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Türkiye'nin Farklı Bölgelerdeki Güneş Enerjisi Potansiyelinin Analizi

Serenay EMİKÖNEL[1*], Ayşe KOCALMIŞ BİLHAN[2]

[1]Nevşehir Hacı Bektaş Veli Üniversitesi, Mühendislik Mimarlık Fakültesi, Elektrik Elektronik Mühendisliği Bölümü, 50200, Nevşehir
[2]Nevşehir Hacı Bektaş Veli Üniversitesi, Mühendislik Mimarlık Fakültesi, Elektrik Elektronik Mühendisliği Bölümü, 50200, Nevşehir

[1]https://orcid.org/0000-0002-2949-8397
[2]https://orcid.org/0000-0002-5008-6784
*Sorumlu yazar: serenayemikonel@gmail.com

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ÖZET

Günümüzde küresel enerji krizi ve artan çevre kirliliği ile birlikte enerjinin ülkelerin gelişmişlik düzeylerini belirlemede en temel faktörlerden biri olduğunu göstermektedir. Özellikle pandemi döneminde günlük hayatın her alanında enerjiye duyulan ihtiyaç ve teknolojik araçların kullanımının artması, enerji kaynaklarının ve enerji üretim sürecinin önemini bir kez daha göstermiştir. Son zamanlarda yapılan araştırmalar, enerji ihtiyacı ve çevre kirliliğinin giderek daha fazla ön plana çıkmasıyla, yenilenebilir enerji kaynaklarının tüm dünyada geleneksel enerji kaynaklarının (fosil yakıtlar) yerini aldığını göstermektedir. Yenilenebilir enerji kaynakları kullanılarak fosil yakıtların kullanımı sonucu açığa çıkan CO_2 gazının çevreye verdiği zararı en aza indirmek mümkündür. Güneş ve rüzgâr gibi doğal kaynaklardan elde edilen enerji, çevreye verilen zararı en aza indirmesi, tükenmez bir enerji fırsatı sağlaması ve temiz bir enerji kaynağı olması nedeniyle fosil yakıtlara kıyasla önemli bir yere sahiptir. Yenilenebilir enerji kaynaklarından biri olan güneş enerjisi, herhangi bir yakıt veya hareketli parça gerektirmemesi, kullanım sırasında atık madde üretmemesi, çevre dostu olması, bol ve ücretsiz olması nedeniyle oldukça tercih edilen bir enerji kaynağıdır. Türkiye'nin coğrafi konumu güneş enerjisi kuşağında yer almaktadır. Bu nedenle hemen her bölgede kurulabilecek bir güneş enerjisi santralinin bölgesel enerjiye veya ülke ekonomisine katkı sağlayabileceği öngörülebilir. Bu çalışmada Türkiye'nin yedi farklı bölgesinden seçilen Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir ve Amasya illeri için güneş enerjisi potansiyelleri araştırılmıştır. Araştırma sonuçlarına göre, farklı iklim koşullarında (kar, yağmur, bulut vb.) iller olsalar da benzer güneş radyasyon yoğunluklarının olduğu tespit edilmiştir. Bu da Türkiye'nin güneş enerjisi potansiyeli açısından ne kadar önemli olduğunu göstermektedir.

Analysis of Turkey's Solar Energy Potential in Different Regions

Research Article

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ABSTRACT

Today, with the global energy crisis and the increasing environmental pollution, it shows that energy is one of the most basic factors in determining the development level of countries. The need for energy in every field of daily life and the increase in the use of technological tools, especially during the pandemic, has shown one more time the importance of energy sources and the energy production process. Recent studies show that, as energy shortage and environmental pollution become increasingly prominent, renewable energy is replacing conventional energy resources (fossil fuels) all around the world. By using renewable energy sources it is possible to minimize the damage to the environment caused by the CO_2 gas released as a result of the use of fossil fuels. The energy obtained from natural sources

such as the sun and wind has an important place compared to fossil fuels, as it minimizes the damage to the environment, provides an inexhaustible energy opportunity and, is a clean energy source. Solar energy, which is one of the renewable energy sources, is a highly preferred energy source because it does not require any fuel or moving parts, does not produce waste material during use, is environmentally friendly, and is abundant and free. The geographical location of Turkey is located in the solar energy belt. For this reason, it can be foreseen that a solar power plant that can be established in almost every region can contribute to regional energy or contribute to the country's economy. In this study, solar energy potentials were investigated for the provinces of Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir, and Amasya, which were selected from seven different regions of Turkey. According to the results of the research, it has been determined that there are similar solar radiation intensities even if they are provinces in different climatic conditions (such as snow, rain, cloud, etc.). This shows how important Turkey is in terms of solar energy potential.

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Introduction

Nowadays, energy is one of the important factors which determine the level of developing countries (Taşkın and Korucu, 2014). The need for energy is increasing day by day due to reasons such as increasing population, industrialization, and pandemic (Şendemir, 2021). Many researches show that not only energy consumption is very important but also energy production is very important because of the use of energy in almost every aspect of our lives such as electronic vehicles, factories, electric cars, and street lighting in daily life (Kaya et al., 2018; Bilhan and Emikönel, 2021). Turkey which is one of the developing countries, the need for energy is increasing day by day (İzgeç, 2020). For this reason, many new renewable energy sources are developed and landed in many different areas.

As it is known, fossil fuels are widely used in energy production (Kaya et al., 2018). However, it also brings many negative consequences such as global warming, air pollution, formation of acid rain, and climate change caused by the CO_2 gas released by the use of fossil fuels (Dinçer, 2011; Atakul et al., 2015; Kılıç, 2015). However, it also brings back many negative outcomes such as global warming, air pollution, formation of acid rain, and climate change by the use of fossil fuels (Dinçer, 2011; Atakul et al., 2015; Kılıç, 2015). According to the prediction of many researchers and the World Energy Form, the limited reserves of fossil fuels will be exhausted in the next century due to the usage of coal, oil, natural gas, etc. in many areas (Kumar et al., 2010; Dinçer, 2011). In order to prevent the damage of fossil fuels to the environment and due to the limited fossil fuel resources, renewable energy sources have been more attractive in the last 50 years (Eltas, 2020; Bilhan and Emikönel, 2021).

The biggest advantage of renewable energy, it consists of natural processes and is available the next day (Kocakuşak, 2018; http://yegmweb.yegm.gov.tr/genc_cocuk/Yenilenebilir_Enerji_Nedir.aspx, 2021). The most popular renewable energy sources are hydro, sunlight, wind, biomass, geothermal, and hydrogen. Also, it is focused on the energy which is produced by the wave in recent studies (Yaman et al., 2019; Albayrak Karadağ, 2020).

Solar energy, which is one of the popular renewable energy sources, has an important place in energy production all over the world (Bilhan and Emikönel, 2021). Sun is an energy resource that basically consists of 92 % hydrogen and 8 % helium and some other elements. The fusion reaction occurs as a result of the conversion of hydrogen gas in the core of the Sun into helium gas. The radiant energy released by the formation of the fusion reaction is solar energy (İnan et al., 2018; https://enerji.gov.tr/bilgi-merkezi-enerji-gunes, 2021). In other words, the energy reflected from the sun on the 1 m^2 surface of the Earth in watts is solar energy (Bilhan and Emikönel, 2021). The intensity of solar energy outside the atmosphere is approximately 1370 W/m^2, but the amount reaching the earth varies between 0-1100 W/m^2 due to the atmosphere (Yolcan and Köse, 2020; https://enerji.gov.tr/bilgi-merkezi-enerji-gunes, 2021). According to the International Energy Agency (IEA), the solar energy which comes from the sun to earth in 90 minutes is enough to meet the energy need of the whole world for a year (Kılıç, 2015). This type of energy, which is obtained naturally during the hours of the sun, has started to be preferred in almost every field due to its unlimited nature and being an inexhaustible resource for centuries (Bulut et al., 2018; Eltas, 2020). The solar energy source has an important place in world energy demand. The International Energy Agency estimates that approximately 11% of global electrical energy production will be provided by solar energy in 2050 (Dinçer, 2011; Kırbaş et al., 2013).

In this study, the sunshine duration and solar radiation intensities of the provinces of Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir, and Amasya, which we selected from seven different regions, were examined in accordance with the data obtained from the Ministry of Energy and Natural Resources to give information about the solar energy potential of our country. There are many studies on solar energy potential in the literature such as Çakmak and Altaş examined the solar energy data obtained from four different sources for the province of Erzincan in their study. Also in their study, the solar energy potentials of Erzincan and Germany were compared. As a result of the study, it was concluded that the province of Erzincan has a higher solar energy potential than Germany and that much more energy can be produced if the PV plants established in Germany are installed in Erzincan (Çakmak and Altaş, 2016). Aksungur et al. investigated the solar energy potential in Turkey and the world in their study and examined and compared the radiation intensities of the provinces of Isparta, Ankara, Erzincan, Birecik, Balıkesir, Yozgat, Yalova, which they selected from different regions of our country in the sunbelt. As a result of their research, they determined that there is not a big difference between the radiation values (Aksungur et al., 2013).

Solar Energy Potential in Turkey

Turkey is located between 26^0–45^0 east meridians with 36^0–42^0 northern parallels and has a surface area of 783,562 km^2. Turkey has a high solar energy potential because of its geographical location. Figure 1 shows Turkey's Solar Radiation Map created by the General Directorate of Renewable Energy (YEGM, 2020). In figure 1, the cities that can benefit the most from solar radiation are shown

in light and dark red colors, and the cities that can benefit from the least amount of solar radiation are shown in light and dark blue colors.

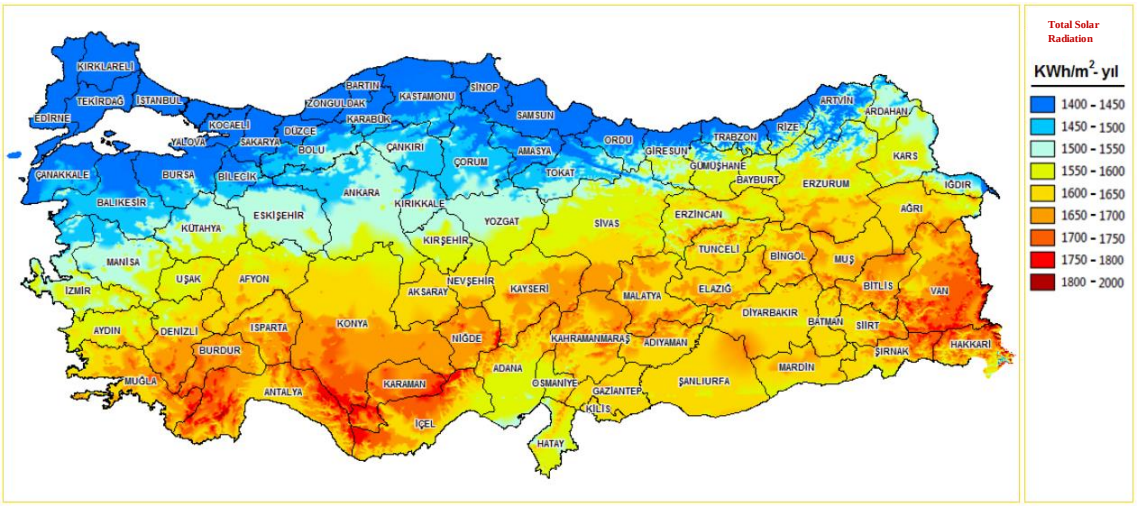
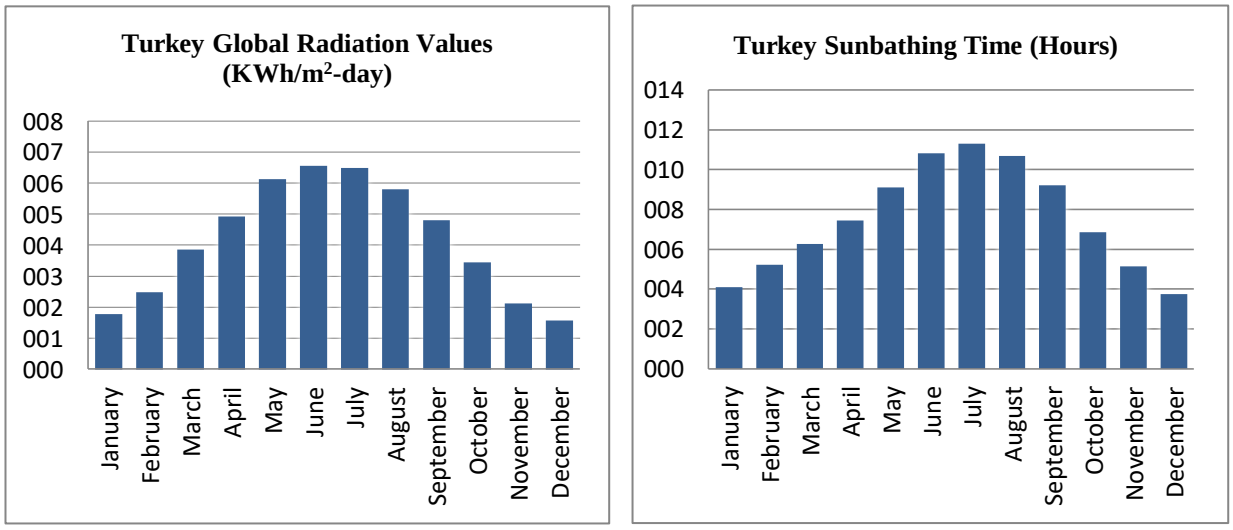


Figure 1. Turkey's Solar Energy Potential Atlas (GEPA)



(a) (b)

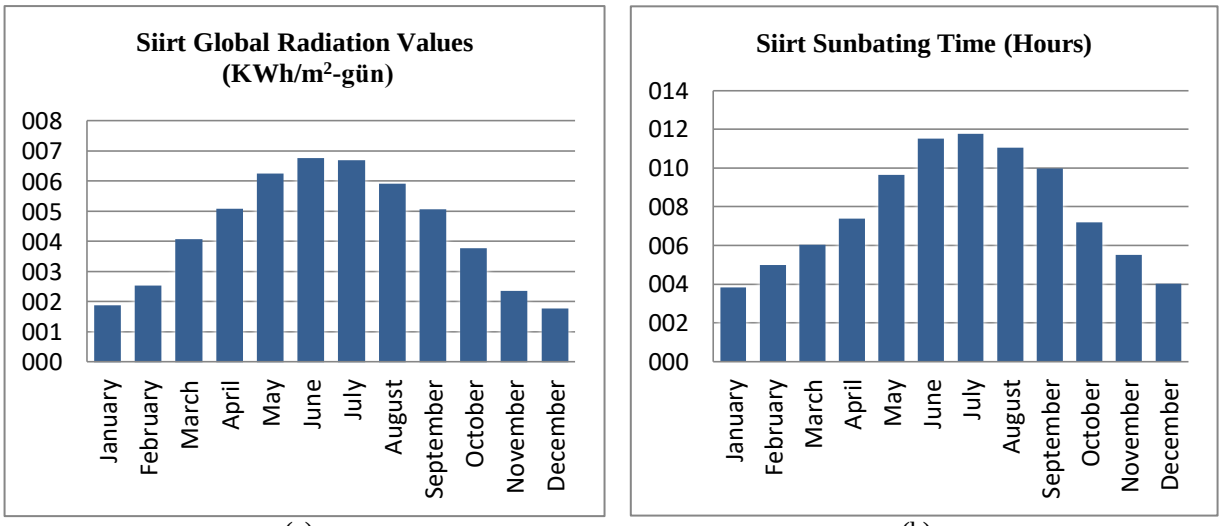
Figure 2. (a) Turkey's global radiation values (KWh/m^2-day), (b) sunbathing duration (hours)

The average daily global radiation values on a monthly basis and the average monthly sunshine duration of Turkey are represented in Figure 2 (a) and (b), respectively (YEGM, 2020). In Fig. 2 (a), it is observed that the global radiation value reaches its highest value in June with 6.57 KWh/m^2-day. The average daily radiation intensity of Turkey on a monthly basis is 4.18 KWh/m^2-day and the annual average total is 1524.18 kWh/m^2-year (4.18x365) global radiation values. In Fig. 2 (b), it can be observed as while the highest sunshine duration was 11.31 hours in July, the lowest sunshine duration was 3.75 hours in December. Turkey's average daily sunshine duration on a monthly basis is 7.49 hours-days and it has an annual average total of 2736.89 hours-years (7.49x365) sunshine duration. Considering all these data, it is seen that Turkey has high solar energy potential.

Solar Energy Potentials of Provinces Selected from Seven Different Regions of Turkey

Siirt Province

The highest solar energy potential among the Regions of Turkey is the South-eastern Anatolia Region. The solar energy obtained from this region, where the sunbeam comes at a right angle most of the year, is 1460 KWh/m^2-year. The annual sunshine duration of the South-eastern Anatolia Region is 2993 hours (https://www.incitas.com.tr/bilgi-merkezi/blog/turkiyede-gunes-enerjisi-potansiyeli, 2021). The average global radiation values and sunshine durations on a monthly basis for the province of Siirt where is located in the Southeastern Anatolia Region are given in Figure 3 (a) and (b), respectively (YEGM, 2020). Fig. 3 (a) shows the highest radiation intensity is 6.78 KWh/m^2-day in June and the lowest radiation intensity is 1.79 KWh/m^2-day in December. Also, the monthly average sunshine duration of Siirt have been shown in Fig. 3 (b), too. As it can be seen from it, the highest value is 11.78 hours in July and the lowest value is 3.84 hours in January.



(a) (b)

Figure 3. (a) Monthly global radiation values (KWh/m^2-day), (b) Monthly sunbathing durations (hours) in Siirt

It can be deduced from Figure 3 (a) and (b) that Siirt province has an annual average total of 2833 hours of sunshine and an annual average total of 1595 KWh/m^2-year radiation intensity. Considering these values, Siirt is in an important position among the places where its solar energy potential will benefit from solar energy (Bulut et al., 2018).

Adana Province

The Mediterranean Region is the second region with the highest radiation intensity in Turkey. In this region where the number of sunny days is high, the solar energy obtained is 1390 KWh/m^2-year and the total sunshine duration in a year is 2956 hours (https://www.incitas.com.tr/bilgi-merkezi/blog/turkiyede-gunes-enerjisi-potansiyeli, 2021)

The average global radiation values and sunshine durations on a monthly basis for the province of Adana where is located in the Mediterranean Region are given in Figure 4 (a) and (b), respectively (YEGM, 2020). Fig. 4 (a) shows the highest radiation intensity is 6.68 KWh/m^2-day in June and the lowest radiation intensity is 1.81 KWh/m^2-day in December. Also, the monthly average sunshine duration of Adana have been shown in Fig. 4 (b), too. In figure 4 (b), the sunshine duration of Adana province has the lowest sunshine duration with 4.21 hours in December, it reaches the highest value with 11.77 hours in July.

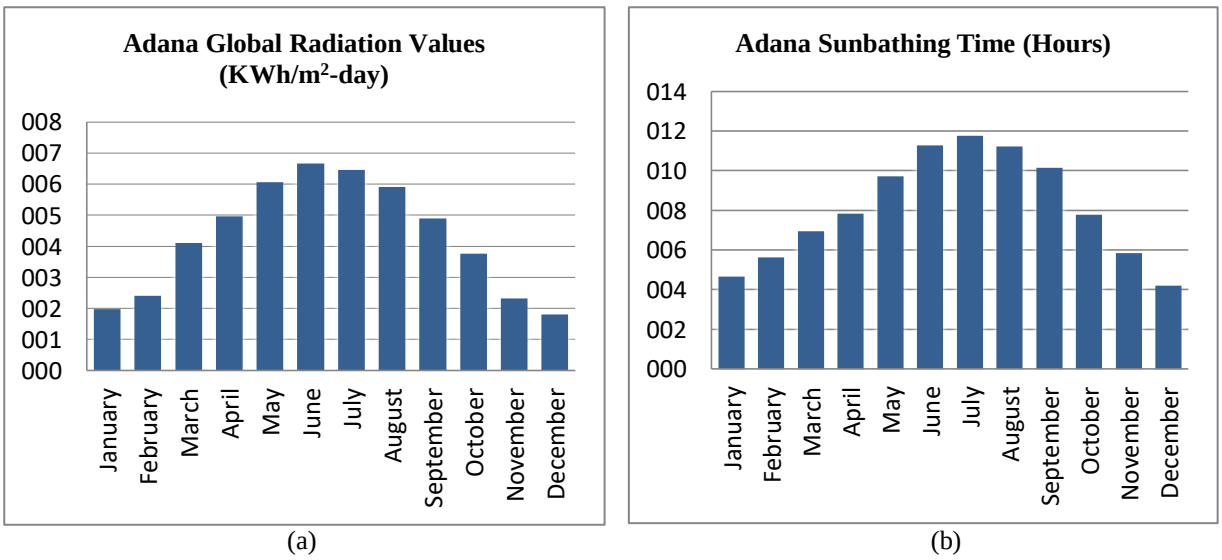
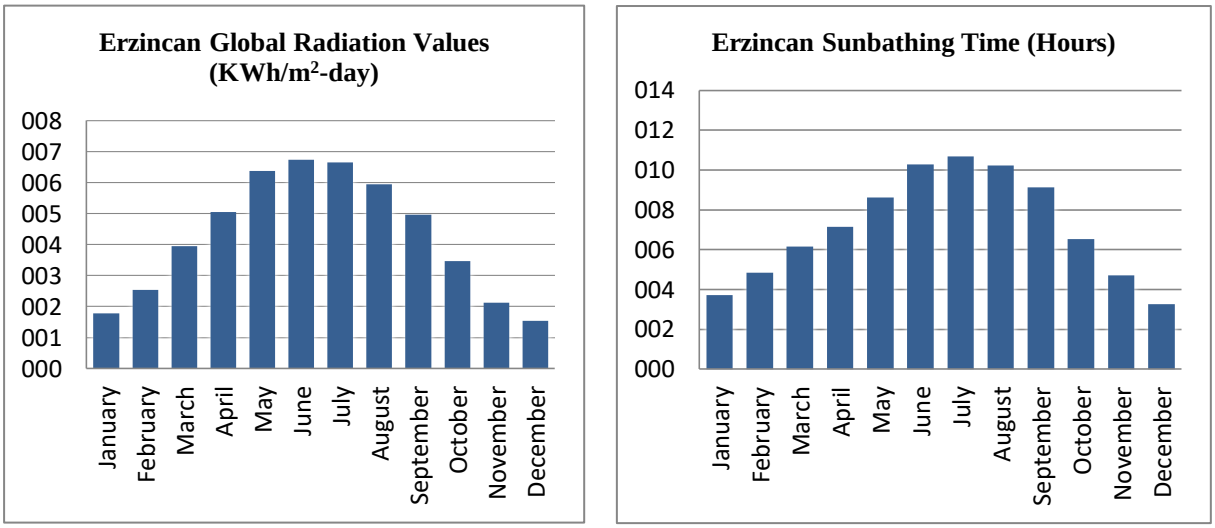


Figure 4. (a) Monthly global radiation values (KWh/m^2-day), (b) Monthly sunbathing durations (hours) in Adana

Adana has an annual average total of 2958 hours of sunshine and an annual average total of 1568 KWh/m^2-year radiation intensity. This shows that it has high solar energy potential.

Erzincan Province

The Eastern Anatolia Region is one of the regions with high radiation intensity. It has an annual average radiation intensity of 1365 KWh/m^2-year and an average annual sunshine duration of 2664 hours. The average global radiation values and sunshine durations on a monthly basis for the province of Erzincan where is located in the Eastern Anatolia Region are given in Figure 5 (a) and (b), respectively (YEGM, 2020). Fig. 5 (a) shows the highest radiation intensity is 6.37 KWh/m^2-day in June and the lowest radiation intensity is 1.55 KWh/m^2-day in December. As it is seen in Fig. 2 (b), the sunshine duration has a minimum of 3.27 hours in December, it reaches a maximum value of 10.67 hours in July.



(a) (b)

Figure 5. (a) Monthly global radiation values (KWh/m^2-day), (b) Monthly sunbathing durations (hours) in Erzincan

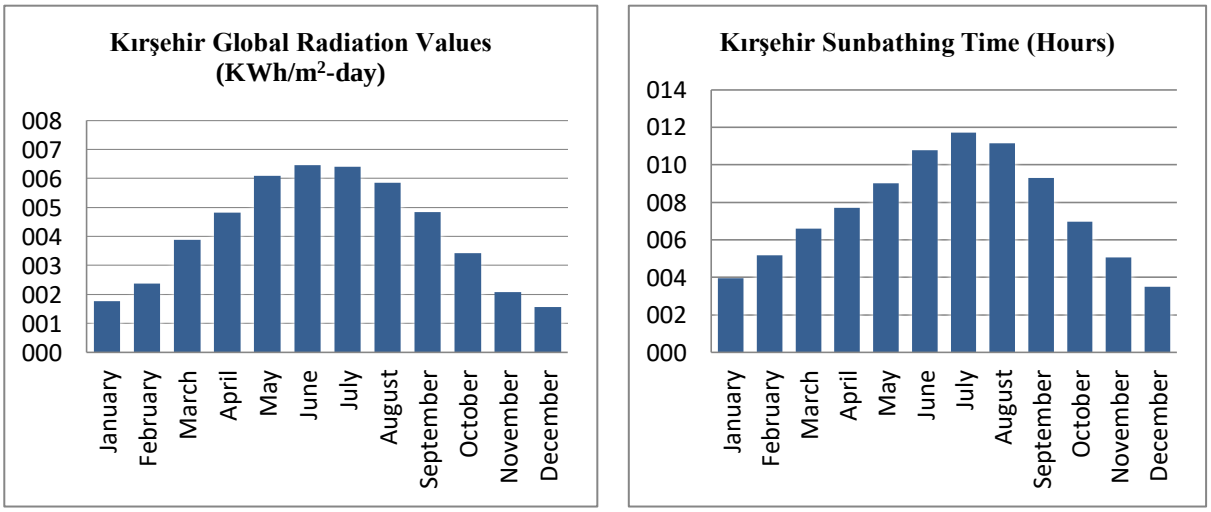
The Erzincan has an annual average total sunshine duration of 2598 hours and an annual average total global radiation value of 1558.84 KWh/m^2-year. The province of Erzincan experiences a longer and hotter summer season compared to the surrounding provinces (Çakmak and Altaş, 2016). This means that Erzincan can benefit from more sun during the summer months.

Kırşehir Province

The Central Anatolia Region is the fourth region with high solar energy potential (https://www.powerenerji.com/turkiye-gunes-enerjisi-potansiyel-haritasi-bolge-il-guneslenme-sureleri.html, 2021). The solar energy obtained in this region is 1314 KWh/m2-year and the annual sunshine duration is 2628 hours.

The monthly average global radiation values and monthly average sunshine durations for the Kırşehir, which is are given in Figure 6 (a) and (b), respectively (YEGM, 2020). When the data in the Fig 6 (a) is examined, it has the highest radiation value with 6.47 KWh/m^2-day in June, while it has the least radiation value with 1.58 KWh/m^2-day in December. Considering the monthly sunshine duration of Kırşehir province in the Fig. 6 (b), July has the highest sunshine duration with 11.73 hours, while December has the least sunshine duration with 3.51 hours.

Kırşehir province has an annual average total of 2773 hours of sunshine and an annual average total of 1513 KWh/m2-year global radiation value. The one-year sunshine duration of Kırşehir province is above the one-year average total sunshine duration of Turkey.

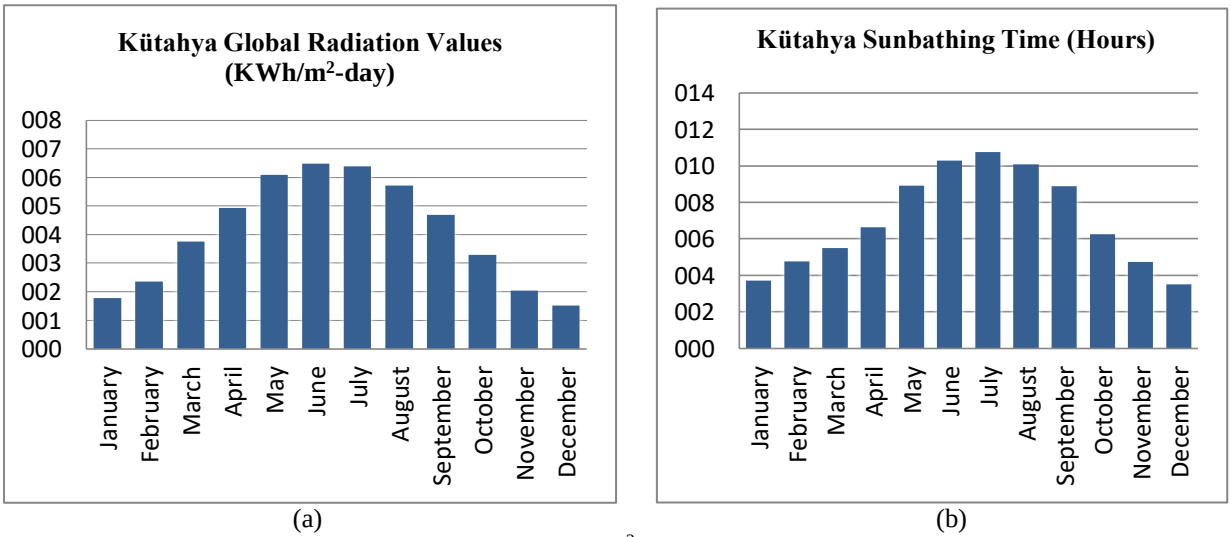


(a) (b)

Figure 6. (a) Monthly global radiation values (KWh/m^2-day), (b) Monthly sunbathing durations (hours) in Kırşehir

Kütahya Province

The Aegean Region ranks fifth in the solar energy potential ranking in Turkey. The Aegean Region has an annual average radiation intensity of 1304 KWh/m^2-year. The total sunshine duration in one year is 2738 hours. This is almost equivalent to the Turkey's average sunshine duration. The monthly average global radiation values and monthly average sunshine durations for the Kütahya in the Aegean Region are given in Figure 7 (a) and (b) (YEGM, 2020). Looking at the monthly average global radiation values of Kütahya in the Fig. 7 (a), it is determined that the highest radiation intensity is 6.48 KWh/m^2-day in June and the lowest radiation intensity is 1.51 KWh/m^2-day in December. In Fig. 7 (b), when the sunshine durations are examined, the highest value was 10.77 hours in July and the lowest value was 3.51 hours in December. The annual average total sunshine duration in Kütahya province is 2562 hours and the annual average total is 1493 KWh/m^2-year global radiation value

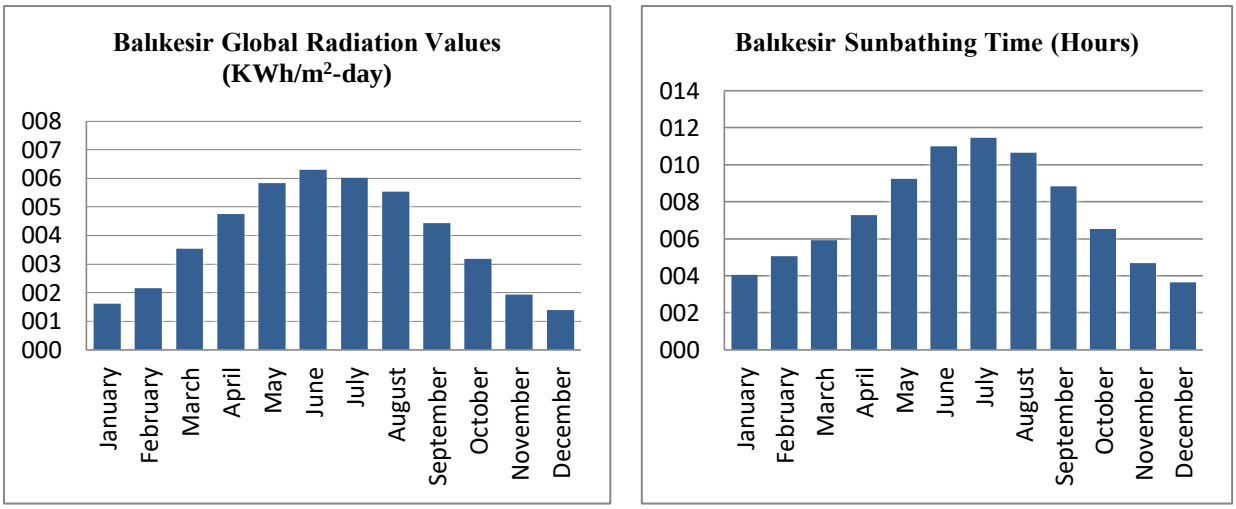


(a) (b)

Figure 7. (a) Monthly global radiation values (KWh/m^2-day), (b) Monthly sunbathing durations (hours) in Kütahya

Balıkesir Province

The solar energy obtained in the Marmara Region is 1168 KWh/m^2-year and the annual sunshine duration is 2409 hours. The average daily sunshine duration of Marmara Region is less than Aegean Region and is more than Black Sea Region.



(a) (b)

Figure 8. (a) Monthly global radiation values (KWh/m^2-day), (b) Monthly sunbathing durations (hours) in Balıkesir

Fig. 8 (a) and (b) show the monthly average global radiation values and monthly average sunshine durations for Balıkesir in the Marmara Region, respectively (YEGM, 2020). Fig. 8 (a) shows that the monthly average global radiation values of Balıkesir has the highest radiation value with 6.29 KWh/m^2-day in June and the least radiation value with 1.39 KWh/m^2-day in December. The monthly average sunshine durations of Balıkesir reaches a minimum in December and a maximum in July as shown in Fig. 8 (b).

Balıkesir has an annual average total of 2690 hours of sunshine and an annual average total of 1421 KWh/m^2-year radiation intensity.

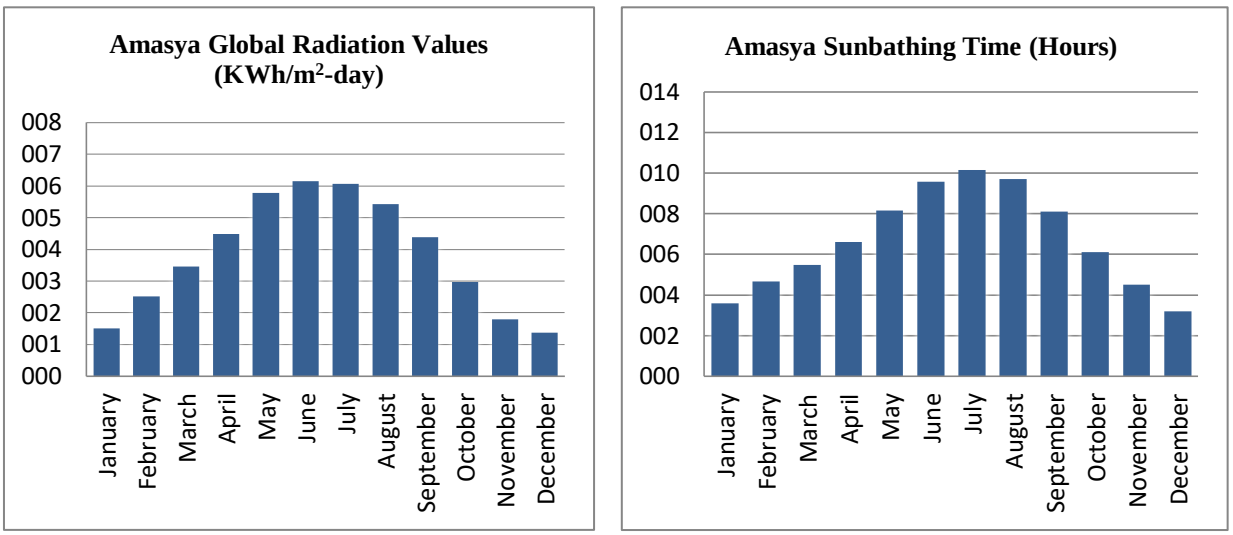
Amasya Province

The Black Sea Region has the lowest monthly average global radiation values. The Black Sea Region has an average annual radiation intensity of 1120 KWh/m^2-year. The total sunshine duration in one year is 1971 hours. Due to its geographical location, the number of sunny days is low in this region where the amount of precipitation is high (Bulut et al., 2018; Doğanay, 2021).Therefore, the region where we can benefit least from solar energy is the Black Sea Region (Bulut et al., 2018).

Figure 9 (a) and (b) show the monthly average global radiation values and monthly average sunshine durations for the Amasya in the Black (YEGM, 2020). When the Fig. 9 (a) is examined, it is observed that the radiation intensity of Amasya is the highest in June with a value of 6.14 KWh/m^2-day, and the lowest in December with a value of 1.36. In the Fig. 9 (b), it is seen that while Amasya has the

minimum sunshine duration in December with 3.19 hours, it reaches the maximum sunshine duration in June with 10.14 hours.

It is observed that Amasya has an annual average total of 2431 hours of sunbathing time and an annual average total of 1396 KWh/m2-year global radiation value. According to these values, Amasya is more fortunate than many other provinces in the region due to its geographical location (Kaynar, 2020). Ranking fourth in the region in terms of sunshine duration, Amasya reveals that it is the most suitable place to benefit from solar energy in the region (Kaynar, 2020).



(a) (b)

Figure 9. (a) Monthly global radiation values (KWh/m^2-day), (b) Monthly sunbathing durations (hours) in Amasya

The radiation intensities and sunshine durations of the regions are summarized in Table 1 (https://www.powerenerji.com/turkiye-gunes-enerjisi-potansiyel-haritasi-bolge-il-guneslenme-sureleri.html, 2021). In Turkey, which is located in the sun belt, the solar energy potential decreases as we go from south to north (Doğanay, 2021). As it is seen from all Figures, the Southeast Anatolia Region has the highest solar energy potential and the Black Sea region has the least solar energy potential. This is because the Southeastern Anatolia Region is closer to the equatorial region and the Black Sea Region is the farthest from the equatorial region (Taşova, 2018).

Table 1. Radiation Intensities and Sunbathing Durations

Regions of Turkey	Radiation Intensities (KWh/m^2-year)	Sunbathing Duration (hour/year)
The South-Eastern Anatolia Region	1460	2993
The Mediterranean Region	1390	2956
The Eastern Anatolia Region	1365	2664
The Central Anatolia Region	1314	2628
The Aegean Region	1304	2738
The Marmara Region	1168	2409
The Black Sea Region	1120	1971

In Table 2, the radiation intensities and sunshine durations of the provinces of Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir and Amasya, which are selected from seven different regions of Turkey, are summarized from the most irradiated to the least area. It is seen that the provinces in different regions have radiation intensities close to each other, even if they have different climatic conditions. This shows how important Turkey is in terms of solar energy potential. It can be predicted that a solar power plant that can be established in every region can contribute to regional energy or the national economy.

Table 2. Radiation Intensities and Sunbathing Durations of Province

Province	Radiation Intensities (KWh/m^2-year)	Sunbathing Duration (hour/year)
Siirt	1595	2833
Adana	1568	2958
Erzincan	1558	2598
Kırşehir	1513	2773
Kütahya	1493	2562
Balıkesir	1421	2690
Amasya	1396	2431

Result and Discussion

Turkey's solar energy potential is quite high due to its geographical location and location in the sunbelt. In this study, it is aimed to reveal the importance of solar energy and to give detailed information about the solar energy potential of Turkey. For this purpose, provinces (Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir and Amasya) were randomly selected from seven different regions of Turkey.

In Table 3, the monthly global radiation values (KWh/m^2-day) and monthly sunshine duration (hours) of Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir and Amasya are listed. All monthly values are shown in Figure 10 and Figure 11, respectively. In Figure 10 and 11, the x-axis shows the months as a

number such as 1 is for January, 2 is for February, 12 is for December. In Figure 10, the y-axis shows global radiation values. In Figure 11, the y-axis shows monthly sunbathing durations by hours.

Table 3. Radiation Intensities and Sunbathing Durations for all Province

	Global Radiation Values (KWh/m^2-day)						
	Siirt	Adana	Erzincan	Kırşehir	Kütahya	Balıkesir	Adana
January	1.89	1.98	1.78	1.78	1.77	1.61	1.50
February	2.54	2.42	2.54	2.38	2.36	2.15	2.51
March	4.09	4.12	3.95	3.89	3.75	3.54	3.45
April	5.10	4.98	5.05	4.83	4.93	4.75	4.48
May	6.27	6.07	6.37	6.09	6.08	5.83	5.78
June	6.78	6.68	6.74	6.47	6.48	6.29	6.14
July	6.71	6.46	6.65	6.42	6.38	6.01	6.07
August	5.93	5.91	5.95	5.85	5.72	5.53	5.42
September	5.07	4.90	4.96	4.84	4.69	4.42	4.38
October	3.79	3.78	3.47	3.43	3.28	3.18	2.97
November	2.37	2.33	2.13	2.08	2.04	1.93	1.78
December	1.79	1.81	1.55	1.58	1.51	1.39	1.36
	Monthly Sunbathing Durations (Hours)						
January	3.84	4.67	3.73	3.97	3.71	4.05	3.57
February	5.00	5.65	4.85	5.18	4.78	5.05	4.65
March	6.04	6.97	6.15	6.61	5.50	5.92	5.48
April	7.38	7.84	7.14	7.72	6.65	7.26	6.60
May	9.64	9.72	8.63	9.02	8.91	9.23	8.16
June	11.52	11.29	10.29	10.78	10.29	10.99	9.58
July	11.78	11.77	10.67	11.73	10.77	11.44	10.14
August	11.07	11.22	10.23	11.15	10.09	10.65	9.70
September	9.99	10.15	9.12	9.32	8.90	8.84	8.11
October	7.19	7.78	6.52	6.98	6.26	6.53	6.11
November	5.53	5.86	4.71	5.07	4.75	4.69	4.51
December	4.02	4.21	3.21	3.51	3.51	3.64	3.19

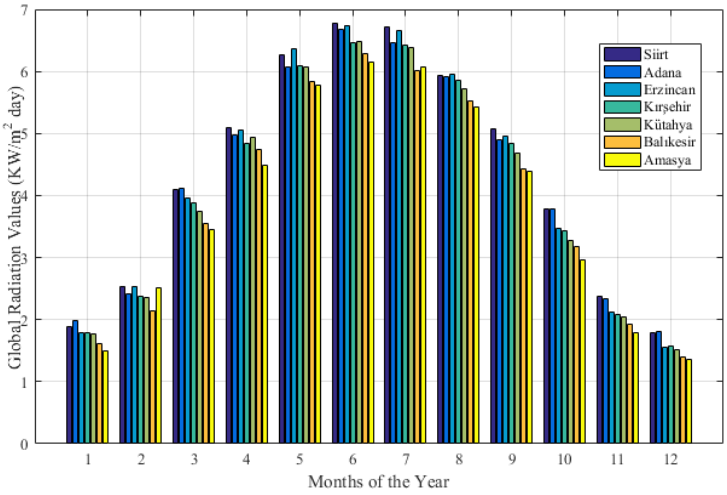


Figure 10. Monthly global radiation values (KWh/m2-day) of Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir and Amasya

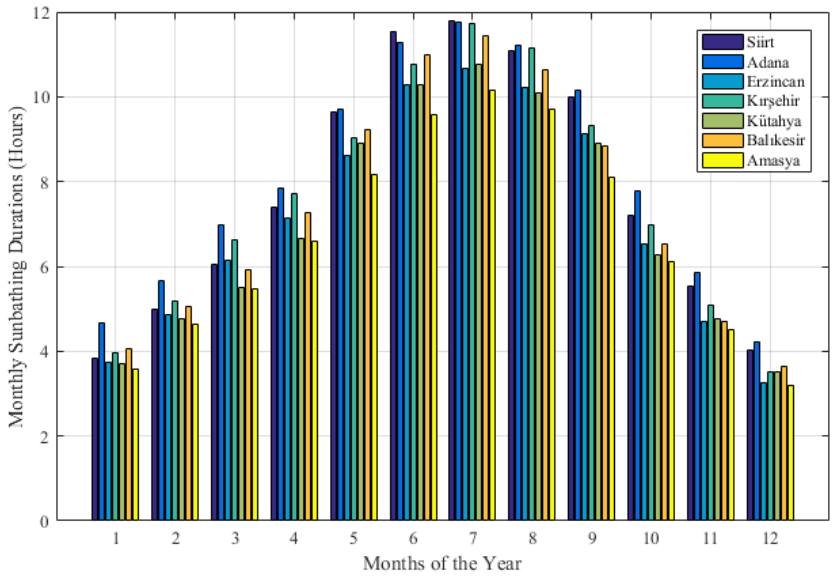


Figure 11. Monthly sunbathing durations (hours) of Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir and Amasya

Conclusion

The increasing air pollution and fewness of fossil fuel sources have increased the interest in new environmentally friendly sources such as renewable energy sources. Solar energy is a type of energy obtained from natural sources and also it is ecofriendly. It is important to get best benefit with use of this type of energy, which provides unlimited energy. Turkey is located in the sun belt due to its geographical location. So, it has a very high solar energy potential according to many other countries. Turkey has an average daily radiation intensity of 4.18 KWh/m^2-day on a monthly basis and an annual average total of 1524.18 KWh/m^2-year (4.18x365) global radiation value. The average daily sunshine duration of Turkey on a monthly basis is 7.49 hours-days and has an annual average total of 2736.89 hours-years (7.49x365). Also, the solar energy potential increases as from north to south. The Southeastern Anatolia Region, where the sun's rays are the most, is in the first place among the regions that will benefit most from solar energy. Then Mediterranean Region where the number of sunny days is high comes in second place. Then Eastern Anatolia Region, Central Anatolia Region, Aegean Region, Marmara Region and Black Sea Region come, respectively.

In this study, not only has given more detailed information about the solar energy potential of Turkey, but also solar energy potentials of Siirt, Adana, Erzincan, Kırşehir, Kütahya, Balıkesir and Amasya were investigated and compared. Datas which were selected for seven different regions obtained from the Ministry of Energy and Natural Resources were used in this study. According to the result of the research, radiation intensities in all provinces are close to each other. However climatic conditions (such as snow, rain, etc.), landforms, floras are different from each other. These features indicate Turkey’s unique structure. Although Turkey has a high solar energy potential, other factors are effective in utilizing solar energy, too. Considering Turkey's radiation potential along with all these

factors, it can be predicted how a solar power plant that can be established in every region can contribute to regional energy or the economy of the country. In future studies, it is planned to examine the establishment of a solar power plant and grid connection in a suitable region with using the information in this article.

Statement of Conflict of Interest

Authors have declared no conflict of interest.

Author's Contributions

The contribution of the authors is equal.

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