

WIND POWER IN UKRAINE: CURRENT STATE AND PROSPECTS FOR THE FUTURE

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The total capacity of wind turbines in Ukraine today is approaching 30 Megawatt. According to available data, total capacity by the end of 1999 amounted to 11.4 MW, and by the end of 2000 it totalled 24.15 MW. Thus, the increase came to over 100 per cent. Ukraine remains the only country of the former Soviet Union, where wind energy is actively developing. Serial production of wind turbines has been established. So far these have been license installations USW56-100 with 107,5 kW rated output.

The country has adopted a Complex Wind Power Development Program, which was developed according to the President's of Ukraine Decree No. 159 of March 2, 1996 «On development of wind farms» and approved by the Cabinet of Ministers' resolution No. 137 of February 2, 1997.

In early 2000s the document entitled as «Alterations and Amendments to the Complex Wind Power Development Program» was developed. It specifies main regulations of the Complex Program with consideration of 4-year experience of wind energy development in Ukraine.

Within the framework of the Danish-Ukrainian project for promoting NGOs' involvement in sustainable development, carried out by the Danish Organisation for Renewable Energy and the Ukrainian Future Age Energy group, we faced a task to find out why Ukrainian wind farms work with low efficiency, in fact two times less efficient than wind farms in Germany and Denmark. Presumably, in some cases wrong sites had been selected for wind farms. Besides, we assumed that the wind turbines might be situated on their sites in a non-optimal way: with no regard to the local relief or mutual impact of wind turbines at different wind directions.

We also aimed to determine whether the efficiency of Ukrainian wind turbines changed after the use of the WASP software package available due to the TACIS program.

It is known that the capacity of wind flow increases pro rata to cube of wind speed. Therefore the choice of site in respect to maximum wind speed is crucially important for subsequent efficient operation of a wind installation. We know also that the most suitable in Ukraine are the Crimea, the coastline and shallow shores of the Sea of Azov and Black Sea, as well as some sites in the Carpathians and other regions.

Considering the limited funding of the Complex Program, it is reputed that wind power construction today has to be focused in two regions: the Autonomous Republic of Crimea, and Donetsk oblast.

However in these regions, generally favourable for wind power development, the wind speed depends on a number of factors such as the surrounding ground relief, earth surface microstructure, and availability of natural and man-made objects on the surface.

The most promising wind sites were defined. The criteria applied were the following: (1) average wind speed, (2) earth surface incline, (3) extension of land, and (4) availability of infrastructure.

According to the TACIS program data, and the actual locations of wind farms, the most promising wind sites are found in the Crimea.

Analysis of operational efficiency of wind farms shows that economic parameters are better for larger farms (over 20-30 MW.) So, at least 200-300 wind turbines USW56-100 should be placed in a single site.

At all larger farms, turbines are arranged in rows. Distance between turbines in one row in Donuzlav, according to V. Bogma, is only 25-35 m, or 1.5 to 2 diameters of a rotor. Obviously under certain wind directions the turbines shield one another.

Similar cross-influence exists between separate rows of turbines. According to the analysis of operation of the Donuzlav wind farm in 2000 by Victor Shulga, Vice Director of the Interdisciplinary Scientific and Technical Centre (ISTC) for Wind Power of Ukraine, the rated power use factor for working (contactor) time for different rows of turbines differs by a factor of one and a half (0.28-0.42). A possible explanation could be the relative position of the rows regarding the prevailing wind.

Experience shows that data of average annual wind speed collected by Ukrainian weather stations is unsuitable for electricity output forecast, as data error is sometimes 40-70%.

Hence, at the moment Ukraine is facing the same problems as were on the agenda in the wind power pioneer countries about 10-15 years ago. International cooperation in the framework of technical assistance programs with Denmark or Germany would substantially accelerate and facilitate the development of Ukrainian wind industry.

Ukraine has been, and ought to remain a pioneer of wind power among new independent countries of the former Soviet Union. There are all prerequisites for further development of wind power. There is sufficient wind potential on a considerable territory, scientific and technology potential, perennial experience, and industrial enterprises, which are capable to produce wind turbines.