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Use of the Renewable Energy Resources in Turkey

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Abstract: Today, the biggest problem that concerns the whole world is the production of healthy and reliable energy. Fossil fuels are the most widely used energy sources. The use of fossil resources causes the accumulation of greenhouse gases in the atmosphere and, as a result, climate change. Global warming caused by climate change is causing great harm to our world. In order to minimize this damage, it is necessary to minimize the use of fossil fuels in energy production and to replace them with renewable energy sources. Solar, wind, geothermal, hydraulic, biomass, biogas, wave, current and tidal renewables are non-fossil energy sources. Turkey is in a very rich geographical position in terms of renewable energy sources. In this study, using of renewable energy sources in Turkey were investigated. Turkey's installed capacity of renewable energy when the data are analyzed; with the largest share of hydroelectric energy at 26681.1 MW followed by 5751.3 MW of wind energy, 832.5 MW of solar energy, 820.9 MW of geothermal energy and finally 488.7 MW of biomass energy.

Keywords: Renewable energy sources, Use of the renewable energy in Turkey

Introduction

With the continuous increase of the world population, energy needs are also increasing. In meeting the energy needs, the use of resources such as oil, coal, causes irreversible damage to the atmosphere. In addition, considering that these resources are running out quickly, we are looking for energy sources that have low and sustainable effects on the atmosphere. To meet the energy needs of countries, except for fossil fuels, renewable energy sources; solar energy, hydraulic energy, wind energy, biomass energy and geothermal energy are also used in electricity production.

In Turkey, population growth, economic development and improving living standards along with energy demand is increasing day by day.

Renewable Energy Potential in Turkey

Turkey is rich in renewable energy sources because of its geographical location. However, the use of renewable energy sources in Turkey remains far below its current potential. Renewable energy is very important in terms of reducing dependence on exports, using sustainable energy and reducing environmental damage. The use of renewable energy sources in electricity production increases every year, but the amount of use remains very low compared to the current potential.

In recent years, important developments have been made in the use of renewable energy resources in Turkey. In the first half of 2018, the installed power reached 87.139 MW. Figure 1 shows the distribution of the installed power by resources in the first half of 2018. In this way, the installed power is 32.0%, hydraulic energy, 26.4%, natural gas, 21.4%, coal, 7.7%, wind, 5.4%, solar, 1.3%, geothermal and 5.8% other resources. In addition, the number of electrical energy generation plants in our country rose to 6.886 (including unlicensed plants) as of the

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first half of 2018. 636 of the existing power plants are hydroelectric, 41 of coal, 232 of wind, 40 of geothermal, 303 of natural gas, 5.422 of solar, 212 of other welded power plants (<http://www.enerji.gov.tr/tr-TR/Sayfalar/Elektrik>).

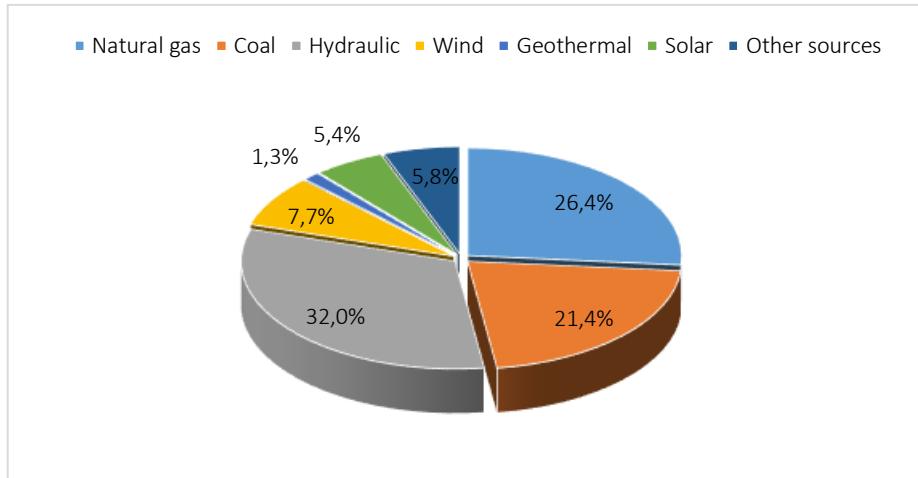


Figure 1. Distribution of the installed power by resources in the first half of 2018. (<http://www.enerji.gov.tr>)

Solar Energy

Solar energy is one of the most common renewable energy sources in the world. Solar energy can be used in many areas such as hot water production, heating, cooking, electricity production. However, the production of electricity from solar energy has not become widespread since it has a high cost.

The use of photovoltaic panels is more expensive than fossil fuel, and only 0.04 percent of the solar energy coming to the Earth is used by people (Mohtasham, 2015).

Because of its geographical location, Turkey has high solar energy potential. According to the solar energy potential Atlas of Turkey (GEPA) prepared by the Ministry of Energy, the total solar energy per year is 2,737 hours (daily total is 5 hours), the total solar energy per year is 1,527 kWh/m² (daily total is 4,2 kWh/m²) (<http://www.enerji.gov.tr/tr-TR/Sayfalar/Gunes>). Solar energy is used to produce more hot water in Turkey, but in recent years it has increased its use for electricity generation.

As of the end of 2017, total installed solar collector area has reached 20.000.000 m² and it has been determined that 823,000 TEP (tons equivalent petroleum) heat energy produces. In 2017, 2.9 billion kWh of solar energy was produced. As of the end of June 2018, total PV solar power plant installed power of 4,703 MW without license and 23 MW with license in Turkey is 4,726 MW (<http://www.enerji.gov.tr/tr-TR/Sayfalar/Gunes>).

Geothermal Energy

Geothermal energy is a type of energy derived from hot water, steam and gases collected in various parts of the Earth's crust, and is a cost-effective and environmentally-friendly renewable energy source. Turkey is located in a region where this renewable energy resource is widespread due to its geographical location. According to calculations made by the General Directorate of Mineral Research and exploration (MTA), Turkey has a total thermal potential of 31500 MW (<http://www.mta.gov.tr/v3.0/arastirmalar/jeotermal-enerji-arastirmalari>).

Geothermal energy in Turkey has shown an important improvement over the years. The installed power was 17.5 MW in 2002 and reached 1144 MW as of June 2018 (<http://www.enerji.gov.tr/tr-TR/Sayfalar/Jeotermal>).

Hydraulic Power

Hydraulic energy is a type of energy obtained by the flow and drop speed of water. In other words, hydraulic energy is obtained by converting water energy into electrical energy. Hydraulic energy is the most widely used

renewable energy source worldwide because it is more advantageous in terms of cost compared to other renewable energy types (Karagöl and Kavaz, 2017).

The installed capacity of hydraulic energy, which was 11175 MW in 2000 in Turkey, reached 27912 MW by the end of June 2018 (<http://www.enerji.gov.tr/tr-TR/Sayfalar/Hidrolik>).

Wind Energy

Turkey is a country surrounded by three sides of the sea because of the potential of wind energy is very important. Wind energy is a renewable energy source that is used to generate electricity. Turkey's wind power installed power capacity of 59 MW in 2006 reached 6671 MW levels by the end of June 2018 (<http://www.enerji.gov.tr/tr-TR/Sayfalar/Ruzgar>).

Biomass Energy

In recent years, bioenergy production has continued to increase in some countries in line with energy demand and environmental objectives. Biomass energy, which is used in many fields such as heating, energy and transportation, constitutes 14 percent of the total energy consumed on earth. This ratio, 4 percent of processed vegetable oils with hydrogen, 22 percent biodiesel fuels and 74 percent of ethanol fuels constitute (Renewables 2016 Global Status Report).

The use of biomass energy in Turkey, which has been increasing day by day, consists of traditional techniques such as heating and cooking in general. Biomass energy, which has high potential throughout the country, is more backward in terms of use than other renewable energy types (Karagöl and Kavaz, 2017).

1.610 GWh electricity production was carried out by the end of June 2018 from biomass-based power plants with a total installed power of 695 MW in the plant (<http://www.enerji.gov.tr/tr-TR/Sayfalar/Biyokutle>).

Results and Discussion

The best way to make use of renewable energy sources in Turkey is by geographical location. For this reason, the incentives and legal regulations necessary to increase the use of renewable energy resources should be extended and continued.

In Figure 1, according to the data of the General Directorate of renewable energy, renewable energy potential and installed power chart were given until 2016.



Figure 2. Renewable energy installed capacity in Turkey (Karagöl and Kavaz, 2017)

Figure 2 shows the datas of the renewable energy in Turkey. The largest share of installed power is in hydraulic energy with the value of 26681.1 MW, followed by wind energy with 5751.3 MW, solar energy with 832.5 MW, 820.9 MW geothermal energy and biomass energy with 488.7 MW.

Turkey needs foreign technology in its renewable energy investments and such investments are burdensome in terms of cost. In order to prevent this, local production of technical equipment used in the field of renewable energy should be encouraged and supported by the state. In this respect, local production of renewable energy equipment, especially wind turbines and solar panels, should be used.

80% of the energy consumed in homes is spent on heating. For this reason, solar architecture should be applied with importance, first of all, starting from major cities in the newly constructed buildings, City and development plans of buildings in accordance with the design and construction of the solar architecture insulation should be given great importance. Architectural features that provide energy savings of up to 30% without additional cost should be used (Türkiye'nin Enerji Görünümü, 2018).

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