

Renewable energy in Belarus

Introduction

The Republic of Belarus belongs to the group of countries without their own considerable energy and fuel resources (EFR). The EFR include: crude oil, natural gas, peat, water resources and biomass. Belarus' own power resources satisfy 15-17% of its EFR requirement.

There are practically no other sources of energy in Belarus other than those of renewable character. Therefore, the share of renewable energy amounts to 80% of the country's own EFR.

At present, the Republic of Belarus is in the process of implementing the "*Target electricity and heat provision program for achieving at least 25% of industrial production with the use of local types of fuel and alternative sources of energy by the year 2012*". In order to provide 25% of electricity and heat with the use of local EFR, it is necessary to boost their production up to 5.93 million tons of oil equivalent (Mtoe) per year, and to use the secondary resources such as heat energy, as well as primary resources from wind turbines and biogas in the amount of 0.82 Mtoe per year. In light of the above, the plans assume that by the year 2012 the use of local energy resources, including secondary heat resources, wind, solar and biomass energy, will be increased by 2.8 Mtoe. So far emphasis has been placed on the implementation of the program focused on the use of wood and wood waste. The potential of other renewable sources of energy is not taken advantage of to a significant degree.

Renewable and alternative energy in the energy policy of Belarus

The concept of power safety considers the share that local fuel types have in the EFR balance to be one of the primary indicators. In Belarus, the share of local fuel types (LFT) in the overall balance currently equals 17%. In line with the assumptions, the share of LFT will be increased to 20.5% by 2010, 27.5% by 2015 and 31.6-34.5% by 2020.

The draft Act "*On non-traditional and renewable sources of energy*" is currently in consultation by the Council of Ministers. It is expected that the Act will set out (1) the directions of state regulations concerning development and the use of non-traditional and renewable sources of energy (NTRSR) and (2) the directions for public support of NTRSR.

The draft Act has not been published, but in line with official declarations its major assumptions relate to the following: (1) guaranteeing a power grid connection for all power systems using non-traditional and renewable sources of energy, (2) obligatory purchase of energy from such systems by state enterprises dealing with provision of energy, (3) a preferential energy tariff (*it is expected that the preferential rates will be paid throughout the system's entire useful life*).

By introducing such regulations, the Act "*On non-traditional and renewable sources of energy*" may serve as a guarantee of support for alternative and renewable energy sectors, and will help overcome numerous problems and obstacles on the path to increasing the share of renewable energy sources in the EFR structure to 25% and beyond. It is still too early a stage, however, to speak about the Act's effectiveness, as its provisions have to become widely known first.

Under the decision of the Council of Ministers of the Republic of Belarus No. 400 "On development of small and non-traditional power plants" dated 24 April 1997, whose wording was amended by the decision No. 288 "On the development of small and non-traditional power plants" dated 28.02.2002, (1) a concept has been worked out for the development of small and non-traditional power plants in the Republic of Belarus, (2) a guarantee has been given for the connection, to the power grid of the Republic of Belarus, of small and non-traditional power plants owned by business entities, regardless of their form of ownership, and the payment for power provided by such entities has been guaranteed, (3) a system has been worked out for determining tariffs for electricity purchased by the power system from small and non-traditional power plants. At the same time, decision No. 91 by the Ministry of Economy of the Republic of Belarus dated 31.05.2006 sets out an increased tariff for purchasing electricity from renewable energy sources with the factor of 1.3, which equals approximately 10-12 eurocents (and for minim heat plants using natural gas – 0.85).

However, the existing mechanisms are insufficient to stimulate the development of the sector based on renewable energy sources.

In line with the "*Target program...*" and other comprehensive programs for state authority organs (ministries, corporations, local executive committees, etc.) tasks have been defined aimed at improving the use of local power resources, with the level of increasing the use of LFT by 2012 defined, as well as specific actions have been devised with the year of commissioning, as well as the amount and sources of financing also determined. Thus, no

stimulation for the implementation of the "Target program..." has been envisaged, and administrative guidelines have been defined instead.

There are three major institutions responsible for shaping and implementing the policy on renewable energy sources: *Energy Effectiveness Department of the State Standardization Committee of the Republic of Belarus, the Ministry of Energy and the Ministry of Natural Resources and Environment Protection*. There is, however, no single coordinating body. The duties of those institutions include planning, implementing and monitoring activities related to renewable and alternative energy sources. *The Belarusian Academy of Sciences* is responsible for development of the scientific and technical background for implementation of projects related to renewable and alternative energy sources.

At present, a complex bureaucratic system is in place in the Republic of Belarus that constitutes an obstacle for the growth of the renewable energy sector. Numerous concepts and programs have been drawn up, whose effectiveness is rather doubtful. The existing scientific base is insufficient for the implementation of projects related to renewable and alternative energy sources, and there are no relevant technical standards. It has to be noted, however, that there are also officials and institutions that are interested in putting the projects of this type into operation.

The potential of renewable energy sources in Belarus

The potential of wind energy is estimated to equal 1.9 – 2.0 Mtoe per year [1]. The potential of wind farm energy is estimated at 220 billion kWh. The wind energy sector is growing rather slowly in Belarus, as investors are faced with significant problems in the Republic of Belarus, and the development of wind farms is not too profitable for local power systems. There are only two regular wind turbines existing in Belarus at present. Their power rating equals 270 kW and 660 kW respectively and they are situated in the village of Druzhnaya in the Myadole Region. Architectural designs have been worked out for the construction of Belarus' largest wind turbines with the power rating of 1.2 MW, to be situated in the village of Grabniki (Unitary Republican Enterprise "Grodnoenergo"). The government has commenced an analysis of the wind energy sector development program in Belarus for the years 2008–2014. It is expected that wind farms should be commissioned in 2010 with the total power output of 3.7 MW, by 2012 – 5.2 MW, and by 2014 – 15 MW. The projects are currently in the planning stage, and envisage establishing partnerships with local power systems in order to construct wind farms with the estimated total power output of 20 – 30 MW each. In addition, the

relevant standardization and legal base should be prepared by 2010. In order to effectively implement wind energy related projects, it is necessary to carry out actual measurements to determine the size of wind energy resources, launch the production of equipment suitable for Belarus' climatic conditions, as well as gather experience in designing, implementing and running wind farms.

The potential of solar energy for hot water provision is estimated at 1.25 – 1.75 Mtoe per year, and for production of electricity – at 1.0–1.25 Mtoe per year[1]. The solar power sector has no industrial significance at the moment. Only several experimental systems exist at present. No use of solar energy on a wider scale is planned in Belarus in the nearest future.

The major directions in the production of energy with the use of biomass are as follows: (1) crop waste; (2) animal breeding waste gas; (3) wood and wood waste; (4) phytomass (plant biomass) and (5) municipal waste.

The use of crop waste as fuel is a new direction in the production of energy in the Republic of Belarus. The overall energy potential of crop waste is estimated at 1.46 Mtoe per year. The potential amount of biogas that can be obtained from animal breeding facilities amounts to 160,000 tons of oil equivalent per year. The launch of 10 biogas installations is planned in Belarus by 2010. At present, there are 3 biogas installations in operation in the Republic of Belarus (in the towns of Zaslav, Brest and Homel). Introduction of biogas installations requires that numerous obstacles be overcome. One of them is the lack of interest by farms which are still offered electricity at preferential prices. The plans, however, assume that private foreign investors will be acquired to build, every year, 8 – 10 installations for recovering and using biogas produced in the course of the animal breeding process. The potential energy included in municipal waste created in the territory of Belarus equals 470,000 tons of oil equivalent. The effectiveness of processing organic waste to produce gas will equal no more than 20 – 25%, which equals 100 – 120 thousand tons of oils equivalent. The considerable amount of waste collected over the years at landfill sites is also to be taken into consideration. Belarus has some experience in implementing projects concerned with the use of landfill gas – a project of this type was carried out, with the use of private investor funds, at the "Trostynets" landfill site, and the system's power rating equaled 3.0 MW.

The economically effective potential of wood and wood waste used for heat and electricity production equals 2.24 Mtoe in 2010 and 3.10 Mtoe in 2012. Switching to local fuel types is carried out under centralized state scrutiny, which, on the one hand, offers incentives for

using wood fuels to provide heat energy, but on the other hand, it has to be borne in mind that enterprises are mainly concerned with the amount of wood they burn, and not the project's economic feasibility. It is often the case that production of heat at local heat plants with the use of wood is 2 – 2.5 times more expensive than in the case of natural gas. The above is caused mainly by a deficient wood fuel collection and processing system, low level of automatization, and the fact that in many instances unsuitable types of wood are used. The problem could be solved by replacing the mechanisms used for stimulating the use of wood fuels with those based on the free market principles. The development of and support for small private businesses to boost their share in preparing wood for energy production purposes is considered a prospective solution. The mini heat plants in Osipovichi and Vileyka have been adapted to use wood as part of a few pilot programs. Approximately 50 other boiler plants have been constructed or modernized.

The economic use of **energy provided by small rivers** equals to 0.11 – 0.15 Mtoe per year [1]. The potential power rating of all Belarus' rivers is 850 MW, with the use of 220 MW out of that amount being economically feasible – this is the target figure that the total power rating of all small water power plants in Belarus is expected to reach by 2020. Currently, the Belarusian power grid uses water plants with the installed power of approximately 20 MW. About 4% of the total water energy potential has so far been used in the Republic of Belarus. Within the next few years the following are to be commissioned: Grodna Power Plant with the power rating of 17 MW on the river of Neman, Poloch Power Plant (23 MW) on the river of Dvina, a Dnieper power plant (5 MW) and mini power plants on the rivers of Moroch, Sluch, Ptich, Servech, Isloch and other small rivers.

According to relevant analyses, it is possible to construct hundreds **of water power plants** in Belarus. At present, construction of the first **geothermal station** is planned in the vicinity of Brest, in the "Beriestyie" heat plant. The plans assume that water with the temperature of 25-30 degrees centigrade will be pumped to heat the greenhouses of a state owned agricultural enterprise.

In Belarus there are isolated cases in which renewable energy sources are used to cater for private needs – construction of eco-homes (the "Eco Home" Social Organization, Minsk City Branch of the International Social Ecologist Organization); installation of a rotor wind turbine to provide energy for an office ("Mohylev Technopark" Joint Stock Company).

In 2008 the first two biogas-powered plants were commissioned in Belarus – at the "Belorussky" fowl breeding farm in the town of Zaslav (340 kW – stage I) and in the "Zapadny" selection and hybrid center in the Brest Region (520 kW). Construction work at the biogas complex in the "Homel Fowl Farm" Inc. is at its final stage at the moment. Construction of biogas complexes is also under way at animal breeding farms in Lan-Nesvyezh and Snow. In the "Rassvet" kolkhoz in the Kirov Region a biogas production system with the power rating of 3 MW is being prepared.

The problem of renewable energy sources is not taken up in the public debate. Information on projects that have already been implemented is posted only on professional / specialized websites. Information on the existing technologies allowing to harness renewable sources of energy is missing as well. An increased interest in the renewable sources of energy has been recorded lately among social organizations, which focus primarily on implementing projects aimed at utilizing renewable energy sources for private purposes ("Eco Home" Social Organization, Minsk City Branch of the International Social Ecologist Organization, "Eco Project" International Social Organization), as an element of the climate policy and as a means of adapting to climate change.

Conclusions / Prospects

The growth of renewable sources of energy is perceived by state authorities as one of the means to improve the country's energy-related safety. The achievement of the primary task, i.e. raising the share of LTF to 25% will be obtained, in the first place, by increasing the acquisition, production and use of wood fuel. An increase in the share that water resources, biogas, municipal waste, solar and wind energy have in the overall fuel and energy balance, is also planned for the near future. Major factors hindering the development of renewable energy sources in Belarus include the following: (1) relatively low prices of traditional energy resources (natural gas) and the resulting low profitability of renewable energy projects; (2) insufficient amount of economic stimuli; (3) cross subsidizing and providing discounts to the residential and municipal sector, as well as to farms; (4) own investment funds insufficient for the sector's development; (5) fear of foreign investors caused by the negative image of Belarus and poor knowledge of the market; (6) the existing situation fully satisfies the power sector employees (monopoly in the power sector); (7) insufficiently developed scientific and technical base; (8) failure to provide information to the interested parties (consumers in Belarus – individual consumers, organizations – should possess comprehensive information on new energy-saving technologies, and should also have access thereto); and problems

related to the projects themselves, namely (9) considerable capital losses; (10) insufficient experience of the Republic of Belarus in implementing projects of the type.

The Belarusian government has been favoring foreign investors lately, especially in such areas as renewable sources of energy. Such a conclusion may be drawn from the experience of specific foreign investors taking their first steps in Belarus. However, the government still has much room for improvement in this regard, and should provide the investors operating in the renewable energy sector with greater incentives, simplify the procedures for issuing planning permissions, for agreeing upon and issuing expert opinions on designs, connecting to the power grid, and improve the normative technical base.

Development of the renewable energy sector is of particular importance for the Republic of Belarus. It is the only means of increasing the country's actual independence, primarily from Russia. As discussing independence of a country that relies on "gas injections" is inappropriate, development of the renewable energy sector will positively impact both the economic and environmental situation of Belarus. The potential that Belarus has in the field of renewable energy sources is immense. Some research has already been conducted, and the authorities, as well as local government and coordinating entities are receiving the information. The market is in the "starting blocks". It is high time that leaders appeared, who will guide the development of the renewable and alternative energy sector.

Bibliography:

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