

SCHEDULE OF INVESTOR'S PROCEDURE AT BUILD WIND POWER PLANT ON EXAMPLE POLAND

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This paper describes a schedule of investor's procedure at build wind power plant. This schedule was elaborated on base of analysis of wind, technical, economical and legal conditions in Poland and composed of four phases: initial, stage of detailed data collecting, economical and stage of investment realisation.

Introduction. Renewable energy sources are of more and more fundamental importance in world energetic. From these sources, the fastest and the greatest development concerns wind energy. Last years in Europe just belongs to wind power energy. On average in last five years in Europe, growth of installed nominal power in wind power plants has followed meanly at 36 % yearly [3]. Cause of this state was creature of profitable organizational and financial conditions for wind energy expansion and support from European Union, goverments of each countries and community organizations. These actions were been in direction of satisfaction of ecological society expectations in range of producing electricity.

Wind power energy in Poland has existed recently. First small power plant about 170 kW nominal power has worked from 1991. Now, 17 mainly small wind power plants about 27 MW power work in Poland, 1 factory produces small wind turbines, three big wind power plants are built and several different are planned to build [1].

Analysis and description of key elements. Construction of wind power plant is composed investment dependent on wind, technical, economical and legal conditions. Especially last-mentioned conditions relating to built wind power plant are essential.

Basic legal regulation related to expansion of renewable energetic is the Energy Law and executed orders refer to this act. The law recommends regard of renewable energy sources in plans of distribution companies expansion and in assumptions to local community plans of electricity-supply and also allows regard to expenses for renewable energy expansion in tariffs of electricity prices, makes electricity prices real and enables to include ecological and social costs to calculation of electricity prices.

The Minister's of Economy order from 15.12.2000, in matter of electricity purchase obligation from renewable energy sources, is law act strengthened position of independent electricity supplier. Distribution companies are obliged to electricity purchase from domestic producers, offered amount of electricity from renewable energy sources (hydropower stations, wind power plants, biogas from biomass installations, solar cells, geothermal installations and the like). This obligation is limited. Electricity purchase obligation is fulfilled when energy from renewable energy sources constitutes determined percentage in balance of total energy sale of given distribution company according to table 1.

Table 1


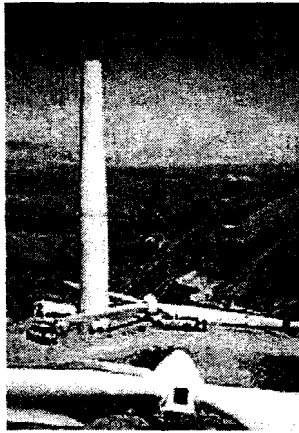

**Share of renewable energy in balance of total energy sale (according
to The Minister's of Economy order from 15.12.2000)**

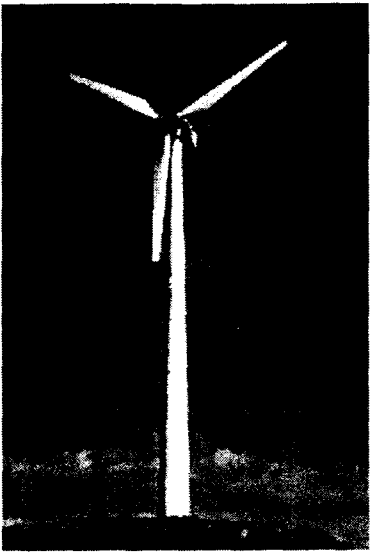
Year	2003	2004	2005	2006	2007	2008	2009	2010
Energy from renewable sources, %	2,65	2,85	3,1	3,6	4,2	5,0	6,0	7,5

Schedule of investor's procedure. Schedule of investor's procedure (tab.2.) at build wind power plant in Poland is elaborated on the ground of investment process analysis in context of wind, technical, economical and legal conditions.

Table 2

Schedule of investor's procedure at build wind power plant in Poland

Phases of procedure at build wind power plant	Schedule of investor's procedure
1	2
<p>I. Initial phase.</p> 	<ol style="list-style-type: none"> 1. Settlement of size of venture and legal form of economical activity. 2. Settlement of some potential localisations of wind power plants. 3. Obtainment of informations from Commune Office related to plan of spatial grounds, potential localisation of wind power plant within a 3-10 km, agreement for wind power plant construction, register of ground's owners and destiny of grounds (industrial, commercial, habitable agricultural). 4. Realisation of analysis of wind conditions for interesting in investor opinion localisations. <p>Initial agreement of distribution company for purchase of produced electric energy</p>
<p>II. Phase of detailed data collecting</p> 	<p>Data collecting related to:</p> <ol style="list-style-type: none"> 1. Connecting of planned wind power plant to power network. 2. Construction conditions on selected ground under wind power plant (heavy equipment using, access road, necessity of ground obstacles levelling and the like). 3. Financial and legal conditions connected with purchase; transport and certification of wind power plant through appropriate institution. 4. Spatial co-ordination of built and exploited high structures.
<p>III. Economical phase</p> 	<ol style="list-style-type: none"> 1. Settlement of purchase costs or payments connected with construction of wind power plant (architectural inspection, geodesy and the like), service, personnel training, insurance, certification, technical approval and credit. 2. Execution of business plan. 3. Settlement of investment effectivity (analysis of results, continuation or relinquishment of construction).

1	2
<p>IV. Phase of investment realisation</p> 	<ol style="list-style-type: none"> <li>1. Execution of realisation schedule. <li>2. Negotiations and collecting of prize confirmations, time-limits and conditions of deliveries for all elements of wind power plants. <li>3. Signature of credit contracts and modernization of full financial plan. <li>4. Execution of delivery orders and installation according to schedule. <li>5. Preparation of ground under construction, levelling of ground obstacles, construction of accesses and foundations, connecting to power network. <li>6. Wind power plant installation. <li>7. Technical and legal receipt of investment, training of service. <li>8. Signature a contract for electric energy delivery to local distribution company and principles of financial settlement of accounts.

Conclusions. Analysis of wind plant investment process in Poland in context of technical, economical, geographical, wind and legal conditions is permitted to formulate following conclusions.

Poland has a great technical potential of energy possible to gain from renewable resources, especially potential of wind energy

Construction of wind power plant, on account of great investment costs, should be preceded exact investigations of economical, technical, localisational and meteorological potential.

Realisation of wind power plant project should consist of four phases: initial, stage of detailed data collecting, economical and stage of investment realisation.

Initial foundations of investment related to construction of wind power plant should include the following data: size of venture, legal form, analysis of wind conditions, some potential localisations of wind power plants and informations related to plan of spatial grounds, register of ground's owners and destiny of grounds (industrial, commercial, habitable, agricultural).

Detailed data collecting should be related to: conditions of connecting wind power plant to power network; construction conditions, financial and legal conditions connected with construction of wind power plant.

Economical stage should include the following elements: settlement of all costs connected with construction (turbine price, installation cost, insurance cost, credit cost, service and personnel training cost, certification cost and the like), execution of business plan, settlement of investment effectivity and opinion of investment profitability

Realisation of wind power plant investment should include from the following stages: execution of work schedule connecting with investment realisation, negotiations of prizes confirmations, time-limits and conditions of deliveries for all elements of wind power plant, signature of credit contracts, preparation of ground under construction, wind power plant installation and signature a contract for electric energy delivery to local distribution company and principles of financial settlement of accounts.

Complicated and unprecise procedures in obtainment of different kind of permits indispensable by wind power plant don't serve wind power expansion in Poland.

Realisation of wind power construction in Poland is complicated on account of constant variability of legal and procedural requirements.

Poland experiences and solutions in wind power expansion are also good for Ukraine.

1. www.elektrownie-wiatrowe.org.pl 2. www.energy.sourceguides.com 3. www.euwinet.iset.uni-kassel.de
 4. www.physik.uni-oldenburg.de/ehf/wind/ 5. www.uni-muenster.de/energie/wind 6. www.windpower.dk
 7. www.windustry.com

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ANALYSIS OF WIND FARM EXPANSION ON EXAMPLE POLAND

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This paper describes a some elements of research project “Wind Farm” which was realised in Wrocław University of Technology. In this paper, analysis of different conditions of wind power expansion in Poland is shown. This analysis is made on basis computational examples of 6 MW wind farm in Poland from the point of view of different groups of parameters. Four groups of conditions: wind, geographical, technical and economical are taken into consideration.

Introduction. Energy is one of the basic factors to necessary for economical, social and technical expansion. Further civilisation expansion of world will grow energy demand, which will entail to enlarge consumption of conventional fuels. It will have consequences as faster exhaustion of these supplies and increase the pollution of the environment. Solution of this problem may be using renewable resources as: wind, solar, biomass, geothermal and sea waves to energy produce. From these sources, one of fastest development has wind energy. Lately, wind energy energetic just scored a spectacular success in Europe (Fig. 1).

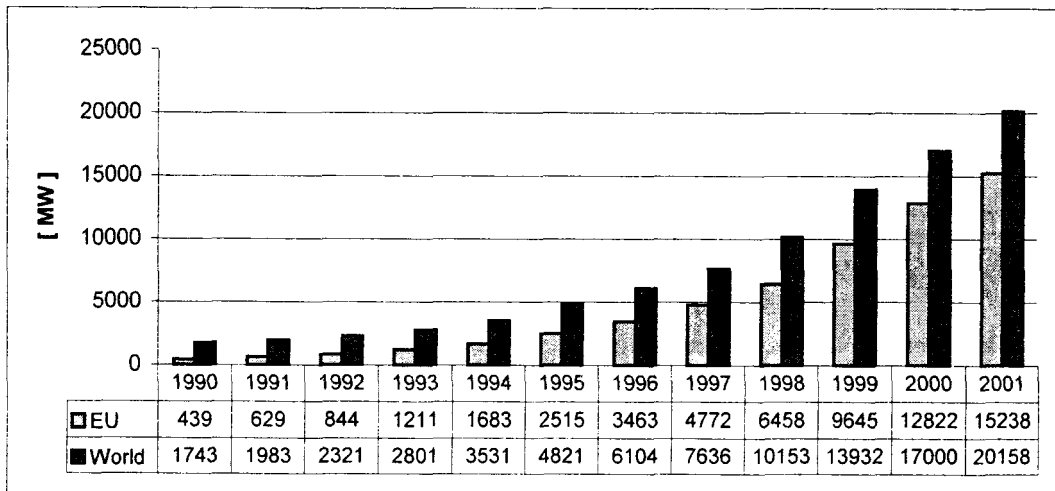


Fig. 1. Growth of wind plants power in 1990 — 2001 [3]

Poland is only on the start of way for wind power expansion. Now, 17 mainly small wind power plants about 27 MW power work in Poland [1]. Localization of wind power plant is presented fig. 2. It is a very small amount of wind power plants in composition with fact that there are excellent wind conditions in two-thirds of Poland (Fig.3). These conditions are increased interest in renewable energy sources such as wind energy and are better than for example in Germany — the world leader in wind energetic[5]. Now, the problems are specially important