

INFO PACK

Turkey's Energy Policies: Towards a Sustainable and Secure Future

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TRT WORLD research centre

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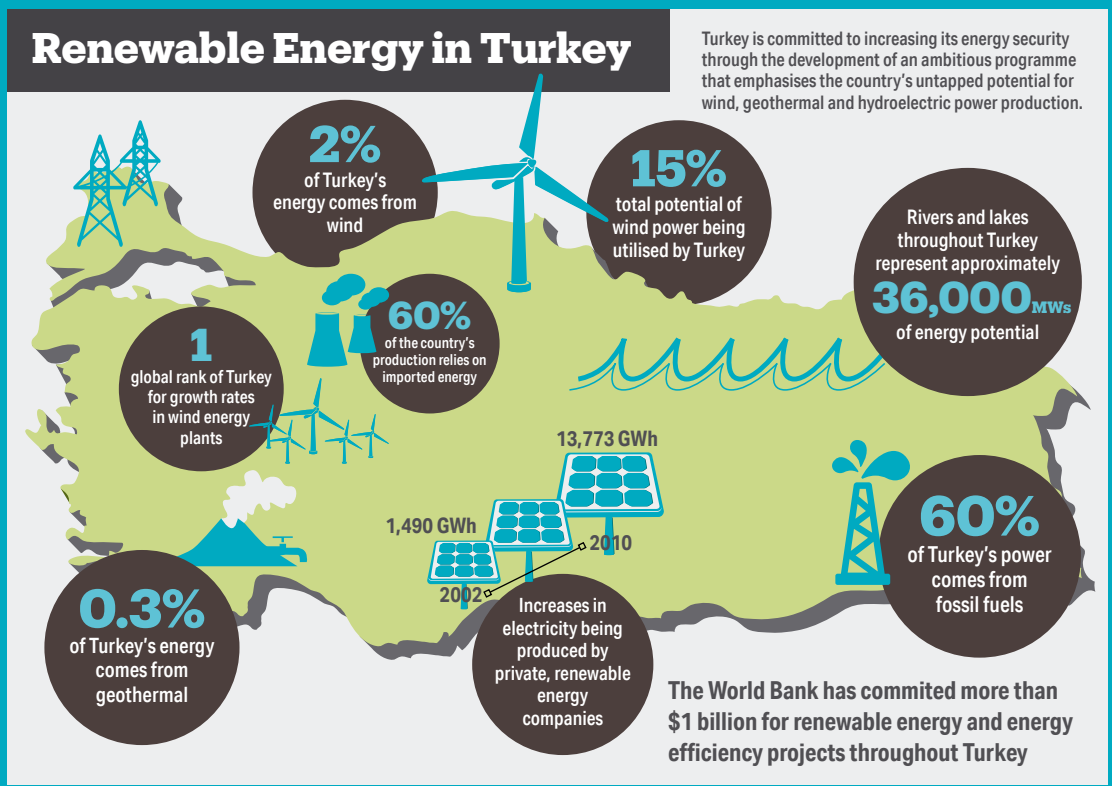
Introduction

On the 5th of July, 2020 President Recep Tayyip Erdoğan joined the Minister of Energy and Natural Resources in the mass opening ceremony of 52 hydroelectric power plants. This is one of the most significant energy investments for the Republic of Turkey in the last years and is set to help decrease the energy dependence of the country. Furthermore, according to state officials, it will help to deliver more efficient electricity to Turkish households.

Turkey plays a significant role in the global energy market as a connection hub between energy exporters and importers. Hosting major pipeline projects for both oil and natural gas, Turkey is also one of the most significant contributors to European energy security. In addition to importing pipeline streamed natural gas, the significance of LNG imports in the domestic market has started to increase as well. Over the last 15 years, Turkey has reached the highest rate of growing energy demand among OECD countries, which has forced the government to prioritise energy sustainability. The Turkish government continues to invest in various alternative and clean energy sources such as solar, wind, geothermal and biomass, along with its investments in hydroelectric power. The recent breakthrough regarding the first Turkish nuclear power plant that is planned to be operational by 2023 is another example of these diversification attempts. Along with the recent investments in hydropower, the development of nuclear power capabilities reflects the Turkish government's attempt to use all available alternative resources in an attempt to decrease Turkey's dependence on foreign energy sources.

Renewable Energy in Turkey

Turkey is committed to increasing its energy security through the development of an ambitious programme that emphasises the country's untapped potential for wind, geothermal and hydroelectric power production.



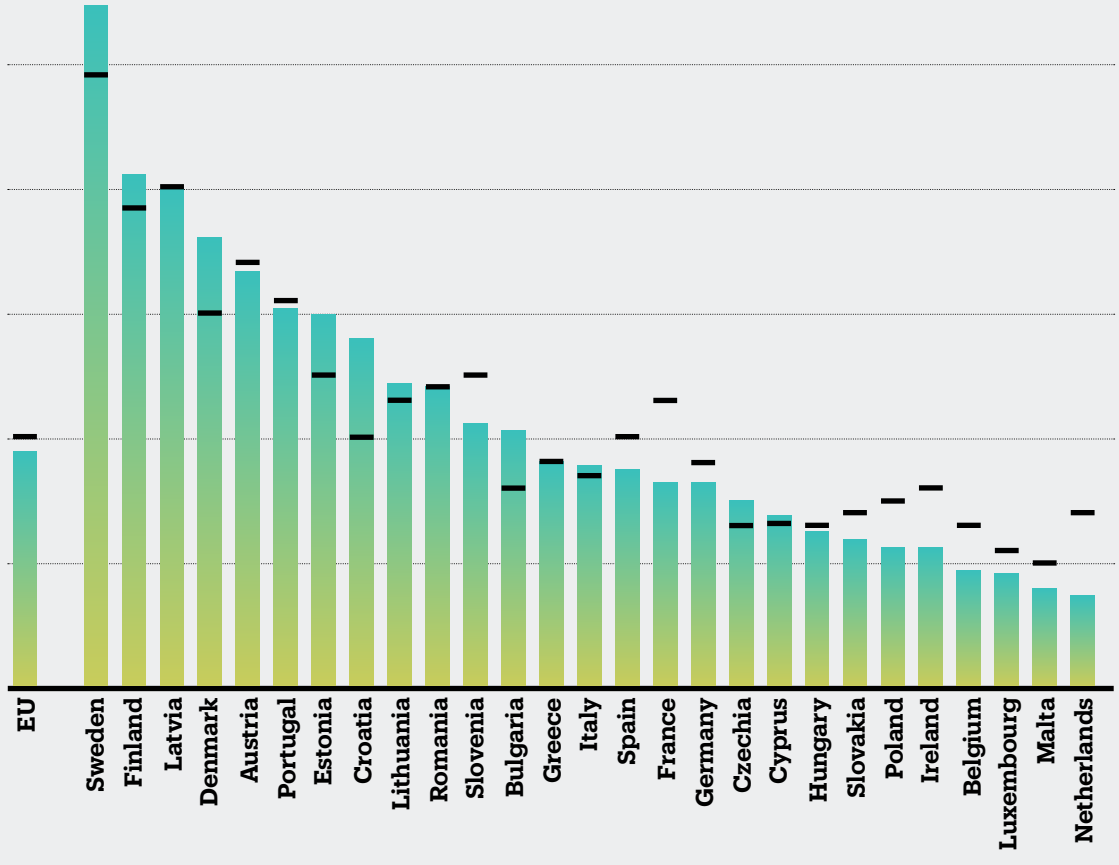
Source: ECA

Energy Security and Turkey's Geostrategic Importance

Turkey's geostrategic location makes the country one of the most important in the world for energy security. For Europe, Turkey is considered as an alternative to the main energy route from Russia. According to the Energy Union published in 2015, the EU prioritises energy efficiency, a low-carbon and environmentally friendly economy, energy security and integrity of the domestic energy market. As the EU is highly dependent on Russian natural gas supply and as it is seeking to meet obligations related to the Paris Agreement on decreasing carbon footprints, the continued rise of renewable energy is inevitable. Besides the economic and environmental benefits of clean energy, it will also help the EU to create energy policies that are less dependent on Russia and to diversify energy imports. In this context, Turkey, being a connection between Russian energy exports and European energy imports, seeks to create a balanced energy strategy to serve the country's ambitions and interests both in domestic and foreign affairs.

Share of energy from renewable sources in EU member states

(2018, in % of gross final energy consumption)



Source: ec.europa.eu/eurostat

Turkey, located in proximity to approximately 70 per cent of the world's proven oil and gas reserves, is one of the biggest electricity and natural gas markets in the region. According to the Turkish Ministry of Foreign Affairs[1], Turkey's energy strategy can be summarised by four main elements. First, the country recognises its increasing demand for energy and high dependency on imports. Secondly, increasing dependency on and usage of fossil fuels is ultimately unsustainable and environmentally problematic. Thirdly, transparency and competitiveness in energy markets are important in order to establish trust for both foreign and local investors. A series of serious economic reforms in the past two decades has boosted the image of Turkey as foreign energy investments accelerated. Lastly, Turkey is increasing its spending on technological innovation, especially on energy, where research and development are considered vital. Furthermore, Turkey is seeking to diversify its energy imports, increase clean energy investments, and boost energy efficiency with the addition of nuclear power.

Turkey continues to be a major partner for major energy projects. In 2005, Turkey played a vital role in the opening of the Baku-Tbilisi-Ceyhan pipeline, which delivers Azerbaijani oil to world markets. With the opening of Turk Stream and the TANAP Trans-Anatolian Natural Gas Pipeline, Turkey again demonstrated its central role as an experienced and safe transit partner and its importance to the energy security of Europe.

For Russia, Turk Stream is largely a matter of bypassing Ukraine. Since the beginning of the conflict in the Eastern provinces of Ukraine in 2014, and especially after the annexation of Crimea, Russia started to seriously look for alternatives to the Trans-Balkan Pipeline, which supplies natural gas to Turkey and Europe. However, a major portion of the pipeline passed through Ukraine. Therefore, Turk Stream was born out of the Russian search for alternatives. Since a previous proposal for a direct pipeline between Russia and Bulgaria under the Black Sea became unfeasible, Turkey once again became the most viable transit route. Turkey will benefit from a direct line from Russia, which will be more stable and durable against further conflicts between supplier and third countries. Ankara now has the means to be in direct contact with Moscow in any case of possible supply failure and will not need to worry about the situation in Ukraine disrupting energy supplies.

TURKISH OIL AND GAS PIPELINES



Source: Anadolu Agency

[1] Turkey's Energy Profile and Strategy', Republic of Turkey Ministry of Foreign Affairs, http://www.mfa.gov.tr/turkeys-energy-strategy.en.mfa

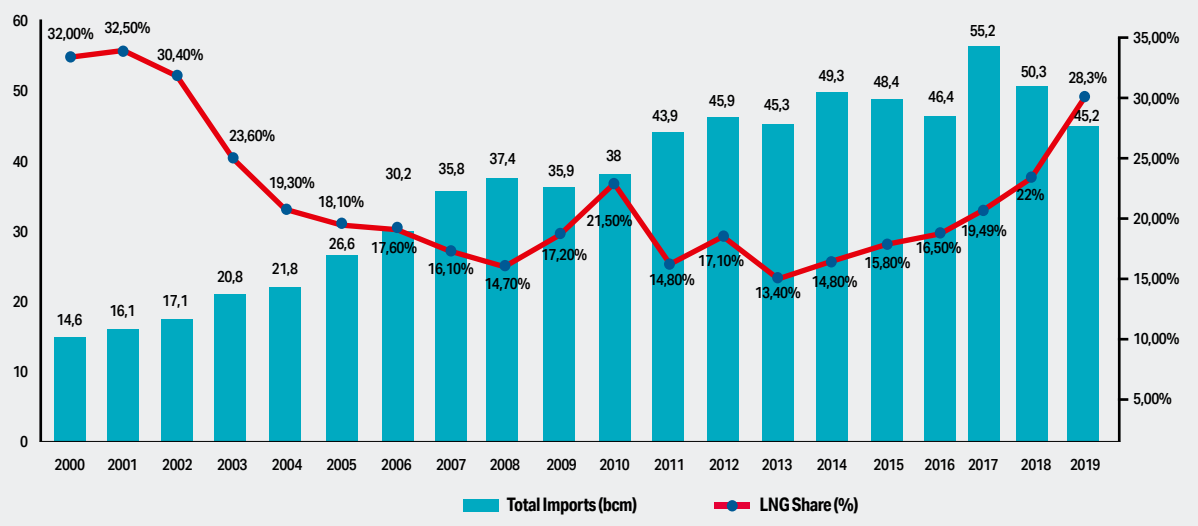
The State Oil Company of Azerbaijan Republic (SOCAR) became the biggest direct foreign investor in Turkey after the successful completion of the STAR Refinery. In November 2019, Turkey hosted another noteworthy opening ceremony in Ipsala where one the most important energy projects of the decade were launched. TANAP was described by President Erdogan as the Silk Road of energy and a symbol of the deep-rooted friendship and brotherhood between Turkey and Azerbaijan. Supplying 16 billion cubic meters (bcm) of Azerbaijani natural gas to Europe will not only serve the securitisation and diversification of the European energy market but also prioritise Turkey as an indispensable transit route.

These two projects provide a perspective on the scope of the future of regional energy security and mark the importance of Turkey as a reliable transit partner. The 'East Med' natural gas pipeline project proposed by Greece, the Greek-Cypriot administration, Egypt and Israel is seen by Turkey as another effort to alienate it from regional energy projects. Experts claim that investing substantial resources to transfer a relatively minor quantity of natural gas through the East Mediterranean may increase natural gas prices and not seriously enhance diversification efforts. In this context, many analysts argue that efficient monetisation of natural gas via safer and cheaper routes such as Turkey is more logical option.

Besides being a transit route and key to energy securitisation, Turkey has also diversified its local energy market by purchasing natural gas from Azerbaijan and increasing cooperation with Russia. Both new pipelines can be supported with projects to store natural gas in Turkey, which will further strengthen the hand of Ankara and release pressure during the winter when the local market consumes more natural gas. Although some EU member states, such as Greece and the Greek Cypriot administration, continue their efforts to side-line Turkey, these multi-billion-dollar energy projects once again prove Ankara's significance in the regional energy market. Turk Stream and TANAP are demonstrative of the fact that Turkey can be a stable and safe choice for further securitisation and diversification of the European energy market.

Turkey's liquefied natural gas (LNG) imports have also been increasing over the last decade, demonstrating the increasing importance that LNG holds in the Turkish effort to diversify energy imports. Facing rising demand for natural gas, Turkey is looking to increase the share of LNG in the domestic energy market. In March 2020, LNG imports overtook pipeline natural gas imports for the first time in Turkish history. The country has invested significantly in LNG facilities in the last several years, increasing the total capacity to 120 million cubic meters of natural gas p/d. Turkey continues to benefit from falling LNG prices, and currently, LNG accounts for 52.5% of total natural gas imports. Qatar and the US are two major suppliers of LNG to Turkey with 786 million and 370 million cubic meters of exports respectively. It is also worth mentioning that imports from the US dramatically increased by 300% compared to 2019. Also notable is the fact that in 2020, the largest two pipeline natural gas exporters to Turkey, Iran and Russia, lost their positions to Azerbaijan.

Share of LNG in Turkey's total energy imports



Source: EMRA, BOTAS, PETFORM

Turkey's Alternative Energy Policies

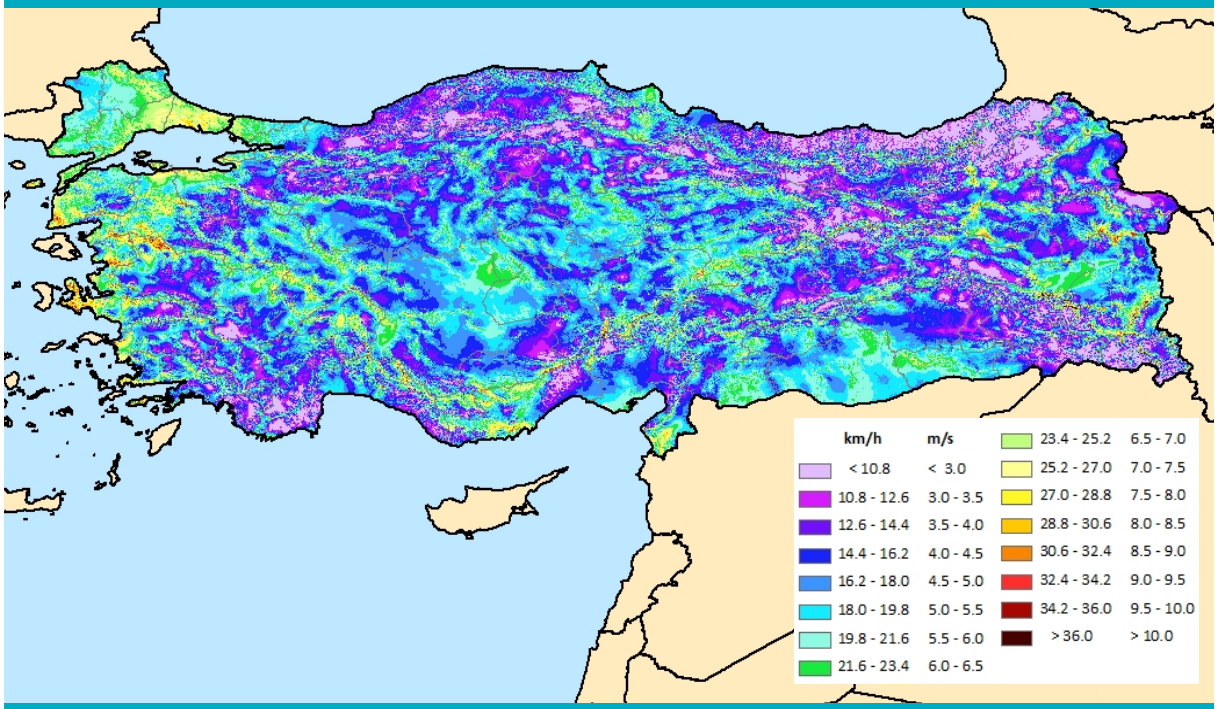
Traditionally, energy investments required to meet growing demand increase annually. According to BOTAŞ, global energy investment was approximately $1.8 trillion in 2015, and the International Energy Agency (IEA) has forecast $66.5 trillion in total investment between 2016 and 2040. In light of the Covid-19 crisis, investments may be limited until the jumpstart of the global economy. According to the IEA Global Energy Review 2020, the pandemic has reduced global electricity demand by 5 to 10 per cent. According to the report, the demand for renewables is on rise.

Population increase is one of the major reasons behind the rising demand for energy. As Turkey's population has reached approximately 83 million, electricity consumption has continued to increase. Turkey mostly uses hydroelectric, natural gas and coal power plants to cover its electricity demand. The country has great potential as well as needs for alternative energy.

Turkey first stated the necessity of supporting renewable resources in the fifth five-year development plan adopted in 1984. Greater utilisation of hydraulic, geothermal and solar energy resources was mentioned in the sixth five-year development plan and the seventh five-year plan restated the importance of renewable energy. It was also stated that the variety of resources should be expanded. In the eighth five-year development plan, renewable energy sources were mentioned in detail and topics such as usage conditions, incentives and their effects on the environment were analysed. Currently, Turkey's usage of hydroelectric, wind, solar, geothermal and nuclear energy, are a strong indication of the country's dedication to alternative energy sources.

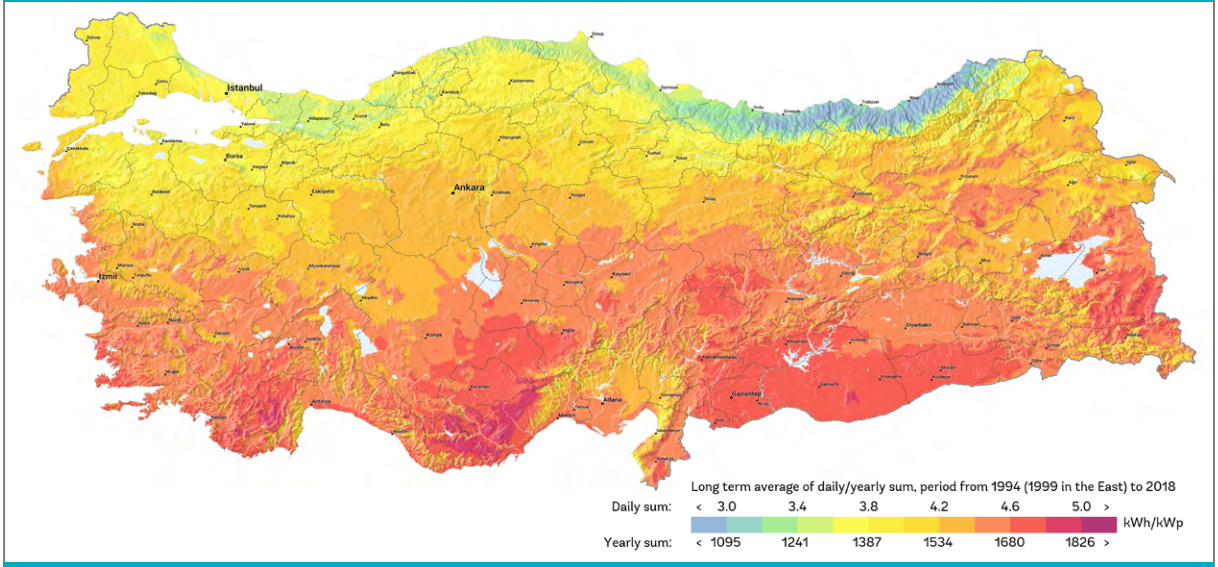
With approximately 3,500 km of coastline, Turkey is one of the richest countries in the world with regards to wind energy potential. The coastlines of the Marmara and Aegean regions, account for 30% of global wind power production. Turkey's Wind Energy Potential Atlas (REPA) calculated Turkish wind potential as 131.756,40 MW, which can be achieved from utilising 3.57% of the total landmass of the country. Wind energy currently generates 8 per cent of the total electricity capacity of Turkey, up from just 2.07% in 2011. Ankara's strategic plan for wind energy includes support for local wind turbine technologies as the country is currently dependent on imports for turbine parts. This initiative has potential to generate new jobs, decrease foreign dependency and boost local technology development.

Wind map of Turkey



Source: https://www.evwind.es/2014/10/31/vestas-secures-66-mw-wind-power-order-in-turkey/48450

Photovoltaic power potential of Turkey

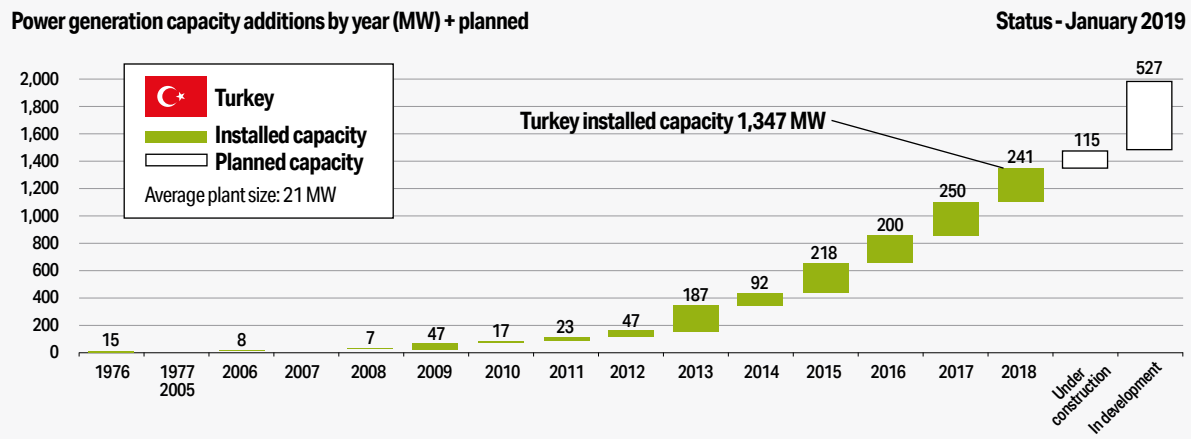


Source: http://globalsolaratlas.info

Solar energy represents another viable clean energy option for Turkey. Turkey's average annual sunshine duration hours per square meter is 2,737; i.e. a total of 7.5 hours per day. The average radiation intensity is calculated as 1,527 kWh per square meter and 4.2 kWh per day. The Mediterranean and south-eastern Anatolia regions have a particularly high solar capacity. Turkey is working to develop solar energy technologies to provide maximum efficiency and to take advantage of solar energy. After financial and legal incentives enacted by the government, more than 100 companies are known to be operating in the solar energy field in Turkey. The country became the third-largest manufacturer and the fourth largest market in the world in the production of solar collectors for water heating systems. This shows the importance of solar energy, which besides being environmentally friendly, also contributes to employment, local manufacturing as well as energy efficiency. Today, the total installed capacity of 1,644 solar power plants in Turkey is 1362,60 MW and is projected to increase to 3,000 MW by 2023.

Owing to its location and consequent tectonic geological structure, Turkey has global importance in geothermal energy and is fifth in the world in terms geothermal energy wealth. Geothermal resources are mostly found in west, northwest and central Anatolia. Maximum usage of the potential of geothermal energy sources would allow Turkey to cover approximately 14% of its electricity and heat energy demand. However, currently only 6% of the total geothermal resources are available for producing electricity. Turkey primarily uses geothermal energy for heating purposes. In 2019, 53 geothermal stations produced a record-high 1,303 MW.

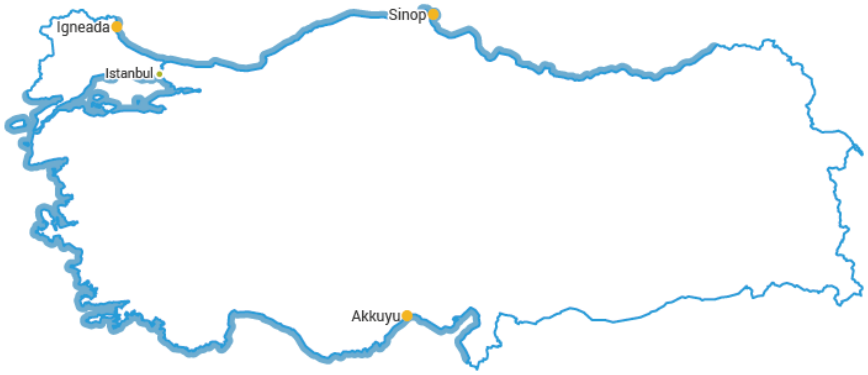
Geothermal development in Turkey



Source: JESDER (2019), TGE Research (2019)

Over the last several years, Turkey has made important strides towards developing a nuclear energy capacity. Nuclear energy is seen as vital for the country's decision makers in order to reduce its current level of dependency on imported fossil fuels. By developing a nuclear power capacity, Turkey hopes that its estimated 2023 energy needs will be met with increased domestic production and a significantly reduced dependency on imported hydrocarbon fuel sources. Turkey is currently working with Russia to build its first nuclear power plant in Akkuyu. A second plant is planned for the northern part of the country in Sinop with the help of Japan. 80 billion kWh of electricity per year is expected to be generated by both plants combined. In comparison, approximately 16 billion cubic metres of natural gas would be used to generate the same amount of electricity at a cost of approximately $7.2 billion per year. Ankara also plans to cooperate with China to build a third nuclear plant in the west of the country at Igneada.

Planned nuclear power plants in Turkey



Source: World Nuclear Association

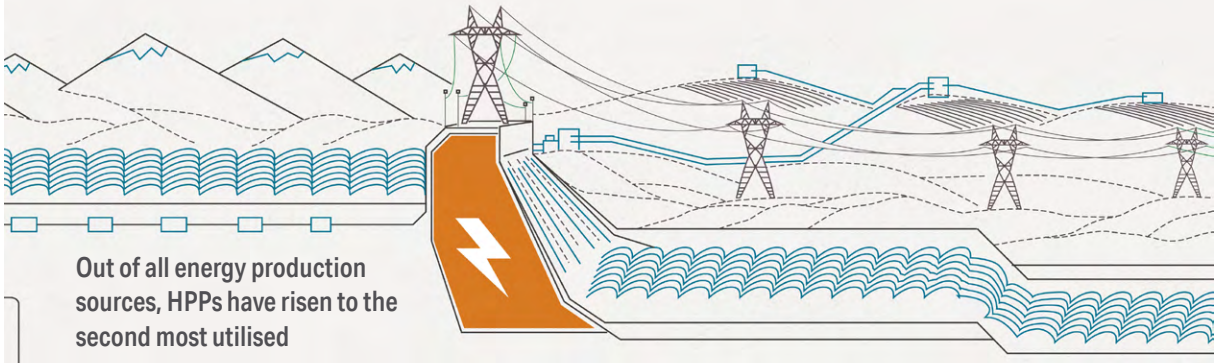
Recent Investments in Hydroelectric Power

Turkey's Minister of Energy and Natural Resources, Fatih Donmez, stated that 52 hydroelectric power plants (HPP) with a total capacity of 1,439 MW have begun operating in the last two years. The plants will provide electricity to 1.85 million households. They will also generate wealth for local economies since the local workforce is actively participating in the building and operational phases. In addition, HPPs are contributing to local agricultural industries by supplying the necessary energy to water fields. Turkey invested $1.64 billion in the new HPPs, which are located across 26 different provinces. Two decades of sustained investment allowed Turkey to increase installed power capacity from 31,000 MW to 91,000 MW in the last 18 years. Turkey has achieved more than 6 per cent annual growth in installed capacity, which ranks the country first among OECD members.

Tokat Niksar Akinci HPP is one of the major projects. It has a 99 MW installed capacity and is expected to produce 448 million kWh per year, enough to provide 231,000 households with electricity. In addition to helping reduce annual carbon dioxide output by 230,000 tons, it will create 600 local jobs. Another gigantic project is the Karakurt Dam hosting the Karakurt HPP, which has 99.5 MW of installed capacity. Located on the Aras River, the dam is a major investment for eastern Turkey and one of the highest asphalt-core dams in the world. Asphalt-core technology is advanced technology and difficult to apply in certain geographic locations. However, strong investment and political will behind the Karakurt HPP allowed the project to successfully open in just two years. The project cost approximately $220 million and is one of the flagship power plants in Turkey. Another giant HPP, Alpaslan-2, has 280 MW of installed capacity and is capable of producing approximately 862 million kWh per year.

President Erdogan has stated that the sustained investment made in energy production capacity is a clear reflection of Turkey's determination to achieve its goal of becoming one of the top ten world economies by 2023. The mass opening of 52 major projects is the first step of the Turkish government's renewable energy investments this year. In August 2020, Turkey plans to open its first integrated solar panel production factory. This is seen as a firm step to achieve energy independence and develop Turkey's domestic technological capacity.

Record production of energy from HPPs

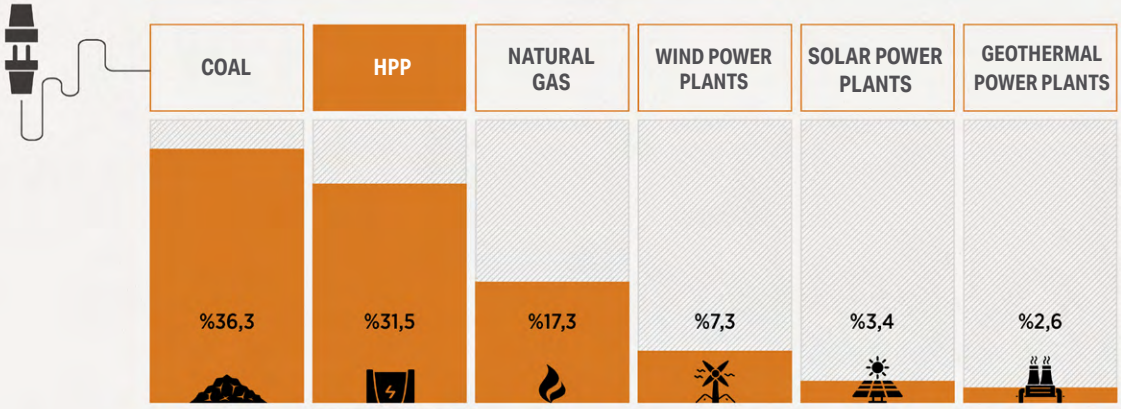


Out of all energy production sources, HPPs have risen to the second most utilised

Energy produced from HPPs

2016	67,2 billion kwh	
(January-October) 2019	79,3 billion kwh	

Shares in energy production sources (January-October 2019)



Within 10 months, energy produced by HPPs has contributed 19,8 billion TL to the national economy.



Minister of Agriculture and Forestry
Bekir Pakdemirli

As of October, hydroelectric power plants functioning under the General Directorate of the State Hydraulic Works and those owned by the private sector have produced 79,3 billion kilowatts per hour. This number has already surpassed the former yearly production record of 2016, which stood at 67,2 billion kilowatts.

We have to take advantage of our own energy resources. In these 10 months, if we had produced 79,3 billion kilowatts of energy using imported natural gas, we would have to pay $3,5 billion to other countries. Consequently, HPPs have a positive effect towards our foreign trade deficit.

Source: Anadolu Agency

Conclusion

Turkey's main objective in its energy policies is to achieve the maximum diversification of energy resources to meet increasing domestic demand and decrease dependency on imports. The country's desire to assert its position as a reliable energy transit and partner country in the global energy market is growing in the context of major projects such as TANAP and TurkStream. Ankara continues to reshape its domestic energy market as well, notably developing pipeline infrastructure for better distribution and investing in LNG facilities. Numbers show significant increases in LNG imports, where the US and Qatar are becoming Turkey's main partners in supplying the increasing demand of natural gas.

The development of renewable energy sources is also on the rise in Turkey and the country has decades of experience in the alternative energy sector. Turkey's effective usage of the Marmara and Aegean regions for wind energy, being one of the major solar collector manufacturers, as well as the country's effort to use its geothermal potential propels it to seek alternatives to fossil fuels. This includes the building of its first nuclear power plant in Akkuyu. Nuclear projects in Mersin, Sinop and Igneada also increase international energy cooperation, where Turkey is collaborating with Russia, Japan and China to build nuclear infrastructure to fulfil its domestic electricity demand.

Under the leadership of the AKP, Turkey has invested in hydropower plants and dams to increase the efficiency of domestic energy production and support local economies. The government's intensive support to technology development and infrastructure for alternative energy holds a significant importance for Turkey in its effort to reach objectives associated with its 2023 vision. These investments hold the potential to boost the Turkish economy and help to make Turkey a regional powerhouse in alternative energy production.



Source: Anadolu Agency

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