



Turkey: Solar Power Market in Turkey

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Solar Energy in Turkey

Turkey's geographical location is considerably more favorable in terms of solar energy potential, placing it well ahead many countries in the solar energy market. According to the Renewable Energy General Directorate and the State Meteorology Affairs General Directorate, Turkey's average annual total sunshine duration is 2640 hours; a total of 7.2 hours per day, with an average total radiation intensity of 1.311 kWh/m² – years, (daily total 3.6kWh/m²). Turkey has the incredible potential to produce an average of 1.100kWh per square meter, if the necessary investments are made on solar energy plants. This makes Turkey the 2nd best country in Europe after Spain in terms of solar power investment potential.



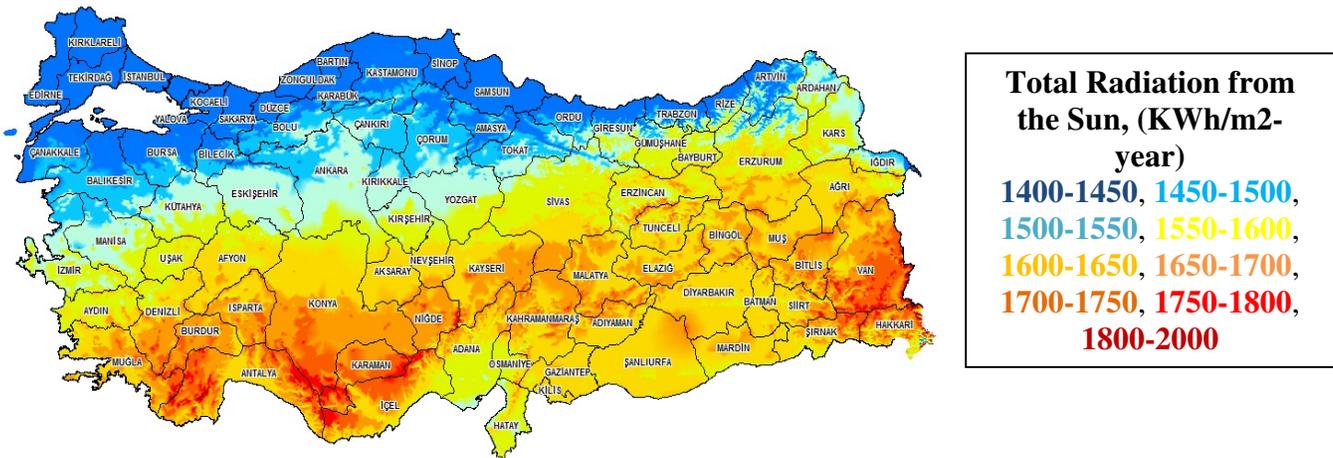
It's the right timing for Turkey as grid scale solar licenses will be issued by the end of this year and most of the solar investments in total of 600 MW must be completed by 2015 to be able to receive the fixed feed-in tariff of \$13.3 cents per kWh. However, other companies may show interest for projects 1 MW or under as these type of projects does not require any license. This threshold limit is expected to be increased to 2 MW and maybe up to 5 MW over the years. For licensed investments, Turkish Government may increase the 600 MW limit to higher values with longer time periods depending on the market conditions.

\$13.3 cents may look too low but with the local production incentives this can go up to approximately 20 cents per kWh. Especially with the current taxes and surcharges on electricity, the current electricity bills paid to the electricity distribution companies come up to approximately 20 cents per kWh delivered to the end-users. Through net-metering solar power generation still makes sense as Turkey is the second best country in Europe in solar intensity and potential capacity.

Monthly average solar energy values in Turkey

Turkey's most efficient months to produce solar energy are June, July, and August. The least efficient months are November, December, and January. In terms of solar energy potential, the Southeastern Anatolia and Mediterranean Regions hold the most potential for Turkey. Central Anatolia's large region of flat lands is another highly profitable area for solar power investments. If we exclude the Black Sea Region, Turkey can produce 1.100 kWh per square meter from an average of 2640 hours of sun light. Accordingly, the total amount of potential energy per year is approximately 1.015 kW hours.

Statistics show that solar radiation in Turkey is 112.74 kcal/cm² and 1311.00 kWh/m² per year. In terms of solar radiation averages, 308.0 cal/cm²-day, 3.6 kWh/m²-day can be produced from an average sunshine duration of 7.2 hours/day.



Potential Regions for Solar Energy in Turkey:

According to regional solar energy evaluations, the South Eastern Anatolia Region has the highest solar energy potential and Mediterranean Region has the second highest solar energy potential for Turkey. Three provinces in West Mediterranean Region also have very appropriate values in terms of solar energy investments.

General Distribution of Solar Energy Potential of Turkey

Region	Total Solar Radiation	Sunshine Duration
Southeastern Anatolia	1460	2993
Mediterranean	1390	2956
East Anatolia	1365	2664
Central Anatolia	1314	2628
Aegean	1304	2738
Marmara	1168	2109
Black Sea	1120	1971

A Major Potential Market: Turkey

Although Turkey has the 2nd best major potential market in Europe after Spain, not much solar energy utilization occurred so far except some implementations of traffic signals, wireless base stations and solar heat installations in particular in the Southern parts of the country. There is no grid type installations occurred so far. The first implementations in small scales less than 1 MW have started. Unlicensed applications for solar power are growing.

However, there is an increasing interest in the Turkish private sector in particular for the manufacturing and installation of solar panels, thin film and concentrated solar. This interest increased especially after the amendment to the renewable energy law that became effective at the end of 2010, which provides additional feed-in tariff incentives for local manufacturing. The Law No. 6094 specifies 13.3 Dollar cents per kWh of electricity supplied from solar power generation as the feed-in tariff no matter where the equipment is supplied from.

The Ministry of Energy defined 121 substation locations in 27 provinces in the country's south and eastern regions, where different types of developers plan to build in total 600 megawatts in solar parks, a document http://www.enerji.gov.tr/duyurular/Gunes_Enerjisi_Duyurusu.pdf on its website shows. The paper sets the maximum capacity allowed in each area and where it can be connected to the grid.

The document with the chosen regions and the connection points is an important step towards the distribution of licenses for solar energy. The licensing process for projects as large as 50 megawatts has been started by EMRA. Once the process completed, licensees will need to make quick decisions on the technology, find financing and implement the projects, starting probably from the beginning of next year.

The renewable energy law states that the regulator will seek competitive bids with discounts to the existing incentive rates if more than one company applies for the permits in one region.

Turkey guarantees prices of 13.3 U.S. cents per kilowatt- hour for photovoltaic energy in the next 10 years and provides additional incentives for the use of local equipment.

In June 2013, EMRA accepted applications for license for these 121 locations. While applications for license for total of 600 MW solar power installations are being considered, a total of 8,900 MW applications for 496 licenses were made. When we consider, some companies have applied for a number of locations, most of the applications coincide with each other. Majority of the applicants were Turkish firms and some were foreign firms. Companies and for which locations they applied are listed in the EMRA web site. EMRA has sent the applications to the Renewable Energy General Directorate (REGD), which will ask companies to complete their missing documentation. Once these documents are completed, REGD will send those applications coinciding with more than one application per location to TEIAS, which will do a tender to decide on the winner.

Experts believe a total of \$650 million of investments in solar power is expected in Turkey until the end of 2015.

Any parts manufactured and supplied locally will receive additional incentives as specified in the table below.

Table II (Annex to Law No. 6094 dated December 29, 2010)		
Type of Plant	Manufacturing Made in the Country	Additional Local Content Incentive (US Dollar Cent/kWh)
C- Photovoltaic Solar Power Generation Facility	1- PV panel integration and production of solar structural mechanics	0,8
	2- PV modules	1,3
	3- Cells composing the PV module	3,5
	4- Inverter	0,6
	5- Equipment focusing the sunlight on PV module	0,5
D- Concentrated Solar Power (CSP) Generation Facility	1- Radiation collection tube	2,4
	2- Reflective surface panel	0,6
	3- Solar tracking system	0,6
	4- Mechanical equipment for thermal energy storage system	1,3
	5- Mechanical equipment of steam generation system that accumulates sunlight on the tower	2,4
	6- Stirling engine	1,3
	7- Panel integration and structural mechanics of solar panel	0,6

New Regulations New Opportunities:

Two important regulations can be found in EMRA's web site of www.emra.gov.tr. One is related to the certification and support of renewable energy power generation without requirement of a license. The first one regulates the methodology of certifying renewable energy resources. Each renewable energy company must receive a Renewable Energy Resource (YEK) certificate to be able to benefit from the incentives provided by the Renewable Energy Law. Application for YEK certificate must be made one year before until October 31st. Such applications are evaluated until November 30th and announced in the web site of the energy regulator EMRA (Energy Market Regulatory Agency). Renewable Energy Power Generation facilities can benefit from the law incentives for 10 years if they come into operation until December 31, 2015. This means they obtain power purchase guarantee for 10 years at the rates specified in the law from the electricity distribution company where the facility is located.

The second important regulation is the terms and conditions of power generation investments without a license if the renewable energy or cogeneration facility is lower than 1 MW installed capacity. This permission is only provided for renewable energy and/or micro cogeneration facilities as well as cogeneration plants that will supply electricity and steam for the subject company's own use.

Under the subject regulation, companies or real persons are exempt from establishing special purpose companies to be active in renewable energy power generation and/or cogeneration if the facilities are less than 1 MW. Cogeneration facilities are included as specified in the energy efficiency law. Each consumer facility can only have one renewable energy or one cogeneration or one micro cogeneration facility. However, if there is enough capacity in the distribution grid, more than one facility can be

permitted as long as the total capacity doesn't exceed 1 MW. Power generation and consumption must be at the same grid area.

More than one real person or company as electricity consumers can get together and establish such power generation facilities for their own use. Grid connection applications are made directly to the regional electricity distribution company directly. For any electricity fed into the grid or received from the grid, such eligible company or real persons pay grid usage fees to the distribution company.

To be able to benefit from this regulation, facilities should be established to supply electricity for their own consumption. However, any extra energy can be consumed in other facilities of the consumer person or the company, or bought by the regional distribution company through metering at the hourly prices set at the Market Finance Reconciliation Center (PMUM). PMUM will soon turn into EPIAS, which is a new company being established under the recently passed electricity law for the purpose of establishing an electricity and natural gas trading market. 30% of the shares of EPIAS will belong to TEIAS, 30% to Borsa Istanbul, 30% to private sector and 10% to a strategic partner.

Resources: *Cakmak Law Firm, EIE, EMRA, West Mediterranean Development Agency, Gas & Power Magazine*

For More Information:

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