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TÜRKİYE'DE YEŞİL ENERJİ

Yeter DEMİR USLU*

Özet:

Dünyada olduğu gibi Türkiye'de de son yıllarda yenilenebilir enerji konusunda büyük atılımlar yapılmış olup hükümet tarafından gerekli kurum ve kuruluşlar yenilenebilir enerji konusunda araştırma yapmak ve projeler oluşturmak için desteklenmektedir.

Türkiye gerek coğrafi konumu gerekse akarsu zenginliklerinden dolayı yenilenebilir enerji potansiyeli bakımından oldukça zengin bir ülkedir. Akarsuları sayesinde hidroelektrik enerji potansiyeli olarak Dünya'da sayılı ülkelerden biri olan Türkiye, güneş, rüzgâr ve jeotermal enerji bakımından da önemli bir yer tutmaktadır.

Bu çalışmanın amacı, Türkiye'deki yeşil enerji potansiyelinin önemini ortaya koymak ve yeşil enerji çalışmaları ile beraber özellikle ekonomik anlamda yeşil enerji potansiyeli bulunan iller üzerindeki yenilenebilir enerjinin etkileri hakkında farkındalık oluşturmaktır.

Anahtar Kelimeler: Enerji Kaynakları, Yenilenebilir Enerji, Yeşil Enerji, Rüzgâr Enerjisi, Güneş Enerjisi.

JEL Kodu: Q42

GREEN ENERGY IN TURKEY

Abstract:

As in the world, Turkey has also improved the renewable energy backed by the government as well as supporting institutions and organizations which build a project and do research on renewable energy.

Turkey is a pretty rich country due to both stream wealth and geographical position. Turkey being known countries as hydroelectric energy potential in the world, owing to the streams has an important position in terms of solar, wind and geothermal power, too.

This study aims to emphasize the importance of green energy in Turkey and create awareness the impacts of renewable energy on provinces having green energy potential, especially in an economic sense with green energy studies.

Keywords: Energy resources, Renewable energy, Green energy, Wind power, Solar power.

* Doç.Dr. Giresun Üniversitesi, İİBF, İşletme Bölümü.

1. Green Energy

From past to present, notion of energy and sustainable energy resources are one of the important issues in the world. Rapidly the depletion of energy resources and insensibly the consumption of non-renewable sources such as petrol, coal and atomic energy and all of this sources' effects on environment and atmosphere lead people to use renewable energy sources (Külekçi, 2009; Özkan, 2016).

Renewable energy is usually defined as energy resources that can be mostly supplied above ground without needing any production process and do not come from fossil resources and are lower harm to environmental (Özkan, 2016) in contrast with conventional energy resources and can renew continuous kinesis and exist on earth at the ready (Adıyaman, 2012).

In other words, renewable energy is a type of energy obtained from flow of energy that exists on natural periods. In contrast with conventional energy sources, renewable resources provide a lot of environmental profits (Ata ve Öcal, 2014; Özkan, 2014).

When it is examined Turkey's energy profile, the concept of renewable energy sources has a highly important position. However, the use of renewable energy sources has quite low levels and these types of energy are not adequately interested. Particularly, the use of solar and wind power contribute substantially to Turkey's energy budget. The importance of plan, policies and strategy in order to benefit properly and healthfully from renewable energy resources gradually increases (Öztürel ve Ecevit, 2001). We can range the types of renewable energy producing energy in Turkey as solar energy, wind power, hydro-electric power and geothermal energy.

2. Solar Energy

Solar power is electromagnetic energy that comes constitutively from the sun. Sun is a plasmic energy resource that consists of 92 % hydrogen and 8 % helium and a trace of other some atom and elements. Plasma is one of the states of matter that electrons separate from nuclear because of ultra-high temperature (Yakıcı ve Pabuçcu, 2013).

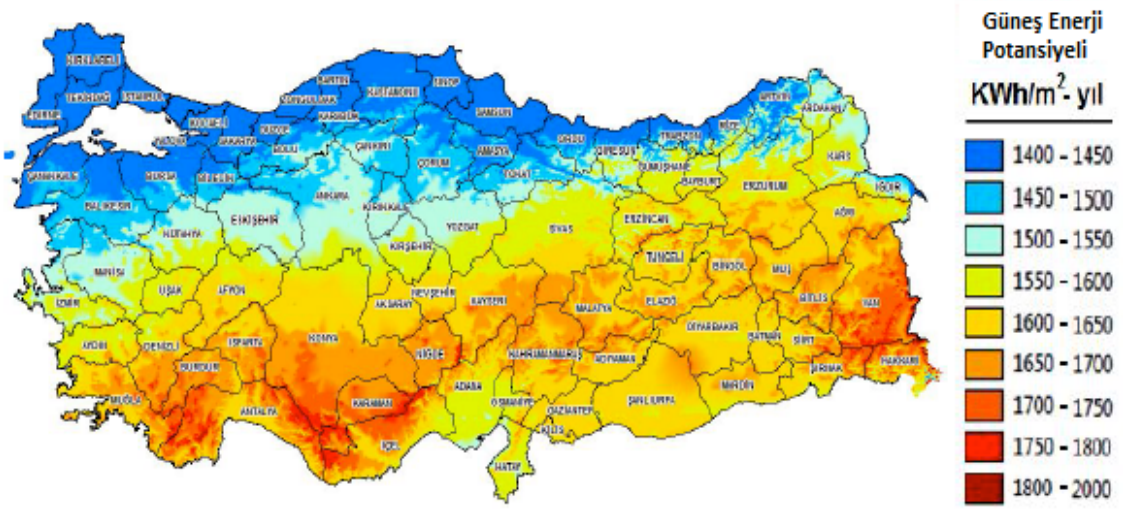

Photo-1: Turkey's Solar Energy Potential (Anonim, 2015a).

According to studies made by General Directorate, renewable energy is low levels in Black-Sea and Marmara regions in Turkey. Sunshine durations in Black Sea region (Özkan, 2014) vary approximately maximum between 8 and 10 hours in June

Even if Solar Power that is 1.168 KWh/m 2-years in Marmara region is under country average, it is a high rate in contrast with Europe. While sunshine durations in eastern Marmara region are average 10 hours, it can rise till 11 hours in İstanbul province. And also, the durations determine as 12 hours in Çanakkale and around..

According to a report studied by Ege University Institute of Energy, with regard to solar energy potential, İzmir is one of the most advantageous after the provinces in Mediterranean and southeastern Anatolia region (Anonim, 2012). While sunshine durations are till 12 hours in the region, utilization of durations from solar power rise (Anonim, 2015d).

Mediterranean that is one of the most advantageous regions of solar energy is determined as 13 hours. The region is at the southern, therefore, Mediterranean being one of the regions that solar radiation is the most intense is a crucial region for solar power. It is observed that is benefited from solar energy in the region, particularly in heating and greenhouse cultivation activities.

It is observed that both Mediterranean and southeastern Anatolia regions improve close rates. In contrast to the other regions, Mediterranean and southeastern Anatolia regions have markedly the advantage thus they separate easily. Consequently, it is anticipated that development policies about power generation produced from solar energy in Mediterranean region play an active role. According to the ministry of energy and natural resources' studies,

it is understood that average monthly sunshine duration is more than Turkey's average sunshine durations for each one month. When it is examined across the provinces, it is understood that only Hatay's sunshine duration in month of July and August is less than Turkey's average. However, it is seen that Kahramanmaraş and Osmaniye have more sunshine durations for one each month according to Turkey's average (Doğaka, 2014).

According to a report made by Serhat Development Agency (SERKA), Ağrı and Iğdır come into prominence in terms of solar power potential in the region. And also, it is stated that Both Ağrı with its solar radiation values and Iğdır with its long sunshine duration are pretty convenient for solar power investments. According to reviews, Iğdır's the average annual of Sunshine duration is 9.149. It is high than 7.49 which is Turkey's average annual sunshine duration. Moreover, it is determined that Iğdır's sunshine duration in the summer month increases above 12 hours and Ağrı has annual average 1700 kWh solar radiation values. Within this scope, the report says that it should be encouraged investments feasibility for power generation via photovoltaic panels and to be done feasibilities based upon greenhouse cultivations via solar power in these provinces and to popularize water heater system via solar energy throughout the region (Yeşil, 2015).

3. Wind Energy

Wind power consists of replacing air mass that has different heats. 1-2 % of Energy, which comes from sun to the world, converts into wind power. Taken into consideration Turkey's geographical features, it can be seen that Turkey is a rich country in terms of wind energy potential. In result of measurements made by meteorology, it is determined that southeastern Anatolia and the Marmara regions' wind power density is rather rich in contrast with other regions (Ata, 2010).

It is confirmed that Marmara region has maximum value with 3.29 m/sec and 51 W/m2 with regard to average annual wind speed and power density in 10 meter-high. On the other hand, Eastern Anatolia region has the lowest level with 2.12 m/sec speed and 13.19 W/m2 power densities. 11 certified wind farms that are above 50 W/m2 with not exceeding 20 W/m2 14 items and 15 items between 30-40W/m2 have been activated in Turkey in 2014.

Examined Wind power committee's power table, it is in evidence 41 % of power to intensify in Aegean region while wind power committee in Aegean region says that 40 % of power intensifies within İzmir provincial borders. This rate that corresponds to formed power 312, 4 MW, points out electric power production annual 826.500.000 kwh. Moreover, wind

electricity, acquired from Aegean region, is 2.000.000.000 kwh/year, and it is sufficient to supply İzmir's domestic-based electricity energy demand (Anonim, 2012).

In consideration of velocity distribution of wind power that the cities have in Southeastern Anatolian region, it is observed that Hatay is the most advantageous one in terms of wind power in that region.As a result of studies, it is confirmed Hatay's formed wind energy power as 216 MW. Futhermore, it is determined that Gökçedağ RES which has formed power 135 MW in Osmaniye, is third big wind energy switchboard of Turkey after Balıkesir RES that has formed power 143 MW and Soma RES that has formed power 141 MW (Doğaka, 2014).

Çanakkale's wind energy potential comes into prominence due to location in Marmara region. It is confirmed the total to be established power capacity in Çanakkale as 13.012. (Anonim, 2015b).

4. Hydro-Electric Power

Hydro-Electric switchboards (HPP) convert running water force into electricity. Water flow velocity or water flow arranges energy amount in running water. Running water which flows in a big river has vast amount of energy. Or, when water flows from a high point, it is acquired high amount of energy. In both ways, water, taken into the ducts or pipes, flows towards turbines, and it supplies to turn turbines that have column like a propeller for power generation. Turbines bases upon generators and they convert mechanical energy into power generation (Anonim, 2015c).

Table-1: Distribution by licensed businesses in the region and hydroelectric power plants Installed Capacity

	≤10 MW	10-50 MW	≥50MW	Toplam
Marmara Region	21	8	2	31
Aegean Region	13	9	4	26
Mediterranean Region	41	30	17	88
Central Anatolia Region	25	21	9	55

Black Sea Region	57	64	28	149
Eastern Anatolia Region	42	27	8	77
Southeastern Anatolia Region	8	9	7	24
Total	207	168	75	450

According to information taken from Energy Market Regulatory Authority, it can be seen in process of operation of HPP's energy power in Table-1. While Black-sea region is in the first place as region that produces more than energy 50 MW, Marmara region takes place last row. When we look at Sequences of HPP that produce low energy than 10 MW, Black-sea region ranks first. While Black-sea comes first in the number of HPP in the form of total operating, Mediterranean region comes second.

Table-2: Ongoing construction of the hydroelectric Distribution by Region and Council of Power

	≤10 MW	10-50 MW	≥50MW	Toplam
Marmara Region	168	83	86	337
Aegean Region	75	100	61	236
Mediterranean Region	88	67	48	203
Central Anatolia Region	94	60	33	187
Black Sea Region	186	157	53	396
Eastern Anatolia Region	99	68	34	201
Southeastern Anatolia Region	40	32	24	96
Total	750	567	339	1656

Statistical information in Table-2 that is acquired from Energy Market Regulatory Board shows that Black-sea region comes first in continuing HPP, while Marmara region comes second. When continuing HPP completes, 1656 HPP will have already begun energy generation.

There is among Turkey's 2023 targets to use overall potential for Hydroelectricity in energy generation. According to a report made by Turkish Electricity Transmission Corporation (TEIAŞ in Turkish), examined energy map in compliance with Turkey's formed hydraulic power, Although Hatay in Southeastern Anatolia region has under 100 MW formed hydraulic energy power, it can be shown that Kahramanmaraş ve Osmaniye have between 100 MW and 1000 MW formed hydraulic energy power. Accompanied by actualizing Hydraulic energy potential projects, it is anticipated that Hatay via HPP that produced the amount of electricity rises from 10 MW to 46 MW and Kahramanmaraş rises from 842 MW to 1.402 MW and Osmaniye rises from 774 MW to 844 MW. (Ayrancı, 2011).

5. Geothermal Energy

It is understood that Turkey being seventh of the world in terms of geothermal energy potential can supply whole electricity demand till 5 % and radiant density demand in heating till 30 %. (Doğaka, 2014).

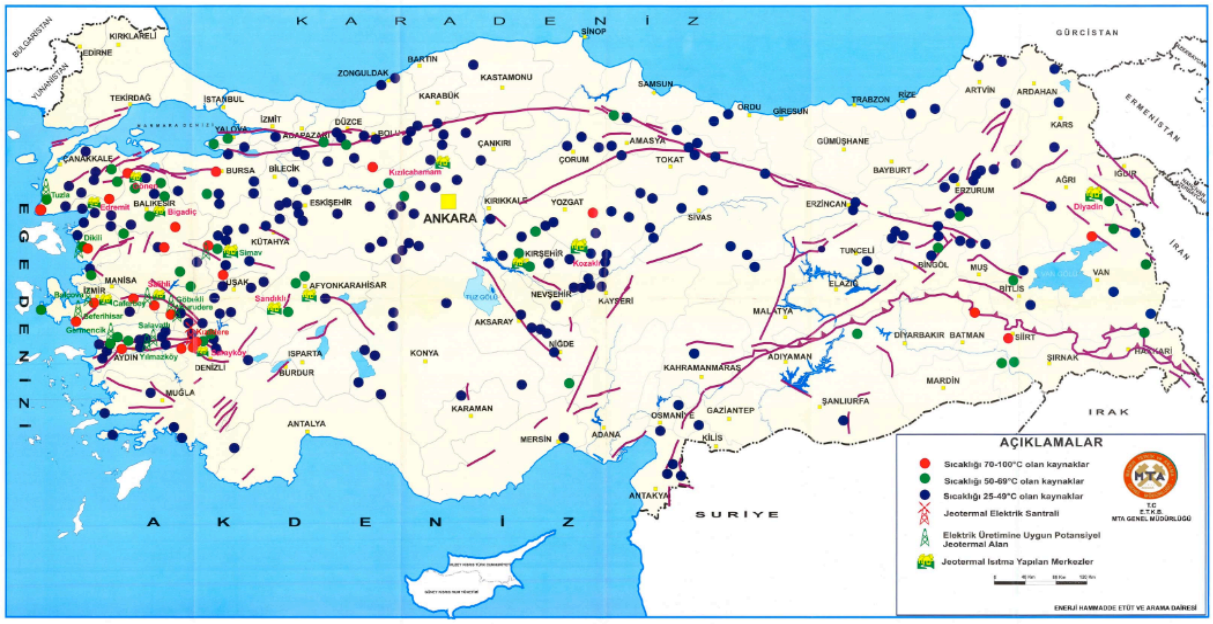

Photo -2: Turkey Geothermal Resource Distribution and Application Map,(Anonim, 2015a).

Examined Image-2, it is showed that geothermal energy resources have parallels with tectonic faults. Hence, it should be indicated that Aegean region is a crucial point in terms of geothermal energy. Particularly, İzmir has richest geothermal field of Turkey and Aegean region. Notably Balçova, the towns of Seferihisar, Çeşme, Dikili, Bergama, Aliağa and Bayındır are important geothermal fields (Anonim, 2012).

Conclusion

It is tried to determine the regions' current situation and important sub-regionals that constitutes renewable energy resources in the studies made by Development agencies and other institutions. In continuation of the these studies, it should be formed healthy and reliable data sets belonging to renewable energy resources and supplied the data sets continuity and updating. For instance; the measurements of renewable energy sources should be locally and uninterruptedly done and recorded. It should be realistically reviewed the regions' gross, technique and economical potential according to emerging technologies.

After it is created required awareness by way of being encouraged renewable energy investments, it will be supplied to get locals' electrical demand through a cheaper process and it will be a perfect example in Turkey those who will establish renewable energy coops. Moreover, it is considered that renewable energy switchboards' building and operating period plays an important role in employment and economy.

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