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Derleme

Turkey's 2017 Actual Wind Energy Appearance

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Abstract: The expansion of renewable energy sources and developments in this sector are very important for global pollution and sustainability. The world economical wind energy potential is 5 180 TWh/y and prediction is that potential will constitute 20 % of energy consumption claim at 2020. World, Wind Energy has gone a long way in terms of sector progress. In addition to this, the first step of this sector in our country was taken in 1998 with 720 MW project of ARES in Izmir. According to TÜREB 2017 Turkey Wind Energy Statistics Report, wind energy power plant is 6 106.05 MW, licensed installed power is 3 221.05 MW and wind power plant on construction is 861.63 MW. Considering the cumulative increase in installation in recent years, wind energy has gained a special importance in last 10 years of renewable sources. Considering existing investments and economic potential of 20 000 MW for our country would not be too wrong to say sector being novel established.

Keywords: Boron uptake, boron toxicity, nutrient uptake, dry matter, maize.

Türkiye 2017 Yılı Güncel Rüzgâr Enerjisi Görünümü

Öz: Yenilenebilir enerji kaynaklarının yaygınlaşması ve bu sektörlerdeki gelişmeler küresel kirlenme ve sürdürülebilirlik açısından çok önemlidir. Dünya Ekonomik Rüzgâr Potansiyeli 5 180 TWh/yıl ve bu potansiyel 2020 yılı enerji tüketim talebinin %20'sini oluşturacağı öngörülmektedir. Dünya, Rüzgâr Enerjisi sektör ilerlemesi açısından epey yol alınmış olmasına karşın ülkemizde bu sektöre ilk adım 1998 yılında İzmir'de 720 MW'lık ARES projesiyle atılmıştır. TÜREB 2017 Ocak ayı Türkiye Rüzgâr Enerjisi İstatistik Raporu verilerine göre işletmedeki rüzgar enerjisi santrali 6 106.05 MW, lisanslı kurulu güç 3 221.50 MW ve inşa halindeki rüzgâr santral gücü de 861.63 MW olarak paylaşılmaktadır. Kümülatif olarak son yıllardaki kurulum artış ivmesi göz önüne alındığında yenilenebilir enerji kaynakları arasında son 10 yıldaki sektör büyümesi ve yatırımlar ele alınacak olursa rüzgâr enerjisi ayrı bir önem kazanmaktadır. Ülkemiz açısından mevcut yatırımlar ve 20 000 MW'lık ekonomik potansiyel ele alındığında sektörün henüz yeni kurulduğunu anlıyor olduğumuzu söylemek pek yanlış olmaz.

Anahtar Kelimeler: Rüzgâr enerjisi, Rüzgâr potansiyeli, Türkiye rüzgâr enerjisi kurulu gücü.

Introduction

For the continuity of human being life energy is the fundamental element. In order to maintain his life, human being has been forced primarily to deal with nutrition, housing and warming problems. Formerly to resolve these requirements human being collected food, hunted and burned wood to survive his life. With the transitional period for communal life they learned to be organized in workforce that they have, they shared the jobs. For towing and transporting they domesticated the animals and used them in works. With sedentary life they started to agriculture, they used humans as workforce, and a new approach slavery has emerged. In B.C. 2800's years at Middle East as a result of the increase of knowledge they have additionally benefited from wind force as a workforce. Wind force has been used for tasks such as water transport and grinding wheat. Industrial developments has provide to use formerly simple machines and then to transition to complex machines. The oldest workforce as legacy of the past to the present is wind energy and wood. With industrial developments and inventions today's need for energy largely carter to fossil fuels. Fossil fuel becomes by the nature itself but it takes hundreds of years. However, when we compare this energy resource growth rate and the growth rate of human energy needs, we see that this is a scarce resource for human use. The existing scarce resources annoyance and increase of needs leads the fossil fuels economically became expensive. Moreover to use burning something as source of energy contains a great risk for today and for the future. It threatens humans well-being and existence. This situation forced human to actively use the alternative energy resources and not take risk for his future workforce. Today these alternative sources are regarded as renewable energy sources.

Fossil fuel is still used in our country and in the world as primary energy resource. In addition consumption of electricity demand growth is 7-8 % per year. With these rates Turkey ranks second in the world after China (Bektaş, 2013). These mentioned sources are not domestic and the question is Turkey is in an external dependence. It's necessary to reduce this dependence and to diversify energy sources. For this reason consideration should be given to renewable energy sources. Renewable energy sources are called as; solar energy, wind energy, hydraulic energy, biomass energy, hydrogen energy and geothermal energy. As seen in Figure 1, the world has rapid developments and goals for this.

One of the renewable energy sources components, wind energy, despite the fact that our country has been less progressed, comparatively progressed very much in the world. The resources can be used to generate free electricity from the nature such as wind should be assessed more. However since 2006 in our country investment in wind energy shows a significant increase (TÜREB, 2015). Aims for Turkey is to increase installed wind power to 20 000 MW till 2023 (EÜAŞ, 2015).

Potency

It's possible to predict the potential of wind energy source to produce electrical power. This potential assessed in five categories:

1. The Meteorological Potential: It's equivalent to wind source potential.

2. The Field Potential; It's an assessment, which is based on the meteorological potential. It's limited to the current geographic field for power generation.

3. The Technical Potential: Values are calculates from the field potential by considering existing technology.

4. The Economic Potential: The potential is defined as techniques that can be performed economically.

5. The Enforceable Potential: This potential is obtained by considering the promote and limitations for wind energy that can be commissioned in given time period to evaluate the potential (Malkoç, 2015)

Moreover the wind speed increases within the altitude. Considering these cases; as the General Directorate of Renewable Energy shared it is know that the total terrestrial wind potential in the world is 62 000 TWh/year for 80 m height from ground level and for over 6.9 m/s wind speed average, in another data the world technical potential is determined 53 000 TWh/year for 50 m height from ground level, towards implementation of regions for over 5.1 m/s wind speed and by considering social constrains caused to use 4% of this field (YEGM, 2015). Figure 2 and Figure 3 shows the distribution of this value on the world.

There are important developments in offshore wind power projects since the beginning of the 2000 year. The countries near the North Sea have significantly improved on offshore power plant installation.

The most extensive resource of information about Turkey wind potential that we can refer to it is Wind Energy Potential Atlas (REPA) distributed by Electrical Power Resources Survey and Development Administration in 2007. Our seas, coasts and our high-attitude regions previously undetectable for potential has become visible by REPA. This data should be processed locally and well investigated for enterprising.

Under the directions of data; wind speeds in outside of the settlement areas at 50 m high from ground level are for Marmara, Western Black Sea, Eastern Mediterranean coast from 6.0-7.0 m/s, for the inland areas from 5.5-6.5 m/s, for Western Mediterranean coast from 5.0-6.0 m/s, for the inland areas from 4.5-5.5 m/s, for North-Western Aegean coast from 7.0-8.5 m/s, for the inland areas from 6.5-7.0 m/s (Güler, 2015).

Turkey wind potential is considering the measurements at 50 m high from ground level and for over 7.5 m/s wind speed, approximately over 48 000 MW/year (Bektaş, 2013). Our potential reaches to 132 000 MW/year by considering 6.5 m/s wind speed is sufficient for the production of electricity (Table 1 and Table 2). But this is a theorical approach. In practice the transmission lines capacity must have the ability to deliver the amount of energy to use in this potential.

Installed Power

Our country have 152 wind energy power plants units with 6 106.05 MW installed capacity in 2016. The regional distribution of installations are; 38.92% for Aegean region, 34.49% for Marmara region, 14.55% for Mediterranean region, 8.76% for Inner Anatolia region, 2.83% for Black Sea region and 0.45% for Southeastern Anatolia region. The part of 3 221.50 MW of the installed wind energy capacity are at the enterprises and the distribution is concentrated 19.15% for İzmir, 16.61% for Balıkesir, 10.47% for Manisa, 5.97% for Hatay and 5.18% for Çanakkale. Furthermore 35 buildings with 861.63 MW

power are in installation stage (TÜREB, 2017). Outside of this information there is an also unlicensed and off-grid individual initiative.

According to Koç and Şenel (2013) Energy Situation in The world and Turkey - General Assessment study 2011 data; the primary energy resource in the world is 87% fossil fuels (33.1% oil, 23.7% natural gas, 30.3% coal). And also they use 4.9% nuclear, 6.4% hydroelectric and 1.6% other renewable energy sources. Regarding our country, our primary energy resource is fossil fuels with ratio 89.3% (31.9% natural gas, 26.7% oil, 16.6% coal, 14.1% lignite). Beside this we use 4.2% wood and waste, 4.1% hydraulic and 2.4% the other renewable energy sources.

In the directions of TUREB 2015 data, about 21% of our existing wind resource have established and can benefit. With recently attempts this ratio will rise to 37%, by the increasing of the entrepreneurs the goal is i to be able to meet the part of 3.3% electricity demand of the country completely from renewable wind energy power.

As you will see in Figure 4 this sector investment acceleration per year is giving hope. In our country, the installed wind power already was 51 MW in 2006, in July of 2015 (in 9 years) this value increased about 82.20%, that mean it has increased 82 times.

Conclusion

World demand for energy is increasing about 4-5% per year (Görez and Alkan, 2015). When take into account the world limited energy sources, as well as beginning the exhaustion of existing resources, environmental effects, pollution and climate changes; it's understanding the importance of wind energy utilization for environmental and presence of sources. The exhaustion of energy reserves in the world is about 200 years for coal, 65 years for natural gas, 40 years for oil but for wind it's endless (Güler, 2015). Energy is one of the most important input for economic and social development of a country. Population increase, industrialization combined with urbanization, as the results of globalization trade increased, depending on production focus demand for natural resources and energy increase every day. Turkey is also one of the country with high demand in energy sources. Between years 1990 - 2008 Turkey demand for primary energy sources was 3 times of the world average. In last 10 years period Turkey is a country where energy demand growth fastest within OCED countries. Likewise, the demand for electricity in Turkey since 2000with a growth rate 55.3% ranks third in the world after 174.8% for China and 56.8% for India (Yılmaz, 2012). It understands that our developing country, parallel with our growing economy, our increasing energy demand proportion per year is over than the world proportion.

For our country it's promising the proliferation of wind-sourced energy use, to prevent on increased dependence on external initiatives and the increasing acceleration of the wind energy industry. Our country didn't reach strictly designated objectives in installed power of wind energy due to periodic economic crises, but considering the facilities on current stage and the sectoral growth we see that we are closer to this goal and it's shows that we are committed for use wind energy and renewable resources in Turkey.

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