

Strategy for Implementation of Wind Power in Poland

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1. Introduction

At this moment in time Polish experiences in implementation of renewable energy resources are rather small and concern mainly utilisation of biomass and solar energy. Only recently there appeared an increased interest in wind energy confined to onshore plants. However, in Poland recently has been established a new energy law, which provides a general ground for implementation of renewable energies. This may speed up implementation of wind energy as soon as it becomes competitive in price and amounts of supplied energy. This statement regards both onshore and offshore potential of Poland. Poland, with its over 300 Kilometres of coast line definitely is a potential site for such exercises, especially in the light of the fact that the northern part of Poland relies on the electricity supplies from the south, where the big coal mines and power stations are placed.

Poland releases into the atmosphere about 2% of global emissions of carbon dioxide [1], predominantly due to coal combustion, which is rather going to remain a principal source of Polish energy supply in the years to come. The strategy of sustainable development demands social and economic transitions, which must take place in Polish economy. This is based on a set of strategic measures comprising social and political issues aimed at improving the environmental management and other areas. Polish strategies for the reduction of greenhouse effect are considered to be based on three scenarios, namely stagnation (small structural changes), basic ones and fast structural changes. All three variants of energy market development presume a small increase of greenhouse gases emissions (up to 2-4% [1]) until the year 2015 with respect to the reference year of 1988. Beyond that date there is a possibility for the reduction of emissions. Commercial use of nuclear power in Poland is rather very unlikely to take place, as this is only required in the scenario of fast changes and in this light the only possibility to reduce emissions by 7% until the year 2030 is by a wide implementation of renewable energies and at the same time conversion to gas. The present share of utilisation of energy from renewable sources is presented in Table 1 and the estimated potential of renewable energy in Poland is presented in Table 2. The amount of effective energy produced from renewable resources corresponds to 2.4% primary energy. In many opinions it is possible to increase the potential from renewable energy sources up to about 1000 PJ before 2010. For recollection, the present consumption of energy in Poland is about 4000 PJ.

Further in future (after year 2020), it will be possible to utilise additionally ca. 1 300 PJ energy from geothermal waters and ca. 1 000 PJ solar energy.

Polish strategy for the development of renewable energy presented by the Polish government in September 2000 states that the assumed scenario for implementation of energy from renewable

	Source	Energy amount [PJ]	Installed capacity [MW]
1.	Hydro power	9 PJ power	630 MW (big plants) + 160 MW (small plants)
2.	Wind turbines	0,030 PJ power	4 MW
3.	Solar collectors	0,025 PJ thermal energy	2 500 m ²
4.	Biogas	0,800 PJ power and thermal energy	20 MW power +20 MW thermal energy
5.	Biomass	45 PJ thermal energy	10 000 MW
6.	Geothermal	0,025 PJ thermal energy	27 MW
7.	Ethanol	1,2 PJ mechanical energy	car engines
	Total	56,08	

Tab. 1: Present effective energy production from renewable sources (1998). Source: 1,2- Statistical Office, 4,6- own data, 5- EC BREC+ own data, 3-[2], 7- EC BREC, 4- biogas produced in waste water treatment plants: 14 MW power+24 MW thermal energy (according to EC BREC), biogas from landfill extraction- 5 MW power + 7 MW thermal energy (own data).

resources falls in the following limits: 7.5% RES by the year 2010 and 14% RES by the year 2020. In a very recent directive of 15 December 2000 there are even more exact amounts stated to be implemented in Poland. These limits say that in 2001 there must be 2.4% from RES, and then respectively 2.5% in 2002, 2.65% in 2003, 2.85% in 2004, 3.1% in 2005, 3.6% in 2006, 4.2% in 2007, 5.0% in 2008, 6.0% in 2009, and finally 7.5% in 2010 and subsequent years.

Established also are three variants for renewable power sources share in the total electrical energy production. According to each variant the following costs of implementation are devised:

- Variant I: 7,5% realisation cost: 3.6 bill. Euro
- Variant II: 9% realisation cost: 3.8 bill. Euro
- Variant III: 12,5% realisation cost: 4.8 bill. Euro

	Source	Energy [PJ]	Remarks
1.	Biomass		
	a. straw	160	
	b. wood	110	35 PJ- forest, 15 PJ- afforestation 30 PJ-wood industry, 30 PJ- recycling
	c. biogas+waste	236	36 PJ- animal manure, 100 PJ- waste 100 PJ- waste water treatment plants
	d. biofuels	44	
2.	Hydropower	40	
3.	Wind energy	47	36 onshore + 11 offshore
4.	Solar energy	370	
5.	Geothermal	200	main sources
	Total:	1 207	

Tab. 2: Technical potential of renewable energy in Poland.

Source: 1a,1b- own calculations, 1c, 1d, 3- EC BREC, offshore- TERES, 2,5- various sources, 4- Hauff

2. Information about existing wind power stations in Poland

Poland is a country with average conditions for the development of wind energy. There are not too many regions in the country where the wind speed exceeds 4 m/s. Additionally winds in Poland often change their power and direction, which hardly improves its implementation. Anyway, over 30% of Polish territory has sufficient wind conditions for construction of wind farms. Presented below are the regions, where construction of wind farms can be justified:

- mountain regions,
- Baltic coast
- North-east Poland (region of Suwalki)
- Central Poland

Best conditions for construction of wind farms of large power are in the coastal and mountain areas. The wind speed in these regions is 4 - 6 m/s (at a height of 10 metres).

At the present moment the role of wind energy in the power balance of Poland is negligible and this is being confirmed by the attitude of Polish officials both from local authorities and leading industries. This situation could be changed, and this is without any shadow of a doubt, if the legal situation concerning the purchasing of such power is sorted out. In such a case a similar scenario to that in Germany would be observed, i.e. a rapid development of this branch of industry. The attractiveness of wind energy is based predominantly on its absolute renewal, possibility for decentralisation of particular power plants and the fact that there is most of this energy during autumn, winter and spring, i.e. periods where its is mostly required.

At present there still exists a feeling that wind energy produces a high level of noise during its operation and interferes with low frequency waves. This opinion could probably be changed if more modern wind farms will come into operation.

Table 3 shows a list of commercial wind power stations connected to the grid and selling the electricity to the grid. These are:

No	Location	No of units	Power [kW]	Producer	User	Year of commission
1	Lisewo near Gniewino, Pommeranian region	1	150	NTK-150 Nordtank, Denmark	Water Power Plant Zarnowiec SA	1991
2	Swarzewo near Puck, Pommeranien region	1	95	DANmark-20 Folkecenter, Denmark	Gdansk Energy Company „ENERGA“	1991
3	Rytko near Nowy Sacz	1	160	EW-160 Nowomag Nowy sacz, Poland	Private owner-priest	1994
4	Zawoja near Bielsko-Biala	1	160	EW-160 Nowomag Nowy sacz, Poland	Temple	1995
5	Wrocki	1	160	EW-160 Nowomag Nowy sacz, Poland	Private owner	1995
6	Kwilcz Wielkopolska	1	160	EW-160 Nowomag Nowy sacz, Poland	Municipality	1996
7	Slup near Legnica	1	160	EW-160 Nowomag Nowy sacz, Poland	Municipality	1997
8	Rembertów near Tarczyn, Mazovian region	1	250	LW-250 Lagerway, Holland	Van Melle company	1997
9	Starbienino, Pommeranien region	1	250	N-27/250 Nordex, Denmark	Casubean National University	1997
10	Swarzewo II near Puck, Pommeranien region	2	1200 (2x600)	TW-600 TACKE, Germany	Private owner-Westwind Poland	1997
11	Wojkowice near Bedzin	1	30	ZEFIR 12A Dr Zaber Nowy Sacz, Poland	Private owner	1997
12	Cisowo near Darlowo	5	660 (5x132)	Seewind, Germany	Private owner	1999
13	Nowogard	1	225	Vestas, Denmark		1999
14	Barzowice near Darlowo	6	4980 (6x830)	Vestas, Denmark	Under construction	
15	Komarowo near Szczecin	2	1500 (2x750)	NEG Micon, Denmark	Under construction	
16	Dukla Pass near Rzeszów	2	2600 (2x1300)	NORDEX, Denmark	Planned	

Tab. 3: Wind turbines and wind farms in Poland

Neue Kurse / New Courses

Leistungskurven, Schallkennwerte, Ertragsgarantien

Wilhelmshaven. DEWI ,19. April, Nr. R01

Reduzieren des finanziellen Risikos von Windparks

Bremen, 8. Mai, Nr. B01

Grundlagen der Windenergietechnik

Wilhelmshaven, DEWI, 3.-4. Mai, Nr. G03

Wind turbine techniques

English, Pamplona, Spain, 10.-11. May, Nr. G02

Weitere Kurse und Informationen ab Seite 75

More courses and information on page 75 pp.

Deutsches Windenergie-Institut, Ebertstraße 96, D-26382 Wilhelmshaven
<http://www.dewi.de> - seminar@dewi.de


DEWI
 your partner in wind energy

3. Legal framework for implementation of wind energy

The issue of renewable energy resources is a relatively new one and hence there recently have been a lot of developments in this area. The present legal framework, however still requires detailed directives for use at the municipal level, where the majority of application for new constructions are being processed. A selection of relevant Polish laws is provided below.

During the procedure of applying for the permission to build the wind power station one needs to consider the following rough procedure. The following laws are to be obeyed:

- regional planning, 1994
- protection and shaping the environment, 31st January 1980
- nature protection , 16th October 1991
- regulations on transport and communication safety

All the above regulations require co-ordination with the following bodies:

- the Minister of Environment
- the Main Health Service Inspector
- Voivod (head of regional authorities)
- Regional Health Service Inspector
- the Ministry of Health- regarding investments in resorts
- Regional Conservator- regarding areas under conservator's protection due to historical values
- the Marine Board- regarding sea ports and harbours, inland waters and territorial sea
- Regional Public Roads Management- to designate the minimum distance from communication routes
- the Ministry of Transport and Water Management, including the Main Civil Aviation Inspector
- the Ministry of Communication

3.1 Energy law

The energy Law issued on 10th April 1997, amended in June 2000, with reference to the renewable energy states as follows:

Art. 15, point 7. Assumptions for national energy policy are required to include development of renewable energy sources utilisation.

Art. 16, point 3.2. Energy plans prepared by energy companies are required to include renewable energy sources.

Art. 19 point 1 & 2.3. Municipal authorities are required to prepare projects of energy plans assumptions including utilisation of renewable energy sources

Art. 32 point 1.1. Power production in sources of more than 5 MW capacity requires obtaining a concession by the Energy Regulation Bureau.

Art. 9 point 3. The Minister of Economy is required to issue a decree obliging energy utilities to buying power from renewable energy sources

As can be seen, the energy law refers to the issue of renewable energy sources very scarcely. It only defines non-conventional sources of energy as those which do not use combustion of organic fossil fuels in the process of conversion into power. These are specified further as those which utilise in the conversion process the energy of the sun cumulated in various forms, particularly solar energy in photovoltaic cells, and the energy of rivers, wind and biomass. It imposes that the enterprises, amongst the others from the area of modernisation, development and construction of new non-conventional energy sources are included in the regional development plans in municipalities. The minister of economy **can**, by way of a directive, force the energy distribution companies to purchase electricity and heat coming from the renewable sources of energy. Such a directive has already been published in March 1999 and requires the utilities to purchase the electricity coming from RES, including the wind energy of a nominal power not exceeding 5 MW.

In the decree issued on the 14th July 1998 by the Minister of Environment, wind power plants are not included to a list of investments particularly damaging the environment and/or influencing it negatively. However, it is necessary to prepare prognoses of the investment's influence on the environment while changing the existing regional plans. It is also obligatory to prepare faunistic valuation of investment areas and their close neighbourhoods.

In the Polish Energy Policy Targets for the year 2020 outlined on 22nd February 2000 it says that the prognoses for renewable energy share in the total energy production in Poland are estimated to reach the following levels: 5.5- 6.3% by the year 2010 and 5.9-7.7 % by the year 2020. In the same document liberalisation and privatisation of the electricity market are planned, aiming at increasing the market competitiveness. Furthermore it is planned to raise the environmental requirements for energy production.

3.2 Concessions

Wind power plants (farms) of the power below 5MW do not require concession. However, in the case of a wind power station or farm with the power greater than 5MW one needs to apply for the consent of the Energy Regulator Bureau (URE).

3.3 Price to be obtained by the sold energy

The Ministry of the Economy in its decree on obligation of buying power and heat from non-conventional energy sources and the scope of the obligation issued on 2nd February 1999 says that on the ground of article no. 9 of the Energy Law (10 April 1997, Law Bulletin no.54, position 318 and Law Bulletin no.158, position 1042 and 668, Law Bulletin no. 162, position 1126), it is decided as follows:

Paragraph 1. Energy utilities carrying on economic activity in the field of power or heat trade, described further on as "distribution companies", are obliged to buy, from domestic producers, proposed amounts of power and heat from non-conventional sources, including renewable energy sources, described further on as "sources", in particular heat and power from:

- hydro power plants,
- wind turbines,
- biogas produced in particular in: animal waste utilisation systems, waste water treatment plants, local waste dumps,
- biomass,
- photovoltaics,
- thermal solar collectors,
- geothermal.

Paragraph 2. Obligation in question in Par.1, does not refer to buying power and heat produced in

- sources belonging to the distribution companies or being under turnover companies' control,
- sources which rated power is higher than 5 MW,
- sources using fossile fuels in production process,
- sources constructed within national investments.

Paragraph 3. Distribution companies are not obliged to buy power and heat from the sources, if the price: of a power unit is higher than the highest valid price of a power unit in the company, binding in the tariff for a power unit supplied to the end-users, connected to the low voltage grid, of a heat unit higher than the highest price of a heat unit offered by other suppliers producing heat from conventional sources.

Paragraph 4. The decree is coming into force 14 days after the date of announcement.

In the case of wind power stations of a power not exceeding 5 MW (i.e. not requiring the concession) the price of unit of energy suggested by the producer cannot be higher than the highest price in the tariff, which is collected by the recipients connected on the low voltage side. The costs incurred by the energy distribution company from purchasing power from the RES are justified costs of conducting the economical activity by this company.

In the case of a wind power plant or farm of a power higher than 1 MW and lower than 5 MW (i.e. requi-

ring the concession), the producer must apply to the tariff department at URE in order to fix the energy price suggested by the producer, which will later be paid by the power company. Application must be submitted together with the price calculation and justification).

3.4 Legal framework regarding the construction of energy units utilising the wind energy.

There are no specific normative legal regulations regarding stationary wind energy constructions in Poland. Therefore, it is necessary to employ general regulations in force. These are described below.

Art. 3 para 3. Structures serving as energy producing devices are so-called constructions. This means that it is necessary to fulfil all the investment process requirements for constructions of that kind to construct, exploit and dismantling them.

Art. 34, para 3. Applications for construction permits for structures that are not included in the Polish Standards and legal regulations, should be supplemented by a specialised expertises issued by an organisational body or a person, appointed by the Minister.

Art. 59, para 1. A constructing supervision organ in the construction permit may oblige an investor to obtain a utilisation permit.

Art. 56 para 1. Investor should inform an appropriate National Environmental Protection Inspection organ about finishing construction works.

Another institution, which is indispensable to be contacted is a Main Maritime Office with regard to their consent on the construction at sea. However, due to the fact that none of the offshore farms have been completed, nor even planned, hence this route is expected to be pretty difficult. It must be stressed that all mentioned institutions confirmed that issuing of the consent for the construction of the wind turbine is a long process and consent conditions are heavily restricted.

4. International seminar "Wind Power Onshore and Offshore", Sopot, 15-17 December 2000

In this light an international seminar "Wind Power Onshore and Offshore" was held in Sopot on 15-17 December 2000. The seminar was patronaged by the Polish Minister for Environmental Protection - Mr Antoni Tokarczuk, the Pomeranian Region Governor - Mr Tomasz Sowinski and the Chairman of Pomeranian Region - Mr Jan Zarebski. The seminar was organised by the Baltic Energy Conservation Agency in co-operation with the Polish Wind Power Association in the frame of the 5th Framework Programme of European Union and formed one of the activities of German-Polish Cross Border OPET (Organisation for Promotion of Energy Technologies). In the frame of this programme the Baltic Energy Conservation Agency co-operates with the Berliner Energieagentur, Berlin, Niedersächsische Energieagentur, Hannover and National Energy Conservation Agency, Warsaw. The seminar gathered significant appreciation as it was attended by over 150 participants from Poland and abroad. The participants were representing the whole spectrum of interested parties, from the local authorities, planning engineers, entrepreneurs, developers, financiers and other interested in the development of wind power in Poland.

It had been noticed that the wind power is the fastest developing branch of renewable energy worldwide. Recently, in the countries of European Union there have been installed several thousands of MW of wind turbines, which reached the share in the energy balance reaching few percents. Poland has rather good wind conditions, which enable installation of wind power farms of the total capacity of several thousands MW. The development of wind power aims at construction of bigger wind turbines and their installation in bigger numbers in farms. Due to limited amounts of appropriate sites onshore there is an increasing interest in finding offshore sites. This direction is strongly backed by the European Union.

The seminar "Wind Power Offshore and Onshore" presented the most up to date developments in this area in Denmark, Sweden and Germany. The perspectives for such development in Poland have also been given. Reports were presented on the experience gained during exploitation of similar objects as well as accompanying procedures for implementation of wind power in Germany, Denmark and

Sweden. Topics describing the situation regarding the wind power in Poland were also presented, including papers on the legal situation in this matter in Poland, especially the barriers obstructing the development of wind power signalled in the Construction Law. The issue was presented from the point of view of the power grid distributors. Also presented were environmental aspects of the problems with two very interesting papers by ornithologists.

During the seminar there was also a special session devoted to the technical problems regarding the design of wind turbines, methods of selection of appropriate sites, wind measurements and other related topics. This information is indispensable in the design of future wind farms. Even negligible errors incurred during estimation of wind potential can lead to significant errors in determination of the energy yield for a given site.

5. Literature:

- [1] Strategy for the development of renewable energy in Poland, Ministry of Environment
- [2] D. Chwiediuk - private communication.
- [3] Energy Law.