

29 AUGUST 2022

VOLUME 4 ISSUE 2

SYNERGY

BİLKENT ENERGY POLICY RESEARCH CENTER NEWSLETTER

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FUEL OIL

17.13

China-Saudi Arabia Energy Cooperation Gains Momentum

Erkin Sancarbaba 

In recent years, it has been witnessed that countries have increased their cooperation both to strengthen existing energy investments and to accelerate new energy investments. The growing ties between China and Saudi Arabia can be seen in this context. The two countries are working to realize joint energy investments aligned with their long-term vision and interests. As a Belt and Road Initiative country, Saudi Arabia seeks to increase investment from China. On the other side, China seems keen to have a stake in projects under Saudi Arabia's Vision 2030. The most recent step to strengthen bilateral relations in the energy field is the Memorandum of Understanding (MoU) signed on August 3 between Saudi Arabian Oil Company (Aramco) and China Petroleum & Chemical Corporation (Sinopec). The Memorandum of Understanding envisages the parties collaborating on projects to be realized in Saudi Arabia.

The MoU signed between the two major energy companies aims to establish integration in refining and petrochemicals and strengthen cooperation in construction, engineering,

oilfield services, and procurement. The two companies also intend to work together on upstream and downstream technologies. In addition, joint investments and R&D collaboration are targeted in carbon capture and hydrogen production.

Another highlight of the MoU is that Aramco and Sinopec will discuss opportunities to establish a new local manufacturing hub in the King Salman Energy Park. It indicates the Kingdom's intention to encourage Chinese companies to invest in the fully integrated industrial ecosystem targeted by Vision 2030. King Salman Energy Park is a megaproject under construction as part of Saudi Arabia's Vision 2030 goals, which aims to establish a secure supply chain for the Kingdom's major energy companies.

Economic ties between China and Saudi Arabia have already gained momentum. Looking ahead to 2021, Saudi Arabia is China's largest oil supplier (Russia is projected to take this place in 2022). Last year, China procured approximately



87.6 million tons of crude oil from Saudi Arabia, equivalent to 1.75 million barrels per day. According to these figures, Saudi Arabia accounted for 17% of China's oil imports in 2021. On the other hand, in the same year, China purchased 27% of Saudi Arabia's total oil exports.

Another critical issue is the energy projects in which the two countries mutually invest. In the first half of 2022, Saudi Arabia received the largest share of investments in the China-led Belt and Road Initiative. Saudi Arabia was the leading recipient of natural gas investments under the BRI, with a share of \$4.6 billion.

Saudi Aramco has also shown interest in planned energy investments in China. In 2019, Saudi Aramco signed an agreement with Chinese companies NORINCO Group and Panjin Xincheng to establish Huajin Aramco Petrochemical Company (HAPCO), a joint venture to build a fully integrated refinery and petrochemical plant. Although it has been questioned whether the project will realize after the sharp

drop in oil prices in 2020, a final investment decision to develop the complex has taken by Aramco in March 2022. The project is valued at over \$10 billion and is one of the largest Sino-Foreign joint ventures. The project, scheduled for completion in 2024, will enable Aramco to supply the refinery with up to 210,000 barrels per day of crude oil.

Saudi energy companies, notably Saudi Aramco, maintain their appetite for the Chinese market. In February, Saudi Aramco's CEO held talks for further investment in China. Although no exact figures for future investments have yet been announced, there is a concrete demand for new investments from the Kingdom and Saudi energy companies.

The most tangible evidence of the momentum in economic ties between China and Saudi Arabia is the active negotiations between the two countries to use the Chinese yuan in the oil trade. In fact, these negotiations have been ongoing for six years but have recently gained momentum



due to the perception on the Saudi side that the US government has not fulfilled its promises to the Kingdom, especially on security issues.

Saudi Arabia's security concerns have historically played an essential role in energy cooperation between the United States and Saudi Arabia. An examination of the Petrodollars mechanism developed by the United States and Saudi Arabia in the 1970s shows that the concept was intended to address the concerns of both sides. The US government's primary motivation was to make the US dollar dominant in global energy trade by trading oil in US dollars with Saudi Arabia after the US energy security was recognized as fragile following the OPEC embargo that led to the oil crisis in 1973. This would indirectly establish US energy security. In return, the Kingdom of Saudi Arabia received important security guarantees from the United States. At a time when Saudi Arabia and the US are trying to re-consolidate their relations, it should be carefully monitored how Saudi Arabia's approach to the use of yuan in oil trade with China

will affect global energy markets.

As a major energy consumer, China is looking for new energy partners to ensure the security of its energy supply. In this context, it can be predicted that the Chinese government will continue to take steps to strengthen its political and economic relations with countries such as Saudi Arabia. It is clear that increased cooperation between Saudi Arabia and China will continue to be on the agenda of global energy markets.

Climate Change and Heat Waves

Yaren Öztürk 

Scientists have been measuring global temperatures for more than a century and report that the Earth is getting warmer. According to the National Oceanic and Atmospheric Administration's (NOAA) annual observations of the world's average temperature, temperature increases are getting more intense every day due to increasing levels of greenhouse gases such as carbon dioxide in the atmosphere. In 2022, temperatures reached unprecedented levels in countries such as the United States, Australia, India and Pakistan. Last month, temperatures broke records across the Northern Hemisphere. While Rome experienced its hottest day on record, in Italy and Japan, temperatures hit 40 degrees Celsius, the highest since 1875, the first year official records were kept. In London, thermometers registered 40.2 degrees Celsius last month. According to environmental scientists at Oxford University, climate change makes heat waves more frequent and hotter. A heatwave, which had a 1 in 10 chance of occurring before climate change, is now three times more likely to occur and peaks at temperatures about 1 degree Celsius higher. According to the World

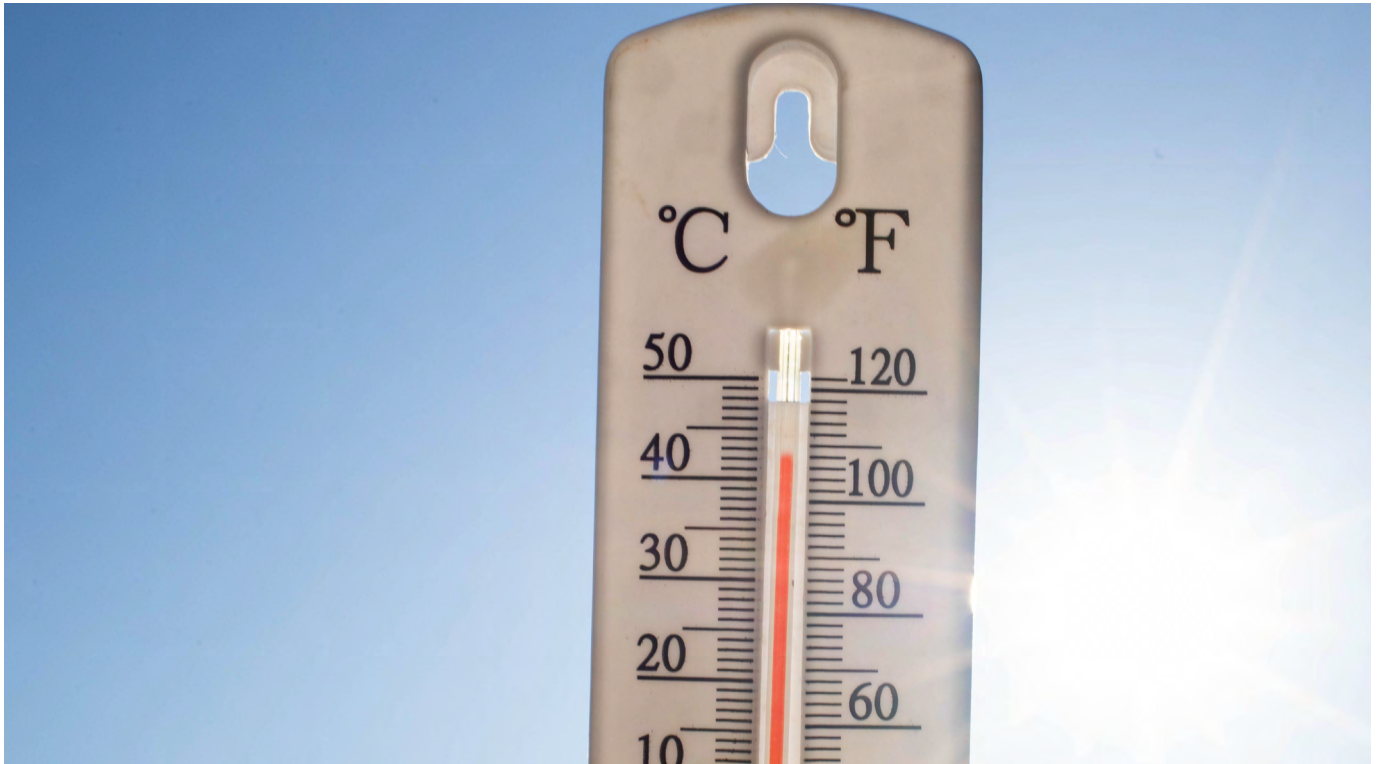
Weather Attribution, this situation, as mentioned earlier, has increased the likelihood of a repeat of last April's heat extremes in Pakistan and India by 30 times.

The last decade has been the hottest decade on record, while each of the previous four decades has been hotter than the final due to climate change. Exposure to extreme heat has serious effects and consequences in many areas. Looking at the effects on human health, a study conducted in Istanbul showed that three heatwave periods in 2015, 2016 and 2017 increased the risk of death by 11%, 6% and 21%, respectively. Over the three years, the total number of deaths during heatwave periods was 419. Between July 10 and 19 this year, more than 1,000 people died in the Iberian Peninsula due to high temperatures. The human body can generally cool itself through sweating, but if humidity is high, sweat cannot evaporate quickly. This can lead to heat stroke. High night air temperature and high humidity are among the causes of heat-related illnesses and deaths. Low-income people exposed to hot air at night and who do not have easy access



to cooling devices such as air conditioners may experience health problems. Babies, children, the elderly, people with chronic diseases and those who have to work all the time outdoors are also at additional risk. On the other hand, extreme temperatures can also damage agricultural land. Plants can be adversely affected by high temperatures. Some crops may be unable to fulfil their need for cool night temperatures. Livestock may experience heat-related stress on nights when temperatures remain high. On the other hand, heat waves and drought exacerbate forest fires. From 2012 until the end of 2021, 27,150 forest fires broke out in Turkey, damaging 226,845 hectares of land. Although the number of fires is not the highest in the last decade, the area damaged in 2021 is higher than the total of the last 9 years. In comparison, an average of 20,760 hectares of land were burned annually between 2008 and 2020 in Turkey; 177,476 hectares were burned between January and August 2021. Again, while Turkey's average number of forest fires in August between 2008 and 2020 was 59, this number increased to 159 in 2021. Also, the number of fires in the

European region has also been increasing recently. While the average number of fires across the bloc between 2006 and 2021 was 1,349, more than 2,300 fires were recorded as of mid-August this year. It was stated that more than 700,000 hectares burned in the fires. In addition, extreme temperatures lead to water scarcity and food insecurity. Another significant impact of high temperatures is felt in the energy sector. While high summer temperatures lead to an increase in electricity demand, this increase may reduce the capacity of transmission lines and lead to an increase in power outages. Estimates show that by 2050, the increase in average annual energy expenditures due to energy demand could reach 30 billion dollars. In addition, as rivers and lakes heat up, their reduced ability to absorb waste heat from power plants can reduce the thermal efficiency of power generation. This can make it challenging to comply with environmental regulations set around the power plant's cooling water temperature, which can lead to plant shutdowns.



Noting that governments are responsible for minimizing the impacts of high temperatures and protecting people from climate change and heat waves, Human Rights Watch has prepared recommendations and measures in consultation with climate, public health, and disaster preparedness experts. These measures include first identifying the risks to public health posed by high temperatures and identifying the regions where these risks are highest. It is stated that various plans should be made to reduce temperatures and respond to emergencies, and the public should actively participate in this. Public health campaigns and policies must be developed to reduce risks and raise public awareness. There is a requirement to ensure reliable and affordable energy, water and sanitation access. The importance of ensuring accessibility for the entire population is emphasized so that the whole population is united against the need for emergency assistance during heat waves. Also, it is essential that increase access to air conditioning and shaded areas for at-risk populations. There is a requirement to ensure the safety of people working

outdoors or in hot environments such as bakeries, limiting working hours and increasing breaks. It calls for controlling capacity by guaranteeing access to social services. There is a need to monitor the impact of the heat and how effective emergency responses are. Finally, keeping national and local plans up to date is essential.

The clock is ticking, and it is no longer possible to ignore the effects of climate change. Unless greenhouse gas levels are reduced, high temperatures will not cease to threaten humans and other living things. Raising awareness and adapting societies and cities to climate change is vital. The high temperatures experienced around the world and the related deaths and illnesses are not fate. The solution to this human invention situation also can be found by humans.

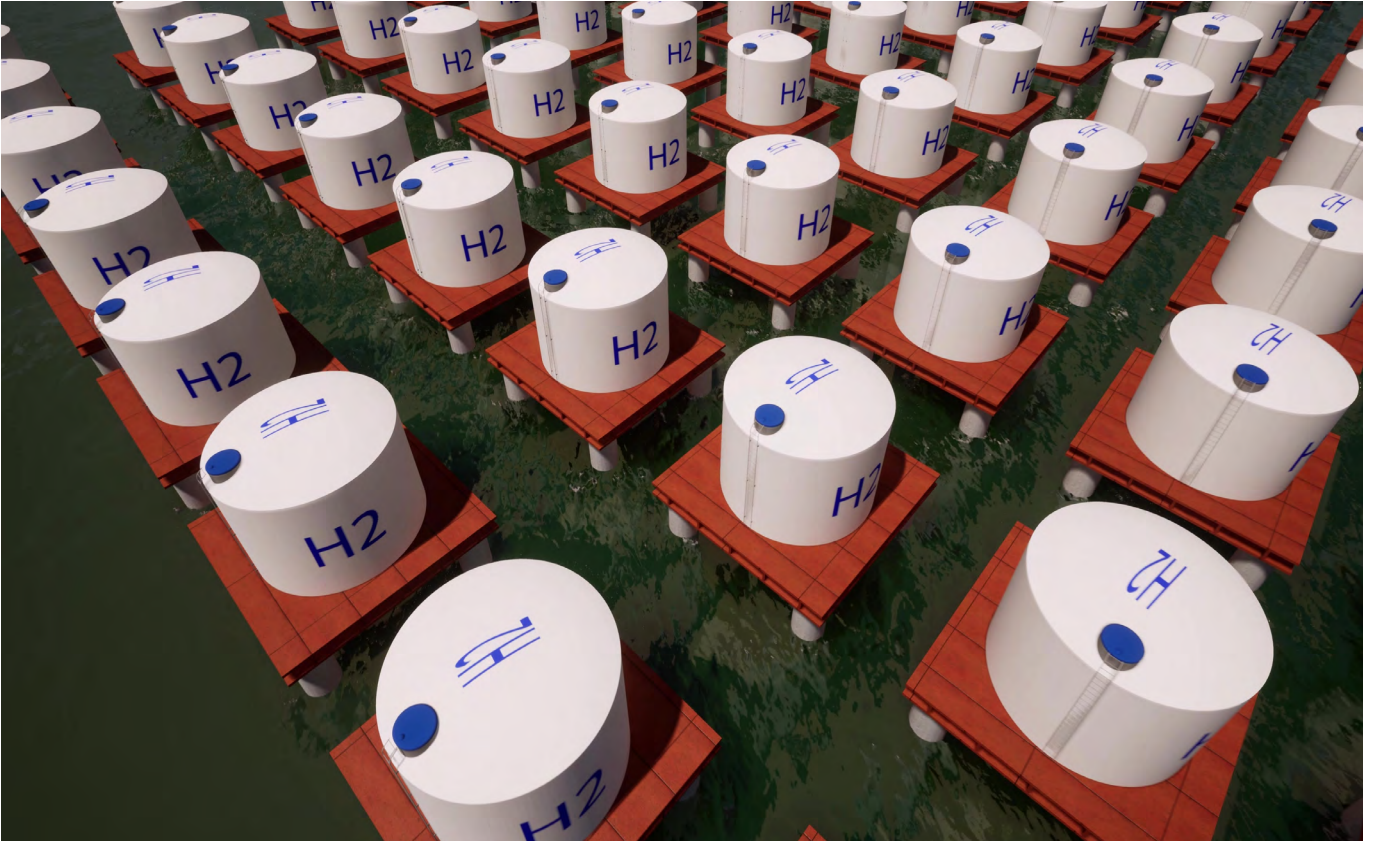
Turkey's Green Hydrogen Potential and Strategy

Sarper Göksal 

In November 2021, Turkey became a party to the Paris Agreement and announced its 2053 carbon neutrality target, which marked a turning point for Turkey in the energy sector, particularly in the integration of renewable energy. By 2053, achieving carbon-neutrality across the planet is the most crucial goal of the Paris Agreement. According to Europe Beyond Coal Campaigner Duygu Kutluay, the most effective step for Turkey to reach the 2053 net zero target would be to phase out coal, which is responsible for 72 percent of greenhouse gas emissions that cause climate change. The fact is that carbon emissions could be reduced by 82.8 percent in 2035 by abandoning coal and doubling the share of renewable sources in energy generation. Therefore, it will be inevitable for Turkey to turn to renewable energy sources or increase their use to ensure energy transformation. Renewable energy generation in Turkey in terawatt hours increased from 23.8 in 2016 to 62.7 in 2021. In short, Turkey is taking firm steps toward achieving its goals.

While the share of renewables in Turkey's final energy consumption was 13.2 percent in 2016, when the Paris Agreement entered into force, this figure has now reached 15 percent. Even if Turkey has increased the use of renewable energy, this figure is insufficient for the decarbonization target. Recently, to realize the decarbonization targets under the Paris Agreement, there has been a shift towards solar, wind, hydroelectric energy, and other alternative sources. At this point, "hydrogen energy" offers essential opportunities for decarbonization. Hydrogen energy can be defined as the energy source obtained by converting hydrogen, which is found as compounds in nature. In other words, hydrogen energy is generated by the separation of hydrogen atoms from oxygen atoms.

It is possible to produce hydrogen energy with different energy sources. For example, hydrogen energy produced with fossil fuels is gray hydrogen, and hydrogen energy produced with natural gas is blue hydrogen. Hydrogen energy from renewable energy can be called green hydrogen,



and green hydrogen is an opportunity to implement the commitments of the Paris Climate Agreement and solve the global energy crisis.

It is undeniable to ensure energy transformation and substitute alternative sources on the path to decarbonization. If Turkey's goal of giving up coal due to the Paris Climate Agreement is considered, the amount of coal consumed in Turkey is relatively high. According to a report published by the Chamber of Mechanical Engineers of Turkey, coal consumed in Turkey in 2018 amounted to 122 million tons, of which 39.5 million tons were hard coal, and 82.5 million tons were lignite and asphaltite. In addition, Turkey's coal-fired electricity generation has increased by 39 percent in the last five years, making Turkey one of the three countries with the highest increase in coal-fired electricity generation, along with Indonesia and Saudi Arabia.

According to Kutluay, the price increases in coal and natural gas due to the current commodity crisis and the increasing costs of coal power plant operations make the transition to renewable energy mandatory. According to the report "Priority Areas for Turkey's National Hydrogen Strategy," published by SHURA Energy Transformation Center, Turkey can overcome the high cost of coal and natural gas with its hydrogen potential. Turkey's 1.6 million tons of green hydrogen potential, which offers a \$45 billion investment opportunity, could accelerate the energy transition. At this point, Turkey's first strategy for hydrogen energy, according to Energy Minister Fatih Dönmez, is to mix hydrogen into the existing natural gas network and use it to reduce the cost of natural gas imports. In short, hydrogen will reduce the exorbitant costs of natural gas and coal and replace them with cheaper energy.

On the other hand, Turkey's green hydrogen potential of 1.6 million tons could create a new export opportunity for Turkey; Turkey could sell its green hydrogen produced



from renewable sources to Europe and generate a source of income for the national economy. For example, China has approved a major green hydrogen project that will replace 180 million gallons of gasoline per year and aims to meet 10 percent of its electricity production from hydrogen energy. Moreover, the US plans to build a plant in New York that will produce 500 tons of green hydrogen per day by 2025, targeting high export revenues.

In sum, the exceptionally high levels of coal use in Turkey in sectors such as industry, transportation, and construction have caused both energy prices and sectoral costs to rise. However, Turkey's potential to produce 3.4 million tons of green hydrogen annually would be highly beneficial in terms of minimizing the import costs spent on natural gas, opening a revenue gate for the country in exports, and fulfilling the commitments of the Paris Climate Agreement. Moreover, by taking an essential step in green hydrogen energy diversification, Turkey will become a new power supporting its position in the energy geopolitics in the

region thanks to its export opportunities. For example, the transportation of hydrogen to Europe through the Southern Gas Corridor, which transports Azerbaijani gas through Turkey, can play an essential role in strengthening Turkey's role in European energy supply security and increasing Turkey's geopolitical importance.

Africa's Future in the Energy Sector

Alperen Ahmet Koçsoy 

Africa has long been struggling with energy production. According to the World Bank, only 48.2% of Sub-Saharan people have access to electricity as of 2020. With forecasts stating that Africa will double its population by 2050, it is a growing concern among African policymakers to provide their countries with sufficient energy.

Increasing production is not the only concern, however. The other concern is deciding between a green path and developing just as Europeans did in history –with the help of fossil fuels. The advocates of ‘just energy transition’ assert that Africa has the right to exploit its resources before drawing its carbon emissions to net zero. “No one in the world has yet been able to industrialize using renewable energy,” said Yemi Osinbajo, vice-president of Nigeria, in May 2022. Renewables are by nature intermittent and still have inefficiencies compared to hydrocarbon energy sources. While Europe is turning to fossil fuel options, some call Europeans lecturing Africans on renewable energy ‘green colonialism.’ Mo Ibrahim, a Sudanese-British businessman

and founder of the Mo Ibrahim Foundation, says, “While gas is approved by the European Union, coal is enjoying a revival in the US, China, and some European countries. If Africans say, ‘Please, we need a little gas, not to heat our swimming pools or to run our air-conditioning, but to have light,’ they are told, ‘Please don’t pollute.’ But it is our turn to develop and end poverty.”

The Russian Invasion of Ukraine contributes to this view. After the invasion, the EU took a decision to cut two-thirds of its gas imports from Russia. The change in the EU’s energy policy prioritizes urgent energy needs over climate goals. Therefore, it presents opportunities for African countries to export fossil fuels. Natural gas export, both by pipelines and by Liquefied Natural Gas (LNG) ships, is the most prominent of them, as the European Union describes it as ‘untapped LNG potential.’ Many African countries, such as Nigeria, are endowed with abundant natural gas and oil reserves.



However, there are some limitations to the hydrocarbon option. First, there is a scarcity of funds from the EU and international organizations such as International Monetary Fund (IMF) and World Bank for fossil fuel investment, even though Europe does not reject gas imports from African countries such as Senegal, the Democratic Republic of Congo, Angola, and so forth. Also, investments for natural gas production could become 'stranded assets' as the globe is transitioning to green energy. The European Union applies 'carbon tax' to companies with above-the-level carbon emissions, for instance. Besides, fossil fuels are finite resources. Fossil fuels in Nigeria, for example, are expected to 'be depleted to an uneconomical point by the year 2050'. Hence, investing in fossil fuels may cause problems when countries want to transition to renewable energy in the future. Furthermore, the continent is affected by climate change disproportionately compared to other continents. Irresponsibly investing in hydrocarbon would only exacerbate the effects of climate change on the continent.

In addition, Africa's principal goal is to provide electricity to its population. Fossil fuels trade might be lucrative because of soaring prices, but those soaring prices make relying on fossil fuels in the domestic market inflationary. Consuming expensive energy is not something that many Africans can afford. Last year, African people without access to electricity grew by 4%, or 25 million. Also, people that are off-grid resort to the solution of having diesel-fueled electric generators, which are expensive to use. African Development Bank (AfDB) estimated that Nigerians spend \$14 billion fuelling petrol or diesel-powered generators. To provide electricity to off-grid people living in remote and isolated areas, one option argued in a 2013 article is investing in small-scale renewable energy resources such as small hydropower (SHP) systems and solar panels.

Africa has enormous renewable energy potential. According to African Development Bank data, "Africa has an almost unlimited potential of solar capacity (10 TW), abundant hydro (350 GW), wind (110 GW), and geothermal energy



sources (15 GW).” This potential keeps ‘leap-frogging’ in the energy sector as an option. Kenya, which started investing in renewable energy as early as 40 years ago, is destined to be successful, with roughly 92% of its energy generation coming from renewables and 71.4% of its population having access to electricity as of the year 2020. In the words of Monica Juma, Kenya’s energy minister, “We are asking ourselves whether there is an alternative. We have done it in digital. Is there a similar leap-frogging in energy? We don’t know, but I suspect there is.” Not all countries are as lucky as Kenya regarding renewable energy potential. However, countries that have immense potential for renewables, such as Namibia (wind), the Democratic Republic of Congo (hydropower), and Nigeria (solar, hydropower, and wind), should consider ‘leap-frogging’ to renewables as a serious option.

Financing renewable projects might get problematic, with investment in them lagging because of the soaring hydrocarbon prices. Plus, the EU is having problems

delivering its promises in clear energy financing. Overcoming this problem might be financing renewables with the hot money from the fossil fuel trade. Exporting natural gas offers a less dirty yet profitable option for some, although natural gas production emits substantial amounts of methane.

We might be at a critical stage in Africa’s energy transition. The current geopolitical environment may offer opportunities for African countries, but those opportunities should be approached rationally and in a long-term prioritizing way. ‘Just transition’ is an option, along with ‘leap-frogging.’ There may also be a synthesis of these two development paths. Whatever path they choose, African policymakers should assess their countries’ needs, capabilities, and the risks of their policies well. They should project their future pragmatically. The continent has a bright future ahead of it if it can put good use of its potential.



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