *c.* 390 MW. As the development of wind farms in Poland becomes more significant some new problems might appear in the near future. One of mentioned by investors is the access to the grid while power sector (based on coal) balances the production of wind energy. The overall renewable electricity production has been steadily growing by 27% annually; the installed capacities in 2008 (2007) amounted to: hydro power plants 936.4 (934.8) MW, biomass 258.9 (255.4) MW, biogas 52.7 (45.7) MW, and wind 390 (287.9) MW.

RES-E generation has been mainly supported by the tradable green certificate (TGC) quota scheme and the purchase obligation. The revised Polish Energy Law introduced a range of rules, which strengthened the the development of RES. The support mechanism consists of an obligation imposed on energy companies selling electricity to end users to obtain and present for redemption to the Energy Regulator (URE) a specified number of certificates of origin, or to pay a substitution fee on average 248.46 PLN/MWh (61.6 EUR). These certificates can be traded either on the bilateral basis or on the Warsaw Commodity Exchange. Failure to comply with this legislation leads to the enforcement of a penalty, which amounts to 130% of the substitution fee. In August 2008 changes were introduced resulting in higher required quotas: for 2008-7%; for 2009- 8.7% 2010 – 2012-10.4% 10,4% up to 12.9% in 2017. For 2007 the required level was 5.1% and the overall domestic obligation, with 4.7% achieved, was not fulfilled. Without fees and penalties the income for the RES producer is the average electricity price 128.8 PLN/MWh (31.9 EUR) plus a green certificate bonus 239.19 (59.3 EUR) (average price) - in total some 91 EUR/MWh. The TGC support mechanism does not distinguish between sizes of different technologies and as a result is not favorable for small capital intensive installations such as photovoltaics. An additional support tool is the excise tax exemption for RES-E, which amounts to 0.02 PLN/kWh (0.005 EUR/kWh) from 2009 it will be refunded after the submission of certificate of origin.

Heat

In Poland in 2007 some 5,126.0 TJ of renewable heat was produced. Solid biomass 3,972.0 TJ (excluding use of biomass in low efficiency heating stoves- the overall biomass primary production in Poland was 190,510.0 TJ) has dominated this production, of which some 56% in cogeneration. In recent years the utilisation of geothermal energy 439.0 TJ and biogas 700.0 TJ (94% municipal biogas) have become more significant. Solar energy- of which 15 TJ was produced in 2007 has had so far a modest share in the overall energy balance, however, its use has been becoming more and more significant (last years 35-40% growth rate was observed), especially in case of small individual installations (*c.* 20,000 installations were built so far).

The utilisaion of geothermal energy for production of heat has been stable with some 110 MWth, which produce heat for 5 district heating networks, the production of heat slightly decreased in 2007 due to some technical problems to 439 TJ. A separate issue is the utilisation of ground heat by heat pumps- in Poland in 2007 c. 10.000 pumps were installed with 133 MWth capacity producing 750 TJ of heat.

Biofuels

In the EU Poland is one of the biggest producers of bioethanol and still one of the biggest consumers for transportation purposes. Biodiesel (RME) has been developed since 2005 and 5 new installations have been built so far. There are c. 400 agricultural distillers of raw spirit and 14 producers of pure bioethanol (dewatering plants).

The targets were set for biofuels consumption of petrol and diesel use for transport: 3.45% for 2008.; 4.6% for 2009 and 5.75% for 2010 and 7.1% in 2013. Compared with 2006 in 2007 the consumption and production of biodiesel actually dropped due to the lack of appropriate and stable legal and fiscal enforcements- in 2006 some 44.9 thousand tonnes of biodiesel and 84.3 of bioethanol were produced, whereas, in 2007 only 37.3 thousand tonnes of biodiesel and 70.8 of bioethanol (some 10% was imported). The national indicative target amounted to merely 0.68% in 2007 and 0.98% in 2006. However, already in the first quarter of 2008 the production surged and the fulfillment of the quota reached 3%.

In 2006 two Acts were enforced: the Biocomponents and Liquid Biofuels Act and the Fuel Quality Monitoring and Control Act, which ensured full transposition of the Directive 2003/30/EC. Currently the "Biofuel and other renewable promotional programme for 2008-2014" is in the consultation phase. Its most important provisions include:

- Production of liquid biofuels by farmers for their own use, exemption from the excise duty in the case of pure vegetable oils and esters. The annual own use production quota is 100 litres per hectare of arable land owned by a farmer. The Fuel Quality Monitoring and Control Act requires liquid biofuels produced by farmers for their own use to meet only minimum quality requirements, in order to secure environmental standards.
- In 2008 of a requirement to ensure specified biocomponent share in the transportation fuels market was introduced. This requirement has been imposed on businesses producing liquid fuels or liquid biofuels and purchasing them intra-Community, for subsequent sale or for their own use. Such businesses are defined as entities implementing the national indicative target.
- The introduction of the concept of "captive fleet", defined as a group of at least 10 vehicles, agricultural tractors or off-road machines, or a group of locomotives or ships fitted with engines able

to burn liquid biofuels. The introduction of this concept enabled to use a wide range of liquid biofuels with high biocomponent content.

Currently a Draft Act amending the Corporation Tax Act is being amended, which introduces corporation tax relief for biocomponent producers. The proposed system is intended to ensure stability of the tax relief and exemption system. Other financial support instruments offered include: exemption of biocomponents used as direct fuel from fuel duty, a system of subsidies for farmers cultivating energy crops for the use in biocomponent manufacture, investment support additional to the EU funds and a reduction of air pollution charges for entities using liquid biofuels in their vehicles.

Support mechanisms

Investments in RES sector in Poland can be supported by environmental funds. In 2002-2008 the Eco-Fund foundation offered financial support for environmental protection projects as its activity stopped, the National Fund for Environment Protection and Water Management (NFOSiGW) remains the biggest funding source. The financial resources from fees and penalties is gathered at the special sub account of the National Fund for Environmental Protection dedicated for subsidies or preferential credits for RES projects; in 2007 some 90 million PLN were gathered for this purpose. In January 2009 the NFOSiGW will announce a RES dedicated support program for the year 2009-2010 the estimated budget is 700 Mio PLN

Moreover, there are also 16 Regional Funds for Environmental Protection and Water Management (WFOSiGW), smaller funds and functioning at the regional level. These funds co-operate with the Environmental Protection Bank (BOS) and other banks specialised in environmental financing. The rule of the thumb is that the National Fund supports bigger projects minimum: 10 Mio PLN (2.5 Mio EUR). There are also special bundling schemes for support of solar installations in a given municipality.

In Poland, there are also EU Funds available for the period 2007-2013, from 2009 subsidies are granted within The Operational Programme “Infrastructure and Environment”. The minimum cost of investment is 20 Mio PLN (5 Mio EUR) with the exception of biomass and biogas and small hydro is 10 Mio 5 Mio EUR), the subsidy varies from 30% to 70% of qualified costs- depending on the region and size of the investor (preferences for underdeveloped regions and small enterprises). The maximum support is 40 Mio PLN (10 Mio EUR) per project. Co-firing is excluded. Financing is also possible under the Rural Areas Development Programme, the level of support is up to 300 tho PLN (83 tho EUR). For energy crops there was a subsidy of 176 PLN/ha (43.6 EUR/ha), however, it will be withdrawn from 2009. Other possible support is available for the development of RES industry development of electricity grids for RES as well as high efficient generation.

Prospect to 2010

Short term forecast is based mostly on investment projects already under development as per the info from developers and investors. The most dynamic growth is expected in case of wind energy- 44 installations have a preliminary agreement for a concession by the Energy Regulation Office. In the table 1, a short term investment forecast for RES in Poland is presented.

Table 1. Forecast of short term RES investment in Poland

	2007	2010	% change expected
Heat pumps	133.0 MW	220.0 MW	65%
Gethermal energy	110.0 MW	220.0 MW	100%
Solid biomass electricity	255.4 MW + cofiring	270.6 MW +10,5 MW cofiring	5.9%
Solid biomass primary energy	190,510.0 TJ	245 200.0 TJ	28%
Solar	235,987.0 m2	550,000.0 m2	133%
Wind	287.9 MW	1,000.0 MW	247%
Biogas	45.7 MW	51.6 MW	13%
Biofuels	37,300.0 tonnes of biodiesel 70,800.0 tonnes of bioethanol	469,000.0 tonnes of biodiesel 766,000.0 tonnes of bioethanol	1160% 980%
Hydro power total	934.8 MW	935.4 MW	+0%
Small hydro	250.0 MW	250.0 MW	0%

According to studies by the EC BREC IEO, the fastest growing RES markets in Poland to 2020 will be: biogas, wind and solar thermal, see table 2.

Table 2: RES forecast in Poland to 2020, source: EC BREC IEO

RES	**Final energy in 2020 PJ**	**Annual growth rate for a given sector**
Solar energy	16	33%
Geothermal energy	12	12%
Biomass, including	382	5%
Energy crops	*135*	*42%*
Biofules	*59*	*21%*
Biogas (waste & energy crops)	*98*	*30%*
Hydropower	11	3%
Wind energy	63	35%
Total RES	484	7%

According to EC BREC IEO, achieving the 15% RES target in 2020 is realistic. Without environmental and other extra constraints it would be possible to achieve even a more ambitious target – up to 20% - as a result of developing wind energy both onshore and offshore energy, energy crops and as well as making bigger effort to implement energy efficiency measures.