

A Study of Solar Energy Production in Turkey, Incentives, Solar Power Plant Installation Cost and Solar Energy Production Investment Return: A Case Study of Tarsus District, Mersin Province

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Abstract

This study aims to provide information about solar energy investments in Turkey and the determination of 5MW solar power plant is to calculate the amount of investment and return on investment. Installation costs of solar energy plants as investment vehicles are explained with tables. The study was based on the data of a real business on the Mersin (İçel) province.

Key Words: Renewable Energy, Energy Economy, Sustainable Environment, Energy Investment

1. Introduction

Throughout history, Energy has become an indispensable means of consumption. Despite the decline seen in fossil fuels in recent years, the increase in energy demand, the inability to store electricity, and the environmental changes have brought about the search for alternative energy sources (Güçlü, 2008).

In order to prevent the effects of global warming; effective energy management policies as well as the evaluation of renewable energy sources (Bayraç, 2011).

In Turkey, it is observed that solar energy power plants have become aware in recent years in parallel with technological developments. The fact that Turkey is one of the countries with the best sunlight position in the world and it brings the chance of being able to benefit much more than solar energy. From this point of view, solar energy is antagonistic as an alternative energy source in Turkey in the future.

According to data from the energy ministry (www.enerji.gov.tr), end of in 2016. In Turkey 34 large solar power plants, total installed capacity of 402 MW and preliminary license 2 solar power plant with installed capacity of 12.9 MW are given. By the end of 2016, with the establishment of unlicensed power generation plants, the number of solar power plants is seen as 1,043, the installed power of these power plants is 819,6 MW and the total installed power together with 2 licensed solar energy power plants reached 832.5 MW. Along with the completed power plants, electricity consumption is highest at noon. The average price is charged by the price of 2 times the daily energy price. Solar energy is responsible for 5.92% of this electricity consumption with completed plants.

We can say that 60-70% of the energy needed by the solar power plants in the 25-30 thousand MW power can only be met by the sunlight in order to get rid of the intensity during the noon hours.

Table 1 below shows the production of licensed electricity from solar energy between July 2015 and May 2017. The increase in investment amounts and the high level of the previous year are striking. When we compare April 2017 with the previous year, April 2016, we can say that production has increased about 4 times. When examined again, it is observed that the production has increased since the spring months, and the production has fallen from autumn to November.

Production in 2015 was 194 GWh, and in 2016 it was 1020 GWh. The growth was 5.5 times more. This growth continues in 2017 as well. Production in the first 5 months of 2017 is nearing the total production in 2016.

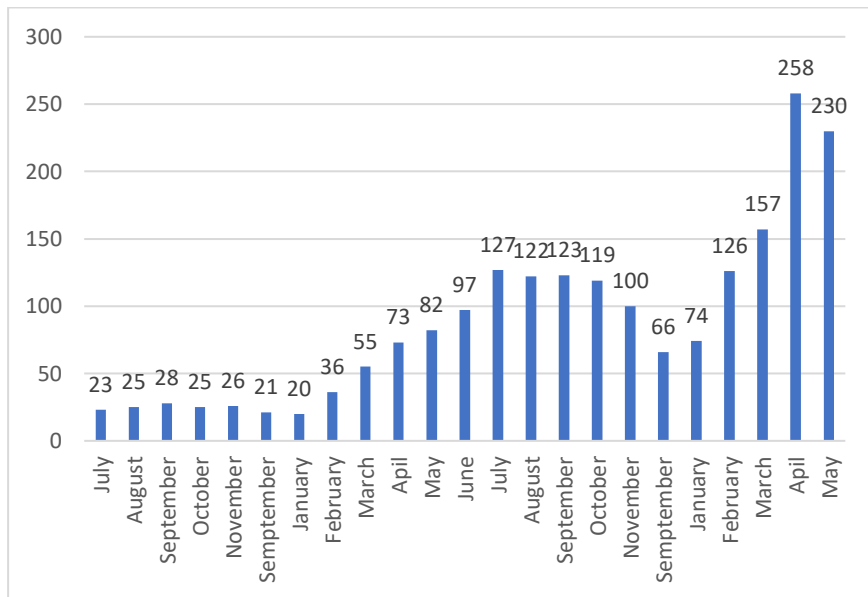


Figure 1. Monthly Solar Energy Production Amount (www.enerji.gov.tr)

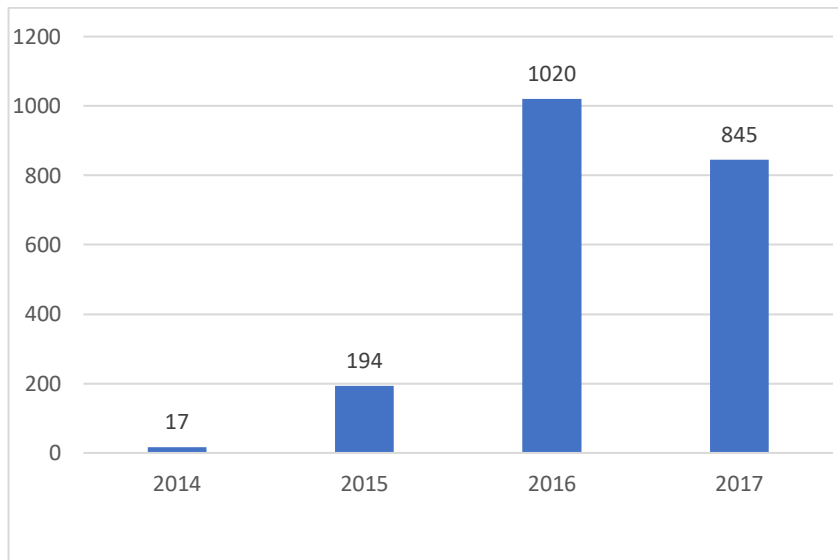


Figure 2. Solar Energy Annual Production / 2017 Year Covers only January-May Period (www.enerji.gov.tr)

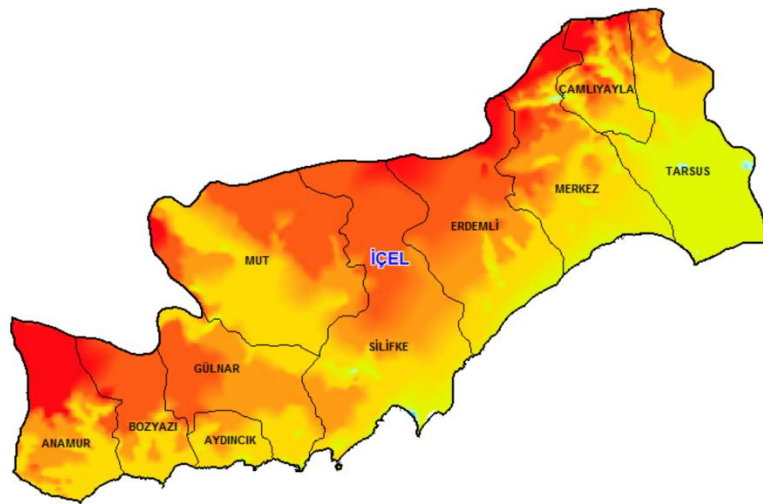


Figure 3. Mersin Solar Map

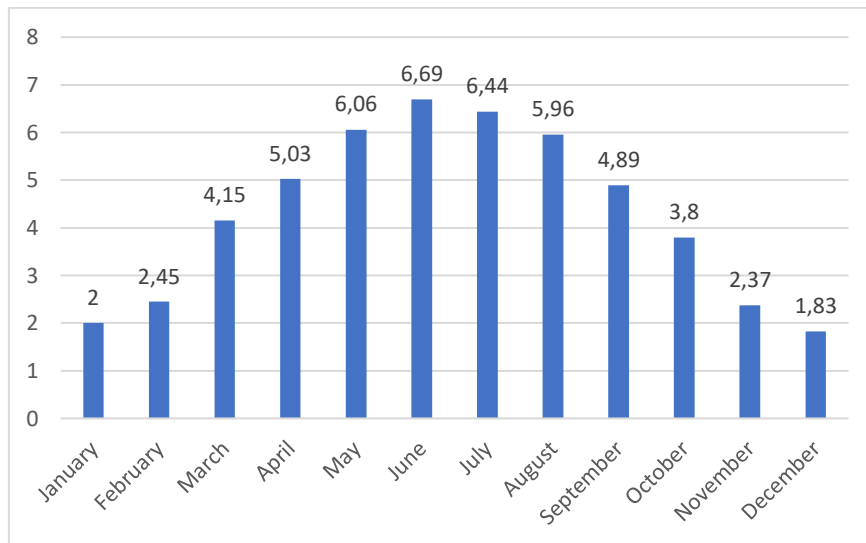


Figure 4. Tarsus Global Radiation Values (KWh / m²-day) (www.enerji.gov.tr)

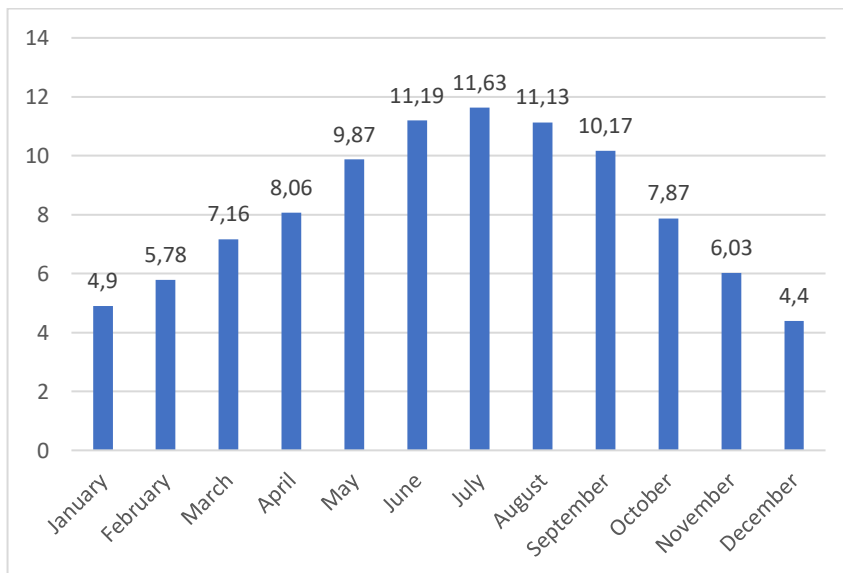


Figure 5. Tarsus Sunrise Times (Hours)

2. Materials

2.1. Incentives

Increasing renewable energy investments in recent years, largely to keep the agenda in Turkey. Government incentives, falling production costs, direct investors towards renewable energy production.

Renewable energy incentives are gaining momentum in the second quarter of 2018, and it is expected that renewable energy incentive loans and renewable energy grant schemes will make a major contribution to sector investors, especially to small and medium investors. Through the promotion of Turkey Ministry of Economy, you may receive tax and customs exemptions. You can also take advantage of insurance discounts and machine equipment tax exemptions in personnel employment.

There is the " Intelligent Energy Europe Program " (IEE), which is supported by the European Union energy fund to increase energy efficiency, to use alternative energy sources, to use biomass energy, to catch EU standards (www.ab.gov.tr).

TurSEFF bank loans that are available in Turkey. The interest rates of TurSEFF renewable energy loans are more appropriate than the interest rates of other loans (www.turseff.org).

Technology Development Foundation of Turkey develop the existing potential of the business with the support of the international market and aims to increase innovation and competitiveness in technological terms. The lower limit of the grant is \$ 100,000 and the maximum grant amount is \$ 1,000,000 (www.ttg.gov.tr).

With 26 development agencies in Turkey can be obtained grants and interest-free loans.

The R & D innovation and industrial application support program provided by KOSGEB can help grants and credits mobilize to develop products and services to meet market expectations. Technology investment support is also a grant and credit program contributing to the production of SMEs with innovation.

2.2. Cost of Installation

The economic life of the installed solar power plants is calculated as 10 years. Installation costs are taken from a private company.

Mounting System: 115.000

Inverter: 55.000

Data Logger: 1.200

Other (Transportation, Insurance, Security, Administrative Building, Regulation, Warning Signs, Temporary Admission Expenses: 60.000

Construction-Panel Assembly: 22.000

Electrical Workmanship: 22,000

Transformer and Distribution Centers: 25.000

DC Solar Cable: 15.500

AC Grounding Panels: 17,000

Trafos: 11.500

AC / LV Table (1x150NYY): 15.500

AC / AG Table (1x50 XLPE): 4.300

AC / LV Table (5x25 NYY): 4.200

AC / AG Table (1x95 XLPE): 2.500

Wire Double: 120,000

SCADA System: 7.000

Compensation Board: 3.500

Photovoltaic Panel: 450,000

Engineering Studies, Project Management and General Expenses: 55,000

Total: 1.006.200

2.3. Income

Power to be calculated: 1mWh

Number of Panel: 4000 pieces x 250 watts polycrystalline

The study is based on radiation values Turkey's Tarsus district of Mersin province, one of the highest places. The average radiation value of the Tarsus district is 8.18 hours / day.

Monthly return calculation is as follows (www.powerenerji.com).

Table 1. 1 MW Solar power plant project monthly - Annual capital calculation

1 MW Solar Power Plant Project Monthly - Annual Capital Calculation				
Months	Kw Produced	Sales Amount \$/cent	Total \$/cent	Income \$
January	84.404,75	13,3	13,3	11.225,83
February	90.379,55	13,3	13,3	12.020,48
March	126.350,73	13,3	13,3	16.804,65
April	142.149,38	13,3	13,3	18.905,87
May	187.308,71	13,3	13,3	24.912,06
June	209.889,71	13,3	13,3	27.915,33
July	234.888,90	13,3	13,3	31.240,22
August	226.094,71	13,3	13,3	30.070,60
September	189.522,02	13,3	13,3	25.206,43
October	148.167,86	13,3	13,3	19.706,33
November	104.882,20	13,3	13,3	13.949,33
December	77.031,90	13,3	13,3	10.245,24
Total	1.821.070,43	13,3	13,3	242.202,37

3. Result

When Turkey's solar energy potential is complimented with, as well as many other world countries, legal regulations, when the producers and users of encouraging initiatives undertaken, photovoltaic technology investment and usage in Turkey will be more widespread.

In this study, solar energy plant installation costs are shown. Explanation of how to get support during installation is explained and the return of investment is shown with tables.

In the following years, it is expected that the installation costs will be further reduced and the investment income will become even more profitable.

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