Interim Report

by the Study Group on Decarbonization, Energy Geopolitics and the Middle East

How Decarbonization Will Transform and Impact Energy Geopolitics in the Middle East and Other Parts of the World

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1. Introduction

1) The Issue

In recent years, particularly after the adoption of the Paris Agreement at COP21, moves toward decarbonization have been accelerating worldwide. This also suggests a growing sense of crisis over the rising average temperature of the Earth. Terms like decarbonization and a shift to clean energy carry complex and broad meanings and are expected to have implications far beyond the energy sector, extending to various social systems and the way people live. However, amid the global shift to decarbonization, the overall process has not been understood sufficiently, although some pioneering studies have been conducted on the magnitude and extent of its impact and the speed of associated changes.

By looking into the changes in the Middle East, especially in the Persian Gulf region as a major oil and gas producing area that is expected to be significantly affected by the shift to clean energy, the Study Group on Decarbonization and Energy Geopolitics in the Middle East intends to deepen the understanding of the current situation of decarbonization and study how the energy transformation in the Middle East will affect global energy geopolitics. The Study Group will also continue to work on potential changes to these moves toward decarbonization, with particular attention to how changes in the Middle East will affect Japan. One thing to note is that Japan's dependency on the Middle East for crude oil imports increased to 97.3% in June this year,

according to the Agency for Natural Resources and Energy. Naturally, diversifying the source is the key to ensuring reliable supply. Japan should seriously consider how to lower its dependency, or it should take action in the first place, such as reducing the relative share of oil in its energy mix by accelerating the introduction of renewable energy. One possible measure for Japan would be to effectively lower the "risks" by contributing to stability in the Middle East through diplomatic or other efforts. It would be also essential that both Japan and the Middle East enhance attention to each other and strengthen mutual relations. With these perspectives in mind, the Study Group intends to make recommendations on how global decarbonization trends will impact Japan's diplomacy, economy, and business, and how Japan should prepare for such impacts.

In light of these objectives, this interim report seeks to generally outline the impacts of decarbonization to lay the groundwork for subsequent studies. The aim is to discuss from broad perspectives international relations, diplomacy, economy, business, and other topics beyond the energy sector in view of the impact of decarbonization on not only the Middle East but also the entire world. By accumulating insights into the decarbonization process and the future of the world through these activities, the Study Group ultimately aims to enhance the awareness of decarbonization in Japan's public and private sectors and thus help Japan chart a clearer path to the future, as well as to ensure that the long-fostered relationship between Japan and the Middle East will be maintained in the future in a meaningful way.

2) Trends toward a decarbonized society

To combat global warming, the Intergovernmental Panel on Climate Change (IPCC) was established in 1988, followed by the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) at the 1992 Earth Summit to set the framework for international cooperation to address the issue. The Kyoto Protocol, which set numerical targets for developed

countries to reduce greenhouse gas (GHG) emissions, was adopted in 1997 and became effective in 2005. In 2015, almost all countries in the world (195 in total) endorsed the Paris Agreement, agreeing to work toward the goal of limiting the increase in the average temperature of the Earth's surface to below 2°C (and ideally to below 1.5°C) above pre-industrial levels.

As mentioned earlier, moves toward decarbonization have become a global trend, driven by these international initiatives. Government policies and actions by enterprises and civil societies have spread globally to stop global warming and the deterioration of the Earth's environment, bringing about major transformations worldwide in the energy and many other fields. One of the enablers is emerging innovations in relevant technologies, such as rapid and major reductions in the cost of renewable energy. This has advanced transition from fossil fuel to clean energy on a global scale. Although it is still uncertain how the complex energy system will change in the future, renewable energy is growing faster than any other energy source and has been the primary driving force of the transformation.

This transformation centering around renewable energy will promote the transition of the traditional fossil fuel-driven geopolitics and existing systems to another form of geopolitics. At the same time, this energy transformation will reach beyond the energy sector and have a significant impact on the traditional forms of society, economy, technology, industry, and even diplomacy and security, in addition to geopolitics, and will inevitably and profoundly change many sectors. Naturally, the implications will extend to all countries and regions in the world, and eventually to international relations and relations between developed and developing countries.

2. Decarbonization and the Gulf region oil producers

1) Overview

Back in 1992, when the adoption of the UNFCCC heightened the awareness of global warming

in the international community, Middle East countries, especially Gulf region oil producers, responded with opposition, assuming that the move would lead to a decline in oil demand. However, in the 2000s, Gulf region oil producers announced “visions” as their leadership was replaced by younger generations, aiming for a new society and a new form of energy security that are built around concepts such as departure from an oil-dependent economy and the diversification of the economy. In line with these developments, they began to introduce renewable energy on a full scale in the 2010s, partly encouraged by the rapidly falling cost of photovoltaic and other renewable energy.

In fact, Gulf region oil producers have made various attempts to move away from the oil-dependent economy since long before they focused on decarbonization. Nevertheless, they have been generally unsuccessful to date in breaking away from the economic structure dependent on revenues generated by fossil fuels. One of the key issues faced by Gulf region oil producers is that as their population has grown over the past 40 years, along with the economic growth, energy consumption has significantly increased, and so have CO_2 emissions. Middle East countries also need large amounts of electricity for air conditioning and desalination of seawater, inevitably making their societies high energy consumers. For this reason, combined with government energy subsidies for fossil fuels and other sources, they have been heavily dependent on fossil fuel energy.

2) Impact of global warming

Let us briefly look at how the Middle East region is affected by global warming.

The Middle East, along with North Africa, is believed to be a region of the world that is most strongly affected by climate change. The average temperature rise there is 0.46°C per decade from 1980 to 2022, well above the global average of 0.18°C. Precipitation has also been steadily falling, causing droughts, while floods hit such countries as the UAE, Iran, Saudi Arabia, Qatar, Oman,

and Yemen in 2022. In particular, sea-level rise, which is an imminent threat to South Pacific island nations, may become a serious issue for small countries like Bahrain and Kuwait in the Middle East.

Climate change and global warming in the Middle East are also about to exert a large impact on Islam. One example is the Hajj, the pilgrimage to Islam's holy city Mecca in western Saudi Arabia. It is among the five religious duties of Muslims (the Five Pillars of Islam), together with prayer and fasting. Reportedly, 1.8 million pilgrims visited Mecca in June 2023, but there are concerns about health risks to pilgrims who offer prayers outdoors in the hot season. Against this backdrop, even the Islamic community is paying growing attention to the global environmental crisis in the context of global warming as an emerging challenge for the world. Likewise, various discussions have begun in the religious world. For example, in Iran, where environmental issues have become a topic of state-level discussion since 2010, "environmental discourse" and policies based on Islamic viewpoints have been implemented in various ways. Iran's supreme leader Khamenei even delivered an open sermon on environmental issues, which is considered part of Islamic environmental policy.

3) The possibility of decarbonization in the Middle East:

Middle East countries have geographical and natural advantages in terms of access to renewable energy. In particular, the Gulf countries are located at the center of the Earth's Sunbelt, which means that they are in the sunniest area of the world and that they have access to abundant natural energy sources. Their generally flat landscape and plentiful solar radiation make them an ideal place for solar photovoltaic, solar thermoelectric, and wind power generation. The Middle East region also has one-fifth of the world's natural gas reserves and has considerable potential as a supplier of emerging energy sources, such as hydrogen and ammonia.

Let us take a look at the energy situation in the Middle East in the context of transition to a decarbonized society.

(1) First, the process of transition from fossil fuel to clean energy will not reduce fossil fuel demand quickly. Although demand for oil will probably reach its peak within several years and then begin to diminish, the Middle East will likely become the last stronghold of energy supply to the world for its strong cost competitiveness supported by abundant reserves. In other words, even during the period of energy transition, Middle East oil producers will likely be able to count on the world's last demand.

(2) In addition, natural gas is considered a suitable energy source for the period of transition to decarbonization because it does not emit as much CO_2 as oil and coal do. In particular, there is a renewed awareness of the importance of natural gas, not just for the fight against climate change but also for energy security, amid rapid changes in the international energy situation.

(3) The Middle East also has high potential regarding hydrogen and ammonia, which are receiving attention as new renewable energy sources in the era of decarbonization. There are unfathomable possibilities in hydrogen, the smallest molecule in the universe, as a clean fuel that could enable energy transition throughout the world. Hydrogen is a gas that can be burned in an engine or used in a fuel cell to power the vehicle, to generate power, or to supply heat. Its strength lies in its ability to fulfill all these objectives as a substitute for fossil fuel while emitting no carbon dioxide. Ammonia is also attracting attention as a carrier for hydrogen or for use as a direct fuel.

There are two ways to produce hydrogen. One is to split water by using electricity. When renewable energy is used in this electrolysis process, the produced hydrogen is called "green hydrogen." If a country is rich in such renewable energy sources as sunlight, solar heat, wind, and water and has the ability to produce and export hydrogen in large amounts, it could expect enormous economic benefits from hydrogen. The second way of producing hydrogen is to extract

it from fossil fuels, which requires the carbon produced through this process to be buried underground. Hydrogen produced by this method is called blue hydrogen. Gulf region oil producers have plenty of space for underground storage of hydrocarbons, from which hydrogen is produced, and CO_2 emitted in the process, by using carbon dioxide capture and storage (CCS/CCUS) technologies. This storage space refers to oil fields and natural gas fields where such carbon originally comes from, and filling these empty spaces with returned carbon would be beneficial.

The above discussions demonstrate that Middle East oil producers have high potential as producers of green and blue hydrogen and will highly likely become major suppliers of new energy sources suitable for the age of decarbonization. Currently, many blue and green hydrogen/ammonia projects are being launched by Gulf region oil producers, and moves are accelerating to capture a major share in the East Asia and European markets.

Take Oman, for example. It is a fossil fuel producer but its oil and natural gas production is not as much as its neighbors. For this reason, Oman seems to have found an opportunity in the production of green hydrogen and ammonia. The country has the potential to produce renewable energy in large amounts by making the utmost use of its long duration of sunshine for solar photovoltaic and thermoelectric power generation and taking advantage of its geographical features (facing the Indian Ocean and thus having strong winds) suitable for wind power generation. Oman aims to achieve net zero GHG emissions by 2050 and its decarbonization strategy toward that goal defines hydrogen as its pillar.

Countries in the Middle East Gulf region are committed to developing hydrogen and ammonia into export industries that will replace fossil fuels. The following section describes the situation in Saudi Arabia and the United Arab Emirates (UAE), which are both making a major course

change toward an energy shift.

(1) Saudi Arabia

In 2016, Saudi Arabia announced Vision 2030, a transformation roadmap for a nation not reliant on oil. In line with the roadmap, Saudi Arabia has been working to develop the private sector and open up the economy by reducing subsidies and establishing a two-trillion-dollar investment fund based on the funds obtained from Aramco's IPO. In the spring of 2021, the Saudi Green Initiative and the Middle East Green Initiative were launched. The former is a project aimed at achieving decarbonization mainly through transition to renewable energy; the latter seeks to reduce GHG emissions equivalent to 670 million tons of CO_2, plant 50 billion trees, and restore 200 million hectares of degraded land throughout the Middle East. As part of efforts to reduce carbon emissions in the Middle East, the projects aim to secure about 10.4 billion dollars for investment funds and clean energy businesses, of which Saudi Arabia will contribute 15%. The remaining part of the financing and the projects will be supported by other Middle East countries and development funds.

Under the king's directive issued on April 17, 2010, the King Abdullah City for Atomic and Renewable Energy (K.A.CARE), a government organization that works on the introduction of nuclear power generation, was established. According to K.A.CARE's plan, developed in line with Vision 2030, Saudi Arabia plans to build 16 nuclear reactors by 2030 for the purpose of reducing fossil fuel consumption, diversifying the national economy, stabilizing energy supply, and fostering domestic technologies.

On the other hand, Saudi Arabia has adopted an energy strategy centered on natural gas and renewable energy, with a plan to reduce oil usage for power generation and divert 1 million barrels per day of oil from domestic use to exports by 2030. In other words, another objective of Saudi

Arabia behind the introduction of renewable energy is to increase oil exports. The country is working to diversify its economy based on oil exports, with the intention of investing export revenues not only into finance, healthcare, tourism, and education, but also into renewable energy and energy efficiency technologies.

Taking advantage of its abundant renewable energy resources, Saudi Arabia also seeks to become the world's largest exporter of green hydrogen. In its future city NEOM, the country plans to produce 0.24 million tons of green hydrogen and 1.2 million tons of green ammonia annually from 2026, based on a 4 gigawatt renewable generation capacity, in a joint project with the U.S.-based Air Products.

(2) The United Arab Emirates (UAE)

The United Arab Emirates (UAE) is highly committed to the fight against climate change, as demonstrated by its declaration to achieve carbon neutrality by 2050, becoming the first to make such announcement among Gulf region oil producers. In 2006, the country established Abu Dhabi Future Energy Company (Masdar), which pursues zero emissions through the use of renewable energy. In 2009, the UAE invited the headquarters of the International Renewable Energy Agency (IRENA) to Abu Dhabi to promote the transfer of renewable energy technologies and share policy and commercialization insights. It was also around this time that the UAE started investing in clean energy projects. Total investments made to date exceed 40 billion U.S. dollars. The current policy projects that clean energy generation capacity, including photovoltaic and nuclear, will reach 14 gigawatts by 2030. The UAE also supports green infrastructure and clean energy projects worldwide and has invested in 16.8 billion dollars worth of projects in 70 countries, most of them developing economies. The country's energy policy aims to increase the share of clean energy to 44% and decarbonize 70% of the entire economy by 2050.

The UAE has also been selected as the host of the 28th Conference of the Parties of the UNFCCC (COP28), which will take place in 2023. Masdar, mentioned above, plays the central role in hosting the event. Prior to hosting COP28, the UAE announced in September 2022 that it would raise the GHG emission reduction target for 2030 to 31% from 23.5%. To reach the new target, the UAE is promoting the use of renewable energy, while accelerating the introduction of nuclear power generation. To eliminate concern over nuclear proliferation in the geopolitically important Middle East region, the UAE signed a nuclear pact called the "123 Agreement" with the U.S. in 2009, providing for the legal obligation to forgo domestic uranium enrichment or reprocessing capability. Subsequently, the UAE granted a South Korean company a project to build the Barakah Nuclear Energy Plant. Of the four reactors planned at the site, two have been completed and are in operation.

The UAE also pays attention to hydrogen and ammonia. Unlike Saudi Arabia, the UAE focuses on natural gas-derived blue hydrogen and has set the target of producing 14 to 22 million tons by 2050 with the goal of garnering a 25% share in the world's major markets, such as India, Japan, South Korea, and Germany. In addition, the UAE has multiple international cooperation projects underway, each with an annual ammonia production capacity of 0.2 to 1 million tons.

3. Changing international situation: Energy crisis and the Middle East

1) Overview

The global energy crisis triggered by Russia's invasion of Ukraine in February 2022 has directed growing attention to Gulf region oil producers, which serve as the world's supply base for oil and natural gas. At the same time, soaring energy prices have created a massive influx of money into the Middle East, radically changing the entire region. Russia's invasion of Ukraine has caused turmoil in the energy market. The event may delay the decarbonization process in the short term,

whereas as predictions by the IEA and others point out, it may also accelerate the departure from fossil fuel over the medium to long term in light of energy security.

This chapter describes the international situation under the energy crisis, with attention to the Middle East.

2) Middle East-U.S. relations

Over the past 15 years, the U.S. influence has been steadily declining over the Middle East. In particular, recent U.S. diplomatic policy has shifted its focus to issues such as Russia's invasion of Ukraine and China's growing ambition in the Indo-Pacific region, apparently intending to minimize involvement with the Middle East. On the other hand, Israel, Saudi Arabia, and other Middle East and Arab countries, as well as Iran and Turkey, no longer value the U.S. as much as they used to. However, from the global viewpoint, the Middle East remains important, and by reducing involvement with it, the U.S. will see its global influence weakened accordingly.

In 2018, as a result of the shale revolution, the U.S. became the world's largest producer of oil and natural gas. This has significantly reduced the strategic value of the oil and natural gas from Gulf region oil producers for the U.S. However, the fact remains unchanged that fossil fuel resources from Gulf region oil producers are indispensable to the global economy as well as to U.S. allies and trading partners. Therefore, if fossil fuel supplies from Gulf region oil producers is disrupted, the world economic system will be greatly affected. In addition, there is a possibility that developments associated with decarbonization may increase the traditional volatility in the Middle East, bringing more instability to politics and economies there and even in the world at large.

Meanwhile, it is notable that the U.S. has been working to broker the normalization of diplomatic relations between Saudi Arabia and Israel over the past few months. In 2023, Assistant to the

President for National Security Affairs Sullivan and Secretary of State Blinken separately visited Saudi Arabia, in May and July and in June, respectively, for talks with Crown Prince Mohammed. During the July talks in Jidda between Sullivan and the Crown Prince, they reportedly reached a general agreement on the conditions for approval of diplomatic relations with Israel. The agreed conditions are (1) U.S. provision of stronger defense for Saudi, (2) U.S. support for Saudi civilian nuclear development, and (3) Israel's concession in its Palestinian policy, according to reports. However, the agreement is not a bilateral issue between Saudi Arabia and the U.S.; it can only be materialized after approval by the U.S. Congress and consent regarding concession from both the Israeli and Palestinian sides. There is growing uncertainty over the future of these normalization talks, now that the Islamist group Hamas, which effectively controls the Gaza Strip in Palestinian territories, launched large-scale military attacks on Israel on October 7. Israel has responded with fierce counterattacks, continuing air strikes across Gaza, killing more than 2,100 people on both sides (as of October 11). Given that Hamas strongly opposes Israel-Saudi normalization, if Israel's future military responses arouse anger against Israel not only among the Saudi public but also in the entire Arab community, the normalization talks will become even more difficult.

3) Middle East-China relations

With a rapidly growing economy, China is making every effort to secure natural resources worldwide to keep up with the sharp rise in domestic energy demand. China has significantly deepened its involvement with the Middle East, especially over the past two decades, partly for energy security and partly as a countermeasure against anti-China economic and military coalitions and diplomatic restraint on China.

Currently, as the U.S. influence on the Middle East is weakening, China is filling the gap. A recent example is that China brokered a rapprochement between Saudi Arabia and Iran in March 2023,

whose diplomatic relations had been severed. Today, China even seems eager to work toward the resolution of historical conflicts in the Middle East to practice great-power diplomacy. These include Iran's nuclear issue and the Palestinian problem, which both have implications on regional order in the Middle East and global security. China seems to place particular importance on relations with Saudi Arabia. For Saudi Arabia, China is a key export destination of petroleum and petroleum products; China, on its part, has fostered bilateral relations with Saudi Arabia not just through exports of Chinese products but also in broader fields, including infrastructure, investment and trade, finance, and people exchange, sending many people to the country to engage in business and investment activities. China is rapidly expanding its presence beyond goods, in such areas as technology, human resources, and financing. At the end of March 2023, China's Foreign Minister Wang Yi visited six countries (Saudi Arabia, Turkey, Iran, Oman, Bahrain, and the UAE), and it is noteworthy that China is deepening relations even with countries like the UAE, Egypt, and Israel, which are close to the U.S.

In addition to bilateral relations, China has been building multilateral frameworks with multiple nations in the Middle East. On the occasion of the China-Arab States Summit in December 2022, President Xi Jinping paid a state visit to Saudi Arabia. The summit is based on the dialogue framework of the China-Arab States Cooperation Forum, which started in 2004. Similarly, the China-GCC Summit uses the framework of the China-GCC Strategic Dialogue, which was launched in 2010. China's traditional involvement in the Middle East has been intended to ensure the stable supply of oil by strengthening trade and investment relations linked to the Belt and Road Initiative. However, more recently, China seems to have moved a few steps forward to deepen and broaden its diplomacy in the region, building relations with individual Middle East countries and showing off its presence in and out of the region.

In fact, amid rapidly deepening ties between China and Middle East countries, criticism from

these countries against Muslim oppression in the Uighur Autonomous Region in western China has reduced. In particular, Turkey, which had traditionally been supportive to Uighurs and at the forefront of the criticism against China, has changed or "softened" its attitude.

4) Middle East-Russia relations

Russia's basic geopolitical strategy is to rebuild its influence in the Eurasian continent through annexations and alliances. A concrete scheme drawn up for this purpose includes a part relevant to the Middle East, which is called the Moscow-Tehran axis. This means that relations with Iran are crucial in Russia's policy for the Middle East. Forming an Eurasian continent version of Russia-Islam alliance centered around it is considered important.

President Putin's diplomacy is aimed at strengthening Russia's influence on historically connected regions, including the Middle East, and strategically significant regions, such as close allies of the West, to increase the ability to counter the West, while firmly maintaining the former Soviet bloc within the sphere of influence. Russia has been following the basic strategy of opposing the unipolarization of the world around the U.S., creating a multipolarized world in tandem with China, and becoming one of the great powers there. In other words, for Russia, the creation of a multipolarized world is acceptable only on condition that its sphere of influence is maintained. In this multipolarized world, Russia intends to bring together emerging countries (BRICS), such as China, India, and Brazil, and traditionally friendly nations, such as Iran, Cuba, and North Korea, under its leadership and defy the dominance of the U.S.

Russia has been active in enhancing its geopolitical influence in the Middle East, too. In Syria, there is Russia's only overseas military base that remains since the former Soviet Union era, and this is one of the reasons that Russia continues its intervention in the Syrian conflict since 2015. To keep as many pro-Russian nations as possible in the Middle East, Russia also maintains close

relations with Israel, while working with countries like Iran, Iraq, and Turkey. Recently, amid the continued energy crisis, Saudi-Russia relations have often been covered by the media as an economic partnership deciding the crude oil prices of OPEC Plus. Following the invasion of Ukraine, Russia appears to be coming closer to China in view of the issues of Iran's arms supplies to Russia and the prolonged military incursions into Ukraine. Nevertheless, some Russians see China as a threat to Russia's geopolitical interest in expanding its power in the Eurasian continent. China, on its part, is managing the delicate balancing act of maintaining relations with Russia while carefully monitoring developments in the international community. Apparently, both countries hold each other in check yet are alike in widening a rift with Western developed countries. The world seems to be gradually shifting to an era of multipolarity, one of Russia's strategic goals, from the era of unipolarity.

5) Middle East-EU relations

Russia's invasion of Ukraine has radically changed the energy situation in Europe, which has relied on fossil fuels, especially natural gas, from Russia. Russia is rich in natural resources, ranked third in crude oil production and second in natural gas production in the world. Before the invasion, European countries depended on Russia for 40% of their natural gas imports and 30% of their oil imports. Dependence was particularly heavy for Germany, which purchased as much as 50% of its natural gas from Russia. After the invasion, the European Council, consisting of the leaders of the 27 EU member states, agreed in March 2022 that the EU's dependence on Russian fossil fuels be gradually reduced. In May, it announced the REPowerEU plan, which set out that the EU should reduce dependence on fossil fuels, diversify energy supplies, continue to develop the European hydrogen market, and accelerate renewable energy development. The plan is designed to complement Fit for 55, the EU's basic policy package aimed for decarbonization, and

is backed by financial and legal measures to build energy infrastructure and systems.

As part of the plan, the EU has updated its external energy strategy, begun negotiations with natural gas producers around the world to increase gas supplies to Europe, and strengthened ties with the U.S. and the Middle East. With the U.S., the EU reached an agreement in March 2022 for significant additional supplies of liquefied natural gas (LNG). The U.S. will supply the EU with an additional 15 billion cubic meters of LNG in 2022, and at least 50 billion cubic meters of LNG per year thereafter until 2030. In addition, Middle East gas exporter Qatar exchanged documents with Germany in May 2022 to strengthen bilateral energy relations, including LNG exports. In November, the country concluded two long-term agreements to supply a maximum of 2 million tons of LNG annually to Germany. In October 2022, Qatar also signed an economic cooperation agreement with the Czech Republic for LNG exports.

In addition to Qatar and the U.S., which are expanding presence as major LNG exporters, as described above, the EU focuses attention on other gas suppliers that could replace Russia. These include North Africa and Norway, which are gas producers geographically close to Europe, and, to be more specific, gas fields off the coast of Israel, Egypt, and Cyprus in the eastern Mediterranean.

Regarding crude oil, the main type that Europe used to import from Russia was Ural crude oil, a blend of sweet crude oil, which has a low sulfur content, and sour crude oil, which has a high sulfur content. Since the invasion, some of the Saudi crude oil directed toward Asia has been diverted to Europe because it is the closest in quality to Ural crude oil among oils produced in the Middle East.

6) Relations within the Middle East

In the Middle East, along with the declining influence of the U.S., there are marked trends in

which countries that used to be in rivalry or at feud with each other are moving toward mutual concessions. This suggests the possibility of a profound change to the traditional landscape in the Middle East, which was largely symbolized by war by proxy, such as one between pro- and anti-U.S. countries or between pro- and anti-Israel camps, as major Middle East nations have begun to look ahead to a post-U.S. era. Among the countries of the Gulf Cooperation Council (GCC), Qatar was boycotted in 2017 but invited to join in January 2021 through the al-Ula Agreement, leading to the restoration of the unity of the GCC.

Saudi Arabia and Iran severed diplomatic relations in January 2016, but dramatically restored ties in March 2023 after being brokered by China. Encouraged by this event, Saudi Arabia has begun to work to end the civil war in Yemen. In May 2023, Saudi Arabia also established diplomatic relations with Canada, after a break since 2018 due to Saudi human rights issues. Both countries agreed to appoint a new ambassador to each other after a period of absence. In Africa, Saudi Arabia has long been carrying out religious and economic activities and has volunteered to broker peace in conflict-ridden Sudan. A more recent event related to Saudi Arabia is that Ukrainian President Zelenskyy visited the country on his way to the G7 Summit in Hiroshima. Although his purpose was to attend an Arab League summit, the visit is believed to reflect the intent of Saudi Arabia, which expressed in May its willingness to broker peace in the Russia-Ukraine war, and that of Chinese President Xi Jinping, who announced a peace proposal for the war in February. At the meeting, President Zelenskyy called for support for Ukraine in front of Arab countries, which maintain neutrality without joining economic sanctions on Russia. This event symbolizes the importance of the Arab League in the current international community, given that the organization is represented by Saudi Arabia, presumably a key actor in the energy crisis. As mentioned earlier, China is growing its influence by taking advantage of declining U.S. attention to the Middle East. Saudi Arabia has also become more flexible in responding to the global realities

that has emerged after the Russian invasion to Ukraine.

Meanwhile, Iran intends to focus on economic diplomacy to realize economic development even under U.S. sanctions. Iranian President Raisi visited Indonesia in May 2023 and three Latin American countries (Venezuela, Nicaragua, and Cuba) under U.S. sanctions in June. Although it is still uncertain how much economic benefits such visits will bring, these are new moves against U.S. economic sanctions and future developments should be worth attention. Iran is also considered a potential factor of instability in the Middle East. It particularly holds true for Japan, which depends on the Middle East for 97.3% of its oil imports. Given that most of the imported oil passes through the Strait of Hormuz, it is obvious that any instability in the Middle East related to oil supplies would have a severe impact on people's lives and economic activities in Japan. Iran's nuclear issue is particularly concerning. Iran and six major countries signed a Joint Comprehensive Plan of Action (JCPOA) in July 2015, which is an agreement that the international community should lift sanctions on Iran in exchange for Iran's measures to limit its nuclear development. However, when the former U.S. Trump administration unilaterally left the JCPOA in 2018, Iran countered by accelerating its nuclear development, causing the agreement to fall apart. With the negotiations at a deadlock and the JCPOA on the verge of destruction, it is concerned that the world may be losing ways to stop Iran's nuclear program. Attention should be paid to how Israel, which regards Iran's nuclear development as a threat, will act next, setting aside whether Iran's nuclear program is intended for the development of nuclear weapons or for peaceful use, as the nation claims. Israel sees Iran as an existential threat and is willing to launch a military attack if Iran continues its nuclear program. If Israel would take such action, the Strait of Hormuz could be effectively closed. Such a closure would be a serious blow not only to Japan but to the world economy. Iran-related risks can increase further, depending on the outcome of the U.S. presidential election scheduled for November 2024.

Aside from the Iranian nuclear issue, there are many other sources of concern for the Middle East. One example is Saudi-Iran relations. How their relations will develop after the normalization remains to be seen. A fight for supremacy between Saudi Arabia, OPEC's largest oil producer, and Iran, a major oil producer, has shaped the basic structure of the Persian Gulf region over the past 60 years. This conflict is multifaceted in that it relates to the basic interest of Arab countries, which want to prevent the rise of Iran, or Persia; that it represents the historical Sunni-Shia divide in the Islamic doctrine; and that it takes place in the context of pro-U.S. versus anti-US, as already mentioned. How Saudi Arabia and Iran will develop their relations, following the restoration of ties in March, should be a key indicator by which to predict future stability in the Middle East.

4. Energy security and impacts beyond the energy sector

1) Energy security

(1) Overview

Today, about 80% of the world population live in net fossil fuel importers. Energy security is a key strategic issue for the world, as it moves forward with energy transformation toward decarbonization, or more specifically, departure from fossil fuels, especially amid the energy crisis. In terms of energy sources, some form of renewable energy with economic value is available almost anywhere in the world, and even countries dependent on fossil fuels for their energy can use renewable energy to gain strategic and economic benefits.

However, to use renewable energy, a country must have access to adequate technologies, funds, infrastructure, etc., and secure lithium, cobalt, nickel, and other rare metals. Such energy transformation also requires new systems that will replace conventional systems, including new domestic policies, new international trading systems and arrangements, and correction of disparities.

There are a number of ways to increase the self-sufficiency of a country, such as developing and using renewable energy and nuclear energy. In addition, in an era of renewable energy, countries are expected to build energy partnerships that are unlike those in the traditional fossil fuel era, and expand the area of cooperation. The following part of this report focuses on issues related to renewable energy and energy security.

(2) Renewable energy and energy security

Renewable energy sources, especially solar power and wind power, occur naturally and their supply stability therefore relies on the weather. To overcome this challenge, energy storage/stockpiling and power grids need to be expanded, and backup systems need to be built. Associated capacities are also required, such as comprehensive technology to build such infrastructure (including soft infrastructure), a supply chain, access to rare metals, and logistic systems. In addition, spreading the use of renewable energy obviously calls for related policy measures, including subsidy systems, carbon pricing, regulations and other rules.

As important as oil-carrying tankers and pipelines is management of power grids. Issues to be addressed include, in addition to managing power grids, how the government, businesses, and other actors should be involved in the management. As in the case of pipelines, an entity that wants to establish power grids across national borders will need to negotiate with the transit country, as well as addressing the issues between the buyer and the seller of electricity. This indicates that energy security in an era of an energy mix dominated by renewable sources hinges not only on access to energy but also on how the stable supply of electricity can be ensured through strategic and effective management of necessary power infrastructure.

2) Points to consider in new energy geopolitics in the age of decarbonization

As a transition to renewable energy advances, energy geopolitics stands out as a factor that is deeply related to, and interacts with, energy security in the new era. The next part discusses key points in studying geopolitics in the age of decarbonization.

(1) Natural conditions

When suppliers of energy sources think about fossil fuels, they value the occurrence of the resources, whereas when they deal with renewable energy sources, particularly solar power and wind power, occurrence does not matter as much because such resources are available almost anywhere in the world. For being unlike fossil fuels, which are concentrated in areas meeting specific geographical conditions, these renewable energy sources will lower the significance of bottlenecks in the current energy transport network, more specifically, a place like the Strait of Hormuz, which is a very narrow strait along a widely used sea route and which is key to global crude oil supplies. In terms of the form of energy, most renewable energy sources are categorized into flow type, and fossil fuels into stock type. Stock-type energy is easy to store and use, although it is lost once consumed, while flow-type energy is hard to store but is infinitely available, making supply interruptions less likely.

The availability of renewable energy sources depends on the geographical location, latitude, and climate, and thus production cost varies by region. Although low-cost producers may have a geopolitical advantage, distribution of production sites not just within the country but on a global scale may be necessary.

(2) Mineral resources

Resources required for renewable energy production, or specifically, rare metals and critical minerals needed for the production of solar panels and batteries, are much more geographically concentrated than oil. Australia accounts for 50% of the world's lithium supply, and the Congo and China account for 70% of the global supply of cobalt and rare earths, respectively. This

indicates that rare metals are far more concentrated than oil, given that the leading oil producers U.S., Saudi Arabia, and Russia account for 10% to 15% of the global supply each. Moreover, 60% to 90% of rare metal refining, manufacturing, and processing services exist in China. Likewise, three-quarters of batteries for electric vehicles and components for solar energy systems are manufactured in China.

Theoretically, regions with larger reserves of minerals essential for the supply of renewable energy will benefit more from energy transformation. However, occurrence of mineral resources alone is not enough to earn such benefits; other factors, such as technology, funds, and economic power, are also needed. Resource-rich countries are also prone to the risk of environmental destruction and associated internal conflicts and disputes, and it is urgently needed to establish mining standards for them.

In this regard, there has been an international initiative to develop a mechanism by which to resolve issues related to so-called conflict minerals. This is expected to make global supply chains more transparent and enhance accountability. Fairly regulated and highly transparent development of mineral deposits will significantly contribute to these countries' economic growth. Such efforts may lead to a review of the post-war global systems and international politics surrounding fossil fuel resources and give momentum to the construction of new systems.

(3) Accelerated electrification

Obviously, transition to renewable energy will make electricity the mainstay in the energy sector. And this electrification is advancing rapidly. At the same time, this means changes to the traditional ways of trading and the players involved in it, as well as to their geopolitical implications.

First of all, unlike oil and natural gas, which are globally traded, electricity is usually traded within a relatively limited area. Furthermore, electricity transactions tend to be more interactive than

transactions of oil and natural gas. Oil and natural gas move in one direction, from the exporter to the importer, while electricity transactions between countries involve two-way movements. A country that generates power from solar energy may import power from its neighbor when it rains, although the same country may export power when it is sunny. This means that import and export of renewable energy always occur in a complicated, interdependent network.

Electricity was generally considered to be difficult to store. But innovation is making the storage of electricity possible. Potential changes in forms of how electricity is used as a result of the wider use of EVs throughout the world, may lead to a future where electricity could be stored in such forms as heat and data. And the use of EVs would allow traffic networks to virtually serve as power grids.

(4) Distributed energy

Renewable energy can be introduced on various scales and its production and consumption can therefore easily take distributed forms. Distributed local energy production gives greater autonomy to households and local communities than centralized power systems do. Distributed renewable energy also provides consumers with the right to choose their energy source and brings them their share of economic benefits. This will at the same time promote public acceptance of investments in renewable energy. In other words, such distribution enabled by renewable energy is expected to bring democratic effects to energy supply, for example, through price setting and the participation of new external stakeholders, such as local financial institutions, industries, NGOs, and residents, in the power supply business.

(5) Impacts on trade

Not only does renewable energy affect the balance of power between different nations, it also reshapes the flow of trade and creates new interdependent relationships concerning electric power systems. Given that the distribution of renewable energy sources is far less geographically uneven

than fossil fuels, countries trading renewable energy will focus on specific fields where they have an advantage, based on their technology, relative prices, transport costs, etc. Major obstacles to launching renewable energy trading based on international partnerships are probably divided international systems, and enmity and rivalry between superpowers.

The Carbon Border Adjustment Mechanism (CBAM), announced by the EU in 2021, is a new set of regulations in the international trade field for a society moving toward decarbonization. Behind the EU's proposal of the CBAM was a concern over the risk of carbon leakage in the situation where non-EU countries often impose less stringent environmental and climate regulations than the EU. The EU feared that if the situation was left unaddressed, carbon leakage could occur, urging companies based in the EU to move their production to non-EU countries or causing products produced in the EU to fall behind imports in price competition in the EU market. In light of the possibility that GHG-emitting manufacturing facilities moving to other areas may undermine global climate change actions, the CBAM is aimed at imposing carbon prices that are equivalent to those imposed within the EU, thus encouraging non-EU countries to further reduce their GHG emissions. Specifically, the CBAM is proposed as a system aligned with the EU's international commitments, requiring importers of designated products to pay a carbon price in accordance with EU rules that impose a carbon price on equivalent products produced within the EU. However, if importers can prove that the carbon price has been paid during the production of the imported products, they are allowed to subtract the total cost. The European Commission (EC) plans to initially apply the CBAM to steel, cement, and fertilizers, which pose a high risk of carbon leakage, launch a system requiring the reporting of the quantity of imported products and associated emissions in 2023, and start carbon price payment by importers in 2026. The EU is a large, stable, and mature market, along with North America, and it now calls on non-EU countries,

in exchange for access to the market, to establish and enhance their decarbonization policies through the introduction of the carbon price system.

There are many arguments and opinions over the consistency of the CBAM with international trade rules, and many of them are related to the scope and interpretation of "like products," a basic concept of the General Agreement on Tariffs and Trade (GATT) that is mentioned in Article I and other provisions of the Agreement. More specifically, the question is, when GATT Article III:2 stipulates that any internal tax imposed on imported products must not exceed those imposed on the "like domestic products," whether products that are the same in performance and appearance but that emit more carbon in their manufacturing process and are not imposed taxes commensurate with their emissions, can be considered "like products." This "like products" issue is just one important example. By proposing international trade rules, the EU is trying to take the initiative in new rules establishment for the age of decarbonization.

(6) Industrial and supply chain restructuring and economic and social tensions

The EU's Green Deal policy and the U.S.'s Inflation Reduction Act provide for massive public investments to develop domestic industries related to a decarbonized society. Under such public support, decarbonization-related industries are undergoing international restructuring.

However, when energy industries are restructured like this, significant changes can occur in a broad range of fields, including the economy, industry, and society, and may accelerate the existing political divides or even create new divides.

Regional blocs like the EU and ASEAN are building interdependencies within the bloc for the stable supply of renewable energy and preparing for unexpected events. Following Russia's invasion of Ukraine, the U.S. adopted the Inflation Reduction Act and is trying to build an original industrial structure by making massive public investments. While becoming independent and self-sufficient can help the nation avoid risks and uncertainties arising from relying on other countries

for energy supply, it should be noted that taking such an approach could result in the denial of the international division of labor and even the global trade system supporting it. Being isolated from the international economy can harm the dynamic development of the economy. More importantly, this may also spread protectionism and, as a result, increase tension in the world, eventually adversely affecting global stability.

3) Toward the development of a new energy security system

Under the traditional concept of energy security, countries focused on increasing their energy self-sufficiency by leveraging nuclear energy and renewable energy, as well as on building solid diplomatic relations with resource-producing countries. However, in the age of renewable energy, these two approaches are not enough, and they should establish a third pillar of security.

As earlier sections show, the stable supply of renewable energy cannot be ensured by a single nation, but it calls for a new framework for international cooperation. In the frameworks for energy supply and the energy market in the age of decarbonization, diverse business models are expected to emerge. For example, actors from the private sector, such as unconventional types of businesses, may join to build an international supply chain. An example of such frameworks that are being put into practice is one for electricity interchange among multiple countries through international power grids. Currently, such practices are implemented mainly in Europe and North America. In the Middle East, electricity is traded bilaterally or multilaterally through interconnection grids within the GCC framework. Recently, Egypt and Saudi Arabia established such power link for the first time, to which a Japanese company has contributed mainly through construction of large-scale high-voltage direct current (HVDC) equipment. This move is notable, although studies are needed on how much GCC members could benefit from electricity interchange, given that they are similar in geographical features and thus in weather conditions

and electricity demand patterns. As the GCC is close to regions under different situations, such as Europe and North Africa, there has been new research exploring the possibility of electricity interchange with these regions through long-distance power grids (super grids).

4) Global governance

To build a new international framework as described above, it is essential to be aware that innovative interdependencies built on new international relations and geopolitics are crucial. Needless to say, global warming is an international issue and cannot be addressed by a single country. Therefore, effective measures can never be implemented on the global scale until all countries, developed and developing alike, come together, discuss, and reach agreement, setting aside their discord in security and many other issues. Meanwhile, global geopolitics has been changing in the age of decarbonization, as described earlier. For example, the matters of concern about energy security today are different from those in the fossil fuel era. This suggests the need to build a transparent framework for international cooperation in light of the reality of international relations and geopolitics in the age of decarbonization. In this field, the European Union (EU) may be considered a pioneer in the establishment of a system that connects different countries. The EU's basic policy has been to build an internal market in the energy sector by gradually integrating domestic energy markets and harmonizing national systems among the member states. ASEAN is also moving toward collective energy governance. Recognizing that no single country can introduce renewable energy on a large scale in a short time, ASEAN countries are working together, taking a multilateral approach to achieving security and sustainable development in the region.

Under such circumstances, the roles played by existing international organizations are also essential. How these organizations can contribute in this context is an issue that should be

discussed by the international community. To create a decarbonized society, forming a new international organization that fits the emerging needs, based on global efforts, may be an option to consider.

5) Power to people: citizens, enterprises, and cities as new entrants

As previous sections described, the ongoing energy transformation is inseparable from the concept of distributed electricity. The fossil fuel economy is compatible with centralized government and in a sense, both have been supportive to each other. However, in the age of decarbonization and clean energy, fossil fuel plays a smaller role, electrification advances, and energy is distributed, and these changes can have a significant impact on the role of the national government.

Distributed electricity will provide electricity consumers, including citizens, with the opportunity to produce electricity on their own from renewable sources, such as solar power and wind power, and these operators of small power generation systems will also supply their electricity to the grids, when necessary. A system that encourages such public involvement should be accommodated in the power transmission and distribution infrastructure. Essential means to achieve this include real-time pricing and smart grids, and these developments will influence the way consumers act. They may become producers and transform how individuals interact with the local government and even the national government.

Distributed local energy production can also give greater autonomy to households and local communities than centralized power systems do. This paradigm shift will highly likely help create new business segments where many new actors join and grow. Distributed renewable energy will provide electricity consumers with the right to choose their energy source and bring them economic benefits. At the same time, it will promote public acceptance of investments in

renewable energy.

What is expected to happen next? One possibility is that as manufacturers of steel, semiconductors, etc., move in search of clean energy, people will move as well, changing the supply chain. For example, companies may move their production sites to Kyushu, which has a long duration of sunshine, or to Hokkaido, where plenty of wind resources are available. As the energy demand side transforms the supply side like this, the overall industrial structure will change. Traditionally, the electricity market has been led by the supply side, such as the national government and utilities. However in the age of decarbonization, it is highly likely that the role of the demand side will significantly grow. If the cost of data transmission via communication cables becomes much lower than that of electricity supplied through power grids, businesses could move their data centers beyond the national borders to various parts of the world in search of cheaper renewable energy. Moreover, distributed renewable energy has the potential to make local communities more resilient to natural disasters.

5. Implications for Japan

This chapter discusses new partnerships between Japan and the Middle East in the era of energy transformation toward decarbonization.

Japan, with its scarce natural resources, has seen the Middle East countries, especially Gulf region oil producers, as its key fossil fuel supply base and maintained a close and friendly relationship with them, particularly since the oil crisis. However, these relations have changed dramatically in recent years. Among Middle East countries, attention to Japan has evidently declined. This is markedly demonstrated by the fact that investments made by Middle East countries in Japan have been steadily falling recently, compared with those in China and Europe.

In addition, even Japan seems to be losing its interest in Middle East countries in general. This

holds true even in light of Prime Minister Kishida's recent round of visits to the Middle East and interruptions in diplomatic activities during the pandemic. However, Japan cannot afford to make light of its relations with Middle East countries now. The reason is not just because Japan's dependency on the Strait of Hormuz (i.e., how much of the crude oil it procures passes through the strait, when crude oil accounts for 37% of Japan's energy mix) has reached a record high of 97.3%. It is because along the path to decarbonization, Asia, including Japan, will inevitably depend more on energy resources from the Middle East, including fossil fuels. Furthermore, Japan, for its resource scarcity, will have to make full use of solar and wind power in the future and will probably be forced to depend also on imported clean energy due to its land constraints. Given these factors, the Middle East has the high potential to become a leading supplier of hydrogen, ammonia, and other carbon-free fuels to Japan, while remaining its fossil fuel supplier. In addition, the hydrogen production cost in the Middle East tends to be lower than the global average. Therefore, even in the age of decarbonization, it is crucial for Japan to strengthen ties with Middle East countries, especially Gulf region oil producers, in view of their future potential.

These circumstances indicate that Japan needs internal discussions on what it can and should do in connection with Middle East countries, considering energy security and other factors, to restore and evolve traditional ties with Middle East countries. In this context, there is a need to build a new platform between Japan and the Middle East that would reach beyond the scope of fossil fuel trading, based on decarbonization initiatives underway in the Middle East and Japan. The following possibilities can be incorporated into this platform.

First, blue hydrogen and blue ammonia are a potential area of cooperation between Japan and the Middle East toward decarbonization. Japan excels in hydrogen transport technology and carbon dioxide capture and storage (CCS) technology, which are needed in this area, and Japanese companies are working with the Middle East to advance such technologies. Hydrogen can be

produced through extraction from natural gas and other fossil fuels or through the splitting of water by electricity, and abundant fossil fuels and natural conditions ideal for photovoltaic generation make the Middle East suitable for hydrogen production. These efforts are also attracting attention as a new form of cooperation that would prevent fossil fuel production facilities and other infrastructure from turning into stranded assets. Also planned along this path is the construction of a supply chain for blue hydrogen through cooperation with Asian countries. Another potential area of cooperation is nuclear technology, particularly high temperature gas-cooled reactors. These reactors provide excellent safety and produce high temperature heat, which can be effectively used, particularly in the Middle East, for hydrogen production, power generation, and desalination of seawater. However, these technologies should be protected from diversion for use for nuclear weapons through the 123 Agreement with the U.S. and inspections by the IAEA.

6. Conclusions

In July, Prime Minister Kishida visited Saudi Arabia, the UAE, and Qatar. It was the first time in three and a half years for a Japanese prime minister to visit the Middle East. In Saudi Arabia, he held a summit meeting with Crown Prince and Prime Minister Mohammed bin Salman and confirmed that both countries will strengthen ties, work together toward decarbonization in various ways, and closely cooperate to promote a balanced green transformation, among other things. The prime minister's visit to the Middle East was accompanied by an economic mission. Government and business leaders visiting the Middle East together presented a significant step forward in increasing attention and building partnerships for the future. However, in the context of Japan-Middle East relations, there still remain challenges, such as strengthening ties with Iran and other Middle East countries. Further developments are awaited.

As mentioned earlier, the UAE will host COP28 later this year. The UAE, which has already been showing its strong commitment to the fight against global warming, seems eager to take international leadership in this area. COP28 can drive decarbonization ambitions even higher not only for the UAE but also for the entire Middle East.

The world must keep its eyes on future developments surrounding decarbonization in the Middle East, and there are many uncertainties about the energy situation and the global political climate. Regardless of such situation, Japan and the Middle East have good reason to build long-term, strategic relationships even in the age of decarbonization. The Study Group will continue its work with attention to three keywords: the Middle East, decarbonization, and energy geopolitics. Going forward, the Group intends to focus more on the Middle East and deepen studies mainly on its relations with Japan.

(End)