EXPERT OPINIONS FOR EAST MED[1]

ENERGY RISKS AND PERSPECTIVES

Michelangelo Celozzi[2]

The global energy crisis

On this first anniversary of the war in Ukraine, the Executive Director of the International Energy Association, Fatih Birol, assessed what has changed during a tumultuous year for the global energy system, with a terrible impact on the global economy (rising inflation, slowing growth, deterioration of the agri-food cycle) highlighting three key points to remember from the crisis so far.

First, Russia played the energy card as a weapon, but didn't win. Russia is now facing a permanent loss of position in the world of energy: it lost its most important customer, the EU - the world's largest importer of gas – that cannot be replaced on Asian markets, and access to key technologies for industry development and international investment.

Secondly, government policies are very important in times of crisis, which have succeeded in encouraging a faster diffusion of new energy technologies.

Thirdly, the crisis is not yet over and we do not know when it will end, although Europe's strong response has saved us precious time: we must make good use of it.

Time will be running out to implement bold policies and the structural changes needed to

1. isolate risks for the energy systems and
2. protect the economy from price volatility (as all activities are linked to energy prices) and therefore from inflation, which it affected all economies of the world.

Risks and solutions are part of a complex and costly problem: changing priorities of the energy trilemma, which no country can solve alone: the role of multilateral cooperation is essential, to share the required efforts.

The first step for building Cooperation is the dialogue, as precondition, especially in the Mediterranean where there are many crisis areas undermining security and stability of the region, which are the preconditions for activating international investments, essential for the sustainable development of all the Mediterranean countries.

The sustainability is not only environmental, but also social and economic.

The role of energy experts today is to promote the dialogue, to overcome the crisis, through exchange and experience sharing and proposals to restart investments.

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The EU has set up a cooperation scheme for common and sustainable development in the Mediterranean, designing the approach to sustainability (the Green Deal) within a cooperation framework (Global Gateway, a 300 billion Euro cooperation program).
These are the hypotheses on which Mediterranean countries can start the construction of a Mediterranean project, extended to the countries of the Middle East and Africa, creating a historic opportunity to revive the role of the Mediterranean in the globalized economy.
The Mediterranean challenge
Based on the EU's approach, many international meetings were held in these weeks to start the new "enlarged" multilateral cooperation scheme.
The leitmotif of these meetings is the strengthening of multilateral cooperation in the "extended" Mediterranean, for enhancing the assets of countries, which can exploit the benefits of the new global context of the common objectives of security and sustainability: “reshoring” of the supply chains, exploiting of domestic energy resources (gas and RES).
The new role of the Mediterranean is based on new format of relations among Europe, Middle East and North Africa. A scenario in which Europe is strongly committed.
Rebalancing the energy trilemma.
The energy trilemma concerns the need to rebalance the three dimensions of the energy system: security (of supply), equity (affordable access to energy) and sustainability (environmental and not only).
The energy crisis has upset the global balances which are the cornerstones of the Trilemma, causing a slowdown in world growth (due to soaring inflation) and the crisis of the agri-food system (damaging above all the poorest countries).
These are the priority issues affecting the global energy economy in 2023, and each country will have to face the new scenario.
Rebalancing the energy trilemma is a complex and costly issue, that requires multilateral cooperation since no country can do it alone and each country must establish its sustainable development plan compliant with the regional development.
Over the past year, energy policies redefined the priorities, moving from sustainability towards security and equity.
We must evaluate, above all, whether in the long-term sustainability will return to the top of the political agenda once the short-term need to focus on security of supply has disappeared[1].
Indeed, the short-term rebalancing of the energy trilemma towards security may even bring long-term environmental benefits, as the will of many countries to reduce their exposure to hydrocarbons in the aftermath of the war and its energy consequences.
In developed economies, until now growing concerns about the environmental impact of the energy economy meant that sustainability had increasingly become the priority, with affordability being concerns related to the energy transition, while security was seen as a less important issue, thanks to the availability of diversified supplies delivered through the global market. By contrast, in developing countries, equity and security arguably rank above sustainability, although the growing impact of extreme weather events put the transition to a low-carbon economy at the top of the political agenda.

The war in Ukraine has not only provoked a dramatic re-examination of this prioritization, with energy security becoming the first goal globally, but it has also highlighted the difference in perception of the trilemma in the world.
In addition, a fourth dynamic – government intervention – further highlights differences in perception and ability to manage the energy trilemma.
The provision of funding is a major topic of debate, particularly in the Global South.
2023 will see new debates on rebalancing the energy trilemma from a global perspective, with key themes that should drive policies and investment strategies.
Regional perspectives
In Europe, the diversification away from Russian energy imports will continue.
This is the priority, requiring a focus on short-term access to alternative energy sources to gas imported by Russia, steadily less reliable. 2023 should also be a year for a faster start of the energy transition.
The development of domestic resources (even coal, which is less environmentally friendly) is again a priority, where cost and availability outweigh climate impact in the short term.
Before the war, the European Union was heavily dependent on Russian energy resources[3].
In 2022, the EU reduced its dependence on Russia's energy supplies, with an overall decline in Russian gas exports to the EU of around 80 bcm. It increased its imports of liquefied natural gas (LNG) by 60% compared to the previous year[2].
During the 2022 Germany joined full independence from Russian gas and the EU has gained the decline in natural gas consumption.
During 2022, in just a few months, the EU diversified gas imports, increased domestic gas production, reduced gas consumption and diversified the energy production, escaping the blackmail of Russian gas: as the saying goes, never put all your eggs in one basket only.
In Africa, EU demand for new gas supplies is stimulating new gas export projects, which can also supply the domestic market at marginal cost. In this case, the dual will to generate export revenues and provide access to energy requires a rebalancing of the priorities of the trilemma.
Energy security
We must define a logical diagram to build a new vision of the state of play.
The combination of a fixed and universal goal, decarbonization with flexible and diversified pathways, offers historic opportunities for energy sector reorganizations, and most operators are optimistic about growth prospects in the coming year. However the situation is different in the sub-sectors of the energy industry (electric power, renewables and oil and gas) and there are many different visions of the future (short term 2030, medium term 2040, long term 2050).

An energy system is not a purely rational construction but the result of the history, geography, orography, hydrography and geology of each country.

[3] In 2021, the EU imported 155 bcm of Russian gas, i.e. about 45% of total gas imports. Russia was one of the largest suppliers of crude oil to the EU (around 108 million tons) and petroleum products (91 million tons). In 2021, the EU also imported 51.4 million tons of coal from Russia, roughly half of its total coal imports. Russian nuclear fuel powers 18 nuclear installations in the EU (6 in the Czech Republic, 4 in Hungary and Slovakia, and 2 in Finland and Bulgaria).

But the concept of resilience is misleading: resilience is the ability of a material to recover its initial shape after undergoing deformation. A Go Back action. Instead, a system must react to a disruption, creating a feedback response to the causes of the disruption.

Therefore, each country analysis must first define the reference scope and time horizons.

Challenges:

1. Protracted underlying crisis (the pandemic, the war in Ukraine) and
2. Phase of high volatility (inflation, bank rates, commodity and technology prices).

A scheduling diagram for discussion

Short term (2030):

- Grid Development and Reinforcement. Transmission (very high and high voltage) and Distribution (smart grid of low and medium voltage).
- Managing the increase in electricity consumption
- Transport Sector (goods and passengers
- Mid- and Long-haul transport. Shift from road-to-rail or road-to-ship and intermodality (blue economy, link with economic sectors impacted)
- Short-haul transport: electric / hybrid vehicles
- Digitalization of processes (industrial and tertiary)
- Reference Energy mix RES - Gas, to increase security of supply (diversification, flexibility) and continue the transition to decarbonization.
- Distributed solar production (more local labour and greater social acceptability)
- Reduced investment risks and focus on short-term investments and on the most mature technologies in the renewables supply chain (photovoltaic, wind, batteries)

Mid-term (2040)

- Hydropower (pumping stations for efficient electricity storage)
- Diversifying gas supply chains
- Hydrogen (well-known technology, problems to solve for transport and storage, interesting ammonia cycle)
- Next generation batteries (availability of critical raw materials for the electricity sector and for basic electronics).
- Development of international interconnections (gas and electricity) for promoting regional integration and renewable energy sources.

Long-term (2050)

D**eveloping technologies**:

Nuclear Fusion

Finally, the energy sector is expanding very rapidly, despite challenges posed by electricity grid capacity, volatile energy prices, regulatory barriers, regulatory bureaucracy and delays in supporting energy infrastructure projects.

Despite the uncertainties, the renewable energy sector continues to grow, driven by a favorable "megatrend" – decarbonization – which supports the confidence of operators and organizations involved in the energy transition.

The energy security is a major challenge, but the electricity industry is focusing on long-term opportunities and the development of a new production model based on a new energy system. Government and regulatory support and licensing problems for the use of new technologies are essential for the development of the sector.

To overcome the current energy crisis, the first step is to promote free format and occasion for technical dialogue, paving the way for a broad and multilateral Mediterranean cooperation.

Rome, 20 March 2023.

THE TURKISH-GREEK-ISRAELI TRIANGLE AS A POST-OTTOMAN LEGACY

Dr. Omri Eilat[4]

The past decade has introduced growing tensions to the Eastern Mediterranean basin under the declining influence of international agreements and institutions and the withdrawal of American forces from the Middle East. One of the tension's sources was Turkey's ambitious demands to extend its EEZs, known as the Mavi Vatan doctrine, on one side, and the growing economic and geostrategic cooperation between Israel, Greece, and Cyprus on the other manifested in the ambitious plan of the EastMed pipeline. This tension peaked between late 2019 and the summer of 2020 when Turkey and the GNA in Libya signed a maritime border treaty that practically split the Mediterranean basin. With the rising number of marine incidents between Turkish, Greek, and Israeli ships and growingly intensive naval exercises involving Egypt and Russia, countries' handling of EEZs raises questions regarding the future of free sailing in the Mediterranean Sea.

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The combination of diplomatic and economic crises and a new administration in the US brought Turkey to the negotiation table. President Erdoğan's attempts to normalize Turkey's relations with Israel included offers to export Israeli gas to Turkey. Despite the optimal correspondence between Turkish energy demand and Israeli gas supply, there is no simple solution to this crisis. In this paper, I intend to outline the potential and limitations of Turkish-Israeli normalization. Israel and Turkey's diplomatic clashes did not substantially derive from maritime disputes, but they are strongly affected by them. In order to mutually earn from the natural treasures of the sea, far-reaching strategic collaboration is needed, and therefore a thorough understanding of the longue durée dimension of the East-Mediterranean international relations is required. This dimension is the post-Ottoman situation to which every country in the region was born. The Mediterranean is a relatively new arena for Israel, whose maritime dimension until the significant gas discoveries was minor. The Turkish-Greek complex relationship is not only a very old one but also an independent conflict on which the effect of international agreements and pacts, such as NATO and EU or UN treaties and agreements, is quite limited.

The state of Israel has always been a source of mixed emotions to the Republic of Turkey, and as we discuss here the maritime dimension, I may add that Israel has been a source of various complexities in the Turkish-Greek-Cypriot triangle. Cyprus was taken from the Ottoman Empire by the British Empire after the last Russo-Turkish War in 1877-1878. The Republic of Turkey officially conceded its claims for sovereignty on the island in the Lausanne Agreement in 1923, acknowledging it as a British colony. Turkey has always been worried about two possible scenarios on the island: annexation to Greece, which groomed the Enosis idea, and deportation of the Muslim minority from the island. The precedent for both occurred in Crete, which ought to remain a country under Ottoman suzerainty and proclaimed its joining to Greece, which annexed it after the Young Turk Revolution in 1908, despite international agreements that guaranteed the preservation of the status quo. It is only one example of the origins of Turkey's primary suspicion toward international agreements. Another example of Ottoman origin to Turkey's equitable position at the Mediterranean is the transfer of the Dodecanese Islands to Greece from Italy in 1945 after the latter conquered them from the Ottoman Empire in the offensive colonialist Lybia War in 1911.

In 1948 both Turkey and Greece voted against the partition plan. However, unlike Arab countries, the reason was not an opposition to the idea of a Jewish state but because they both wanted the British Empire to stay in the Mediterranean Basin as a counterbalance to Soviet expansionism. Turkey officially acknowledged Israel in 1949, while Greece did so only practically due to the delicate relations with Egypt, which still had large Greek communities. In the Cypriot case, the Jewish Yishuv in Mandatory Palestine had secret, special relations with the island around illegal immigration in what was called Aliyah Bet.

The next complex episode in these relations was in the late 1950s around the periphery alliance led by David Ben-Gurion against Nasserism and Communism in the Middle East. Even back then, deep inside the bipolar world of the cold war, Turkish-Greek relations were an independent system, and Israel got itself mixed in it when it officially and very effectively aided

Turkey in the UN with the status of the island before the UN resolution in 1960, that made it a binational state. This support, in a reality of isolation, was perhaps vital but also very costly on the Greek side that became pro-Arab, later pro-Palestinian. Moreover, Israel could not fully achieve what it wanted from Turkey, as the latter had to improve its relations with its neighbors, Syria and Iraq.

In the 1974 conquer of northern Cyprus and the proclamation of the Turkish Republic of Northern Cyprus in 1983, Israel did not support Turkey. Still, Israel can be a strong supporter of a peace agreement between both sides of the island, of the kind Turkey enthusiastically promoted in 2004, which ended up in the failure to pass the Annan Plan. Turkey's frustration from the fact that in TRNC, Turks voted for the plan, while in Cyprus, the Greeks voted against, is very similar to the Israeli disappointment from the failure of the Camp David talks in 2000 that failed, leading to the Al-Aqsa Intifada.

The Marmara incident in 2010 changed the historical balance in the Israeli-Turkish-Greek triangle. Israel was unaware that the incident was not only a result of Turkish support of the Palestinians but also, perhaps even more, a result of Israel's negotiations with Cyprus on their maritime border. Indeed, Turkey has no legitimate legal claim against such an initiative, which is totally legitimate. Still, the Turkish sense of alienation in the region and the grievance toward UNCLOS, which Turkey cannot accept, has to be understood. Not only because practically Turkey can prevent attempts to build infrastructure in high waters but also because of the need to move forward to regional understandings that would enable all the Eastern Mediterranean Countries to enjoy the region's natural resources and increase security, free trade, and collaboration in environmental issues.

Still, the Mexican tie has not been broken. Israel cannot export gas to Europe without Turkey, but laying a pipeline to Turkey is too complicated, as it will have to pass through either the Lebanese and Syrian EEZs or through both Cypriot and internationally unacknowledged North Cypriot waters, which is neither practical nor sustainable. Hence, either Northern Cyprus has to be acknowledged by the UNSC, or Turkey has to recognize Cyprus at least de facto to import gas from Israel through a pipeline. Moreover, there will be no substitute for all-inclusive regional cooperation in the Eastern Mediterranean. In all the talks on maritime borders, the traditional positions remained the wall behind each country stands. It is time to begin moving out of these traditional positions. The world is getting more complicated and dangerous with expansionist wars, fragile markets, pandemics and climate crisis. This new great challenges require new thoughts and efforts. The time to do it is now.

THE WINDOW OF OPPORTUNITY TO EXPLOIT EASTERN MEDITERRANEAN HYDROCARBON RESOURCES IS ABOUT TO CLOSE

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The island of Cyprus is at the crossroads between east and west, as well as north and south.

Because of its strategic location it guards the exit of the Suez Canal to the Mediterranean through which 12% of world trade passes. The island is thus harbours two British Sovereign Bases. Cyprus got its independence from Great Britain in 1960 as a partnership Republic, co-founded by the Turkish Cypriot people and Greek Cypriot people. Sadly the Greek Cypriot partner staged a coup and usurped the partnership Republic in 1963, turning it into a 100% Greek Cypriot republic. Since then we have had conflict, violence, suffering and instability in Cyprus, which in recent years is spilling into the Eastern Mediterranean and beyond

We are sharing a small island and need to have a positive working relationship with each other. To end this 60 year old conflict Turkish Cypriots are prepared to negotiate the arrangements needed for a structured cooperative relationship with the Greek Cypriot Side, based on the equal status and inherent sovereign equality of each.
Challenges and Opportunities Facing the Exploitation of Natural Gas Around the Island of Cyprus
Although some still try to keep the 2000 kilometre long East Med Pipeline on the agenda, the announcement of the position of the US government through US Under-Secretary of State Victoria Nuland on 7th April 2022 has dealt a deadly blow to this project. Under-Secretary Nuland had stated that the proposed pipeline to deliver natural gas from deposits in the Eastern Mediterranean to European markets is too expensive (estimated cost $6 billion), not economically viable and will take too long to help countries seeking alternatives to Russian gas.
One of the owners of a huge gas fields in Israel announced on 5 January 2023 that the best way to access the European market is through liquefied natural gas facilities.

Only this month Greenpeace published a report titled "Time bomb:
Geopolitical and climate risks of the East Med Pipeline" in which they say that "The pipeline project is likely to add new heat to the unresolved conflict between the Republic of Cyprus (RoC) and the Turkish Republic of North Cyprus (TRNC) over control of the island of Cyprus. The project would exclusively benefit the Republic of Cyprus and cement its maritime claims. In recent years, gas exploration has led to increased tensions between both parties and an increased military presence in the maritime area, especially since the RoC and TRNC granted permits for fossil fuel companies to drill on overlapping maritime zones. Building the pipeline to transport gas from the region would weaken the position of the TRNC, effectively limiting its marine access and precluding any revenues from underwater exploitation. Any destabilisation of the TRNC increases the danger of Turkey resorting to military means."

As for the situation on the island, both Sides are currently facing pressing environmental (like CO2 emissions) and energy issues that can no longer wait for political settlement. Both totally rely on imported heavy fuel oil and gas oil for the generation of electricity.

The UN Secretary-General has repeatedly been saying that in the absence of a political settlement the two Sides need to put aside their differences and address pressing practical issues.

He is pointing out that natural resources around the island should benefit both Sides and should constitute a strong incentive for the parties to find a mutually acceptable and durable solution in Cyprus and to engender deeper regional cooperation.

The key standard setter on environmental issues in our region is the European Union (EU), which has been developing climate and renewable energy policies, designed to achieve the goal of decarbonising the entire EU economy by 2050.

The Eastern Mediterranean region, in which the island of Cyprus and the Turkish Republic of Northern Cyprus (TRNC) is centrally placed, is poised to play a significant part in this transition period to renewable energy on two counts:

* Through joint action, the natural gas resources of the Eastern Mediterranean belonging to Egypt, Israel and the island of Cyprus can help in partly meeting the pressing natural gas needs of European countries.
* The TRNC, together with the Greek Cypriot Side, Egypt and Israel, can be significant generators of solar energy in the process of transition to renewable energy, again through joint action and interconnectivity to the EU electricity grid.

Turkish Cypriot Cooperation Proposals

The rational exploitation of the natural gas resources of the Eastern Mediterranean and transition to green energy necessitate forward looking cooperation between Egypt, Israel, the TRNC and the Greek Cypriot "Republic of Cyprus". The securing of such cooperation will help the realization of the quadruple objectives of preparing the ground for political settlement in Cyprus; most rational exploitation of the hydrocarbon resources of the region; transition to renewable energy; and security, stability and cooperation in the Eastern Mediterranean region.

With the above thoughts, TRNC President Ersin Tatar has made six proposals to the Greek Cypriot Side on 1 and 6 July 2022, which include, among others, cooperation on the exploration and exploitation of offshore hydrocarbon resources and cooperation on the development of solar energy.

The hydrocarbon resources around the island are co-owned by Turkish Cypriots and Greek Cypriots. The discovery of hydrocarbon resources has unfortunately turned into an area of contention due to the unilateral actions of the Greek Cypriot Side.

Preferring diplomacy over unilateralism, the Turkish Cypriot Side has put forth three constructive proposals in 2011, 2012 and 2019 to foster cooperation on hydrocarbons exploitation aimed at turning this crisis into a mutually beneficial opportunity.

The latest Turkish Cypriot proposal of 1st July 2022 envisages the establishment of a joint committee to be composed of an equal number of members appointed by the two Sides. Through such a committee decisions on offshore hydrocarbon activities, including revenue-sharing, could be jointly taken by the Turkish Cypriot Side and the Greek Cypriot Side.

Agreement could include a proviso that decisions taken and the arrangements made in this respect will not prejudice the legal and political positions of the Turkish Cypriot Side and the Greek Cypriot Side on the Cyprus issue.

The joint committee could operate with the facilitation and in the presence of the United Nations, with the European Union as observer.

The proposal also suggested the involvement of the energy companies that have been separately licensed by the Turkish Cypriot Side and the Greek Cypriot Side, by creating a mechanism whereby they would be authorized by the contracting Side.

Such a joint mechanism could be entrusted with cooperation on and coordination of future off-shore activities, future contracts and issues related to monetizing and sharing, as well as recommendations on the, transfer of these resources to international markets.

Regarding the shared objective of transition to green energy, the Turkish Cypriot Side has proposed the establishment of another joint committee to explore maximum utilization of solar energy, including investments throughout the island, to the benefit of both the Turkish Cypriot People and Greek Cypriot People.

To supplement this proposal the Turkish Cypriot Side also offered electricity interconnectivity of the Island with Europe through Türkiye, which is already connected with the former, by using the existing inter-connected electricity grid between the two Sides on the island.

This would enable further expansion of the use of green energy on both Sides by contributing to the stability of both electricity grids and by ensuring a balance between energy generated and energy consumed, thus avoiding grid imbalances and overloading.

This would also facilitate the utilization and trade of renewable energy among interconnected countries.

Because of its proximity, the project to establish a connection with Türkiye is definitely more cost-effective and has the added premium of contributing to cooperation and rapprochement both in Cyprus and the Eastern Mediterranean region.

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Both Sides have a lot to learn from the agreement reached between the Governments of Israel and Lebanon in their agreement, facilitated by the United States, to establish a permanent maritime boundary.

By conveniently parking their pending political differences to one side and addressing the pressing issue of delimitation of their maritime boundary, both Israel and Lebanon have equally benefited from this historic achievement.

The region and beyond will also reap the benefit of this agreement because of its contribution to security, stability, and prosperity.

It is time to think and act outside the box in which the island of Cyprus has been trapped for the last 60 years.

EVALUATION OF RECENT EARTHQUAKES IN TERMS OF TURKEY AND THE EASTERN MEDITERRANEAN

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According to the records of the Disaster and Emergency Management Presidency (AFAD), a devastating earthquake with an instrumental magnitude (Mw) of 7.8 occurred around Kahramanmaraş-Pazarcık on 06 February 2023 at 04:17 local time. Approximately 9 hours after this earthquake, a second destructive earthquake occurred around Kahramanmaraş-Elbistan at 13.24 local time with an instrumental magnitude (Mw) of 7.6. In AFAD records, the coordinates of the first earthquake in question are 37.288N - 37.043E, focal depth is 8.6 km; The coordinate of the second earthquake is 38.089N – 37.239E, and the focal depth is 7.0 km. On February 20, 2023, an earthquake with an instrumental magnitude (Mw) of 6.4 occurred around Hatay-Defne at 20:04 local time. In the AFAD-DDB records, the coordinate of the earthquake in question is 36.121N-36.074E, and the focal depth is 16.74 km. It was felt very strongly in Kahramanmaraş as well as in Hatay, Adıyaman, Gaziantep, Malatya, Kilis, Diyarbakır, Adana, Osmaniye and Şanlıurfa. In addition, more than 8,500 aftershocks with an instrumental magnitude of 6.6 occurred.

Why Does an Earthquake Occur?

An earthquake is the event of seismic fluctuations that occur as a result of unexpected energy in the earth's crust and the shaking of the earth by these waves. Earthquakes may occur due to volcanic eruptions and major collapses on the earth, as well as earthquakes originating from faults (fractures) caused by tectonic activity in the earth's crust. However, the most known and common of these are tectonic movements and fault-induced earthquakes.

The average thickness of the earth's crust is 0-35 km. However, this thickness is 35-70 km in the continental crust and 5-8 km in the oceanic crust. The part called the lithosphere consists of the earth's crust and the uppermost mantle, and has a thickness of 670 km from the earth's surface. As you go deeper into the ground, the Asthenosphere is passed. The asthenosphere is the molten portion of the upper mantle. This section is in basaltic lava composition and forms a magma source for volcanic activities. The lower mantle below it is in magnesium and ferrous silicate composition; It has a temperature of 1900 °C. The thickness of the mantle together with the lithosphere is 2900 km. The outer core is a mixture of molten iron and nickel, at a

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temperature of 3700 °C and a thickness of 2250 km. The inner core at the center of the Earth is 1220 km thick and has a temperature of 4500 °C.

The face of our world, which has existed for billions of years, has changed many times until today. The surface of the earth's crust is not made of a single whole crust as in a rubber ball, but without deforming its spherical shape; It consists of many pieces, such as cracked eggshells. Sometimes these single, giant or tiny pieces of crust that can cover oceanic and continental crustal areas together are called plates. There are many smaller plates in the earth's crust, apart from plates such as the Pacific Ocean, Eurasia, Arabia, South America, North America, Africa, Nazca, India-Australia, Antarctica, Cocos, Tongo, Anatolian plates. Plates can be made up of continental crust that forms continents and oceanic crust that forms the bottom of the oceans, or just one of these. The heat produced in the central parts of the earth always tries to move outward by passing through the mantle. This event causes the movement of the upper mantle and the development of convection currents there. These movements cause the fragile earth crust pieces (plates) covering the earth to move due to friction, causing the eruption of volcanoes due to the fractures that occur, and the opening or closing of the oceans between the continents. The continental crusts of the plates sometimes diverge like free-floating rafts in a lake, and sometimes they converge. The convergence causes the oceanic crust to rupture and plunge into the earth, thus colliding after the subduction of the oceanic crust. With the continental crust sections under the influence of convection currents moving away from each other, the crust splits into two parts and the pieces begin to move away from each other. This divergence allows for the development of an expanding ocean and a growing oceanic crust between the two parts. The movement speed of the plates varies up to 24 cm/year.

Why is Turkey an Earthquake Country and Why Are These Earthquakes So Destructive?

Turkey is a country under the influence of large plates on a global scale. For this reason, due to the thrust exerted by these large plates on each other, fractures occur along certain zones. The most well-known and largest of these fracture zones are the North Anatolian Fault Zone (NAFZ), the East Anatolian Fault Zone (EAFZ) and the Dead Sea Fault Zone (ÖDFZ). These faults are strike-slip faults due to their structure and mechanism. The faults are classified as normal faults and reverse faults that have vertical slip according to their working mechanisms in the earth's crust, and strike-slip faults that move laterally with respect to each other. Sometimes there are also oblique (oblique) slip faults with both vertical and horizontal components.

The recent earthquakes we have experienced are earthquakes formed by strike-slip faults (EAFZ, ÖDFZ) at a triple junction point located in the vicinity of Kahramanmaraş, similar to the one in Japan. Seismic waves produced by strike-slip faults are R (Rayleigh) and L (Love) waves, which are called surface waves, and these are the most destructive waves on structures. Turkey is in the position of a country where large-scale and severe earthquakes are always possible with its active tectonic structure, which is close to the major plate boundaries and as a result of the movements of these large plates. The USGS (US Center for Geological Survey) has released an aftershock statement for the M7.8 earthquake, explaining what could happen next month. The statement describes three scenarios and the most likely scenario shows that the frequency of earthquakes has decreased by 90 percent and none

greater than the M7. In this scenario, moderate aftershocks are likely between M5 and M6. These moderate earthquakes can cause damage, especially to weakened or old buildings that are not built to withstand earthquakes. The other two scenarios are less likely, but more extreme. There is a 10 percent probability that an aftershock will be M7.0, and the probability that the aftershock will be similar in size or greater than the M7.8 mainshock is about one percent. Whatever the scenario, smaller earthquakes between M3 and M4 will continue to be felt by people near their epicenters. Sequences of aftershocks can last for years to decades, long after people stop feeling increasingly smaller earthquakes. In order to minimize the damages of this situation, it is imperative to construct structures suitable for this active seismic structure and soils.

Possible Risk Areas for Turkey and the Eastern Mediterranean

Along the border between the Eurasian and Anatolian plate, the Anatolian plate is moving relatively to the West. Earthquakes will continue to occur here with the temperature difference in the supply due to the plate boundary and the movement in the plates. As the energy accumulated in the region in recent earthquakes is relieved by rupture, it is expected that the new stress will be at the edge of the fault where the rupture occurs. Therefore, the area between Elazığ-Bingöl-Karlıova starting from Malatya on the Eastern Anatolian Fault Line in the north is also expected as areas that may pose a risk. In the south, there are Hatay and Adana basins, and after the earthquake in Hatay, the energy may have been transferred to other faults with the movement of the plate. The continuation of the Adana basin is bordered by Cyprus. For this reason, there is a risky area from Adana to the south to Cyprus, which can also include Lebanon. However, Turkey's most dangerous seismic boundary is a 1650-kilometer zone extending from Karlıova to Greece. The studies carried out always keep the possibility of a possible Marmara and Istanbul earthquake on the agenda. In addition, there are active faults in the İzmir region, and the large fault in the İzmir Bay carries the risk of producing earthquakes.