

SYNERGY

Bilkent Energy Policy Research Center Newsletter



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Rabbit and Tortoise



For some time, Saudi Aramco was on the headlines. Now Aramco is the most valuable company in the World. After years of digital companies' reign, energy companies are still struggling to stay at the top. However, there is a hitch.

Probably at the top of the valuable list, there are two sorts of companies: the activity mediators and activity enablers. Mediators are like digital companies, and enablers are like energy, automobile companies. The value produced by mediators looks enormous. But as the creative destruction is faster on the bit level than atomic level, mediators and their rankings are subject to a lot of change. The enablers are more into fundamental activities, and despite value deflations, they persist for a longer time horizon like the rabbit and tortoise. Therefore enablers happen to be more successful in the long term transition. You may think about Nokia and Shell.

The first problem with energy companies was low oil prices. The expectation of lower oil prices for a more extended period due to shale oil also added insult to the injury. These events are pushing the fossil fuel companies to be more competitive, more efficient, more relevant. The high oil price era was a golden age for producers where everyone and every business decision was deemed successful. Like all good things, this era has ended for now. It will come back, but until then, the urge for transfor-

mation is upon them. The early signs are here with write-downs and IPOs.

Chevron announced this week that the expected write-downs for some of its costly assets. It was expected from a climate change viewpoint. But Chevron's depreciation was due to low oil prices and fossil fuel gluts. The stranded asset discussion was fundamentally centered on the fossil fuel and infrastructure that will not be utilized or produced due to climate change policies to limit emissions. But the real stranded asset discussion hit the headlines due to lower oil prices.

At this point, we have to pause and think about the energy transformation that is said to be happening. On the one side, there is the climate emergency, COPs, Green Deals, but rising emissions. On the other hand, we see an increasingly challenging environment for fossil fuel producers due to low oil prices. For now, the latter pressure is more significant than the former to change the way energy is utilized.

Compared to the past, this is alarming. While renewable energy companies are not transforming but trying to fix their returns with long-duration contracts, the oil companies are trying all sorts of ways to stay profitable. They face a more real and destructive force than climate change: low oil prices.

One person who worked on the IPO for nearly four years talked to a news agency claiming "the royal palace panicked thinking oil prices were about to crash." The low oil prices whipped a national oil company to rush to an IPO. Whether it is trade wars or shale oil, the pressure on the national oil companies is quite high. Therefore Aramco IPO and its aftermath will be vital for OPEC countries.

Aramco IPO has the potential to be very transformative for national oil companies. Despite all the pressure from New York and London bankers, the company achieved a \$2 trillion valuation. It may be due to the Saudi strategy to increase demand for Aramco shares. But behind this IPO, there was the logic to transform the Saudi economy. It is the dream of all middle eastern oil producers. A small step in this direction will open the doors for other oil producers.

Looking into the future, the tortoise always looks like the loser, but due to its urge to transform still has a chance. Despite not having the charm of a rabbit, it is working more meticulously on the new ways to survive. These new methods will be contagious to other similar companies. Think about what will happen with lower natural gas prices for a longer time...

Barış Sanlı

Current Situation of the U.S. Energy Policy



The United States is the second-biggest producer and consumer of electricity worldwide after China. It is also the biggest producer of oil. Since they are leading the world economy with 20 trillion U.S. dollars, they are in a high pressure when it comes to green energy initiative. United States should lead the G20 with its decisions on universal energy since G20 accounts for 78% of greenhouse gas (GHG) emissions.

The United States is the highest producer of greenhouse gases when measured on a per capita basis. Overall, China is the world's largest producer. Greenhouse gas emissions surged to a record high in 2018, according to a new report from the United Nations Environment Programme (UNEP).

According to the UNEP report, global emissions will need to be cut by more than 7% each year over the next decade to prevent temperatures from rising more than 1.5 degrees Celsius. Although the U.S. did decrease its carbon emissions by 14%, they did this in 12 years between 2005 and 2017.

On brighter news, the State of California is leading the U.S. as the most significant state with more environmental incentives than any other country. Former governor Arnold Schwarzenegger signed a 1 million solar roofs initiative into law in 2006. That goal has been achieved on December 13, 2019. One of the other goals of the bill was to generate 3 gigawatts of solar energy. They achieved that goal earlier than expected in 2015. Today, solar roofs in California generate 9 gigawatts of solar energy, equivalent to six natural gas power plants. It helps the world

avoid 22 million tons of carbon dioxide annually.

Regrettably, California's goal of being 100% clean energy state had hit a bump when California Public Utilities Commission allowed gas-burning facilities to keep operating until 2022 in a unanimous vote. The commission said that these facilities should keep running to ensure reliable electricity flow to Southern California. With a 40 million population, California manages to supply 50% of its electricity to this vast population with renewable energy. However, one-third of its energy is still generated from natural gas or fossil fuels. The commission has also ordered to buy 3,300 megawatts of new resources, enough to power 4.4 million homes. They have also prohibited the construction of new gas-only power plants.

On the same note, Los Angeles will build the first hydrogen-fueled power plant. To get rid of the last of its coal-generated electricity, they will build a natural gas plant in Utah. Since natural gas plants are still a danger to the environment, the Department of Water and Power of Los Angeles has pledged that the facility would eventually burn renewable hydrogen instead of natural gas. At first, the plant will burn 30% hydrogen and 70% natural gas when it opened in 2025. After that, the ratio will steadily change until 2045 when it starts to burn 100% hydrogen

Furthermore, Baker Hughes signed a 10-year agreement with French-owned EDF Energy to power its 170 facilities in Texas with wind and solar energy. Company officials estimate that the wind and solar power deal will reduce the equivalent of 1.2 million metric tons of carbon dioxide

over the 10-year term of the agreement. Equal to taking 27,000 cars off the roads, the deal will eliminate the equivalent to 12 percent of the company's global carbon emissions. This agreement has been made 11 months after the company announced it would reduce net carbon dioxide emissions to zero by 2050.

On a related note, some of the steel plants in U.S. have set to run on wind and solar energy. The steel industry is responsible for 6% to 7% of global GHG emissions. Nucor Corporation's new 250 million USD powerplant is set to be the first U.S. steel plant to run on wind energy. The company will supply its required power from the local company Evergy. Senior vice president of Evergy claimed that the U.S. sits in the Saudi Arabia of wind, and they can provide the customers with sustainability and price competitiveness.

Xcel Energy is also one of the companies to supply their needs with renewable energy, but this time it's solar. They have reached an agreement with Lightsource BP in late September to develop a 250 million USD solar power facility that will power Xcel's Steel facility. The plant will be the largest on-site solar plant to power a single customer, and the Steel facility is the first U.S. steel plant to be powered by solar energy. Xcel has further closed two of its coal facilities in the area to reach its renewable goals.

United States Steel has also taken action in November to reduce global GHG emissions by 20% by the year 2030. World Steel Association, which represents 80% of the worldwide steel production has also launched a program for a transition to a car-



bon-neutral steel economy.

Amazon has also announced three new wind farms in April 2019. This will help reach their goal of being powered by 100% renewables by the year 2030 and have zero-carbon emissions by the year 2040. According to CNBC, large wind and solar facilities not only contribute to companies reaching their environmental goals but also creates economic booms for rural communities.

On an interesting note, National Geographic has written an article on Yellowstone Supervolcano as a possible energy source. According to them, Yellowstone could power the entire continental U.S. with clean energy. This idea came from research into possible eruptions and catastrophic effects it could have if the Supervolcano were to erupt.

In 2017, NASA scientists thought of possible ways to delay an eruption by drilling wells around the park and pumping cold water to cool down the magma chamber. This solution would also have benefits as they could generate five gigawatts of electricity, making it one of the largest powerplants in the world. They also claim Yellowstone hosts enough geothermal energy to power the entire country.

Thankfully, Yellowstone is still protected under the 1970 Geothermal Steam Act, which prohibits the placement of geothermal plants in national parks. Many experts believe Yellowstone should remain untouched to preserve the natural state of the environment. We can see the precedents of a possible geothermal plant by looking at New Zealand. In 1958, New Zealand established geothermal plants in the Wairakei Basin, where 70 geysers were active. Today, all 70 of the geysers are destroyed. And once home to 220 geysers in the 1950s, New Zealand had only 55 geysers remaining by the 1990s.

Canberk Taze

China's Belt and Road Initiative (BRI) is undoubtedly the most prominent regional connectivity and development project of the 21st century. The main focal points of the BRI announced by Chinese President Xi Jinping in 2013 are transportation links, power infrastructure projects, and energy transmission schemes across Asia. However, all the potential benefits projected by China and most of the countries located in its route, this revitalization of the historical Silk Road, worries many for multiple reasons. Today, I will focus on the clean energy investments within the broader scope of the BRI.

There is an ongoing debate on the question of 'do China's energy investments around the world -especially in South and Central Asia- promote clean power generation or do they export China's dirty coal-fired power generation systems?'. On one side, Kelly Gallagher from Tufts University presents the data from China Global Energy Finance (CGEF - at Boston University) and argues that China's BRI is a conduit for polluting investments by Chinese policy banks around the world. On the other side, John Mathews and Carol Huang from Macquarie University, Sydney, argue that the BRI is a magnet for renewable energy investments. From the same dataset that Gallagher used, they reached a different conclusion suggesting that China's global energy investments over the past five years, since 2014, have been more green than black.

According to the CGEF data, over the past five years, more than half of China's investments in energy projects around the world have been directed towards clean energy production,

namely, hydroelectric power plants, wind turbines, and solar panels. However, according to a study published by Greenpeace in July 2019, China's wind and solar power investments in BRI countries have reached the amount of 12.6 GW since 2014, while coal-power investments in the same region and during the same period amounted 67.9 GW. Chinese investors' ratio of coal to solar is currently 6/1 in favor of coal, and the level is the same as the domestic ratio in China. According to Reuters, China supports more than 25% of all new coal-fired power plants across the world by 2019. Moreover, China has been criticized by global experts and policymakers for funding coal-fired energy projects abroad that would not meet even its emission standards.

As noted in the previous issue, China's commitment to green energy follows a fluctuated graph, at least in the short term. There are promising developments both in China and overseas in terms of Chinese investments on clean energy. Moreover, the BRI region, including China, Central, and Southeast Asia, offers fertile grounds for renewables. According to the Paris Climate Accords, Indonesia, for instance, has wind energy reserves of 60 GW and solar over 200 GW. On the other hand, China also continues to export coal energy technologies and undertakes constructions of coal power plants across Asia and Africa. As China keeps on wearing more than one hat, its conflicting image, as it was the case in its domestic policy on clean energy, continues to reinforce both suspicions and expectations at the same time.

Hikmet Can Çakan

BRENT OIL	65.45 \$/BL	GASOLINE	6.94 ₺/LT
USD/TRY	5.85	DIESEL	6.58 ₺/LT
EUR/TRY	6.52	FUEL OIL	4.07 ₺

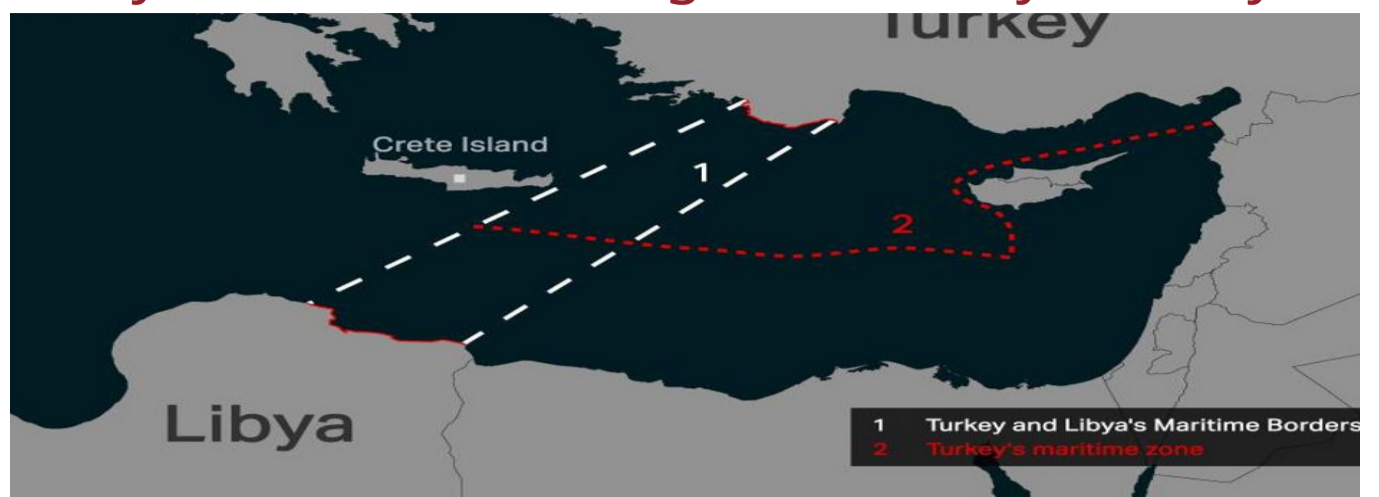
Go Big or Go Home: Military Assistance Package Underway for Libya

Key Point: Turkey drastically steps up its security assistance to Libya and plans to establish a military presence in the country to make sure its deal with Libya on maritime jurisdiction in the Mediterranean remains uninterrupted.

On the night of December the 7th, when the Memorandum of Understanding (MoU) between Turkey and Libya on Delimitation of Maritime Jurisdiction Areas in the Mediterranean was published in the official gazette, news outlets reported the deal as breaking news. Indeed, it was such a kind. Perhaps it can be described as the first major diplomatic initiative taken by Turkey on the energy dispute in Eastern Mediterranean, which for far too long relied on the might of Turkish Navy who recently came into another standoff but this time with the French Navy and a commercial vessel belonging to BP.

The deal was protested and recognized as null and void by the EU Council and Greece. The very essence and aspects of this agreement were covered well at our twelfth issue by Aria İdil Kadirli. And with the statements made by various authorities including President Erdogan, Turkey has also signaled a significant policy shift in the region, calling on Israel, Egypt, and Lebanon that Turkey is open for negotiating agreements of the same kind with neighboring countries. These statements were followed by Erdogan, stating that this agreement was part of a two treaty package, and Turkey was ready to send troops into Libya under the framework of this second agreement, which until today was not publically available.

Of course, the offset of this agreement would be a generous security assistance package to Libya's internationally recognized Government of National Accord (GNA). Because the current turmoil in Libya is very fragile and to speak frankly, the situation on the ground is not very promising for Fayez Al-Sarraj's GNA as the Libyan National Army (LNA) under the leadership of General Khalifa Haftar, enjoys military and political control over the majority of territories in Libya along with the backing of local tribes. Therefore, given the sensitivity and importance of this maritime jurisdictions deal, it is critically vital for Turkish national security policy to keep Al-Sarraj in power and make



sure that the legitimate government in Libya defeats LNA, which has the backing of Egypt and UAE along with other major foreign powers.

Currently, as per the Panel of Experts Report Pursuant to UN Security Council Resolution 1973, Turkish military support to Libya consists of Kirpi mine-resistant ambush-protected vehicles (MRAP) and Bayraktar unmanned combat aerial vehicles (UCAV) along with a small number of experts which also includes three Pakistani nationals contracted to support GNA's air campaign. Turkish Ministry of Foreign Affairs denies any involvement of Turkish personnel in the security assistance and stated that this personnel was brought to Libya to review security protocols in place for the embassy. The UN report also concludes that Bayraktar drones are delivered in parts and assembled at Misrata, which is the second stronghold of GNA. These drones, after becoming operational, fly sorties near the regions of Misrata and Mitiga on Northern Libya.

With stakes too high to lose for GNA, agreement with Turkey concerning maritime jurisdiction to prevent further Greek access to Eastern Mediterranean, threatening Turkish interests in the region, of course, would come with a price. Given the small scale of existing support to GNA and its ability to lead troops lacking the discipline of a regular army and effective command structure, with this new deal, GNA gets to have a real chance of tackling Haftar's LNA.

The Memorandum of Understanding between Turkey and Libya on Security and Military Cooperation, which currently is at the Turkish parliament awaiting approval, covers a wide range of security requirements of GNA, making sure that Libyan commitment to the agreement concerning maritime jurisdiction in the Mediterranean is to remain uninterrupted. The Agreement includes the

exchange of personnel, material, equipment, information, and experience to support GNA.

This week, President Erdogan said during an interview that should the formal requests are made, the Turkish military may be deployed to Libya. Once passing the parliament and signed by the President, with this agreement, Turkish Armed Forces will establish a Quick Reaction Force (QRF) to undertake police and military responsibilities in Libya, which would mark a sudden increase in Turkish involvement in Libya both in terms of military presence and capacity-building.

Interestingly enough, there is another article in the agreement which also covers the establishment of a joint Office of Defence and Security Cooperation in Libya and Turkey. This provision is left optional in the Agreement. Still, the writing and the format of the clause suggest inspiration from USA's Defence Cooperation Offices all around the globe, run by the US Department of Defense. Therefore, we can forecast that such an office will undoubtedly be established in no-time once the agreement becomes in force. This office is tasked to serve as a consulting authority on operation principals, military planning, coordination of intelligence, and operational activities.

This agreement is legally bound to remain in force for three years. It is to be extended automatically for successive periods of one year unless one party does not notify the other to terminate it.

In general, the details of the agreement covers the financial, administrative, and security necessities to implement the program. However, in terms what fields of security and military cooperation is to be provided, as outlined by the Article IV of the agreement, among a large number of areas, few of them attracts our attention apart from the formation of

a QRF, intelligence support, and a security cooperation office, and these are;

- Allocation of basing and military ground, sea and air vehicles including armed platforms
- Defense industrial support
- IED/EOD operations (dismantling explosive ordnance)
- Countering Irregular Migration
- Structural and organizational reform of defense and security forces of GNA and their equipment
- Mapping and Hydrography
- Exchanging and sharing information on maritime situational awareness (MSA)

The also allows the sending party, which would be Turkey, to jointly conduct security and 'peacekeeping' operations in Libya. To conclude, a large chunk of military provisions in the agreement signals the international community that for Turkey given the military advance and control of LNA over more significant Libya, its foreign policy for the country is stepped up and now it acts on the principle of "Go big or go home." Of course, with the maritime agreement, this would be expected. But having such a broad scope and by large we mean as abundant as additionally covering naval issues such as hydrography and maritime mapping or supporting Turkish MSA in the Mediterranean, Turkey once again relies on its military muscle to support Libya's commitment to the agreement it reached with Turkey on maritime jurisdictions.

However, the downside of these agreements in the history of security assistance is that a sudden influx of money and resources draws the attention of foreign actors in ways that it annoys the unsatisfied side and pushes it for further foreign assistance, which in our case would be

Egypt and UAE. Previously both UAE and Egypt made statements that the two countries unilaterally may launch an air campaign in support of Haftar's LNA in Libya. A United Nations report published in November 2019, stated that these airstrikes are taking place. Both the UAE and Egypt have competing interests and relations with Turkey concerning many issues in the Middle East, such as Sudan, Somalia, and many more.

Therefore, this would give incentives for the two countries to expand their footprint in Libya, which can bring these countries into a military crisis and collision with Turkish forces once they are deployed. Legally speaking, the UN currently has an arms embargo on Libya as per the Security Council Resolution 2473. But it is worth mentioning that any state hardly abides by it. And as for its possible setbacks for Turkey, getting more involved over the period draws Turkish forces closer to direct clashes with both Haftar and its sponsoring states, which Turkey has hostile relations with.

On the other hand, this agreement is vitally important to keep the Libyan government on track and committed to its agreement with Turkey on maritime jurisdictions. Therefore, Turkish forces need to have a clearly defined set of rules of engagement and defensive capabilities to make sure that no military crisis takes place in the country involving Turkish personnel which foreign powers would use and take advantage of in opposition to Turkish foreign policy and interests in both North Africa and Eastern Mediterranean, bringing the danger that the war in Libya could spill over into the Mediterranean.

Ercan Emre Çelik

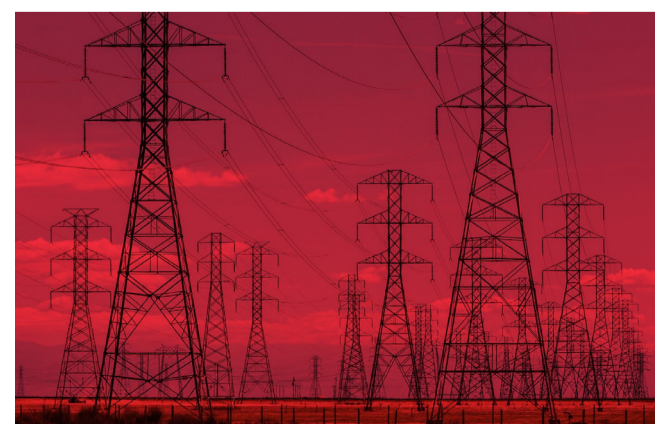
of the attack remained virtual, and its impact found a physical form.

The most significant cyber attack against a critical energy infrastructure was reported in 2009: the Stuxnet, a cyber worm, deployment against the Iranian nuclear enrichment facilities at Natanz. The malware was developed by the US and Israel and was meant to damage the Natanz nuclear enrichment facility. It had a unique code, called "zero-day" and 4 of them were found in the within the malware. It was designed to exploit the vulnerabilities in the data acquisition system (SCADA) and its control mechanism. After completing its duty, the malware was right after infected to the network in 2010.



These recent acts raised concerns about the cyber threat that is expected to increase in the future as a new weapon of choice. The damage of these attacks is generally economical and social, and in the future, the severity of damages is expected to increase. Power networks and gas and oil sectors have been classified as the most critical infrastructures.

Electric power grid disruption can lead to widespread blackouts and shutdowns. The 2006 European blackout was started in Germany but spread to millions of households in France, Belgium, Italy, Portugal, Spain, and Eastern Europe. This blackout did not only cost money but also emphasized how strong is the interdependency of the European power system and how successful the cyber-attack was.



A Brief Overview of the Cyber-Threat to Critical Energy Infrastructures

The number and severity of the cyber-attacks on critical energy infrastructures are discernibly increasing. As oil and gas becoming more dependent on information technology systems, they are becoming more and more vulnerable. The critical energy infrastructures have always been the target of physical attacks, which are easier to mitigate. On the other hand, cyber-attacks perceived as a new

type of threat for the companies providing electric power, gas lines, and water systems, and they are harder to prevent. The growing dependency on information technology systems has enabled a new type of cyber attack, which is a cyber-enabled physical attack. Up to a point, cyber-attacks have remained in the digital world, but as technology improved, its capacity has increased as well. The means



The oil and gas sectors have the highest rates of service attacks. One-third of the attacks have classified as denial-of-service attacks (DDOS), which occur when networks of infected computers are used to attack the target network with fake requests. DDOS has an assertive effect on the oil and gas sector due to its possibility to cause a serious impact on operations and critical breakdown of them.

The cyber-threat remained a central concern of the energy infrastructures, especially information technology systems became more integrated with the modern power system. The risk area has expanded; more and more systems became connected to the Internet. For example, SCADA, which is used to gather data and control critical infrastructure and enable engineers to control system components such as pumps. This system was initially planned to be closed with few security features, and now it is connected to the Internet and interconnected to other systems as well.

The threat to critical energy infrastructures is growing as the interconnectedness of energy system operations, and dependency on information technology systems are increasing. Although the cyber-enabled physical attacks are not associated as a security risk, it is a threat to the economy and society. And the appearance of the danger is susceptible to change, which makes it harder to mitigate it.

İrem Ayça Aykın

Foreign Direct Investment (FDI) in Intra-state conflict zones

Foreign Direct Investment is a source of financing that allows businesses to grow, which can be seen as a source of innovation that promotes energy efficiency. As mentioned in my previous writings due to geographical limitations, energy firms can only focus on specific regions to produce and extract energy. This limitation occurs in hydrocarbon resource extraction as well in the renewable energy sector. Precious earth minerals which used in the renewable energy sector-production of solar and wind panels' are- usually located in the developing world.

In addition to resource richness, such regions generally provide more profit to companies due to less developed labor rights and regulations. When we compare the hourly wages that a company has to pay to its labors in developing states (ie, Zimbabwe) to its workers who do the same job in developed countries (ie, USA), choosing developing nations becomes more profitable for the firms. At the same time, such investments allow developing nations to improve their sectoral and economic development. To preserve their prestige and standards, international firms implement specific regulations like not allowing child labor. If they can manage to perform regulations in accordance with international labor and child law, they can also contribute to the development and the domestic stability of the home state, which gives us a win-win case. However, these hydrocarbon or rare-earth mineral-rich regions tend to fall into vulnerable zones category in terms of security in comparison to the developing world, which causes firms to hesitate or don't create long term investment plans for the home state.

In the literature, some scholars argue that arm conflicts reduce FDI by increasing expected loss in return of the firms; thus, firms abandon regions where arm conflict exists.

Armed conflicts indeed cause detrimental environments for business both in terms of product competitiveness and price competitiveness. Still, the liability of the state can cause investors to avoid all of these risks. If a home state guarantees the security of firms by either sending its military protection or allows other nations to provide security to the firm, like the fallow-the-fag effect, then it can attract more FDI's.

Nevertheless, conflict may end before it reaches an intensified level. Also, from a different perspective, armed conflicts lead to markup in the prices, which increases firms' profit. This scenario can last until the conflict gets intensified; when it started to impose unbearable dangers to firms, investors have to pull out of the market. In that sense, conflict zones become desirable regions for the energy companies.

Resilience and expectations of other firms, sectors is another blurry area. States who own oil, natural gas, and rare-earth minerals usually more vulnerable to civil wars due to their developmental scale. Due to geographical limitations, if a firm wants to invest in the energy sector, their expected risks will be automatically higher than a firm which invests in another industry like technology items. In terms of a country selection, a firm that works in the IT sector may have various options, but when it comes to energy sector regions and states that firms invest much more limited. On top of that, even though energy companies try to avoid investing in hydrocarbon related businesses in conflict zones, they can only resist up until a particular time when it comes to extracting rare earth minerals. Energy firms need these minerals to produce renewable energy technologies because of the increasing demand for renewables due to state energy security concerns.

Yüksel Yasemin Altıntaş

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Publisher: Bilkent Energy Policy Research Center

Editor: Gökberk Bilgin

Contact: eeeps@bilkent.edu.tr

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