

BLACK SEA 2022

ENERGY CRISIS





BLACK SEA 2022: ENERGY CRISIS

PREWORD

Black Sea coasts are the cradle of the human civilization structuring the modern era and still keeping the eyes on. All history of the geography is full of instabilities followed by great movements of people. However, these activities are followed by the Great Wars shaping the region. The most battlefields of WW 1 and 2 has been happened in the region due to its resources especially energy and strategic routes. Hence, the peaceful economical mapping of the Black Sea and development strategies has been solved within a common agreement in the first possibility of peace period. In the light of the inter-governmental agreements today, the region has a great development potential.

Under today's war drums we are still keeping the hope of peace and development of the region and take action focusing on the energy side on behalf of multilateral treaties. As TESPAM, we have prepared this report accompanying the International Black Sea Regional Energy Summit. TESPAM has established a working group under it is periphery to enhance and jointly carry out studies together with the regional organizations and universities, which are voluntarily, put their contribution.

In the light of latest vicissitudes, Black Sea Report will summarize you the Energy Crisis, latest developments, future technologies applicable beyond conventional ones such as nuclear and renewables. Providing with numeric values both amounts and percentages report will demonstrate current and future oil and gas situation.

On the other hand, the social impacts of the current geopolitical crises around Black Sea Region is also taken into attention. TESPAM hopes readers to have benefit from the Report, which has been prepared by the TESPAM Study Groups.

Ali Murat Becerikli

TESPAM V.President



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TÜRKİYE'S BLACK SEA DISCOVERY AND REGIONAL ASPECTS

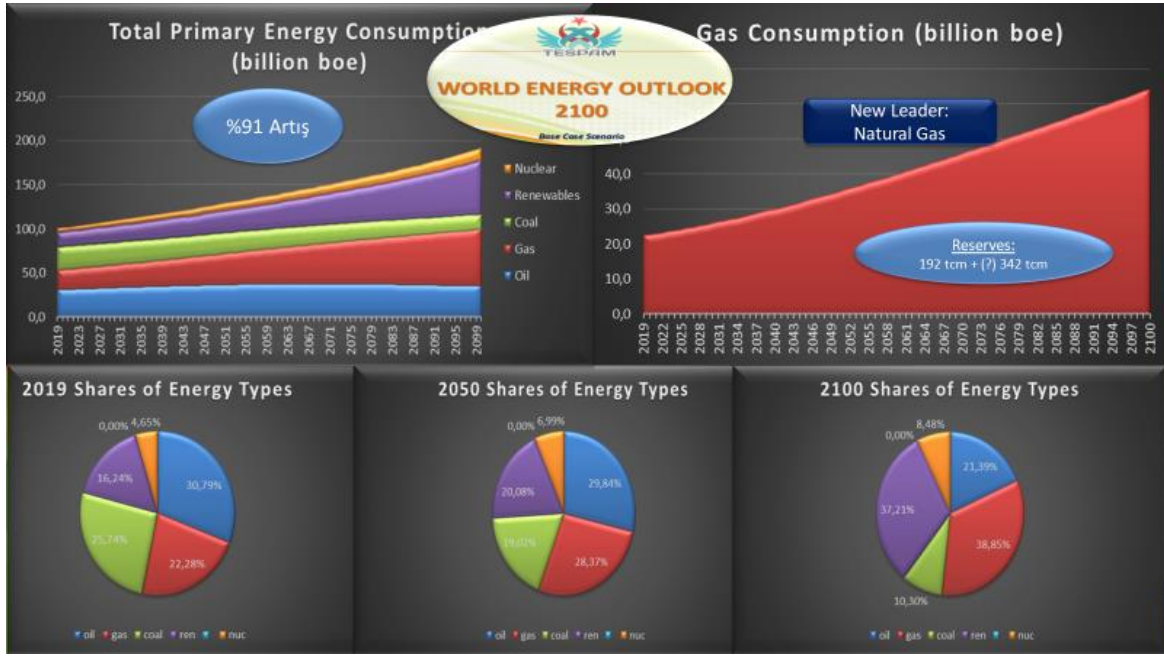
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Oğuzhan Akyener, TESPAM President

Global energy demand has been rising rapidly since the beginning of the 1900s. In this context, the trend towards energy types has changed over time due to mainly supply security and CO2 emission concerns and technology-cost alterations. Oil, which has become the most important energy source with the beginning of the 19th century, gradually leaves its throne to natural gas (which we can partially describe as cleaner), especially within the scope of carbon mitigation targets. As expressed in the long-term global demand projections prepared by TESPAM, although great progress will be made in the field of renewable and clean energy, socioeconomic and technological factors reveal that the era of oil and natural gas (even coal), will not be ended in such a short time. In this context, as can be seen in the graphs below, natural gas will emerge as the most important resource of the future. [1]



Graph 1: Global Energy Trends and Projections [1]

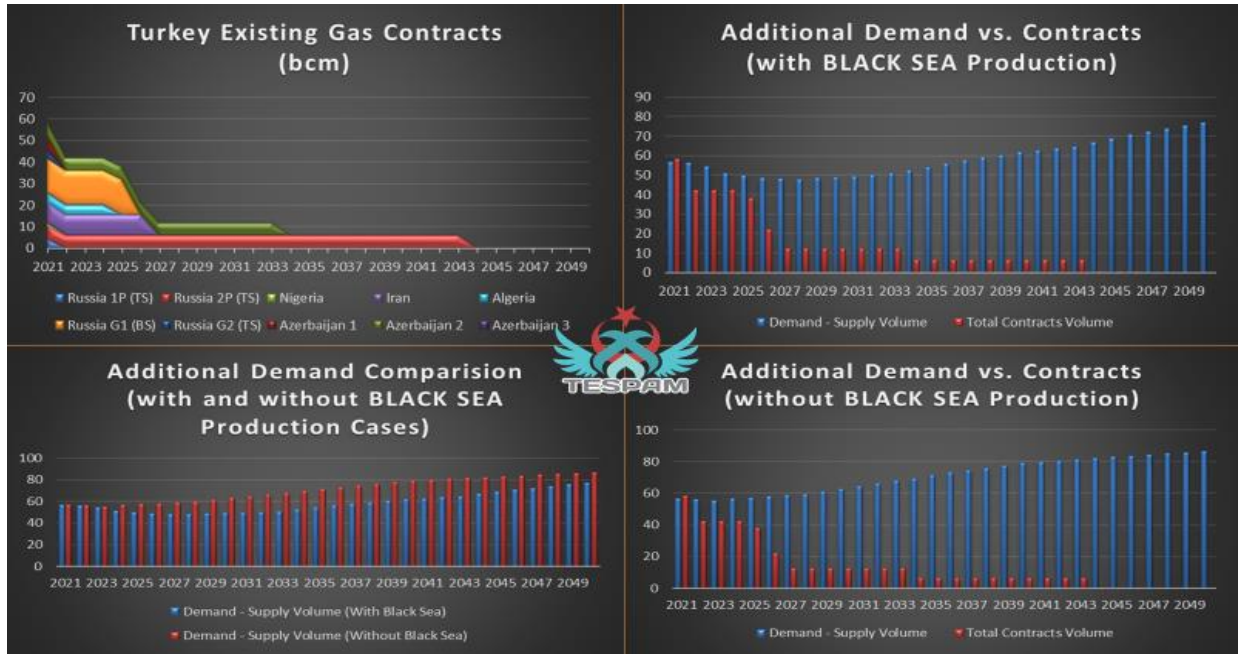
While such a picture is in question on a global scale, natural gas (which we describe as the most important energy source of the future) will have a much different place for countries such as Türkiye (which is growing, has the ability to access new resources through many different routes and has to import almost all of its consumption). In this context, Türkiye's gas discovery in the Black Sea is a revolutionary development from the perspective of the country's energy supply security.

In addition to these, current energy crisis has increased the importance of natural gas to such levels that cannot be predicted anymore.

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This resource, which Türkiye has completely discovered with domestic resources and will start production in 2023 (again with domestic capabilities), has the abilities that can change many balances on a national and regional basis.

Firstly, while the data announced by the Turkish Ministry of Energy [2] are interpreted in the national framework, Türkiye's natural gas balances and importance of Black Sea discovery can be projected as can be seen in the graphs below.



Graph 2: Türkiye's Gas Balances up to 2050 [3]

We have to note that, in this scenario it is assumed that a plateau rate of 17 billion m³/year (which will last for about 10 years and can be reached during 2030s) will be achieved in Black Sea. Moreover, for Türkiye's demand projections, TESPAM's due private models were utilized. Undoubtedly, supply projections will change as the final production scenarios shared by the Turkish NOC.

The results claim that domestic resources in Türkiye can meet almost 30% of the domestic consumption for around 10 years.

In addition to the domestic consumption shares, the due discovery will provide Türkiye with many benefits, such as: strengthening the Türkiye's ability to manage natural gas supply-demand balances, reducing possible prices in new import agreements, making new Turkish Gas Market (under EPIAS) more effective and functional, ensuring stock security and obtaining opportunities for new discoveries. Moreover, there will be many direct and indirect contributions to the development of domestic technologies.



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For evaluating the long-term regional aspects of this discovery, a complicated dynamic model has to be constructed. Within this model, annual national gas balances, seasonal supply properties, new possible import contracts, available LNG and pipeline capacities, storage probabilities, supply potentials of new possible domestic and/or foreign resources and current international free transmission capacities has be be evaluated. TESPAM (by using such a private model) continues to project new possibilities and to interpret different scenarios by taking into consideration the updated emerging developments.

In general, our existing model shows that, Türkiye will continue to increase the volume and the efficiency of its domestic gas market. By continuing to support the volumetric increase of its storage capabilities and the development of Black Sea discovery, will not risk its existing contractual import options within the existing sellers.

It reveals that it can establish a dynamic supply-demand, domestic production-import-export mechanism. In this context, production in the Black Sea greatly relieves Türkiye's hand. In other words, it is not reasonable to expect Türkiye, which is a big consumer, to become a net gas exporter at the current stage. However, when the due dynamics (such as, number of technically and economically accessible markets, profitable supply agreements, increased domestic production potential and overcomed domestic demand) are re-shaped by time, spot export opportunities will also be in question. On the other hand, while considering that, the Black Sea discovery was made in an untouched area; new exploration possibilities in the Black Sea or other areas could change all the balances and move Türkiye to a very different position in terms of both gas trade and regional balances. For this reason, the eyes of all foreign missions, especially the existing suppliers, are on this new discovery of Türkiye.

As a result, Black Sea discovery on a regional basis increased the geostrategic importance of the area in terms of new potential resources. In addition to this, existing energy crisis, Russia – Ukraine War and EU's desperate struggle to find alternative gas resources in the short time puts this discovery and Black Sea in a more critical position. Türkiye's developing economic and technical capabilities in this area (by considering the fact that having investment and profit in a region can make you to invest also in to the other low profit resources such as the methane hydrate, wind and hydrogen) also can be other important points to be discussed for an integrated greener targets. Moreover, this will not be only for Türkiye, will be for the regional actors. We have to note that, making an important discovery in a region means that the due region will be appreciated and therefore, the ability to allocate finance for economic-new exploration investments, logistics and alternative resources will be able to be strengthened.

For this reason, the Black Sea and Türkiye's new discovery has come to a more important position for both Türkiye and other regional and global actors.

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BLACK SEA RESERVES AND ENERGY POTENTIAL

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The first exploration well in the Black Sea was drilled on the Golitsyn run high in 1975, almost simultaneously with the start of drilling in the North Sea. Since then, the North Sea passed through all the way to the natural decline in oil and gas production, whereas in relation to the Black Sea there is still no clear answer to the question – does it really contain projected huge reserves of hydrocarbons?

The answer to this question can only be given by drilling ultra-deep offshore wells exceeding 2.000 m deep.

History of Explorations in the Black Sea and Situation of Countries

Prior to Russia’s annexation of the Crimean autonomy in 2014, Ukraine made some progress in increasing gas production on the shallow northwest shelf. In 2013, it grew up to 1.65 bcm. In 2015, production was to reach 3 bcm due to the completion of the Odeske and Bezimenne fields with resource reserves of not less than 35 bcm of natural gas. At that time, Chornomornaftogaz PJSC owned 17 fields, of which 11 gas fields, 4 gas condensate fields and 2 oil fields. The total reserves of these fields were: 58.56 bcm of natural gas, 1,231 thousand tons of gas condensate, 2,530 thousand tons of oil. Ukraine lost the ability to produce hydrocarbons in a number of fields (Bezimenne, Odeske, Arkhangelske, Shtormove, Schmidta), as well as continue exploration work in other promising areas (Zakhidno-Golitsynska, Kulisna and the Dnieper paleochannel).



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Georgia, Russia, Türkiye, Bulgaria and Romania have been actively involved in the oil and gas exploration race within their Black Sea economic areas over the past decade.

The flagship of deep-sea exploration of the Black Sea is undoubtedly Türkiye. Since 2006, Türkiye drilled eight prospecting wells in the deep-water Economic Zone, which turned out to be “dry”.

However, the Turkish national oil company revealed 13 promising gas structures on the shallow shelf.

Romania made significant progress in studying its shelf. Since the second half of the 2000s, several fields were discovered on the Romanian shelf – Delta – 4 (oil and gas field), East Swan (oil and gas condensate field), West Swan and Pescarus (oil and gas fields), thanks to which annual oil production grew by 7 million tons.

Despite the skepticism about drilling the first Domino-1 deep well in the Romanian sector of the Black Sea (Neptune block, sea depth-930 m), a field with preliminary reserves of 42-84 bcm of gas was discovered in 2011. Two gas fields – Galata (2.5 bcm) and Kaliakra – were discovered in Bulgaria.

The discovery of the Domino-1 field in the Romanian sector of the Black Sea gave an impetus to the start of 7roje on the Khan Asparukh block in Bulgaria, the Scythian area and the Foros section in Ukraine, the 7roje Black Sea section of Russia, and the continuation of work in Türkiye’s deep water. Georgia announced the discovery of three promising sites, the potential of which was estimated at 70 million 7roject to 1.3 billion barrels of oil. However, there is no real confirmation of this yet.

All fields of the Black Sea in operation are located on the shallow shelf while promising oil and gas structures are expected to be in the deep-water part of the water area.

During 2010-2013, in the Black Sea economic zones of Türkiye, Bulgaria and Romania, well-known companies (British Petroleum, ExxonMobil, Chevron, Petrobras, Sterling Resources, OMV Petrom and Petro Ventures) drilled 11 exploration wells using modern mobile offshore drilling platforms of the fifth generation (Leiv Eiriksson, GSP Jupiter) and a floating drilling vessel of the sixth generation (Deepwater Champion). The table clearly shows the negative result of extremely expensive wells. For example, the cost of the Surmene-1 well was USD 4 billion (official information by Mehmet Uysal, CEO of the Turkish state-owned company TPAO).

Currently, 21 wells were drilled at sea depths exceeding 500 m: Romania – 10, Türkiye-8, Bulgaria-2 and Russia – 1. So far, not a single well was drilled in the Ukrainian and Georgian deepwater segments.

In December 2017, Rosneft, together with the Italian company Eni, started drilling the first Maria-1 ultradeep exploration well in the Russian Black Sea sector on the Shatsky shaft.

Drilling the Maria-1 prospecting well was carried out using the Scarabeo-9 drilling platform owned by Saipem.



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With a sea depth of 2,125 m and a designed depth of 6,126 m, drilling of the well was terminated in March 2018 at a depth of 5,260 m.

The reason for project termination of work by the Italian company Eni was anti-Russian sanctions.

The drilling revealed a fractured carbonate reservoir with a capacity of more than 300 meters, which, according to Rosneft's press release, is highly likely to contain hydrocarbons.

The discovery of a number of giant ultra-deep oil concentrations at depths exceeding 10 km confirms the possibility of the existence of hydrocarbon deposits at significant depths.

The exact volumes of gas currently lying deep underneath the Black Sea are not yet known. Rough estimates predict that the Ukrainian shelf may contain more than two trillion cubic meters of gas.

Ukraine's state energy company Naftogaz is preparing to explore 32 remaining blocks.

Meanwhile, Türkiye made international headlines in 2020 when it said reserves at its offshore Tuna-1 exploration project to be as high as 405 billion cubic meters. Further reserves could be discovered in adjacent blocks.

To the west, Romania is thought to hold anything between 150-200 bcm of offshore reserves, being one of the most advanced littoral countries in terms of developing resources.

Bulgaria's total reserves are unknown but just one of its as-yet unexplored fields, Khan Asparuh, is thought to contain 100 bcm. If this project proves to be correct, these reserves alone could cover the country's annual demand for more than 30 years.

To the east, Georgia may have overall recoverable gas resources of 266 billion cubic meters, although how much of these reserves lie in its Black Sea economic zone has yet to be determined.

In recent months, Romanian-Austrian integrated oil and gas company, OMV Petrom, which has been developing Romania's Neptun Deep project together with US company ExxonMobil, has been seeking cooperation opportunities with neighboring countries.

In February 2021, it signed a memorandum of understanding with Naftogaz for joint gas exploration projects in Ukraine. Last summer, it increased its share in the Bulgarian Khan Asparuh project to 42.86% following the transfer of Spain Repsol's 30% stake. The company also won a bid for exploration in Georgia's offshore Block II.

Türkiye's Discovery

Turkish Petroleum Corporation (TPAO)'s FATİH drilling ship discovered 320 billion cubic meters (bcm) i.e. 11 trillion cubic feet (tcf) of natural gas reserves in the Black Sea, within the western part of Türkiye's Exclusive Economic Zone (EEZ). The reserve — identified to be within the Tuna-1 exploration zone — was discovered some 4,525 meters below the sea bottom, at near 2 km depth.



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News of the discovery has been welcomed in Türkiye as a game-changer with regard to the country's expensive natural gas import bill.

Sakarya is an ultra-deep-water exploration well within block AR/TPO/KD/C26-C27-D26-D27 that is 100 percent TPAO equity which is 7000 square kilometers in all. The formation is located some 150 kilometers off Türkiye's western Black Sea coast and is at the perimeter of Bulgaria's and Romania's maritime borders. Tuna-1 is located around 100 kilometers south of Romania's Neptun Deep block (84 bcm) – the previous largest gas find in the Black Sea discovered eight years ago by Petrom and Exxon. Türkiye has discovered a new 135 billion cubic meter (bcm) natural gas reserve in the Amasra-1 well in the Black Sea off the northern Zonguldak province.

Last year, Türkiye's Fatih drillship discovered 405 bcm of natural gas in the western Black Sea region's Sakarya field, about 100 nautical miles north of the Turkish coast, in the country's biggest discovery.

State energy company Tpaö found 135 billion cubic meters of gas at the Amasra-1 offshore well, bringing the total amount of deposits discovered over the past year to 540 billion cubic meters, Erdogan said in televised remarks from the Black Sea coastal city of Zonguldak.

This physical proximity indicates that Türkiye may face production difficulties similar to Neptun's in the extraction of Tuna-1 reserves. The basin center is deep, cold, and highly anoxic (lacking oxygen – A.C.). These harsh, challenging conditions require specialist experience. The Sakarya development will almost be at the deepest limits of the Black Sea. This is an ultra-harsh environment.”

Türkiye's Energy Minister Fatih Donmez said that there are still around 1,000 more meters of drilling to be conducted: “Seismic data shows two more layers of similar reservoir structures below currently, we are 3,500 meters deep and have cut [into] second important reserve.”

Türkiye currently has four long-term take-or-pay pipeline contracts with Russia (Blue Stream until 2025 and Bati Hatti until 2021), Azerbaijan (until 2021) and Iran (until 2026). Even beyond these dates, Türkiye will continue to import from these suppliers. However, Sakarya can provide bargaining power for Türkiye to renegotiate the pricing in these agreements. If and when Sakarya comes online, energy experts argue that Türkiye can convince Russia to index its current gas prices to spot natural gas price—a proven strategy of European countries.

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Figure 1- The Tuna-1 zone is located off the mouth of the Danube block at the crossroads of the Bulgarian and Romanian maritime borders and the inland waters of Türkiye.

The Economic Value of The Discovery

The discovery can be categorized as a giant field. Türkiye consumes 45-50 bcm of natural gas per annum and the Sakarya field, in an optimum production level, has the potential to supply a quarter of Türkiye's needs for about 25-28 years. The field is planned to pump gas in 2023, but it will take at least 5-6 years to reach its peak production. Thus, the expected contribution will be in the longer run. The gas prices are expected to recover after 2024 and hence Türkiye can take the advantage of its own resources to decrease the cost

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of its imported energy bill. Considering this potential trend, International Energy Agency (IEA)'s director Fatih Birol says that its value can go up to \$80 billion.

Government officials say that the current estimated value of the reserve based on the price that Türkiye pays to third countries is around \$64 billion. In market terms, this value could go even lower. Considering the downward trend in the spot markets due to the oversupply of Liquefied Natural Gas (LNG) and COVID-19, the LNG prices plunged in 2020 and hit below \$1.7 per million British thermal unit (MMBtu) in June. Since then the markets have been recovering and spot LNG prices tend to move above \$2 per MMBtu. Thus, the spot LNG price is almost one-third of the gas price that Türkiye receives via pipelines from third parties. Beyond its economic value, the finding is important to foster exploration efforts, which so far had been futile. In this regard, the debate on the value of the Sakarya reserve has secondary importance.



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Implications for Turkish Russian Relations

The finding will definitely give Türkiye an upper hand in its relations with Russia. BOTAŞ and private sector's contracts (in total 8 bcm per annum) with Gazprom will expire in 2021. These are long-term, oil-indexed contracts and have "take or pay" clauses. In 2020, Gazprom has lost its dominant share in Türkiye's natural gas consumption. Türkiye has recently opted for importing more LNG from the spot markets (particularly from the United States - US) rather than pipeline gas. After the capacity increases in LNG terminals and new Floating Storage Regasification Unit (FSRU) investments, Türkiye's regasification capacity reached 30 bcm per annum. Even though currently Türkiye uses one-third of this capacity, the consumption pattern has changed dramatically. As the LNG imports increased, the share of Russian gas declined from 55 percent in 2015 to 33.6 percent in 2019. Ankara aims for better terms in new contracts as Gazprom's European partners managed to get in the last decade. The new discovery of the offshore gas field has the potential to contribute, along with Russia's multi-billion-dollar investment in the Turkish Stream and recently increasing volume of LNG imports, to Türkiye's position in negotiations. Energy trade is an important area of cooperation between Moscow and Ankara. However, the Turkish side has been complaining about the unbalanced trade for a long time. The discovery has the potential to offer Türkiye advantage. Yet, the room to increase Russian gas supply to Türkiye is getting dimmer in parallel with the new trends in the LNG market and Türkiye's energy consumption pattern. The finding will definitely give Türkiye an upper hand in its relations with Russia. BOTAŞ and private sector's contracts (in total 8 bcm per annum) with Gazprom will expire in 2021. These are long term, oil-indexed contracts and have "take or pay" clauses. In 2020, Gazprom has lost its dominant share in Türkiye's natural gas consumption. Türkiye has recently opted for importing more LNG from the spot markets (particularly from the United States - US) rather than pipeline gas. After the capacity increases in LNG terminals and new Floating Storage Regasification Unit (FSRU) investments, Türkiye's regasification capacity reached to 30 bcm per annum. Even though currently Türkiye uses one-third of this capacity, the consumption pattern has changed dramatically. As the LNG imports increased, the share of Russian gas declined from 55 percent in 2015 to 33.6 percent in 2019. Ankara aims better terms in new contracts as Gazprom's European partners managed to get in the last decade. The new discovery of the offshore gas field has a potential to contribute, along with Russia's multi-billion-dollar investment in Turkish Stream and recently increasing volume of LNG imports, to Türkiye's position in negotiations. Energy trade is an important area of cooperation between Moscow and Ankara. However, the Turkish side has been complaining about the unbalanced trade for a long time. The discovery has the potential to offer Türkiye leverage. Yet, the room to increase Russian gas supply to Türkiye is getting dimmer in parallel with the new trends in the LNG market and Türkiye's energy consumption pattern.

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Türkiye's Capacity, Expectations and Strategies

Offshore hydrocarbon exploration activities carried out by TPAO in the Black Sea have gained momentum since 2004. Between 2004 and 2019, intensive seismic activities were carried out in the Black Sea, 142,000 km two dimensional (2D) seismic data and 37,610 km² three dimensional (3D) seismic data were collected and interpreted in the fields that TPAO holds license. After the



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interpretation of the collected data, a total of 6 deep sea and 10 shallow sea exploration wells were drilled. Following the gas discovery in the Akçakoca-3 and Akçakoca-4 wells, number of wells drilled in the Akçakoca production site has reached to 24.

However, more investors are needed to provide technology, financial support, and know-how to help littoral states develop an integrated strategy addressing shared challenges. With the exception of Russia, all other littoral countries of the Black Sea have traditionally been dependent on energy imports. This reality could soon change. Türkiye has estimated that the Black Sea holds recoverable reserves of ten billion barrels of crude oil and two trillion cubic meters of natural gas. As part of exploration plans to confirm the Black Sea's reserves, an ultra-deep water well (one of the first in the region) was recently drilled off the coast of Türkiye.

The Sakarya field is certainly going to change Türkiye's energy security posture. It is highly likely that with further drilling its reserves will be enhanced. Yet, Türkiye needs to analyze its options for this project sensibly – if mismanaged the Tuna-1 field could transform from boon to burden for Ankara.

Türkiye's emerging economy still does not enjoy a strong country risk ranking, and FDI for large hydrocarbon projects does not come easy these days. To attract international majors to Sakarya, Türkiye needs to prove attractive geology and reserve data, and offer an array of economic incentives. Only then can it confidently hail the game-changing prospects of this new find.

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WORSENING ENERGY CRISIS in EU

Oğuzhan Akyener, TESPAM President

The world continues to struggle with an intense and increasingly violent energy crisis centered on the EU and Asian markets. The stagnation that started with the pandemic process, the inadequacy faced with normalization steps and then the Russian-Ukrainian War take the global integration process to a completely different point. In an environment that has become even tenser with the break in value chains, shrinkage in insurance and logistics processes and new sanctions make nearly all liberal models that are based on globalization fall in a higher fragile situation. Furthermore, if they exhibit an intense foreign dependency in energy, their endurances become weaker.

Therefore, we can easily understand that the EU draws attention as the biggest loser of the energy crisis in such a picture.

In this concept, let us initially start with slightly remembering the energy crisis started in September 2021.

What had happened?

During the pandemic period, investments in hydrocarbon resources were interrupted due to reasons such as complacency in the field of energy, stagnating growth rates and contraction in sectors such as transportation.

During such a lethargy era, many international bodies (even G7 leaders and some institutions such as the IEA) started to claim:

- Let alone coal and oil, even natural gas and nuclear, their era is over!
- In addition to coal, discovered new oil and natural gas fields should not be developed and put into production!
- Renewable age is near and clean renewables will be enough to meet the global demand!

Nevertheless, what happened when the stagnation and complacency in the pandemic period ended?

Actually, supply could not meet the demand. The fluctuation that started in the Asian coal markets spread to the global LNG markets and Europe in particular was faced with a deep energy crisis.

All these consecutions happened before the Russia – Ukraine War!



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At that time, the climate-mongers, who attracted attention with their inconsistent comments, fell into silence. Then, unfortunately, (with the fire of the USA!) the war between Russia and Ukraine officially started.

What happened next?

The cost of the entire energy crisis was directly dumped in Russia's lap. No one was talking about the fact that wrong energy policies might have been followed! Russia was suddenly described as the greatest evil in the world! The Nord Stream 2 pipeline, which is actually very important for EU energy security, was suspended just as it was completed and started to operate! The United States has ensured that the pipeline, which it could not prevent from being built, is shelved at the last minute!

On the other hand, USA also has achieved the position of being the largest LNG exporter in the world with the investments it has made in its country for years. While an average gas producer in the USA (excluding taxes) can make a profit of close to 50% in the domestic market, this rate has risen to over 500% thanks to LNG exports to the EU! In addition, US exporters profited hundred billions of dollars in 1 year! US LNG was not a long-term cure for the EU's troubles and could not replace Russian gas, but it was still important for the US to take the confused-minded EU under its shoulders.

As of June 2022, with the maintenance period on the Nord Stream-I pipeline (which can be technically accepted as a reasonable annually scheduled maintenance, as happened in the previous year, at the same season), gas flow on the corresponding line decreased up to %20 levels.

Russia mentioned that it could not efficiently manage the maintenance process due to existing sanctions. The panic atmosphere in the EU deepened and Russia was blamed of using energy trade as a political argument. However, if Russia had really wanted, it could have locked the EU markets by pulling the maintenance to March and closing the Ukraine and Belarus lines for technical reasons (which are currently active)! However, it did not act in such a manner.

In the EU side, on the other hand, a panic atmosphere was created by the highly trenchant words of some leaders. This naturally increased the pressure on the markets and the prices.

Then, EU energy ministers accepted to decrease gas demand around %15. However, they could not enucleated a reassuring road map. Again, some leaders started to advise as their citizens, not to take a shower, not to wear a tie, etc. Accordingly, every clownish, nonsensical or vacuous move/statement caused more insecurity in the markets and increased the prices. Electricity prices raised up to 10 times higher than they should be, natural gas prices raised 5 times higher and coal prices were 4 times higher. High-energy intensive industries started to shift production to other countries with cheaper energy costs. Of course, priority again was given to the USA for such investments.

In addition to the increasing distrust and unrest within the EU, the thoughts about leaving the EU started to draw attention in powerful states such as France. (It has once again been understood that



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the UK has decided on Brexit by predicting the pandemic and the processes after it long before, just in time!)

On the other hand, coal consumption increased and some of the old coalmines reopened. Some EU members surprisingly decided to relax the ban on cutting trees for heating.

Natural gas and nuclear were also re-included in the clean energy category.

The global climate lobby, meanwhile, continued to blame Russia.

At those days, Russia declared a 3-day full closure of the Nord Stream-I pipeline for maintenance. However, some EU leaders criticized Russia by assuming it will not re-activate the pipeline anymore.

Perhaps, Russia would have activated again the %20 flow of the pipeline in 3days, however, at the latest G7 summit, some declarations introducing a ceiling price limit on Russian oil imports broken all the balances.

This act, naturally brought Russia into a critical point and Russia started to use energy as a political argument.

For a product with an international market system such as oil, such a policy would not be both fair and viable. Moreover, this application could easily be pierced with backdoor sales. However, the due lobby had already started working and harsh rhetoric was flying in the air.

On top of that, Russia stated that the Nord Stream-I pipeline (which has already had problems in the maintenance - repair process due to embargoes) cannot be re-activated until the sanctions are lifted. In the face of this rest, the EU started to talk about the possibility of introducing an upper price quota for Russian gas. The EU's counter move resulted in Putin's intervention and the voicing of the threat of a much heavier and clearer power cut.

Of course, after this point, it is certain that EU leaders will not be able to come together and agree on a realistic ceiling price for natural gas (or at least only Russian gas). However, relations are still strained. Winter is at hand. Although the occupancy rates in the underground storages are not so bad, how the winter can be managed is a serious question mark.

In this context, we can suggest to EU leaders that they might start negotiating with Russia to put the Nord Stream-II pipeline (which is in standby) into operation, at least until Nord Stream-I is reactivated. Such a move will directly reduce the price bubble in the EU markets to lower levels and prices may be reduced up to \$35/mmBTU.

Of course, it also seems difficult for EU leaders to demonstrate the will to do this and to take joint decisions in this context.

So again, this winter, every EU member country has to focus on taking care of itself. In summary, a very difficult winter awaits the EU.



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RE – BORNING NUCLEAR

Prof. Dr. Uğur Çevik, TESPAM Advisory Board - KTU

The idea of a nuclear power plant was introduced to the world agenda with the slogan of "*Atoms for Peace*" in the United Nations in 1953, by the US President Eisenhower, right after the effects of the atomic bombs dropped on Hiroshima and Nagasaki in Japan, which led to the end of the Second World War in 1945. There are currently 494 nuclear power plants in the world, including those with ongoing construction. Since the process that started in the 1950s, I., II. III and III+ generation reactors operate in 38 countries. The fact that these power plants have been constructed in developed or developing countries is an indication of high technology. Each generation is built with safer and higher technologies, considering the problems experienced by the previous generations. Countries with nuclear technologies are in a completion to have a say in this issue by producing their own reactor types. For example, CANDU is a Canadian type of nuclear power plant powered by the pressurized heavy water designed in the 1960s. VVER is a Russian made water-cooled pressurized water reactor series. Although many types of reactors meet more than 10 percent of the world's energy need, it will be possible to increase this rate with the reactors whose constructions are completed.

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The Russia-Ukraine war showed that European countries that do not have enough natural (underground) resources are dependent on the countries such as Russia, Azerbaijan, Iran, Iraq, that are very lucky in this regard, especially Russia. Fossil-based energy sources such as natural gas, oil and coal still account for more than 50 percent of the energy production of many countries. However, increasing world population and developing agriculture and industrial production have caused serious increases in energy demands. Therefore, countries have tended to use all kinds of energy resources to meet their energy demands. Of course, countries with insufficient underground resources and climatic conditions are obliged to meet the energy needs with imports. From the point of view of renewable and non-renewable energy resources, it does not seem easy for the countries to give up, especially despite the fact that the use of non-renewable energy resources has caused the global climate changes. Given that, the Russia-Ukraine war and the events after it, the embargo imposed on Russia, has caused severe problems in Europe's natural gas supply, and many of the countries have already taken measures for the coming winter. Many precautions were taken, from the Spanish prime minister who said not to wear a tie, to the warnings to keep your doors closed when the air conditioners are on in France. Increasing natural gas prices and problems in supply were the spice of all these issues.

Of course, at this stage, the orientation of countries to other alternative energy sources came to the fore. Although there are many types of energy among the alternatives, many problems experienced by the world due to the global climate change experienced for many years prevent the easy use of all



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of them. In fact, an increase of approximately 1.5 °C in the average surface temperature of the world in recent years has been considered as the greatest threat to humankind in recent years. The countries that foresee these problems are exploring efforts to overcome this problem by holding meetings under the leadership of the United Nations. The last of such initiative is the 2021 climate summit in Glasgow. After this summit, the countries of the world have agreed for a zero carbon footprint in the prevention of climate change due to the use of fossil fuels. Despite disagreements on natural gas and nuclear, the European parliament has accepted natural gas and nuclear as "environmentally sustainable economic activities". Prior to this agreement, countries that had previously invested in this area both started the process one step ahead and gained an advantageous position compared to other countries in terms of foreign dependency. For example, France meets about 70 percent of its energy needs from nuclear energy.

Considering all the reasons mentioned above, it is inevitable that nuclear power plants be one of the most important alternatives for energy production. With the attitude of nuclear opponents and political parties, the opposition to nuclear in Europe is evolving into another process after the crisis in natural gas prices and supply. The Russia-Ukraine war and the subsequent drought left Europe to face with a major energy bottleneck. Coal and nuclear power plants have started to become popular again in Europe, preparing for a difficult winter as Russia cuts natural gas in response to the sanctions. In the light of recent developments, governments have begun to reconsider their policies towards nuclear energy. For example, in Germany, which has decided to phase out nuclear at the end of this year, there is a tendency to use the three power plants that are still in operation for a while if the safety tests yield positive results.

At this stage, it is also necessary to discuss the effect of the increase in temperature due to the global climate change, causing to the decrease in water resources. It is inevitable that nuclear power plants established by large rivers limit energy production due to the decrease in water level. For example, the power plants in France, which use nuclear energy intensively, have been adversely affected by the results of the extreme heat in the recent period and had to reduce production in some power plants.

Despite all these, considering the crises experienced, nuclear power plants stand out as the most important and critical energy production source. The capacity factor (the amount of electricity produced over a specified period divided by the amount of electricity that would have been produced if the plant had been running at its installed capacity during that same period) is an important parameter in energy production. Nuclear reactors with a very high capacity factor (about 95 percent) compared to other types of energy production will be deactivated only during maintenance. Therefore, considering the relatively low capacity factors of renewable energy sources (e.g., solar energy 25 percent), the advantages of nuclear reactors over the other types of energy are once again acknowledged.

In conclusion, it should be stated that although renewable energy sources are an important alternative to protect the world from all negative effects, it is obvious that such sources cannot meet the energy



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needs of the entire world. Therefore, the resources that are considered clean energy such as natural gas and nuclear become critical as they are produced in a sustainable environment. From these sources, nuclear energy will be the foremost alternative in terms of having a high production capacity and not being affected by the environmental conditions.

ECONOMIC ASPECTS OF THE GLOBAL TREND

Dr. Abdullah Altun, TESPAM Economic Studies Coordinator

It is clear that there is an energy crisis. However, there is not a consensus on what the real roots of this energy crisis are. Simply the main reason for the recent severe increases in price fluctuations and supply side shocks is not the scarcity of world energy reserves.

The world economy has witnessed some very significant problems since 2007 such as 2007 global food crisis, 2008 global economic crisis, 2018 trade wars, 2020 covid-19 pandemics and recent 2022 Russia-Ukraine war. Interestingly all these difficulties have impacts on economies in a very similar direction in terms of increasing the self-sufficiency concerns and the protectionist sentiments. Even there arise questions such as whether a deglobalization process occurs.

After 2008 global economic crisis, many countries become much aware of the concept of the bullwhip effect. To be a participant of a value chain may result in becoming much vulnerable to economic shocks even in a much-amplified way. Due to this changing mentality world witness the slowing down of the speed of the expansion of the global value chains.

Trade wars are the signs of the changing algorithm of global economy since 1990s. Second great unbundling or global value chains revolution is the main algorithm of the global economy since 1990s. USA is the main responsible actor for this process and the increasing power of China is among the most significant results of this revolution. The conflict between USA and China since 2008 trade wars seems continue and even on the rise. Increasing tariffs after trade wars, supply and demand shocks and the increasing freight costs after covid-19, Taiwan conflict and AUKUS pact are all indicate a big problem between USA and China.

European Union (EU) had the foremost role in efforts towards reducing emissions and taking actions against climate change. EU not only offered and increased considerable financial supports for greener energy projects but also reduced and even removed financial sources for fossil fuels. One more



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intensification of the EU actions towards fossil fuels was the stop financing renewable energy projects of the fossil fuel producers.

One of the main questions arising here is whether the other big players of energy game have the same inclination towards climate change and emissions issues as EU? Possibly others don't ignore the issues but not concerned as intense as EU. However, the big efforts of EU in stopping using or financing fossil fuels have possible counter arguments both from fossil fuel producers and developing nations. Whether supporter of conventional energy resources and supporter of the greener or renewable energy are in a competition is another topic of interest. Interestingly Russia and Ukraine war drive EU towards reconsider the role of the conventional energy resources.

One of the biggest threats for the near future of the global world is food crisis. Russia and Ukraine war not only decreases the grain exports considerably but also many countries still suffer from the lack of fertilizers. If the disputes in fertilizers trade continue, probably many countries, especially developing ones, will face with serious decreases in agricultural crops. Simply this means that the food security and sustainability is in a great threat nowadays.

Winter is coming in EU. Alternative energy resources for EU probably are not enough to fully compensate the lack of Russian gas. Although EU governments try to take precautions by recommending alternative actions to their societies, EU people probably will not much satisfy with the outcomes of this process in the wintertime.

Russia and Ukraine war increase the number of refugees. Especially EU hosts the majority of the Ukrainian refugees. Türkiye, as hosting the largest number of refugees, doesn't ignore the Ukrainian refugees and gives support. However, it is necessary to indicate here that EU has a double standard towards Syrian refugees and doesn't give a really satisfactory support to Türkiye in this process.

One of the sources of conflict especially in our region was related with the EastMed pipeline. This pipeline was first configured as a very long offshore pipeline by ignoring Türkiye. Finally, it was understood that no project can be finished or successful despite Türkiye. Moreover, the cost of the project and the hesitations about the sustainable consumption patterns make USA withdraw its support from the previous configuration of the pipeline. Regarding the recent new developments about the Türkiye and Israel relations, East Mediterranean energy can be transferred to EU through Türkiye.

The increasing capacity of Türkiye in terms of offshore drilling both in Black Sea and Mediterranean Sea by new ships may be a big game changer. New gas discovery of Türkiye in Black Sea raises the hope for other possible discoveries. Meanwhile Türkiye's attempts towards running the underground natural gas storage facilities at full capacity enable Türkiye sustain energy security and sustainability in the midst of the energy crisis.

In brief, the world is in turbulence. And it is not much possible to access a stable global order soon. Thus, interesting new developments may occur and Türkiye's role will have much more significant than ever not only for our region but also for much far regions



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FUTURE TECHNOLOGIES AND RENEWABLE ALTERNATIVES

Lütfi Taşkiran, TESPAM Technical Studies Coordinator

The Black Sea region has always been considered a bridge between Europe and Asia. When it comes to the energy sector, the status of all these countries might be different, as some are producers, some rely heavily on imports and some others just serve as corridors. However, the future is one and only and over the last years all these countries have started working in the same direction.

The urgency of the fight against climate change has been acknowledged almost by every country. So far well-known for its role in the gas industry, the Black Sea region is now emerging as a potential renewables hub.

In particular, concerning renewable energy sources, significant advantages have been introduced across the countries, such as feed-in tariffs, renewable energy zones, green certificates, and other attractive incentives.

Today, the local energy demand in the countries of the region is forecast to grow in line with the GDP, with Türkiye alone registering a 5.1 percent electricity demand growth since 2002.

The Black Sea presents strong resources of renewable energy in each of the six surrounding countries (Romania, Bulgaria, Georgia, Ukraine, Türkiye, and Russia).

Thanks to the hinterland of this region, the demand will absolutely help to design such a good scenario to shift to 100 percent renewable energy.

Achieving energy security is at the top of the authorities' agenda for many countries in the region. By the end of 2020, Romania plans to meet the obligations set by the EU in terms of greenhouse gas emissions through its legislative package Climate changes – Renewable Energy. Bulgaria adopted the Renewable Sources Act already in 2011, regulating the generation and consumption of energy from renewable sources. The wind potential is limited in all countries but Romania and Serbia have good water potential.

The Black Sea is one sea-basin stirring new interest. The World Bank estimates it has 453 GW of technical offshore wind potential – 269 GW for bottom-fixed and 166 GW for floating offshore wind. The Romanian Parliament is debating a draft Offshore Wind Bill. And Bulgaria is starting to look into offshore wind deployment as well.

How much solar do we need to electrify the energy system in the Black Sea and how can we scale the industry up to meet that demand? What are the most promising utility-scale projects in the region?

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- Romania plans to add around 3.7 GW of solar by 2030;
- Türkiye plans to commission 10 GW of solar by 2027;
- Bulgaria envisages the installation of 1600 MW of solar between 2020 and 2024.

Wind Potential in the Black Sea

The recent wind power conditions for a 30-year period (1976-2005) are assessed based on the results provided by the same RCM (Regional Climate Model) used to generate the future climate projections of the wind fields. The impact of climate change on the future wind power potential is evaluated by comparisons between historical data and near-future (2021-2050) and more distant future (2071-2100) projections. Under the scenario considered, an increase in the mean wind power was observed until the middle of the 21 st century, followed by a small decrease.

Annual means of the wind power at the height of 80 m above the sea level for the point M3 computed for historical data and, near future and distant future projections under the RCP4.5 scenario. The linear trend is indicated by the red dashed line. (Rusu, 2019)

The highest mean values of wind power there are in all deep water points, for all time periods considered, with values ranging between 500-550 W/m².

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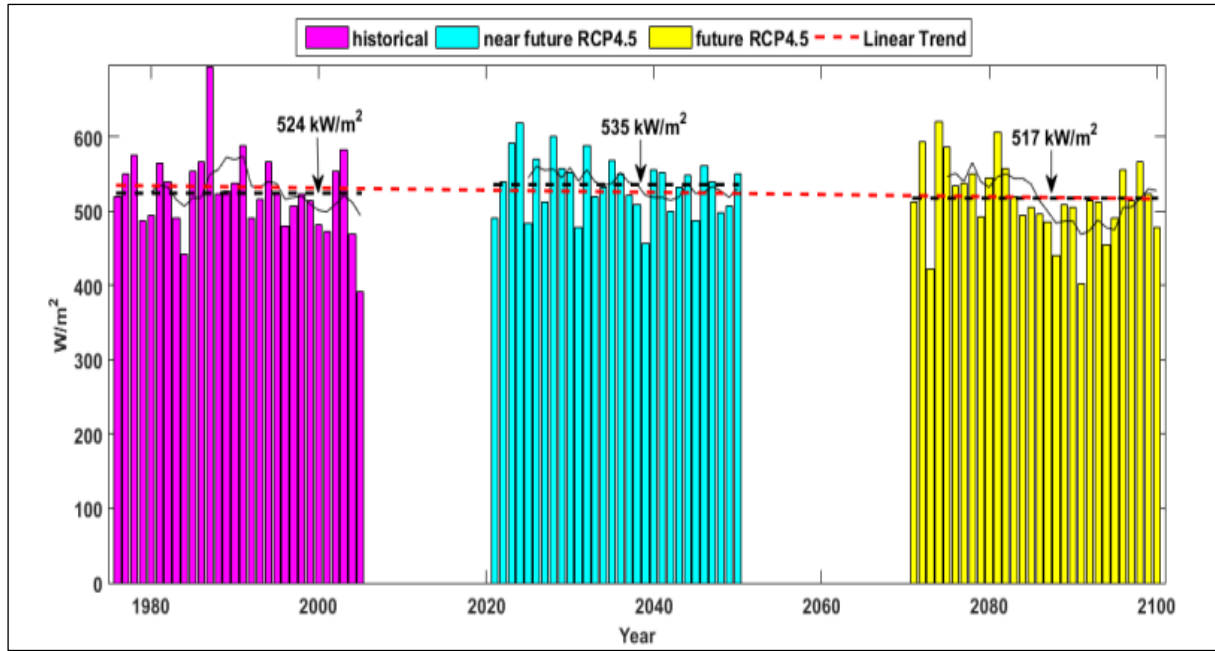


Figure 1- Annual means of the wind power at the height of 80 m above the sea level on Black Sea

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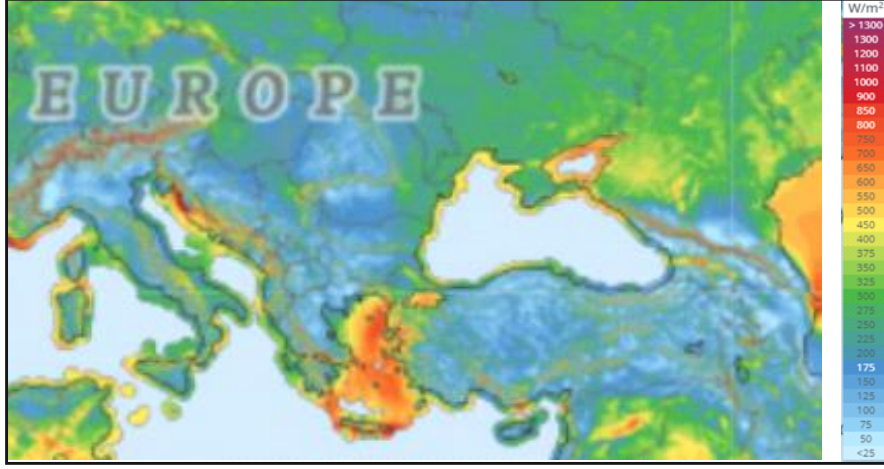


Figure 2- Average wind values of Europe and Black Sea

Current Renewable Positions of the Black Sea Countries

Türkiye

The wounds by the end of July 2022 can be experienced according to current sources; 31% hydraulic energy, 24.8% natural gas, 20.7% coal, 10.9%, 8.5% solar, 1.7% geothermal and .4% ü are other sources.

Türkiye has an important solar energy potential due to its geographical location. According to the Türkiye Solar Energy Potential Atlas (GEPA) prepared by our Ministry, the average annual total sunshine duration is 2.741 hours and the average annual total radiation value is calculated as 1.527.46 kWh/m².

Our onshore wind potential stands strong and as most of the Turkish sites are still young, re-powering them in the next decade may again boost the installed wind fleet, by better using existing resources, About offshore, we consider that the potential is remarkable and together with the improvement of technology and amelioration of the economic aspects, Türkiye would be on a competitive edge.

According to the data of the Turkish Wind Energy Potential Atlas (REPA-V1) prepared in 2006 with a horizontal resolution of 200 m using a medium-scale numerical weather forecast model and a micro-scale wind flow model, the annual average wind speed of 50 meters above ground level and over 7.5 m/s It has been accepted that 5 MW wind power plants per square kilometer can be established in usable areas with high speed and the total capacity of wind power plants that can be established in Türkiye is determined to be 47,849.44 MW. As of the end of June 2022, our installed power based on wind energy is 10,976 MW, and its ratio to the total installed power is 10,81%.

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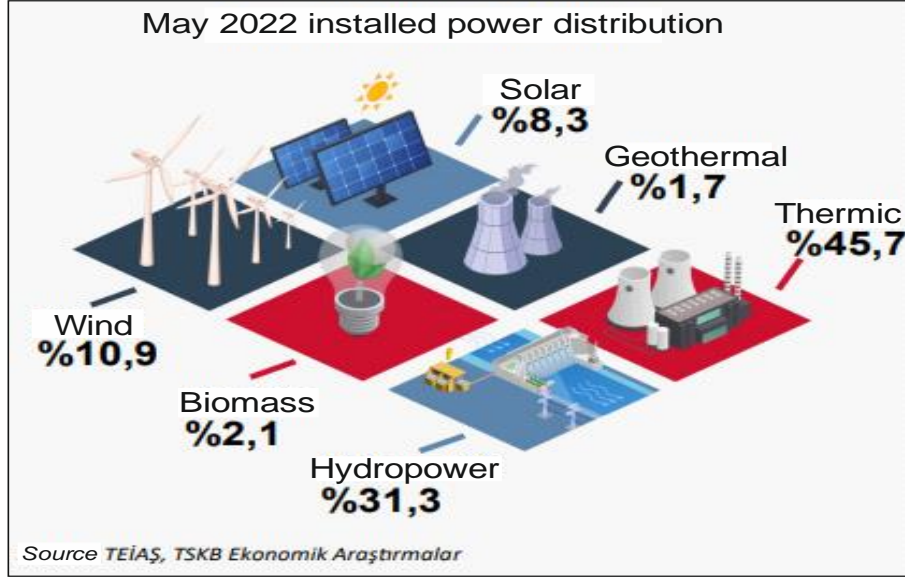


Figure 3- Installed power distribution of Türkiye at 2022.

As it is known, geothermal energy is a domestic underground resource that is renewable, clean, cheap and environmentally friendly. Since our country is located on an active tectonic belt due to its geological and geographical location, it is in a rich position among the world countries in terms of geothermal. There are geothermal resources at different temperatures in the form of approximately 1,000 natural outlets spread all over our country.

Türkiye is the 1st country in Europe in terms of geothermal potential and the 4th country in the world in terms of installed power.

The geothermal energy installed power, which is widely used in electricity generation as well as district heating, is 1686 MW as of the end of June 2022, and its ratio to the total installed power is 1.66%.

Georgia

Georgia also could reach a 100 percent renewable future, thanks to its tremendous resources in hydro, wind, and solar. It will depend on the pace of technological development. Forty percent of the electricity comes from the energy produced in summer. However, for the cold season, the country needs storage.

There are no plans to produce green hydrogen locally so far, but they are actively engaged in this sense and there are many international players like the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank, and the World Bank which is ready to support them.

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Technology is quite expensive for now, so in the short term, Georgia will exploit its natural resources as much as possible.

Indeed, if rightfully exploited, the Black Sea's untapped energy potential could actually serve as a bridge between today's use of resources and a future based on renewables.

Bulgaria

Bulgaria started renewable energy promotion, including the establishment and implementation of the institutional and legal framework only in 2007, which is far later than the other old EU member states. The state experienced strong RES development in two periods (2007-2012 and 2012-2016) and increased its share dramatically. Currently, the installed output of RES plants in Bulgaria stands at well over 1700 MW (mostly wind and photovoltaic). Bulgaria is among the 11 EU member states that have already hit their 2020 renewable energy target. According to the National Statistic Institute, the share of renewable energy in gross final energy consumption in 2018 was 20.5%

At the end of 2019, Bulgaria pledged to update its national target for renewable energy and raised the share of wind, solar and other renewables to 27% of their energy consumption respectively by 2030. Hydropower plays an important role in the energy production of Bulgaria with a share of approximately 14% of the total installed capacity. Electricity generation from hydropower makes a substantial contribution to meeting the increased electricity demand and is currently the most used resource which is not fossil fuel or nuclear-based electricity generation technology. Bulgaria has a total installed generation capacity of 12.6 GW (2017), including 4.5 GW lignite and hard coal, 2.0 GW nuclear, 0.6 GW natural gas, 3.2 GW hydropower including pumped storage, and 1.8 GW of other renewables.

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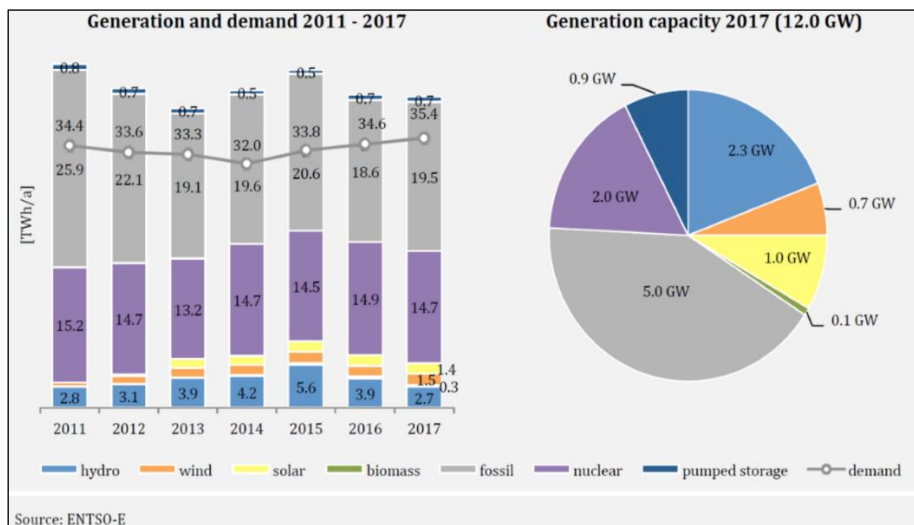


Figure 5- Installed power distribution of Bulgaria



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In Bulgaria, there are 242 hydropower plants in operation. In total, the National Electric Company (NEK) owns 30 conventional hydro and pumped storage plants with a total installed capacity of 2,713 MW in generating mode and 937 MW in pumping mode. Hydropower contributes to an annual avoidance of 491,690 tons of CO₂ emissions, which translates into an annual CO₂ cost avoidance of \$3,5 million.

Romania

According to the data displayed by Electrica Furnizare SA in August 2020 (source www.electrifurnizare.ro), the structure of electricity production in Romania in 2019 was provided by:

1. High-carbon energy sources: 38.85%, as follows

- 22.89% – coal
- 13.95% – natural gas
- 0.01% – naphtha
- 2.00% – other conventional sources

2. Low-carbon sources: 61.13%, as follows

- 26.75% – hydro-energy
- 18.98% – nuclear
- 12.09% – wind power
- 0.68% – biomass
- 2.62% – solar energy
- 0.01% – other renewable sources

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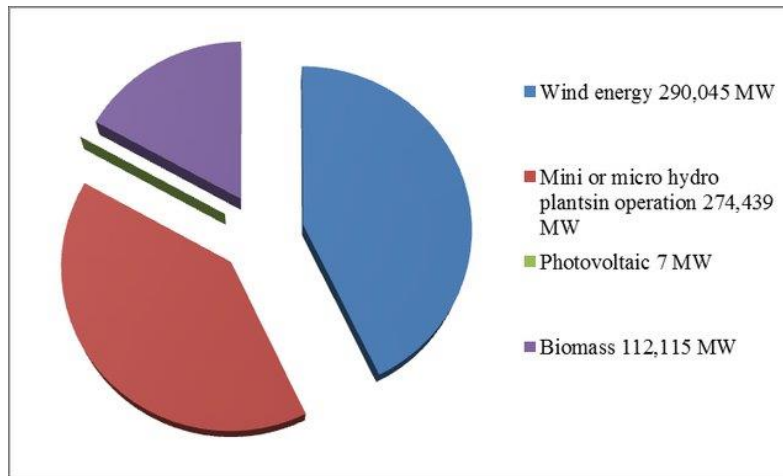


Figure 6- Capacity of renewable energy facilities in Romania

Russia

Renewable energy in Russia mainly consists of hydroelectric energy. In 2010, the country was the sixth largest producer of renewable energy in the world, although it was 56th when hydroelectric energy was not taken into account. Some 179 TWh of Russia's energy production came from renewable energy sources, out of a total economically feasible potential of 1823 TWh. 16% of Russia's electricity was generated from hydropower, and less than 1% was generated from all other renewable energy sources combined. Roughly 68% of Russia's electricity was generated from thermal power and 16% from nuclear power.

While most of the large hydropower plants in Russia date from the Soviet era, the abundance of fossil fuels in the Soviet Union and the Russian Federation has resulted in little need for the development of other renewable energy sources. In the early 21st century Russian Prime Minister Dmitry Medvedev called for renewable energy to have a larger share of Russia's energy output, and took steps to promote the development of renewable energy. But by 2020, wind and solar only amounted to 0.2% of electricity generation, compared to the world average of 10%.

Russia is one of the world's largest producers of energy, most of which it obtains from oil, natural gas, and coal. The country's focus on those resources for production and export, which constitute 80% of foreign trade earnings, means it has paid little attention to renewable energy. Out of the 203 GW of electric generation capacity that Russia has, 44 GW comes from hydroelectricity, 307 MW from geothermal, 15 MW from wind and negligible amounts from other renewable sources.

Ukraine

In Ukraine, the share of renewables within the total energy mix is less than 5%. In 2020, 10% of electricity was generated from renewables; made up of 5% hydro, 4% wind, and 1% solar. Biomass provides renewable heat.



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Methane Hydrate (Natural Gas Hydrate)

Gas hydrates are ice-like crystalline solids that can form under low temperature and high pressure (thermo-baric) conditions. These structures are formed when water molecules trap low molecular weight gas molecules when suitable thermo-baric conditions are provided. Gas hydrates were discovered accidentally in the laboratory in the first quarter of the 18th century. The fact that gas hydrates can occur spontaneously in nature was understood by the extraction of gas hydrates from permafrost areas in the Messoyakha region of Russia in the 1960s, and it has been known that gas hydrates can also occur in marine sediments for more than 30 years. Gas hydrates in nature are also called "Methane Hydrate" or "Natural Gas Hydrate" because they contain predominantly methane gas. Studies have shown that 1 m³ of gas hydrate can contain 164 m³ of natural gas. Gas hydrates are considered the energy source of the near future due to their ability to trap a gas 164 times larger than its own volume.

Gas hydrates, like shale gas, were not considered commercially in terms of hydrocarbon production in the years when they were first discovered in nature. To explain through two similar examples; the USA. Commercial natural gas has been produced from shale gas in Louisiana since 1905 and from gas hydrates in the Messoyakha region of Russia since 1970. On the other hand, the possibility that both shale gas and gas hydrates may offer potential in terms of natural gas production in other fields has been neglected for many years by the oil industry. On the other hand, due to the increasing energy need of the world and the depletion of traditional hydrocarbon resources on a global scale, shale gas from these two non-traditional energy sources has been investigated in detail and appropriate production technologies have been developed over time. As a result of this situation, shale gas has taken its current place in the oil industry since the 2000s, and today it has been described as a "game changer" in terms of the policies of countries toward energy resources.

In terms of gas hydrates, the Turkish Seas offer quite a high potential, except for the Aegean Sea. On the other hand, the Eastern Mediterranean and the Marmara Sea, especially the Black Sea, are among the important areas in the world in terms of gas hydrate formation. In particular, the fact that the Black Sea is an anoxic basin and there is no oxygen below 150 m of water depth brings along very good protection of the organic material required for hydrocarbon production and the gases derived from organic materials. Although the Turkish coasts of the Eastern Mediterranean are still untouched areas in terms of gas hydrate research, the continental edges of this area are also very suitable for gas hydrate formation.

Researches are concentrated in the Black Sea Basin, the world's largest intercontinental anoxic basin. In contrast, the amount of data in the studied areas is insufficient for a detailed gas hydrate survey. In addition, there are areas of the Black Sea Basin that have not yet been studied on the continental margins of our country.

As a result, gas hydrate researches carried out in Turkish seas have focused mainly on the first phase of gas hydrate researches carried out around the world, and studies on the determination of potential areas as an inventory are continuing.



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Hydrogen

Using lower-quality renewables like solar energy to generate hydrogen from the water provides a zero-carbon fuel, which has higher quality than natural gas. Black Sea countries are very fortunate in this respect because the seawater is exceptionally rich in H₂S gas that may be split into hydrogen and sulfur using abundantly available off-shore renewable energy sources like wind, wave, and solar. The Black Sea has alarmingly high levels of H₂S awaiting useful applications to reduce simultaneously environmental and human risks.

The Black Sea is one of the world's largest H₂S reservoirs. The total reserves are estimated at between 28-63 billion tons (between 41x10¹² and 92x10¹² m³) (Ertan, 2020; Kılış, 2020). Assuming a retrieval ratio of just 50% and considering that there are six countries with continental shelves, the Turkish share is estimated between 7 and 15x10¹² m³ of hydrogen. (Ertan, 2020; Kılış, 2020). Hydrogen has an exergy-based calorific value of almost three times more than natural gas (Kılış, 2020). Therefore, on a natural gas equivalence comparison, the natural gas-equivalent net reserve for Türkiye will be about 21 to 45x10¹² m³ of equivalent natural gas. This is almost 65 times more than the recently discovered Tuna-1 (Sakarya) natural gas reserve (Kılış, 2020).

Furthermore, the yearly increase of H₂S gas reserves in the Black Sea is annually increasing by a rate between 4-9 million tons/annum (Ertan, 2020). Again, taking the lower estimate, this annual H₂S gas increase in the Black Sea is about nine times more than the Tuna-1 reserve. In other words, if H₂S gas is not used by renewables to produce hydrogen, Türkiye will be missing nine natural gas reserve-equivalent energy reserves every year, which is a much cheaper-to-produce zero-carbon fuel.

Because of the historic energy generation capacities of those countries, such a transformation will not only be a strong step to reach climate neutrality but also may create a transformation within the industrial development, by enhancing engineering skills, manufacturing chains and smart distribution solutions.

The Black Sea Region need an energy transition, the solution is provided by governments, which, with their policies, can really get everybody on board and stimulate investments in the region. Every country and every region must do its part in the de-carbonization and cooperation is crucial.

Now, among the priorities, Black Sea Region countries need to increase the share of renewables, untapping the potential of offshore wind, storage, and hydrogen, so to make them innovative hubs for new technologies. For countries, a realistic path includes improving energy efficiency, increasing renewable and nuclear energy and using natural gas as a transition fuel.

The number of auctions, support schemes, acquisitions and investments in the renewable energy field shows that not only companies are ready but also consumers (and prosumers) are aware of the important role they can play in the energy transition. After all, is not only about renewables but also about a change of mindset and the Black Sea region is fully embracing that.



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THE EUROPEAN ENERGY CRISIS AND ALTERATIONS IN CLIMATE POLICIES

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Fatih TEMİZ, Climate and Environment Studies Coordinator

The great havoc of the Covid pandemic has not yet ended, the fatality of the virus has diminished greatly yet its scar is still on global economy and world energy sector. The prices of hydrocarbons dwindled momentarily during the last two years. Without waiting for the dust to settle, in a notorious sense, the Russo-Ukrainian War has put a cherry on top of the pie of world problems. The Russian ambitions are based on topography and history and the Russians are one of the nations mentioned in Prisoners of Geography by the author, Tim Marshall, the vast northern plains put no natural borders; therefore, Russia always looks towards these flat areas to solidify her defences. In this report, a summary of how a greener future path has found an obstacle will be studied.

First, as a result of the negative consequences of global warming and climate change, both the initiatives of international organizations and the pressure of non-governmental organizations, many countries, especially Western countries, have to give up on fossil fuels completely and turn to renewable energy resources in order to reduce greenhouse gas emissions in order to minimize environmental damages. Developed countries took a series of decisions in order to make investments in this field. The most recent of these summits, where various decisions have been taken and convened many times since the Kyoto protocol, was the COP26 summit held in Glasgow, Scotland. This framework includes reducing the use of fossil fuels gradually, especially the use of coal, increasing the funds for renewable energy sources, providing the necessary support for the energy transformation and infrastructure from developed countries to developing countries, reducing the carbon emulsion by 55% of the 1990s level. Keeping the temperature rise below 1.5 degrees Celsius and reducing the methane gas emulsion by 30% were agreed.

Moving away from coal and similar fossil fuels and investing in renewable energy sources were topics that have been on the European agenda since the end of the Cold War. Many European countries have put the de-coaling policy on their main memos, and the electricity generated from coal in the European continent has fallen by one third over the decades. Green energy plans and the funds allocated for it have focused on renewable energy sources such as solar and wind power. Yet, an unexpected war in the international arena turned all the balances upside down. Along with the Russo-Ukrainian War, Europe's sanctions against Russia caused the latter side to use her energy card. The energy resources from Russia are her biggest standing authority against other European countries – Russia roughly provides 40% of the energy needs of Europe which leaves the continent on fragile terms.

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In response to this move by Russia, European countries sought alternative coal supplies and allowed the thermal coal power plants, which had previously halted their operations indefinitely or reduced their existing working capacities, to operate at full capacity again. Especially in order to have a problem-free winter, Europe is currently spending most of its efforts on providing energy supply. With the dry climate conditions and the addition of logistical difficulties, it was especially reflected in the increase in energy prices, therefore; while trying to provide additional support to consumers in order to not to create social tension due to cuts in fuel tariffs, the consumers also had to limit the working hours of street lamps, public spaces, main areas and governmental buildings in order to save up on energy. Meanwhile, European countries are planning to use floating terminals between October and March to process liquefied natural gas imported from elsewhere. Currently, twenty LNG infrastructure projects have been fashioned and funds have been allocated for them. However, by turning Europe towards Africa, it has attempted to establish a supply chain through African hydrocarbon fields. In these studies, Germany plans investments through Senegal, while France and Italy continue their investment researches through North Africa. Although it will be difficult to get a share from other markets with energy-hungry countries such as India and South Korea, and it will cause difficulties for Europe in terms of price. It is easy to see that the European Union has focused on LNG terminals and investments to be made in order to get out of the monopoly of Russia at the moment; this step will cost about €3.7 Billion.

Likewise, the USA turned to fossil fuels and nuclear energy resources again after the Russo-Ukrainian War. Furthermore, the USA even started to design local projects similar to the Chinese government by broadening the energy resource spectrum. The Americans, which had already learned from the energy crisis in the 1970s, made large investments after the crisis both to increase the functionality of coal deposits within their country and to facilitate their transfer within the nation, as well as to diversifying other energy resources (including wind and solar energy). Germany and the Netherlands will allow to operate on €4.5 Billion worth of coal to surpass this sudden crisis. As of February 2022, the Biden administration started to follow a European-like policy by giving the green light to the use of oil and fossil fuels for energy production and even accelerating it.

The sudden reversal of the West's policy of gradually reducing the use of fossil fuels and pulling greenhouse gas emissions down to zero both worries the climate and environment-conscious public and non-governmental organizations. The latter sides are in expectation of following a greener path. Following these happenings, developing countries can feel lonelier in their endeavors of reaching cleaner and less polluting futures.

The current situation for Europe is – perhaps – temporary and no European country shows any intention to step backwards from environmental goals for the year 2030. However, the fact that investments are not focused on green energy or renewable energy, but rather on LNG and nuclear energy resources, raises doubts about the possible realisation of the commitments. While investments and projects in LNG, in particular, require a long-term (a 20-year period) commitment and high funds to complete, there are concerns that sufficient investments cannot be made in renewable energy resources and that these infrastructures will increase methane gas pollution. In addition, many



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opinions are being discussed that the amount of carbon dioxide to be released into the atmosphere will be much higher than the use of coal this year compared to previous years. According to environmental perspectives, there are many ideas that a lower level of pollution and higher efficiency can be achieved by mixing green hydrogen technology in infrastructure works for LNG. The European Union has given citizens a whopping amount of €280 Billion since July 2021, the average Joe in Europe is suffering from this big economic hit, however, the EU countries cannot sustain these ongoing subventions. In the UK, it is estimated that 10% of house income will go towards energy consumption bills in this winter, which is about double the amount spent during the previous year.

Following this afore mentioned attitude of the West in the search for new fossil fuel resources, climate lobbyists, think-tanks and NGOs are concerned – especially in Europe where climate-related issues are considered. It is also noteworthy that the European Union is the third largest greenhouse emitter after China and the USA. In addition, with the global climate change even the famously green Britain looks dried and yellowish on satellite images. To make things worse, with less precipitation received the capacity of hydropower is going down which further limits the passage towards renewable energy.

At the UN's COP27 climate summit in Sharm el-Sheikh, Egypt, global leaders will re-discuss the difficult question of how much wealthier nations - typically the heaviest polluters - will support developing countries in the climate transition, and the reachability of their decisions taken at the previous summit.

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EFFECTS OF THE ENERGY CRISIS ON ELECTRICITY MARKETS

Göksel Topal, TESPAM Energy Markets Study Team Coordinator

In September 2021, the global energy crisis began due to the consequences of the natural gas and coal crisis in the United States, China and Russia. The effects of this energy crisis have not decreased, but with the start of the Russia –Ukraine war in February 2022, the effects of the energy crisis have increased and affected the whole world. In this study, the causes of the global energy crisis were mentioned and their effects in our country and in Europe were examined. The steps taken by Europe and our country as a solution to these effects were mentioned.

Europe's Natural Gas Supply

A significant part of European countries such as Bulgaria, North Macedonia, Estonia and Finland are 100% dependent on Russian Natural Gas. The natural gas demand of these countries is provided only from Russia. When we compare with other European countries, the amount of gas imported by these countries from Russia is quite low. According to the possible consequences of the Russian – Ukrainian war, we can say that Russia will not be much affected by the interruption of gas flow by Russia, but some European countries will be seriously affected due to the fact that Russia is the only supplier. We can state that Germany and Italy will be greatly affected by the imposition of sanctions on the Russian state or an interruption by Russia. Western European countries such as Germany, the

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Czech Republic, Poland and Italy use natural gas in the process of converting from fossil fuels to clean and renewable energy sources.

Lithuania received most of its natural gas supplies from Russia until 2015, but this percentage has now fallen to 69%. Despite the fact that Poland is gradually trying to reduce its dependence on Russian gas after the fall of the Soviet Union, the percentage remains above 80%. France meets 10% of its natural gas needs from Russia. The Netherlands imports close to 5% of its own needs from Russia, where it imported no natural gas until 2005. Although Italy plans to reduce the import rate of natural gas, in recent years this rate has again reached the level of 33%.

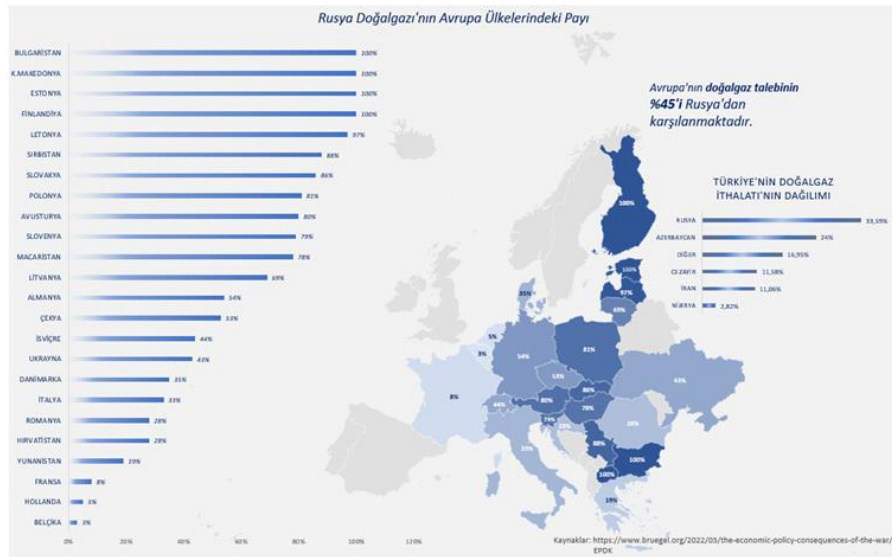


Figure 1: The Share of Russian Natural Gas in European Countries

Türkiye's Natural Gas Supply

When we examine the BOTAS data, Türkiye has the capacity to receive 19.1 million m3 of gas daily from Azerbaijan, 17.3 million m3 from TANAP, 28.5 million m3 from Iran, 47.3 million m3 from MAVI Stream (Russia), 46.9 million m3 from TurkStream (RUSSIA). In addition, BOTAŞ Marmara LNG terminal has a daily capacity of 37 million m3, Silivri natural gas underground storage facility has a capacity of 28 million m3, EGEgaz terminal has a capacity of 40 million m3, IMPACT Port FRSU facility has a capacity of 28 million m3.

When we examine the annual natural gas import data published by the EPDK, the distribution of imports in terms of source countries is; Russia 33.59%, Azerbaijan 24%, Iran 11.06%, Algeria 11.58%, Nigeria 2.82% and other countries account for 16.95%. Russia ranks first in the supply of natural gas to our country. Due to the long-term Commercial Natural Gas Agreements concluded with Russia, gas interruptions are not foreseen in our country in the coming days.

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From the use of natural gas imported by our country, electricity production is in the first place. When we examine the 2021 data, 26.64% of natural gas is used in combined cycle power plants, 23.10% in the industrial sector, 10.97% in commercial and official offices, 36.3% in residential buildings, 2.53% in oil refineries.



Figure 2: Turkish Gas and Oil Lines

Causes of the Energy Crisis

Due to the drought affecting the whole world and our country, the reservoirs of hydroelectric power plants have not reached the desired occupancy levels and have not been able to produce at the required capacity. The electricity production of renewable energy sources such as Wind, Solar and Geothermal remained well below the expected amounts. It has commissioned base load power plants (which come into operation in a short time at the time of demand and meet the demand) that use fossil fuels such as natural gas and coal to meet the energy supply in other countries, especially in European countries. With the increasing demand for coal for electricity generation in thermal power plants, countries have started to look for coal.

The use of coal in power plants has led to an increase in countries' carbon footprints, carbon tax and emission values. In order for this situation not to cause a possible climate crisis, European countries have taken different policy steps. In October, in addition to the increase in coal demand, the reserves of natural gas in Europe have fallen to the lowest levels in the last three years. With the increase in natural gas demand in Europe to meet the electricity needs and the heating needs in winter, natural gas prices have risen to high levels. With the approach of winter months, it is expected that natural gas prices will increase in the coming periods.

American oil companies have stopped new investments in accordance with the energy and environmental policies of the European Union. Since September, Brent oil prices have increased.

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Europe's faster-than-expected transition to renewable energy sources has reduced its investment in fossil fuel power plants. Thus, it has reduced the diversity of sources in electricity production.

Sudden increases in natural gas and oil prices due to political reasons caused by Russia's undoubtedly being a major energy supplier for Europe and its invasion of Ukraine.

Russia has reduced the capacity of the Nord Stream 1 pipeline, where gas trade with Europe continues, by 70% on maintenance grounds.

The demand of European countries to increase their natural gas reserves for the winter months

Russia is the regional power in energy by meeting 25% of the oil needs in Europe, 46% of the coal needs and 40% of the gas needs.

The sanctionist policy of the countries of the European Union against the Russian economy

Energy production in our country; approximately 35% of natural gas and 18% of imported coal are foreign dependent sources such as:

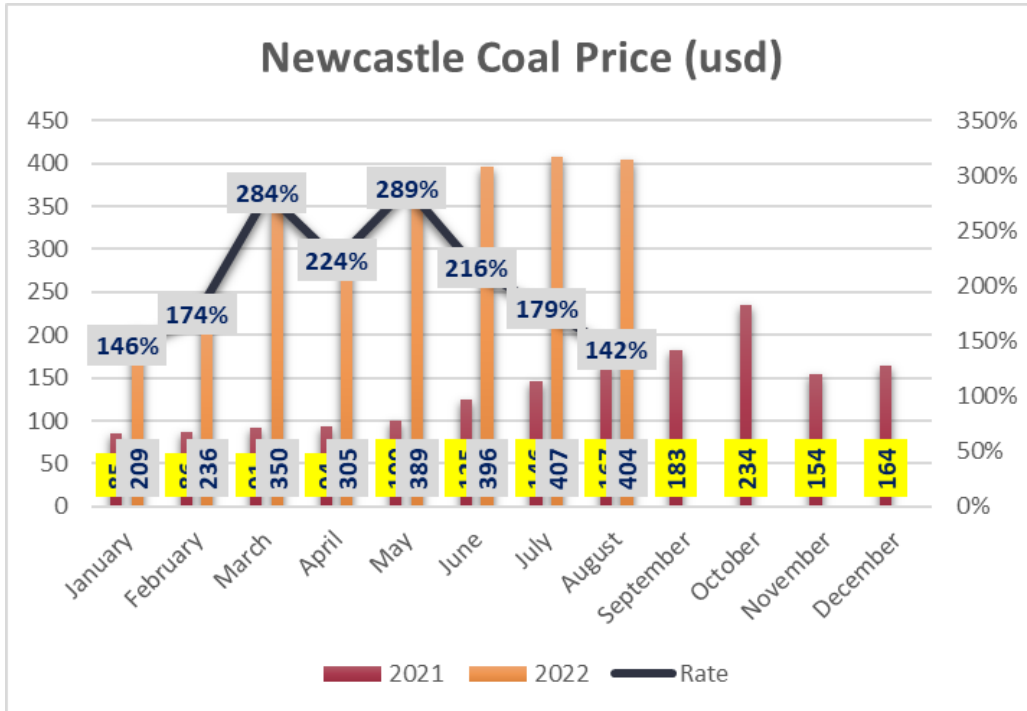


Figure 3: Comparison of coal prices compared to the previous year

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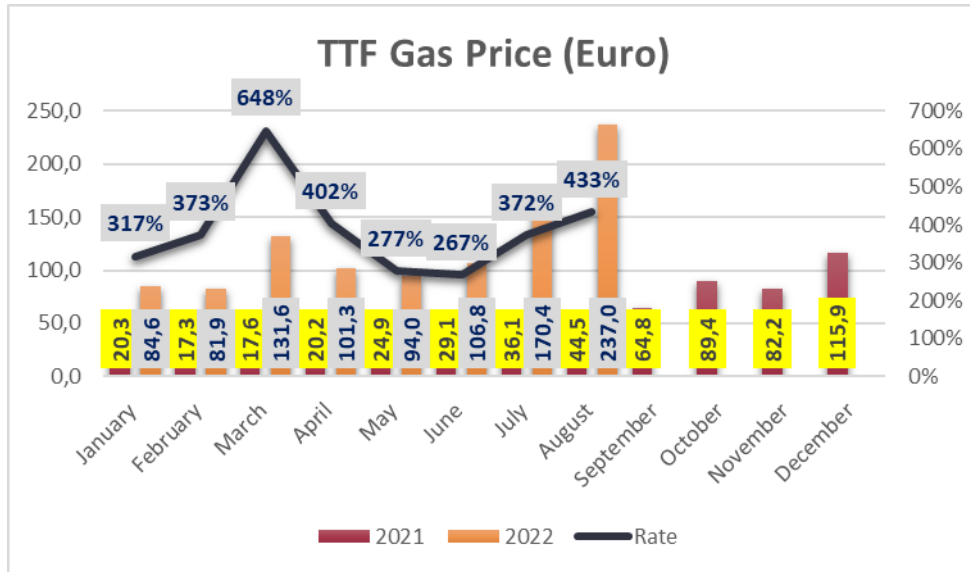


Figure 4: Comparison of TTF Gas prices compared to the previous Year

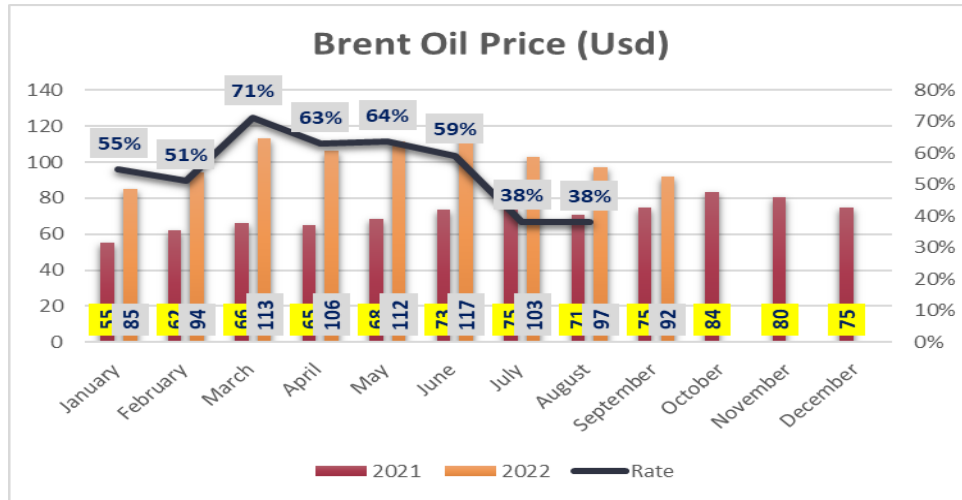


Figure 5: Comparison of Brent oil prices compared to the previous year

Global Effects of the Energy Crisis

Approximately 70% of the electricity production in Europe and 53% of the electricity production in our country are provided from fossil sources. Due to the drought, renewable energy plants have been below the expected level in energy production in Europe and in our country, which has increased electricity prices to record levels since September of last year. In addition, the policy of closing coal and nuclear power plants in Europe has led to an increase in electricity prices, as it has also reduced the diversity of sources. The increases in exchange rates experienced in our country have increased

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the unit production costs of natural gas and coal power plants. As a result, it has caused electricity prices to rise.

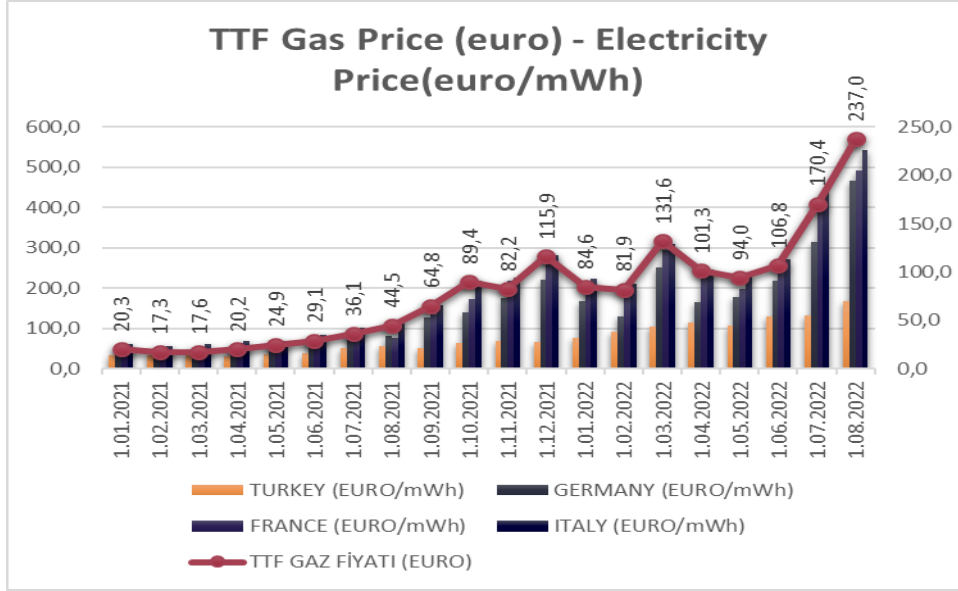


Figure 6: TTF Gas Price - Electricity Price Comparison

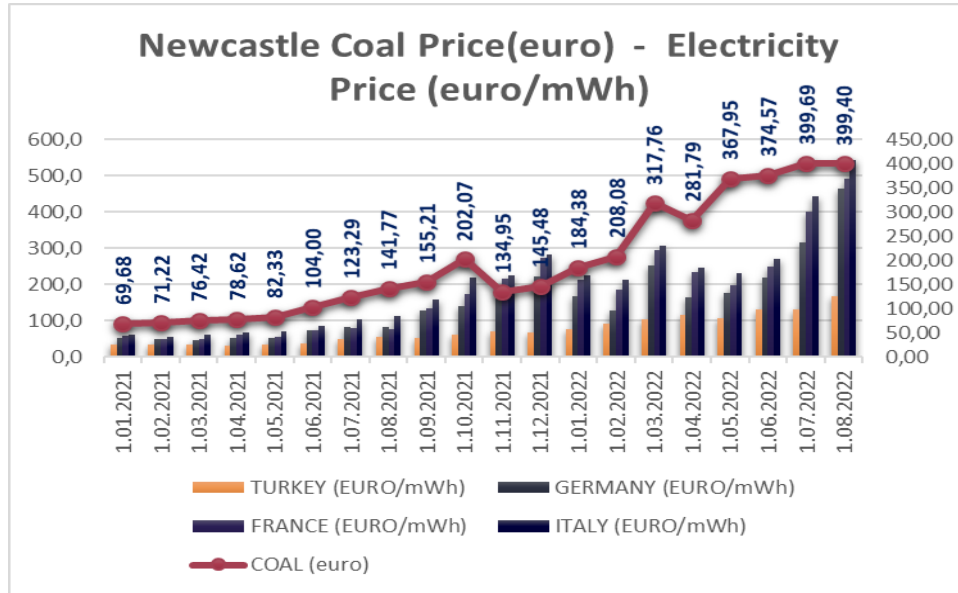


Figure 7: Newcastle Coal Price - Electricity Price Comparison

In addition, in October 2021, in addition to the effect of coal and natural gas prices, the increase in the dollar exchange rate caused the increase in market clearing prices.

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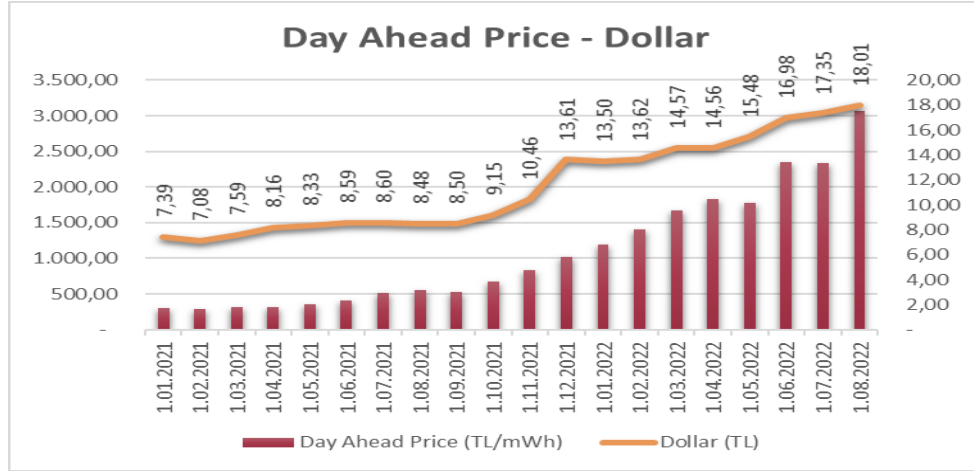


Figure 8: Day Ahead Electricity Price in Türkiye - Dollar Comparison

Effects on the Production Sector

The effects of the global energy crisis on electricity markets have also been felt in our country, including Europe, Asia, China, America and the United Kingdom. As a solution to the supply shortage caused by rising coal prices in China, intermittent power outages have been experienced in 31 provinces of China, 20 factories and homes in the region. Because of the power outages, small, medium and large-sized enterprises in the global manufacturing sector have stopped their production. Factories in the Netherlands temporarily stopped their production due to rising energy costs. Aluminum manufacturing companies in Germany announced that they will reduce their production by 50%. Similarly, various production factories in France have stated that they will stop their production due to rising energy costs. Large-scale production factories in Switzerland and Romania have also stopped production due to increases in energy costs.

In our country, there were 3-day natural gas and electricity restrictions in January, especially in the organized industrial zones in our major cities, and many factories gradually reduced their production.

Measures Taken Against the Energy Crisis

Action Plan of the International Energy Agency

The International Energy Agency has presented a 10-point plan to reduce the European Union's dependence on Russian Natural Gas by 35% and to support the European Green Deal.

1. By not renewing gas supply contracts with Russia.

Effect: Provides greater diversification of supply this year and in the coming periods.

2. By replacing Russian supplies with gas from alternative sources.



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Effect: Russia increases its non-sourced gas supply by about 30 billion cubic meters in a year.

3. By fulfilling the minimum gas storage obligations.

Effect: Increases the continuity of the gas system until next winter.

4. By accelerating the processes of new wind and solar projects.

Effect: Reduces gas use by 6 billion cubic meters in a year.

5. By maximizing energy production from bioenergy and nuclear energy.

Effect: Reduces gas use by 13 billion cubic meters in a year.

6. By taking short-term tax measures to protect electricity consumers from high prices

Effect: Even when gas prices remain high, there are no sudden changes in energy bills.

7. By accelerating the process of replacing gas boilers with heat pumps.

Effect: Reduces gas use by October by an additional 2 billion cubic meters per year.

8. By increasing energy efficiency improvements in buildings and industry.

Effect: Reduces gas use by close to 2 billion cubic meters per year.

9. By encouraging consumers to lower the thermostat values by 1 °C.

Effect: Reduces gas use by about 10 billion cubic meters per year.

10. By accelerating the processes of diversifying production sources and decarbonization.

Effect: Reduces fuel costs used in power plants.

Measures Taken by Different Countries against the Energy Crisis

Spain

-The heating temperature was limited to 19°C.

-VAT on natural gas will be reduced from 21% to 5%.

Belgium

-VAT on electricity and natural gas is 6%.

-Public buildings will not be illuminated between 19:00 and 06:00 Dec.



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Italy

- Fuel taxes have been reduced.
- A subsistence allowance of 200 euros will be provided.

Poland

- Households will be paid a one-time 650 euro.

Greece

- Public buildings will be heated to 19o.

Germany

- Billing support will be provided to citizens
- Unlimited ticket application in public transportation,
- Public buildings will be heated to 19o.

Bulgaria

- Electricity and natural gas taxes have been abolished
- Electricity price increase was limited to 3.4%.

England

- Those who received public assistance were paid £ 650.
- 300 Euros will be provided to pensioners October.
- The total of households' energy bills has been fixed at £2,500 per year.

The European Union has prepared an emergency plan in case of a possible interruption of the flow of natural gas from Russia. It has been decided that the member states of the European Union will reduce their gas consumption by 15%. In addition, it is aimed that the EU countries will fill their gas reserves by 80% by the winter months. For the countries of the European Union, it was demanded to save energy. The budget was allocated for the energy efficiency of buildings. The operating periods of some coal and nuclear power plants have been extended. It was announced that rock gas studies will be supported. Supports were provided for renewable energy plant investments.



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THE BLACK SEA AND THE ENERGY EQUATION IN THE MIDDLE OF POWER BALANCES

Neşat Gündoğdu, TESPAM G.Secreteria

Since the Russian invasion of Ukraine, the waters in the Black Sea have not calmed down.

From the first days of the occupation, although the demand of Western states, especially the USA, to send a navy in the Black Sea by suspending the terms of the Montreux Agreement, put Türkiye under great pressure, Türkiye has not made any concessions from the Montreux Agreement until now.

Desiring to see the Black Sea as a sea of peace, Türkiye established the Black Sea Economic Cooperation organization and included even Armenia in this organization, seeing the Black Sea not only as a sea where borders are shared, but also as a common denominator where problems are resolved.

Among the difficulties faced by Türkiye in its geography, although the developments in the Aegean and the Eastern Mediterranean have increased the possibility of conflict that has become more apparent in recent years, despite the Ukrainian occupation, a risk that engulfs Türkiye in the Black Sea has not emerged yet.

Although Russia's idea of locking the Straits lies behind the uncontrolled flow of sea mines off the Ukrainian coast, the absence of an exploding bomb is a result of Türkiye's keeping the necessary navy ready by following the process closely.

The fact that Russia is still the dominant power is still evident, even though the Ukraine invasion is subject to Ukrainian attacks that will take these steps back by Russia, which has advanced by cutting off its sea connection.

Excluding this and making a Ukraine-based Black Sea analysis may mean breaking with reality.

Since Türkiye knows Russia's power and influence from the very first day, it maintains its position of not accepting border changes in the future against border disputes involving Türkiye, while maintaining good relations with Russia despite Russia's aggression. Moreover, the fact that Russia, which sees NATO as the reason for attacking Ukraine, is willing to act as a mediator without even mentioning that Türkiye is a NATO member, shows the confidence shown.



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This situation is actually a result of the joint security mechanism between Türkiye and Russia that was created in Syria and continues in Azerbaijan.

Experienced processes have proven that new approaches, which are established by clearing the past fears and doubts, are also facilitating in the solution of other problems.

What Türkiye wanted to provide in the Black Sea was the correct application of these previously established ties in the business.

In fact, it should not be overlooked that behind this, another process that started after the downing of the Russian plane that violated the Turkish airspace from the Syrian border is an accelerator.

After the downed plane, Russia's ban on tourists and the suspension of tomato imports from Türkiye hurt Russia the most.

After this loss, Russia, which is in search of normalization in relations without compromising its reputation, came to the rescue of the President of the Republic of Türkiye, Recep Tayyip Erdoğan, with an apology letter.

The rapidly developing normalization process after the two countries made them see that they were the only losers.

A similar process has been taking place between Europe and Russia since the invasion of Ukraine. Although Russia, which was even excluded from the Council of Europe, was seen as a part of Europe until yesterday, the only reason why it is today's persona non grata is of course not the occupation of Ukraine.

The uneasiness created by Russia is the same as Hitler's Germany...

Europeans are living in Ukraine with the fear of German invasion, which cannot be lessened even by the involvement of British Prime Minister Neville Chamberlain, who gave the green light to Hitler's invasion of Czechoslovakia, in the fate of another nation.

The Europeans, who do not believe that a piece of land to be given from Ukraine will stop Russia, are in great loyalty to the Ukrainians, with whom they are not very related.

But this loyalty brings with it another process where today Europe will suffer much more than a military invasion.



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In recent years, we have watched European leaders, who say that NATO is brain dead, continue to divert this resource to other areas instead of fulfilling the NATO requirement to spend 2 percent of the budget for defense expenditures for years.

With the occupation of Ukraine, a sharp turn began to take place in this regard.

It was stated that the military power will be increased with the spending of 100 billion euros announced by the new Chancellor of Germany, Scholz.

In Japan, the first steps were taken to return from a pacifist constitution.

After the assassination of Shinzo Abe, who argued that the constitution should be changed and Japan should establish an army with improved intervention capability, the goal of Abe's Liberal Party, which took power in Japan, was to enlarge the army.

Behind this decision, there is definitely the issue of the Kuril Islands, which is an area of conflict between Japan and Russia, as well as the developing aggression of Russia against Ukraine.

It is seen that Türkiye, which can only sit at the table with both sides, has a very unique place among the NATO countries, which are trying to distract Russia's aggression with more economic power instead of a chance to counterattack.

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As the President of the Republic of Türkiye Erdogan stated in the 77th General Assembly speech of the United Nations, Türkiye wants to continue its mediation between Russia and Ukraine.

Although the expectation for a ceasefire after the Istanbul talks went back depending on the developments in the field, the establishment of the Grain Corridor shows that Türkiye's influence on the two states still continues.

The fact that Russia, which declared mobilization with the autumn months when Ukraine started a counter-attack, continued this step with Putin's threat of nuclear attack, showed that Russia's economic stagnation, as well as its tolerance for loss on the field, were up to a point.

This step of Russia, which cut off the natural gas flow indefinitely at the end of the summer, did not yield any results and the Europeans' emphasis on savings instead of taking a step back caused Russia to put forward a strategy that increased the military tone.

This situation, which Europe carries out without attacking Russia, may start a new process.

In particular, the fact that Finland and Sweden are waiting for approval in the parliaments of the last five NATO states regarding their NATO membership contains another threat.



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Although it is an assurance for Russia that Türkiye has a say in the admission of these two states, which Putin warned about joining NATO, another threat exists as Europe maintains its sharp language against Russia.

Although it is not easy for Russia or Europe to reach this threat, the implementation of a referendum in the regions occupied by Russia and adding these regions to its borders can be seen as an effort to provide international justification for the nuclear attack.

The fact that the President of Ukraine, Zelensky, is gradually moving away from the ceasefire with his success in regaining the lost lands, exists as a great threat in the Black Sea's departure from the atmosphere of the sea of peace.

The Black Sea, through which natural gas pipelines pass and is also a trade route for the Belt and Road Initiative, will also become a natural gas production region by 2023, making it a more strategic and conflict-free region for Türkiye.

Although it does not seem possible to find a solution for the European states to survive the expected hard winter, the process may soften if the expectation that Russia adopts a gradual normalization policy and that the pacifist reaction of the Europeans in the same Crimea will continue against the new referendum regions.

The increased risk of conflict will cause Russia to want to show its aggression even more harshly.

Even though there is enough US dollars in the Russian Central Bank until 2025, Russia's option to establish a new export route through Türkiye, which is isolated from international trade, strengthens the belief that the peace climate in the Black Sea will not deteriorate.

The general conclusion drawn from this whole equation was the fact that Europe's commitment to the green deal fell off the agenda and ignored all carbon problems to keep warm.

While it is clear that the green transformation targets planned for 2030 should be revised at a later date, the possibility of making Türkiye the new production base for the Europeans gives a slight chance of realizing the green agreement targets.

While Türkiye and European leaders' maneuvers in domestic and foreign policy will determine where the process will evolve, Türkiye 's intimidation of the EU for membership in the Shanghai Cooperation Organization shows that Türkiye is aware of the balances and will not give up its trump card that easily.



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In this intertwined process, the US's approach beyond selling LNG to Europe may cause it to assume a game-changing role, and the possibility that the unchanging stance will allow China to enter the playing field should not escape the attention.

With the investment plans of China, which is already energy-hungry, making Russia respond to its own demands, it reveals new economic routes that other states in Central Asia, including Mongolia, have gained.

There is a situation in which the world may embark on a transformation away from the USA's control with reserve money initiatives, but the USA's reaction to this cannot be predicted.

In all these balances, it would be an expression of truth to say that Türkiye and the Black Sea will have a say and this will have a changing weight in the system.



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SOCIAL FRACTURES IN EU THROUGH PANDEMIC -ENERGY-WAR TRIANGLE

Ayşe Akyener

Although its negative effects are observed all over the world, it can be seen that the EU has been dragged into a much deeper social anxiety and fear climate since the pandemic period.

During the pandemic process, risk faced by the (ageing) population potential, harsh sanctions that restrict freedoms, increasing unrest and street demonstrations against these sanctions and the economic contraction have already caused serious social concerns. In addition, in all these difficult processes, while the member countries (as always) primarily took care of their own national interests, their approaches that put the joint decision-making mechanisms into trouble also blocked the way of taking effective holistic measures.

The complacency in the energy field due to the decrease in demand resulted in the radical green transformation rhetoric of EU countries and the directing of many common social funds to this field. The energy crisis that followed, on the other hand, left the EU countries alone with black spots on the hasty pink transformation tables they had constructed.

The energy crisis that started after the pandemic and the ongoing Russia-Ukraine war that followed brought the situation to a much more fragile point in the social sense.

Natural gas and electricity prices, which were almost 10 times higher than what they should have been in the spot markets, had a serious negative impact on the EU citizens, especially for the low-income segment. High-energy prices led to a slowdown or even a stagnation in many sectors. In sectors with high-energy intensity, entrepreneurs decided to move their facilities to countries such as the USA, where energy costs are lower. As a result, unemployment increased. Growth has slowed. Inflation rose and recession concerns threatened almost all EU member states.

Populist (and not quite sincere) pro-Ukrainianism gradually gave way to anxiety. The management of millions of immigrants from Ukraine has become very difficult.

The break in the value chains, the shrinkage in the insurance and logistics processes and the liberalized EU systematics, which was placed on the basis of globalization in an environment that was even more tense with new sanctions, began to shake its foundations.

Inconsistent and harsh rhetoric by politicians, which would put many investors in harm's way, caused the prices to rise and to waste many large investments.



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Although financially strong states tried to manage the process with economic aid packages for the people, the weak ones were insufficient in this context and the problem grew more and more.

The related economic bottleneck and social disintegration continue to a degree that may cause the overthrow of the existing powers in many EU countries and even increase the unrest within the EU.

EU citizens, who have been accustomed to comfort for nearly 70 years, continue to remain in a state of deep anxiety and panic-attack approaches in the face of the real war at their doorstep.

So, how do EU leaders manage the situation when such a deep crisis is wearing down the EU?

How does it solve the energy crisis?

Just as the markets are starting to settle down, the environment is getting tense with new harsh rhetoric and Russia's counter moves make energy management even more difficult.

Support and financial aid are not enough.

Unrest is increasing in many member states, which operate on a completely free market model and where the social state principle is weak compared to its place.

Even in countries with nuclear resources such as France, ideas begin to draw attention with the departure from the union, similar to BREXIT.

EU leaders, who are unable to manage the energy crisis and put forward a reasonably manageable action package against Russia, and have weakness in making joint decisions, find the solution is to reduce the supply of more expensive LNG and consumption by 15 percent.

Despite this entire bad picture, the intensified sanction processes against Russia, especially with the suggestions of the USA, both make risk management more difficult and fall short in practice.

Since the problem will not be solved with more LNG supply, EU leaders advised to their citizens to reduce energy consumption:

- Don't take a bath every day. Make the bathroom together with a partner.
- Don't wear a tie.



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- Do not heat your house.
- Dim the lights.
- Do not heat the public buildings after to 19°C and do not illuminate at night.
- Re-arrange the working hours of shopping malls and entertainment venues.
- Condon the use of coal.
- Turn a blind eye to situations such as cutting trees with the intention of burning.

So, how do you think this situation affects EU citizens socially?

This picture, which even the politicians themselves do not comply with, puts the member states in serious sociological difficulties in terms of both the national and the common EU vision.

Social trust erodes as the suggestions offered as solutions, which are not satisfactory. The majority, especially those with low and middle-income levels, are crushed under the markets, which are even more impasse with the harsh/populist and inconsistent discourses of the politicians.

After the risk of refugees from the Middle East (which they have been trying to close their eyes with for years with inhumane policies) it is a matter of curiosity how the EU, which does not know how to manage the people who come from Ukraine, will take steps in such an intensified energy crisis.

Refugee management processes are making EU societies even more uneasy in this difficult period, when unemployment is increasing due to the economic contraction and the effects of the cost of living are felt deeply.

This is the first time that the European Union is experiencing such disturbing social breaks in this pandemic-energy-war triangle!



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THE ONLY REALISTIC OPTION FOR A RUSSIAN GAS-FREE EU: TÜRKİYE ROUTE

Oğuzhan Akyener

After USA, (with around 400-bcma annual consumption levels) EU is the second largest gas consumer in the World. Due to having lack of enough domestic reserves, EU has to import nearly %70 of this volume and the biggest import partner is Russia (with around %45 import dependency in gas).

In fact, the dependence on Russian natural gas for EU countries goes back before the EU was established. Natural gas, which is a much more practical and cleaner energy type, has been imported from Russia by many EU countries for many years, without hindering the industrialization and growth targets.

On the other hand, since the Cold War period, especially with the diplomatic spurts of the USA, the EU has been trying to create markets that abstain from Russian gas.

However, since they know that the Russian gas will be the cheapest, easiest to access and safest gas regarding with the supply route (generally sustainable), an effective policy cannot be carried out in this context. Moreover, we have to note that, the nature of the gas markets, which requires giant investments and climate-related policies, also affects the decisions to be made within this regard.

Therefore, EU was usually following a confused policy, where it cannot completely agree on the situation of additional Russian gas imports.

This situation has gone up to the Russia-Ukraine War!

The Russia-Ukraine war has really started to feel that: the EU countries coherently are signaling that they agreed on taking much more drastic measures and clearing their markets of Russian gas (at least in the long run). Although many countries will want to resume natural gas trade with Russia after scenarios such as change of administration (in Russia), end of war, and re-normalization with Russia, the current situation reveals that the EU seems serious for the first time!

Well, in such a scenario, how will the EU reduce Russian gas imports and reset it in the long run?

Let us shortly analyze the situation within some critical questions:

- In this context, will additional LNG from countries such as the USA, Nigeria, Qatar, Australia or the additional pipeline to be supplied from countries such as Algeria, Libya, Norway, Azerbaijan really be able to replace Russian gas in a sustainable way in the long run?
- Do the relevant countries have sufficient reserves and export capacities?



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- Are there technically adequate facilities within the EU to ensure the demanded imports?
- Can these processes be circumvented with reasonable costs?
- Will LNG options be as safe and sustainable as the pipeline-gas during bad weather conditions (usually in winter season, where the demand is peaked)?
- Although currently the USA (now the largest LNG exporter in the world) is feeding the EU gas markets with profits of hundreds of billions of dollars, will this situation continue?
- When gas prices in the domestic market start to become a little more disturbing for the US citizens (due to natural gas exports to EU), will the USA be able to maintain its export stance towards the EU? Are there enough natural gas reserves in USA to manage this process?
- Will the EU be able to avoid being dragged into even more chaos, weakness and instability in this process?
- Is there a formula to substitute Russian gas in the short term?
- In the current situation, will the decisions to reduce consumption (by creating a fearing climate) really be enough?

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Unfortunately, the only answer for all of the above questions is “NO”!

At this point, as TESPAM, by using our gas balances model, we suggest a new long-term achivable option to the Europeans.

Yes, this option can only be achieved in the long term, has a huge economic and political cost and the possible gas transit through this route may not be as cheap as the Russian gas (by evaluating the unit production and transportation costs). However, this seems the only realistic, sustainable and applicable option for a Russian gas-free EU!

In this context, in TESPAM we modelled EU’s long-term gas demand and export scenarios. In the base case scenario (at 2050), as can be observed in the graph below;

-Romania will need an import volume of 6-bcma,

-Türkiye will need 80-bcma,

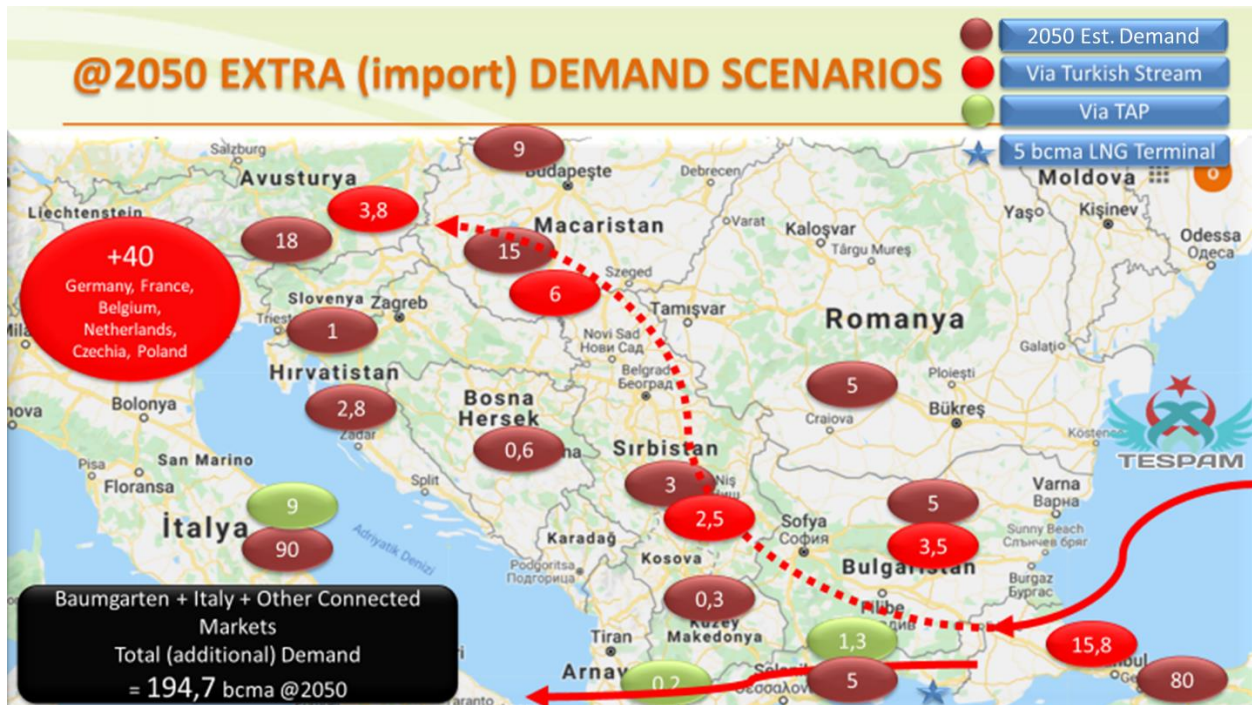
-Bulgaria will need 5-bcma,

-Italy will need 90-bcma.

-The demand of the other European countries is shown in the map within damson color balloons.

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-Through the possible transit routes (pipeline infrastructure) only with some additional investments, gas in Baumgarten or/and Italy markets can be used to feed some Western & Middle Europe countries such as Germany, France, Belgium, Netherlands, Poland and Czechia. Through this route an additional 40 bcm/a can be available (by evaluating the limitations through the technical constraints).



Graph 1: 2050 Gas Demand Projections in Some EU Markets

As can be observed, Baumgarten, Italy and other connected markets will be fed through a possible Turkish route. And the total reachable demand will be around 194,7-bcma in 2050 (without Türkiye).

Note that, “+40” bcma for the due connected markets is not the total demand of those countries. This is only the volume of possible supply through this route (by taking into consideration of the technical limitations).

At this situation, if these markets have such a huge demand in 2050, who will be the suppliers?

Russia? Azerbaijan? Northern Africa? LNG?

There are different opportunities and many different limitations to deal with.

Of course Russia again will lonely be enough to completely feed these markets (if new infrastructures will be construted and the conflicts be ended).



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- This huge supply potential can be achieved only if the security concerns and the conflicts to be solved and investment environment to be sustained.
- This huge volume can be a real long-term solution for Russian gas-free EU!
- If EU will not make a spurt to get this gas, we are sure about that China is waiting (and making investment) for all of the gas resources in due region (Turkic Countries).

Note that, during calculations, only discovered and proved reserves were taken into consideration. Field by field production profiles were estimated. Up to the possible operator's operational capabilities, all related parameters were tried to be analyzed. For the existing gas exporting countries, their additional export potentials were calculated. For example, now Azerbaijan is exporting around 20-bcma gas. In 2050, this potential will be around 35-bcma. Which means its additional gas export potential for the region is 15-bcma.

To sum up, this option currently can be the only realistic option for EU to reach a Russian gas-free market target. New discoveries may change the estimations. However, in each case Türkiye has a great role in the balances.



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CONCLUSION

In the light of the articles that are provided by references with in this report, Black Sea Region is getting higher importance in the World's geopolitical agenda. The Energy perspective and it sub-tasks are detailed together with the social impacts. Especially the free market of EU on the energy is highly dependent for imports.

The world continues to struggle with an intense and increasingly violent energy crisis centered on the EU and Asian markets. It has been started with the pandemic continued with the Russian-Ukrainian war and supported by the global fiscal measures. Natural Gas, Electric and coal prices are multiplied with a few times than the regular pricing. High demand of EU increases the global markets. EU has taken some measures to reduce this dependency which are mainly under the tasks of Renewables, Energy Efficiency and Storage. EU's proactive role in the COP implementations have not brought the success on the supply side not only conversion but also in the security of supply. This situation is also demonstrating that the current implementation of Climate Actions are so lazily and requires 10 years effort in single year such as simple easy access to finance, project development facilitation by governments, implementation so that new and more players to be seen in the picture other than the conventional power generation companies etc. Instead of paying 280 billion Euros (with 2021 numbers) to gas besides the climate concerns, EU should mobilize this amount funding as per year to future energy investments. These investments could also be diversified with new technological developments such as hydrogen in our daily use.

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Despite the energy transition tasks in recent decades these solutions have been highly promoted and investment. In the present situation, these supply security studies have been all failed against just one natural gas pipeline. In the famous NEAP regulations and preparations, all risks have been studied together with the solutions for many years together with billions of Euros investments. Additionally, EU has developed a percentage of 15 savings program directly reducing the life quality. The result is the US energy exporters have been multiplied their benefit 5 times, as that has never seen before just with the 119 bcma export capacity.

As per the TESPAM Projections published on 2019 it is clearly demonstrated the world energy demand will be increased and hard to meet in any increase in the supply diversified by the energy mix.

When we focus on the Black Sea region all coastal countries have the opportunity to meet s significant share of their natural gas demand. Romanian are leading these investments and with the new discoveries, Türkiye is just behind so that the other countries will follow the investing on explorations and drillings. Currently 21 wells were drilled at sea depths exceeding 500 m: respectively Romania – 10, Türkiye-8, Bulgaria-2 and Russia – 1. As detailed in this report, all these efforts are mostly to secure the supply of demand of the countries together with the upcoming economic crises rising from the global monetary tightening.

Türkiye and Romania are paying significant efforts comparing the others. Türkiye's discoveries has demonstrated that the potential in a few years will meet the demand of its own consumption about %20 for the time being.



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On the other hand, a “Russian Gas Free EU” route can also be established by using Türkiye as bridge from east and southern resources. The subjected projection can not reach the total requirements. The eastern route has a significant natural gas supply to Russian pipeline network and which are financing Turkic governments. The Gas trade on this route via Russia is problematic with the EU Sanctions, which seems to be in use some more years. The alternate trade route via Türkiye, a southern corridor of Black Sea, together with pipelines could be a significant option to meet some portion of EU demand, which will take the fever. Another potential is the East Med, Iraq and Qatar resources to be transferred via Türkiye, which will provide a significant prosperity to regional development. Both routes are providing Natural Gas to Balkan geography and eastern EU Natural Gas as well.

The energy mix of the region is also differ from each other. Most countries has Nuclear already in use. The latest assumptions on the Nuclear side is receiving more attention than ever due its carbon free outputs aligning with the Net Zero targets in recent policy papers. Thus this volatile energy prices besides security of supply difficulties made the Nuclear investments taken into the picture back which has been halted to finance some years ago by the financial institutions.

IEA’s recommendations of 10 measures for reducing the dependency of EU to %35 is also directly effecting the daily use of energy as well. All the Roads in this security of supply, pricing and economic crises of Energy will keep shaking the EU citizens going deeper. This triangle of war- pandemic on energy will be effective with disturbing social breaks in European Union, which is to be first time faced with!

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