World wind energy use

Small wind turbines are the two countries with the highest in China (number: 450 000/166 MW) and the U.S. (number: 144 000 /179 MW), respectively. In 2020 the total capacity of small wind turbines is expected to reach 3800 MW. Medium-sized turbines are more common among countries, the United Kingdom, Canada, Germany, Spain, Poland, Japan and Italy. [1]

Despite the revival of this sector in many countries, only a few countries producing small turbine offers special support policies. A few countries purchase guarantee. Especially in regions where access to electricity is very little support in developed countries. Only in China, the energy generated by a small wind turbine in rural areas, policies, supported by reasonable price a little bit. Small wind turbines, the energy market are a very low level. However, the market potential is very high. [1]

Offshore wind capacity continued to increase in 2010. Like previous years, the sea was built on wind farms in 12 countries. 10 of them in Europe, while the other 2 percent in Asia. Total capacity is 3117 MW. In 2010, 59% of the new capacity is added.

Wind energy using in turkey

As can be seen in the table below, Turkey is a country dependent on foreign energy. Provides nearly half of the energy from abroad, therefore, attaches importance to the local energy production. In 2001, the «Energy Market Regulatory Authority» established in the electricity, natural gas, oil and LPG market held by this committee.

According to projections made by the International Energy Agency, the world's primary energy demand will increase by 40% between 2007–2030. This, of 12 billion tons of oil equivalent (toe) by 2030, 16,8 billion TOE refers to the level exit. Important for Turkey's energy security. Therefore, to evaluate the potential of new and renewable sources of energy, nuclear power plant investments made significant investments in energy efficiency and new energy technologies. That these laws have been enacted in order to plan. Electricity Market Law (2001), the Natural Gas Market Law (2001), the Petroleum Market Law (2003), LPG Market Law (2005), Renewable Energy Sources Act (2005), Geothermal Resources Act (2007).

Wind potential of Turkey is 48 000 MW. 8000 MW of this is very efficient (> 8,5 m/s), 40000 MW in the medium-efficiency (> 7 m/s), respectively. In 2004, with 18 MW of installed wind power, 800 MW in 2010 has been exceeded. After the entry into force of the Law on Renewable Energy 3363 with a total capacity of 93 MW, is granted a license. Part of the construction of 1200 MW of these projects are ongoing.

Wind Atlas of Turkey is seen in the western regions is very advantageous for the wind. Therefore, the major part of the investment realized in this region. With the guarantee of the government purchase the energy produced by the wind turbine businesses selling. This warranty cents 5,5 for the first 10 years. Turkey, adequate incentives for entrepreneurs who want to invest in wind energy state [3].

Conclusion

Wind energy can be said in summary about the location of the present and future.

- According to 2009 in 2010 and reached 197 GW 37 GW increase.
- The growth rate in 2010 was 23,6%.
- Wind sector, turnover of 40 billion euros in 2010 and 670 000 employees.
- Total installed capacity in China, became number one. (19 GW capacity expansion in a year with 50% of the world market of new investments)
- In Europe, Germany 27 215 MW and 20 676 MW, followed by Spain, and it maintains the first place.
- In Europe, the share of wind energy in the total energy production in Denmark 21%, Portugal 18%, Spain is 16%.
- New capacity growth of 54,6% with Asia first, with 27% from Europe, North America, 16,7% in the third.
- Nuclear accident in Japan, and due to the oil spill in the Gulf of Mexico, has increased the importance of wind energy. Countries have been forced to evaluate wind energy policies accordingly.
- Global capacity, 1,5 million MW in 2015 and in 2020 is estimated at 600 000 MW [2].

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THEORETIC EXPLANATION OF INCREASING OUTPUT AND BIOLOGICAL QUALITY OF CONSUMABLE WATER FROM SLITS

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In order to explain stimulation of water selection, in other words, prove a provision of continuous technological process under different terms of operation of water inlet silts, it is necessary to study processes that take place in the mouth of a water inlet slit under different schemes of water flow, define the worst one of them; develop a mathematic model and provide an analysis of the process of protecting slits from sanding, show that the suggested scheme meets the listed requirements.

While analyzing schemes of water flow towards a slit under same initial data of water-bearing horizon (coefficient of filtering (C_f) and filtration of rock (μ^c), power of water-bearing layer (m^l), etc.) it is necessary to underline that the most unfavourable scheme of water flow is that of water inlet to a slit in a pressure water-bearing horizon. It proves the fact that while comparing all variants of water flow towards to a slit, under a same output, the greatest decrease in dynamic level is observed on the scheme of water flow towards slit in a pressure water-bearing horizon [3].

To prove a continuous operation of slits under any scheme of water inlet, we will study the worst of them – the scheme of water inlet in pressure water-bearing horizon.

While analyzing dynamics of soil water motion to a slit, we need to make a number of assumptions, introduced by Dupuit, that can simplify all reasonings:

– mirror of soil waters is horizontal and parallel to the surface of underlying waterproof layer;

– the soil is homogenous, and, therefore, coefficient of filtration is the same, and motion of the inflowing underground waters has a laminar nature.

According to these assumptions, mirror of soil waters was horizontal before pumping out water-bearing layer, in other words, the slit was placed down into a soil pool, not gravel flow. A funnel of depression is formed around the slit when the water is pumped out. Sections of this funnel by vertical flatnesses that cross the slit's axis, give us symmetrical curves of dispersion in all cases [7].

Under the given assumptions geometric place of the points of the dispersion curves touching the lowered surface of soil waters present a round that is described from the slit center by radius R (in other words, radius of Dupuit).

In order to define the amount of water that inflows to a slit, it is necessary to define an area of some surface S_s that is equal to pressure and speed of filtration.

When coefficient of filtration C_f is known, amount of water that goes through this slit wil equal:

$$q = S_e C_f \frac{dy}{dS}, \qquad (1)$$

where dy is a difference between curves of dispersion on equipotential surface ac and the nearest equipotential surface a_1 c_1 that is locater on distance dS from the first line of flow.

A decrease in water level in a slit under pumping out of duration t_{day} in no-pressure water-bearing layer is defined with formula:

$$\Delta h(t) = Hw - \sqrt{H_w^2 - \frac{Q}{\pi Kw} \ln \frac{1{,}5\sqrt{a_y t}}{r}}. \qquad (2)$$

In formula (2) value $\ln \frac{1{,}5\sqrt{a_y t}}{r} = \ln \frac{R_p}{r}$ characterizes hydraulic resistance from hydrogeological conditions that can be generally expressed as:

$$R = R_O + \beta\, \xi, \qquad (3)$$

where $R_O = \ln \frac{R_p}{r}$; $\beta = \frac{Q_O}{Q}$ is a deviation of output of one slit to an output of another slit (dimensionless coefficient);

ξ is an additional resistance (defined according to tables) [3], dimensionless coefficient.

A slit's efficiency for pressure water-bearing layers:

$$Q_w = \pi C_f \Delta h_{add}(2H - \Delta h_{add})/(R_O + \beta\, \xi), \qquad (4)$$

where Δh_{add} is an optimal decrease of water level in a slit, m; H_w is a domestic power of water-bearing layer, m.

An impact of water level over the slit's output $h_O = H - \Delta h$ has a great practical significance. Pumping off water can alter a position of water level in a slit, and, therefore, regulate the slit's efficiency.

A mark water level outside a slit is always higher than that inside it. This difference of marks increases as a deepness of water drop increases. An emergence of water level leap by the slit walls is explained by the fact that the surface of equal pressure near the slit, where curve of dispersion comes with greater angles to the slit wall, obtains a curved form and, if we draw a surface of equal pressure from the point of crossing slit walls by the curve of dispersion, its probable form in a cut will be presented as a curved line A B that deviants from the higher limit of the slit with an angle that equals an angle of fall of dispersion curve, and from the lower limit it comes to a vertical line. On this line piezometric pressure will be same in all cases and equal to the height of soil waters at a final point A of dispersion curve. If water level in a slit was also at the same height, then water, placed in the area between surface $A – B$ and slit surface, would not be able to move, as this motions requires a certain decrease in pressure h_0, that can develop only via water levels in a slit and across walls in its water-bearing soil.

S.K. Abramov has suggested the following empiric formula that considers an impact of basic factors over h_0 [5]

$$h = a\sqrt{\frac{Q \cdot \Delta h}{C_f S_p}}, \qquad (5)$$

where a is a coefficient that depends on a construction of filter, m^2; h_0 is a leap in levels, m; Q is an output of slits, m^3/day; Δh is a decrease in water level inside the slit while pumping off, m; C_f is coefficient of water layer filtration, m/day; S_o is an operative area of the filter, m^2, $S_o = \pi dl$, d is an outer diameter of the filter, m; l is the filter length, m.

Analysis of processes that take place in slit mouth under the starting regime of submersible pump shows us that operative pressure increases 1,5 times at this moment, and, therefore, consumption increases as well. An increase in consumption leads to a sharp alteration in difference of water level marks in a silt and at the filter border. The less permeability of the soil, the higher a value of level leap Δh.

A sharp change in level leap value Δh, and, therefore, alteration in water flow to silt causes destruction of natural filter and carrying out soil.

While using the suggested construction of reverse valve, an even change in consumption under any pressure takes place. Therefore, we can conclude that under transitive processes in submersible pumps the reverse valve with an adjustable period of opening excludes the possibility of a sharp change in water level difference in a slit and at the border of the filter with a sufficient level of reliability (process of diffusion is not present).

Our theoretic premises will be confirmed by test results.

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