

China and the Middle East Interdependence in Renewable Energy Amidst China-US Rivalry

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Abstract

This article explains renewable energy cooperation between China and the Middle East based on the complex interdependence theory. In the new era, China has an attitude of interdependence in economic matters with the Middle East, particularly in the green sector. The Middle Eastern countries that are the focus of research in collaboration with China are Iran, the United Arab Emirates (UAE), and Saudi Arabia. China and these Middle Eastern countries have shown deepening cooperation in the renewable energy sector, with both sides profiting substantially. By using the complex interdependence framework, this paper analyzed how both sides gained advantages through this partnership and how it can also lead to reducing the global dominance of the United States (US) amidst the China-US rivalry.

Keywords: *China-US, China-Middle East, Interdependence, Cooperation, Renewable energy*

1. Introduction

Renewable energy has become a crucial aspect of the relationship between China and the Middle East. China, the rising green superpower requires access to new markets and a new method of modern diplomacy. On the other hand, a shift towards a more sustainable economy is crucially needed by the Middle Eastern countries. In the green sector, China has been strengthening its status. To establish itself as the catalyst for the Middle East's shift towards green

development, particularly in the clean energy sector, China has employed a mix of infrastructure development, financing, and power politics (Elnaggar, 2019).

The nations of the Gulf Cooperation Council (GCC) have all warmly received China's surge to eminence in the world. The US engagement in the Middle East declined due to the US's pivot to Asia, which occurred in late 2011. Before the pivot, the GCC-US relations were robust. Following the pivot, the GCC countries and corporations began vigorously seeking China and receiving its expanding influence in the Middle Eastern region. All these countries have recognized the potential complementarity and symbiosis between the Chinese Belt and Road Initiative (BRI) and their developmental visions. These visions include the Abu Dhabi Economic Vision 2030, the Saudi Vision 2030, the New Kuwait Vision 2035, Bahrain's Vision 2030, the Oman Vision 2040, and the Qatari National Vision 2030. The switch towards renewable energy is an essential element of these six countries' development plans since they are all highly reliant on hydrocarbon exports (Forough, 2021b).

Consequently, the GCC countries' comprehensive strategic cooperation with China is increasingly centred on the renewable energy industry. This green cooperation is urgently needed since both parties are among the world's biggest polluters. On a per capita basis, the UAE and Saudi Arabia rank amongst the world's worst polluters. Consequently, the leaders of both nations have prioritised sustainable and renewable energy in their development plans. Furthermore, both countries have been passionate advocates of China's regional engagement and BRI (Forough, 2021b). The GCC is not the only region where China is becoming progressively more important in the sustainable energy sector. Another important partner of China in the Middle East is Iran. Iran considers its relationship with China significant (Forough, 2021a).

This research chooses Saudi Arabia and the United Arab Emirates as case studies because when it comes to collaborating with China on the renewable energy sector, these two nations have been the most active amongst the states of GCC and perhaps the Middle East and North Africa (MENA) region (Forough, 2021b). Over the last decade, China's renewable energy investment, which includes wind and solar energy, has been concentrated in four Middle Eastern countries, including Saudi Arabia and the UAE (Zhou & Ma, 2023). The UAE is China's biggest export market in the Arab world and second-largest trading partner. China is also the UAE's biggest non-

oil trading partner globally (Emirates News Agency, 2022). As for Saudi Arabia, China is its main oil consumer and trading ally. In a multipolar world, Riyadh views China as a primary ally (Turak, 2023). Another significant reason for choosing Saudi Arabia as the case study is because China's state-owned Silk Road Fund (SRF) signed an agreement in 2019 to acquire a 49 per cent stake in Saudi Arabia's leading holding company in renewable energy projects, ACWA Power. In Saudi Arabia and throughout the MENA, ACWA Power is a leading investor, developer, and funder of power generation and desalination facilities (ACWA Power, 2019).

This research also uses Iran as a case study because China's strategic alliance with Iran is essential for China's progress in the Middle East (Hamrah & Eliassen, 2021). In addition, the country is located strategically along the "Belt and Road," on a new land bridge in the Silk Road Economic Belt and the China-Central Asia-West Asia Economic Corridor. In Iran and China's partnership under the BRI, renewable energy is an essential issue (Xu, Wang & Pang, 2020). In the past, Iran regarded China as a factory, and China saw Iran primarily as a market. However, Beijing's outlook on Iran has evolved. Iran is crucial for the three primary reasons. One is as a dependable energy source. The second is to forge more allies since America and its allies are allying to hold back China. Third, 60 per cent of China's crude imports in 2022 originated from the Middle East, which Iran can destabilise. China is by far Iran's biggest trading or economic partner. China is seeking various kinds of opportunities in Iran. Amidst China's rivalry with the US, Iran holds a geopolitical and geostrategic value (Hadian, 2023). Moreover, Iran is part of the three nations, together with China, Russia, and North Korea that oppose the world order established eight decades ago by the US and its allies (Michta, 2023).

The expanding multipolarity and weakening of US hegemony are fostering the new China-Middle East renewable energy interdependence and bringing the two regions closer together. Countries like the UAE and Saudi Arabia are fully aware of this situation and are trying to exploit it. One main advantage of renewable energy interdependence with the Middle East for China is that it may be used to accelerate the renminbi's internationalisation and potentially endanger the dollar's standing in the long term. Regarding the US-China rivalry, the reality is that China and the US are engaged in a prolonged trade war. The US has escalated the trade war in the renewable energy industry by announcing extensive tariffs on Chinese solar cells and

modules. Chinese businesses have demonstrated expertise in shifting their production facilities to other regions like the Middle East and adjusting their tactics to bypass US tariffs and other prohibitions as new regulations are implemented (Cohen, 2023; The Japan Times, 2023).

The US is becoming worried about China's growth in the renewable energy sector from an economic and geopolitical standpoint. The US is gradually realising how swiftly China is transitioning to a green economy. The US has a slow start in implementing a green transition. This slow start was the result of the Trump administration, which has a dismal environmental record. Another reason for the slow start is because of the political and economic structure of the nation, where private actors and the state behave differently (Forough, 2021b). Several American analysts and policymakers have attempted to raise concerns regarding China's supremacy in the green industry. For example, the former secretary of state, John Kerry, has called on the US economic and political authorities to stop China from dominating the green race (Kerry & Khanna, 2019). Over 80 per cent of the world's rare earth elements (REEs) supply is dominated by China. As a result, this monopoly in the market would help China gain leverage in producing various high-tech and renewable energy projects that depend on these rare earth elements. China's economy and inventiveness would then become progressively important globally (Wells, 2023).

Over the past two decades, the Middle East region has become increasingly important for China, primarily due to its energy security interests. The BRI development, which aims to create sea and land routes connecting Eurasia and East Asia with Europe via the Mediterranean Sea, Red Sea, and the Persian Gulf, has made the region crucial for China. This project has led to China's increasing cultural, military, and political involvement with the region (Sidlo, n.d.). Furthermore, China sees the Middle East as a means to reduce United States dominance. A significant portion of China's strategic progress in the Middle East is a result of its relations with countries hostile to the US. For instance, China and Iran signed a comprehensive agreement in 2021, covering the military, economic, and political sectors. This development has further complicated US policy in the Middle East (Lons & Nouwens, 2021).

In 2023, China's BRI began to shift to renewable energy after 10 years of helping other countries set up power plants in large quantities. Ongoing or planned overseas development projects related to renewable energy currently account for 57 per cent, whereas over the last 10 years they

amounted to only 37 per cent of established capacity. With government policies intensifying the drive to no longer use fossil fuels, accompanied by declining prices for solar panels and wind turbines, this energy transition is taking place. China is starting to completely pivot its tactics, namely more direct investment rather than the bilateral loans that were more common at the start of the BRI and concentrating more on renewable energy (The Business Times, 2023).

Middle Eastern countries are trying to reduce their dependence on natural gas, crude oil, and coal by increasing the capacity of their renewable energy sectors. Middle Eastern countries such as Saudi Arabia, the UAE, and Iran have made efforts in the energy transition to renewable energy (Al-Sulayman & Alterman, 2023; Butch, 2021). China seems to be in the correct position to help develop the environmentally friendly energy sector in the Middle East region, considering that China is the largest renewable energy market in the world. Leveraging Chinese expertise in Middle Eastern countries to develop renewable energy capacity is no longer surprising. Regarding renewable energy, China and Middle Eastern countries have complementary needs. The Middle East region needs to keep up with the increasing electricity demand and diversify its energy sources, and China has ample financial resources and expertise to help the region (HSBC, n.d.). In addition, China needs the Middle East region to expand the manufacturing base of its green energy companies (The Japan Times, 2023).

In the energy transition in the Gulf countries, China has established its position as a critical ally. Chinese companies and government have established relations with Gulf countries in the petrochemical and oil industries. Their relationships are slowly shifting to higher-value inputs in the renewable energy sector and investors and co-investors in massive wind and solar power projects in the Middle East and other regions (Al-Sulayman & Alterman, 2023). China has been collaborating on joint clean energy projects with other countries. The continents of Europe, Africa, and Asia are also involved in the project held by China. Hydroelectric power plants and wind and solar power plants are some of these initiatives, demonstrating China's seriousness in distributing resources and its knowledge in the renewable energy sector. This international cooperation highlights China's position as a great country that bears obligations and is ready to serve as a model in global efforts to deal with climate change (Farooq, 2023).

However, even though its influence has grown rapidly, China still cannot replace the US in the Middle East. This condition is because the US is committed to protecting its allies and military bases in the region, and Beijing is currently unwilling to assume that task. For now, China can benefit from increased economic and diplomatic influence while leaving issues related to the region's security to be borne by the US (Hale, 2023).

In this study, renewable energy cooperation refers to the strategic partnership between China and the Middle East that encompasses trade, joint venture (JV), and investment. In this context, renewable energy refers to energy from natural resources that replenish more rapidly than depleted. Examples of renewable energy include sunlight, hydro, and wind (United Nations, n.d.). This study analyses all forms of renewable energy. This study does not differentiate the roles of state-owned enterprises and the private sector in the renewable energy cooperation between China and the Middle East.

Regarding the China-US rivalry, this study argues that the China-Middle East renewable energy cooperation may influence reducing US dominance both regionally and globally. The US is the sole superpower in today's world. However, considering that issues like climate change are critical at the global level and with China being the leader of the green transition, the US may eventually lose the superpower status. Through its trade, JV, and investment in the renewable energy sector, China has the strategic influence to shape regional and global politics outside the traditional sphere of fossil fuel diplomacy. Based on the research background and theory, the research investigates the interdependence between China and the Middle East in renewable energy cooperation amidst China-US rivalry. The hypothesis that emerged in this research is that there are characteristics of mutualism between China and the Middle East in renewable energy cooperation. This cooperation could potentially debilitate US global influence.

2. Literature Review

Many researchers have written several previous studies relating to China's influence in the Middle East. Fulton discusses China's growing role in the Middle East. His research focuses on Saudi Arabia-China relations. In his research, Fulton explained that the relationship between the two countries was not that significant before; now, the relationship between the two countries has become a vital alliance that covers everything, including the renewable

energy sector (Fulton, 2020). Ponizilova, in her research, explains the objectives of China's policy in the Middle East and how China, as an essential energy partner in the Middle East, is ready and able to take a position as an extra-regional leader who will maintain the stability of the regional framework. His research shows that China is not yet ready to play a significant role in influencing regional politics, even though China is increasingly involved in the region (Ponížilová, 2019). Cole explains that the Chinese government is starting to establish new relations with the Middle East through investment in environmentally friendly energy. His research explained that Chinese solar panel companies are facing rising domestic labor costs, but they have advantages in production and research in the global market. His research sheds light on China's involvement in renewable energy in Morocco, the UAE, and Pakistan (Cole, 2016).

Huang explained that the essential component of the One Belt and One Road Strategy is the Middle East. China's significant investment in the Middle East is in the energy sector. Given the growth of its external investment and the globalisation of its resource distribution, China will have to assume its future energy security (Huang, 2017). Koc explains that the Middle East is essential for China because of its geopolitical location and energy resources. To gain easy access to energy resources, China practices careful diplomacy by not interfering in the internal affairs of other governments and viewing all parties in roundtable discussions as apparatuses. The increasingly crucial role of China in world affairs and the strengthening of its alacrity in achieving its global goals raise questions about how the Middle East can fit into China's international strategy (Koç, 2015). Singh explains that China is becoming increasingly active militarily, diplomatically and economically in the Middle East. Western policymakers often struggle to understand or predict China's policies. China sees the Middle East through its relations with the US, the BRI, and its direct interests in the region (Singh, 2021).

Ciuriak argues that in the Middle East, technological conditions have had a good impact on the region and have not resulted in confrontation between the United States and China in the Middle East. The increasing US-China competition has made China choose the Middle East as a choice (Ciuriak, 2023). Husain and Sahide explain that China has significant interests in the Middle East, which include things such as strengthening its status as a large country, external relations and internal stability, geostrategic goals, and

energy security (Husain & Sahide, 2022). Kenderdine and Lan explain that industrial and external trade policies are the basis of China's geoeconomics strategy for the Middle East. In essence, this industrial and trade policy is a parallel and geo-industrial strategy, combining geoeconomics and geopolitical policies to export the industrial capacity base (Kenderdine & Lan, 2018).

Yao explains that Middle Eastern countries are undergoing significant economic transformation. Middle Eastern countries have created long-term economic development plans to accelerate industrialisation, providing a historically significant opportunity for Chinese businesses to set up ventures there (Yao, 2016). Jin wrote that China's future foreign policy towards the Middle East is to observe the projects and ideas that have been proposed, such as the "Belt and Road" project, pursue mutual interests with related countries, uphold justice, and build a new kind of great-power relationship (Jin, 2017). Niblock concluded that although China views its relations with Middle Eastern countries as necessary, they are in second place after the interests considered most crucial for China (Niblock, 2020).

From the articles reviewed, many studies discuss Chinese cooperation in renewable energy with several countries. However, no articles discuss Chinese interdependence with Middle Eastern countries in renewable energy cooperation using the concept of complex interdependence with case studies on Saudi Arabia, Iran, and the UAE. The article written by Fulton is close to this research. Fulton (2020) discussed Chinese strategic collaboration with Saudi Arabia through the '1+2+3' cooperation pattern. Each number in this pattern denotes a distinct partnership priority. One stands for energy, 2 for infrastructure and trade and investment, and 3 for renewable energy, space satellite, and nuclear energy. However, renewable energy is not the focus of his article and is only discussed in minor detail. The article did not mention the advantages that China gained through its cooperation with Saudi Arabia in the renewable energy sector in terms of navigating US tariffs, and it also does not discuss the impact of the cooperation towards the US' unipolarity.

The article written by Cole is also quite similar in terms of the case study country, which is the UAE. Cole (2016) described the Chinese green energy investment in the Middle East with case study countries such as the UAE, Morocco, and Pakistan. The article only explained in minor detail regarding China's solar energy investment with the UAE and does not encompass renewable energy export. The novelty of this research is the discussion

regarding the interdependence of China and the Middle East in renewable energy amidst the China-US rivalry, with case studies of Saudi Arabia, the United Arab Emirates, and Iran. This research also analyses trade, JV, and investment between China and the Middle Eastern countries in the renewable energy sector.

3. Theoretical Framework

This research uses the concept of complex interdependence from Keohane and Nye. This study utilises the complex interdependence theory to examine Chinese engagement with the Middle East in the context of renewable energy cooperation, set against the backdrop of competition between China and the US. Complex interdependence is an economic liberalist concept that considers cooperation as relevant in international politics as conflict. Issues like social warfare are equally significant with security on the global agenda, and states are not the only significant entities (Genest, 2004). If translated into the language of globalism, complex interdependence politics is a politics where the level of economic, environmental, and social globalism is high and military globalism is low (Keohane & Nye, 2000).

Complex interdependence developed as a significant aspect of the neoliberal perspective and has been frequently utilized in analyses of international politics to fully comprehend states' eagerness to establish cooperative relationships with other states in dependent and anarchic settings. This theory is considered to have envisioned what is now known as globalization while stressing the increasing relevance of multinational corporations (MNCs) and international organisations (IOs). According to Keohane and Nye, the world has become more interdependent in every domain, particularly economics, and the core foundation of international relations has changed in the age of interdependence (Rana, 2015).

Complex interdependence is characterised by a multitude of channels that facilitate relations between communities. These channels encompass interactions between countries, businesses, and non-governmental actors. In the country-to-country channels, officials from each country convene and subsequently forge joint agreements. In the business with countries' channels, businesses can invest in projects in the host country. In the business with business channels, companies from different countries collaborate on

renewable energy projects in specific countries. The influence of banks and multinational companies can extend to shaping domestic and inter-country relations. The presence of non-governmental actors is increasingly influencing policies between countries (Keohane & Nye, 2012). For instance, China's cooperation with the Middle East in renewable energy is facilitated through these three channels.

Another characteristic of complex interdependence is the non-hierarchical nature of issues. Foreign policy does not always prioritise military security in a complex interdependence (Keohane & Nye, 2012). Foreign policy is becoming increasingly diversified and is not always related to traditional agendas such as regional rivalries, ideology, and military security. New issues such as population, environment, and energy are becoming more critical than these traditional agendas (Blood, n.d.). China's foreign policy in the Middle East fits with the non-hierarchical nature of complex interdependence, where renewable energy cooperation is equally or more important than military issues. China needs the Middle East to export its renewable energy components. In addition, Middle Eastern countries want to collaborate with China to help increase the renewable energy mix and increase economic growth in their countries. By emphasising the interdependence between China and the Middle East, the study suggests that both parties can gain advantages from renewable energy cooperation and that it can also help diminish the US' unipolarity.

4. Method

This research uses qualitative methods from Neuman (2014). According to Neuman, qualitative research relies on critical or interpretative social science principles. It is concerned with cultural meaning, cases, and context and emphasizes detailed analysis of specific cases that arise in people's lives (Neuman, 2014).

This research undertook a comprehensive literature review of previously published research. The review was conducted by exploring a wide range of topics related to China's renewable energy cooperation with Middle Eastern countries. This research is classified as qualitative as it concentrates on events and the construction of social reality. The focus of qualitative research is on thematic analysis, specifically the identification, analysis, and interpretation of meaning patterns in qualitative data.

Documents, observations, open interviews, maps, photos, and so on are some forms of qualitative data. The data was then divided into two categories, namely comparative historical research and field research. In qualitative research, data is collected through transcripts, observations, and documents in the form of images and words.

This research uses secondary data such as (1) official websites related to China's cooperation with Middle Eastern countries, (2) China's investment database, (3) journal articles, (4) short reports, and (5) books.

5. The Energy Relations of China and the Middle East

In 1983, China began purchasing oil from Oman, signifying the beginning of its energy relationships with the Middle East. Thenceforward, gas and oil have dominated these relationships. Together, the states in the region have consistently accounted for 40-50 per cent of China's increasing imports of these resources. Chinese national oil corporations have been investing more in the oil and gas reserves in the region, especially in Iraq and Iran, since the mid-1990s. In recent years, Chinese corporations have been developing electricity generation projects, especially those incorporating renewable energy, such as nuclear and solar power. Bilateral intergovernmental deals form the basis for many of these energy projects (Andrews-Speed & Lixia, 2021). The affordability of Chinese renewable energy components has also made them an attractive commodity in the Middle East market, which is crucially in need of a green transition (Saxena, 2023).

Figure 1. Energy Sources Comparison

Source	Renewable	Emissions	Land Use
Hydro	Yes	1	3
Solar	Yes	1	2
Wind	Yes	1	1
Natural Gas	No	3	1
Petroleum	No	4	2

Source: CFR Education

Regarding the sustainability of renewable energy cooperation, they are significantly more sustainable in terms of the emissions produced compared to fossil fuels. China and the Middle Eastern countries are some of the biggest polluters in the world. Hence, this cooperation helps not only tackle climate change but also helps both parties take on leadership positions locally and globally in the emerging new energy landscape. However, ten and a half years of oil and gas investment cooperation allowed both parties to establish trust and connections, which have been extended over into the renewables industry by a different group of state-owned companies (Al-Sulayman & Alterman, 2023).

As net-zero transitions advance, the oil and gas industry becomes riskier and less lucrative. Revenues from fossil fuels also may vary annually due to the volatility of its prices. Currently, returns on investment from oil and gas projects are marginally higher but are less consistent. Between 2010 and 2022, the oil and gas sector's return on capital was projected to have been between 6 and 9 per cent, while clean energy projects saw a return of 6 per cent. Contrary to the more stable returns for renewable energy projects, oil and gas returns fluctuated substantially over time (International Energy Agency, n.d.).

5.1 China's renewable energy cooperation in the Middle East

Relations between the two regions of China and the Middle East are becoming more comprehensive with the commitment of the Gulf Cooperation Council (GCC) to environmentally friendly energy and China's increasing power in the renewable energy supply chain. The Gulf states' oil-based economies have more prospects due to China's economic and diplomatic relations. Despite their heavy reliance on oil income, most GCC states hope to transition their economy away from fossil fuels. GCC states can bring in foreign direct investment and diversify their economies by cooperating with China. Therefore, the Arab nations aim to increase their collaboration with China in renewable energy, infrastructure development, and technology transfer (Akçay, 2023).

In the UAE, the Al Dhafra Solar Power Project has been completed by a Chinese company, and a few days before the opening of COP 28, the UAE announced the completion of the construction. The project will increase the share of renewable energy to 13 per cent in the UAE's overall energy mix, annually reduce 2.4 million tonnes of carbon emissions, and supply environmentally friendly electricity to 200 thousand households. China and

several Middle Eastern countries, such as Morocco, Turkey, Saudi Arabia, Jordan, Oman, Israel, Bahrain, and the UAE, have made firm efforts to address climate change by making plans and timetables that align with the carbon neutrality goals of the Paris Agreement. China and the Middle East have become role models for South-South cooperation for sustainable development, with a strong foundation for cooperation on environmentally friendly development and energy transition between the two regions. China and the Middle East have the same vision for dealing with climate problems. A consensus regarding the green transition was reached between Middle Eastern countries and China when the secretary general of the Gulf Cooperation Council, as well as the foreign ministers of Iran, Turkey, Bahrain, Oman, Kuwait, and Saudi Arabia, visited China (Huaxia, 2023).

In December 2022, during the first China-Arab Summit, China promised in the next three to five years eight significant cooperation initiatives in areas such as energy security, environmentally friendly innovation, and others in its cooperation with Arab countries. China and the Arab side demonstrated their perseverance in strengthening bilateral climate cooperation by proposing the development of a cooperation center for renewable development as well as a joint international research center to fight land degradation, desertification, and drought. Chinese companies are also helping to drive the energy transition in Middle Eastern countries by using technology and experience from China, as well as participating in several large-scale energy projects in the region. The first green coal power project in the Middle East was contracted by Chinese company Harbin Electric Corporation in the UAE's largest city, Dubai. This project will supply as much as 20 per cent of the total electricity usage in Dubai. Once construction is complete, the plant, which uses ultra-supercritical technology, will consist of four units, each of which will produce 600 megawatts. Unit 4 of the plant was successfully integrated into the national electricity grid in May 2023. In addition, the largest tower power plant in the world, developed by a Chinese company in Morocco, the Noor Concentrated Solar Power Plant, with an installed capacity of 160 megawatts, has reached the stage of third. Apart from that, there are many other projects developed by Chinese companies, such as the world's largest energy storage project located on the Red Sea coast in Saudi Arabia, the Ibri Solar Power Plant project, and the largest renewable energy project in Oman (Huaxia, 2023).

In the green finance sector, China and the Middle East are also establishing stronger cooperation. Environmentally friendly projects in the Middle East have received funding assistance from several Chinese financial institutions that have begun operating in the region. In the UAE, the Al Dhafra Solar Power project and the environmentally friendly Hassyan coal-fired power plant have received funding from the Bank of China. China also supports environmentally friendly projects that meet the BRI coverage countries by issuing Belt and Road bonds worth 770 million US dollars, which is the first in the world. Carbon neutrality bonds have also been issued by the Industrial and Commercial Bank of China with a value of 600 million dollars, which have been issued at its bank branch in Dubai. Renewable energy, environmentally friendly, and low-carbon transportation projects will be the recipients of these bonds. In the Middle East and North Africa region, China issued its first green yuan bond, underscoring the synergy between the UAE's "Net Zero by 2050" strategic initiative and its "double carbon" goal, according to the head of investment banking at First Abu Dhabi Bank, the largest lender in the UAE, Martin Tricaud. In the expansion of renewable energy, China and the Middle East are complementary and, in related sectors, have significant potential for cooperation, according to Egypt's Deputy Minister of Electricity and Renewable Energy, Ahmed Mohamed Mohina. Climate-related cooperation is expected to continue between the two parties (Huaxia, 2023).

This does not only happen in the Gulf region, where China controls the environmentally friendly energy supply chain. Based on production value, six Chinese companies are the largest in the world in terms of solar module production (Santos, 2023). Along the value chain, various components of wind and solar power are also controlled by Chinese companies. Countries tend to concentrate on importing the most efficient and cheapest components in a market that places significant emphasis on obtaining the lowest prices through tenders and rentier effects. Despite sacrificing the effectiveness of industrial policy in the short term, China remains a source of these components. For Chinese companies, this makes the UAE and Saudi Arabia markets crucial. However, Shanghai Electric and China Energy Engineering Group, which are Chinese contractors, have a more minor role in the value chain, although they played a significant role in developing the first group of utility-scale projects. This is because lower-cost Indian contracts are starting to come in (Al-Sulayman & Alterman, 2023; Gupta, 2021).

It is interesting to note that there is an expansion of Chinese participation as developers and investors in brownfield and greenfield developments, as well as solar power projects at both utility and commercial scales. In terms of accessing capital or debt, Gulf countries generally do not have problems. In general, this sector is an investment target for state-owned companies in the Gulf countries. However, on a utility-scale, the Saudi Arabian solar power tender was won on a large scale by Jinko Solar, the largest module manufacturer in the world (Jinko Solar, 2022). In these projects, Chinese companies have succeeded in making the most of the value chain. Jinko, in this case, is a developer and supplier of modules, while a small portion of its expenditure is for substructures, civil contracts, and cables to fulfil local content criteria by being distributed to local corporations. In Abu Dhabi, the Al-Sweihan project, which is one of the world's largest single-site photovoltaic projects with a capacity of 1.2 gigawatt-peak, also involves Jinko (Saba, 2022). Together with Taqa, the UAE's state-owned development company, Jinko supplied the modules and developed the project. Chinese companies show strong ambitions to participate in the Gulf countries in the entire value chain of project development with the existence of these two projects (Al-Sulayman & Alterman, 2023).

However, the most significant and clear sign of increasingly close cooperation with this region was when, in 2019, 49 per cent of the shares of ACWA Power Renewable Energy Holding (ACWA Power RenewCo) were acquired by an investment fund from China, the Silk Road Fund. With solar and wind power plant assets totalling 1,668 megawatts spread across Morocco, Egypt, Jordan, South Africa, and the UAE, ACWA Power RenewCo is the main holding company from Saudi Arabia operating in renewable energy projects (ACWA Power, 2019). Of a series of greenfield co-development agreements relating to two solar projects and one coal project in the UAE between the Silk Road Fund and ACWA, this more significant transaction is the continuation. In the years to come, this growing collaboration will be a precursor to international joint development. In the ACWA project, China has invested 10 billion dollars until October 2023. In October 2023, the Chair of ACWA explained this at a forum celebrating the 10th anniversary of the Belt and Road Initiative. Apart from reiterating its commitment to the Chinese market, as many as seven new cooperation agreements with several Chinese SOEs have

been signed by ACWA at this forum (ACWA Power 2023; Al-Sulayman & Alterman 2023).

On a commercial and industrial scale, significant progress is also taking place. One of the largest state-owned electricity developers, Chinese company Three Gorges, acquired UAE-based Alcazar Energy in 2021. Based on its scale, this transition is less attractive as the portfolio is only 400 MW. On the other hand, because this project combines many projects from markets in the MENA region, China Tree Gorges has a different understanding of the market, which is a sign that their risk appetite is more than just working together with state-owned enterprises in large projects. The transaction was also, unsurprisingly, funded by the Silk Road Fund (Al-Sulayman & Alterman, 2023).

In the upstream sector of the renewable energy chain, increasing investment shows that China's economic cooperation with Gulf countries in the clean energy sector is becoming stronger. Even though the European Union and America have implemented new trade barriers to delay China's business development in important sectors, the opposite trend in the Gulf region appears to be ongoing. Apart from accumulating sovereign wealth, several ambitious industrial policies have been implemented by the UAE and Saudi Arabia to develop manufacturing facilities in their domestic markets by attracting joint venture partners. The concluding joint venture agreement between Longi Solar, one of China's largest global module manufacturers, and Saudi Arabia's public investment fund (PIF) is the most striking example of this trend (Aguinaldo, 2023). PIF is developing a series of large-scale solar PV projects using modules from Longi. With plans to start development in 2023, China's Hon Hai Precision Industry Company (Foxconn) and PIF entered into an agreement to collaborate in the development of an electric vehicle called CEER in Saudi Arabia (Swilam & Saba, 2022).

China's relations with the Gulf countries have gradually evolved from relations based on transactional trade to large-scale reciprocal foreign direct investment relations in renewable energy as well as fossil fuel assets, which are an important supporter of the energy transition in the Gulf countries (Al-Sulayman & Alterman, 2023). Apart from China's cooperation with Arab Gulf countries, China also entered into a comprehensive agreement with Iran. In March 2021, Iran and China signed the 25-Year Iran-China Comprehensive Cooperation Agreement. Bilateral energy cooperation is considered the most significant part of this agreement. Cooperation in environmentally friendly

energy development projects and the renewal of outdated power plants are also carried out by the two countries (Rashid, 2022).

5.2 China's renewable energy cooperation with Saudi Arabia

Over the years, Saudi Arabia has strengthened relations with one of its biggest oil export customers, China, by investing in the country's fossil fuel sector. China also gave the same reply. Chinese companies are facing worsening tensions with the US and its partners, as well as unprecedented margin pressure at home. In hopes of expanding their manufacturing base internationally, Chinese renewable energy companies are turning to the Middle East region. Sean Wang, executive president of international operations for TCL Zhonghuan Renewable Energy Technology, which is constructing a 20-gigawatt solar wafer factory in Saudi Arabia, believes that Saudi Arabia offers various benefits, such as its strategic location between Africa, Asia, and Europe, a relationship that is good with many countries, as well as electricity, which has low costs (The Japan Times, 2023).

With good relations with Western and Eastern countries, Saudi Arabia has become a comfortable place. At the China-Saudi Investment Conference in Beijing, the culmination of Saudi Minister Khalid Al-Falih's six-day tour of the country, TCL was among the companies praising Saudi Arabia. Other companies heaping praise on Saudi Arabia were also present at the conference, such as battery supplier Ganfeng Lithium Group and wind turbine maker Envision Energy. According to the investment ministry led by Al-Falih, more than 60 agreements covering various sectors, such as energy, health services, and tourism, were signed at the conference with a potential value of 25 billion US dollars. This visit comes at a turning point in China's energy sector, where revenue is eroding due to excess capacity. After more than ten years of building supply chains to produce low-cost electric vehicle batteries, wind turbines, and solar panels needed for the global energy transition, competitors are trying to imitate China's success and protect their domestic industries by hampering Chinese companies with tariffs and other trade barriers (The Japan Times, 2023).

At the same time, as the world began to move away from oil, Saudi Arabia's largest source of income, the Kingdom sought to expand its economy beyond oil, and deepening relations with Chinese companies helped achieve

the Kingdom's goals. Saudi Arabia, which hopes to one day replace fossil fuels, could become a big actor in clean energy with investment from China. In addition, this will increase China's influence in the Middle East region, which is important for their long-term energy security. According to Ganfeng Lithium's investment director, Roy Zhang, at a time when China was a political target for many countries, the Saudi Arabian government offered promises of policy certainty. However, allowing more Chinese corporate human resources to enter Saudi Arabia can attract more Chinese investment (The Japan Times, 2023).

Recently, the world's largest hydrogen project in a futuristic city located on the northwestern coast of Saudi Arabia, which is currently under construction, Neom, received delivery of its first group of turbines from one of China's largest wind power generator manufacturers, Envision. According to Envision's global vice president, Yu Feng, Saudi Arabia has abundant renewable energy sources. In Saudi Arabia, energy sources such as green hydrogen, solar power, and wind will become very essential sectors that will supply clean energy to the global market. According to the vice president of strategy and business development at state-owned mining company Maaden, Khalid Alsharief, metals are a crucial component for the energy transition, making Saudi Arabia also interested in using China's mining expertise. Metal mining businesses on the Arabian Peninsula can be accelerated if their services are utilised (The Japan Times, 2023).

Improving economic relations between China and Saudi Arabia is beneficial for the growth of both countries and the stability of the Middle East in a comprehensive manner. Lack of development is one of the factors contributing to geopolitical instability in the Middle East region. Conditions that help peaceful development can be created, and conflict can be reduced with an approach that emphasises strengthening regional economic cooperation. Cooperation with Saudi Arabia is also an important part of China's efforts to increase its economic resilience to Western pressure and sanctions and expand international trade. Saudi Arabia's long-term development also benefits from cooperation in the field of renewable energy with China (Global Times, 2023).

5.3 China's renewable energy cooperation with the UAE

According to the UAE's special climate change envoy, next year, before hosting the UN climate conference, the UAE is looking for climate cooperation partners such as China to maintain the rapid acceleration of its energy transition. Of all new electricity generation capacity in 2021, the UAE represents 80 per cent and has achieved record growth in renewable energy, according to the UAE's special envoy for climate change and Minister of Industry and Advanced Technology, Sultan Al Jaber. For the energy transition to be successful, climate and economic action must be undertaken together (Yumul, 2022).

The UAE plans to increase its renewable energy portfolio by 2030 to 100 gigawatts. Jinko Power has invested in and helped develop the Noor Abu Dhabi solar power plant, which has 3.2 million solar panels (Yumul, 2022). This power plant, located in Sweihan, Abu Dhabi, started commercial operations in June 2019. As many as 90,000 people can meet their energy needs with this power plant. Noor Abu Dhabi produces 1.2 GW of power, covering an area of 8 kilometres, with 3.2 million solar panels installed. In partnership with Abu Dhabi Power Corporation (now part of Taqa), the project was developed by the venture firm Jinko Solar as well as the Japanese company Marubeni. The engineering, procurement, and construction (EPC) work on the project was carried out by Sterling and Wilson, a Mumbai-based engineering company. The Noor Abu Dhabi project has a value of 871 billion dollars, or 3.2 billion UAE dirhams (MEED, 2020).

Apart from the Noor project, the UAE is also collaborating with Chinese companies in the development of the Mohammed bin Rashid Al Maktoum Solar Park. According to the Independent Power Producer (IPP), this single-site solar park is the largest in the world. In 2030, with a total investment of 50 billion AED, 5,000 MW of production capacity is planned for this project. In the 4th phase of this solar park, to design, construct, and operate the power plant, the Noor Energy 1 project company was formed by a consortium led by ACWA Power and Dubai Electricity & Water Authority (DEWA). DEWA controls 51 per cent of the company's shares, ACWA Power owns 25 per cent of the shares, and Silk Road Fund, which is owned by China, controls 24 per cent. The Power Purchase Agreement (PPA) has been signed for 35 years. Three hybrid technologies will be used in this fourth phase. The three technologies include

a parabolic basin complex with a capacity of 600 MW, the world's highest solar tower with a height of 262.44 metres and a capacity of 100 MW, and photovoltaic solar panels with a capacity of 250 MW. The project has the largest thermal storage in the world, with 15 hours after completion. As many as 1.6 million tonnes of carbon emissions will be reduced annually, and as many as 320,000 residences will receive a clean energy supply from the fourth phase of this project (MBRSIC, n.d.).

The UAE and China are also collaborating in the construction of Al-Dhafra Solar PV, which is the largest solar power plant in the world. The UAE has three of the largest solar power plants in the world. Chinese companies have a stake in building the three largest power plants in the world. This explains the dependence between the UAE and China, where the UAE needs services and investment from China. Meanwhile, China can increase its influence in the UAE and the Middle East.

5.4 China's renewable energy cooperation with Iran

The Chinese company Gezhouba Group is holding a cooperation project that is currently the largest in the renewable energy sector between China and Iran. The project is an EPC project for the Rudbar Lorestan hydroelectric power plant in Iran. Of these projects, 80 per cent of the total projects implement Chinese standards. In Iran, the hydroelectric power plant has the largest installed capacity and is the first project under China-Iran financing cooperation. The project provides a solid foundation for Chinese companies to be involved in the development of hydroelectric power projects in Iran. About 454 kilometres from the capital Tehran, the Rudeba hydroelectric power plant project is in Iran's Lorestan province, in the Rudeba River Valley. During construction, as many as 2,000 local residents gained employment from the project. This project installs two units with a capacity of 225 MW and an installed capacity of 450 MW, annually producing a total of 986 GW after production and annually cutting greenhouse gas emissions by around 626,100 tons. The EPC project was built in 2011, totalling 4 billion RMB of investment. China produces the main structure, generator, and main equipment. Two generating units with a capacity of 225 MW began operating in May 2017. In addition, Sinosteel's 1 GW solar park and the 600 MW PowerChina photovoltaic project are significant photovoltaic cooperation projects between Iran and China (Xu, Wang and Pang, 2020).

The 600 MW photovoltaic project, which is the biggest photovoltaic project in Iran, was the subject of a cooperation agreement between China Power Construction Group Guizho Engineering Corporation and Quercus Investment Partners Limited, the third biggest new energy investment fund in Europe, in November 2017. The project will be developed in six phases with a capacity of 100 MW each, totalling 600 million euros of investment. Within three years, the project is aimed to be completed and linked to the electricity network. Furthermore, China Power Construction Group Guizho Engineering Co., Ltd. and CIRI signed a contract for a 1,114 MW photovoltaic power plant project in November 2017. Larestan, Iran, is the location of the project. Italy's Denikon and Sinosteel signed an agreement in July 2018 to construct a solar park in Yazd, Central Iran, with a capacity of up to 1 GW (Xu, Wang and Pang, 2020).

In addition, a photovoltaic panel manufacturing plant and twenty thousand residential solar power plants and will be involved as part of the agreement. This will help minimizing Yazd's dependence on fossil fuels for electricity generation. The construction agreement for the 2.5 MW Lotak wind power plant, located in Lotak, Iran, was signed by CIRI and China Power Construction Group Guizhou Engineering Co., Ltd. Construction with EPC was carried out by Guizhou Engineering Company of China Power Construction Group (Xu, Wang and Pang, 2020).

With a total contract value of RMB 1.5 billion, the EPC project for wind power generation in phase III of Nimrouz was signed by Guizhou Engineering Company of China Power Construction Group in March 2018 with Energy Park Jaadh Abrisham Asia, Energy Sabz Jaad Abrisham, as well as Baad Gostra Paak Asia, which are three SPV companies. Chinese companies have so far only been involved in EPC projects on most of Iran's renewable energy developments. Chinese companies do not currently act as lead developers or control renewable energy projects in Iran. With limited involvement of private companies, the major actors in Iran's renewable energy market are currently Chinese state-owned enterprises (Xu, Wang and Pang, 2020).

5.5 Chinese renewable energy exports and investments in the Middle East

The table below shows that China invests heavily in the renewable projects of the Middle Eastern countries. In the United Arab Emirates, investments are

focused on solar projects. Three of the largest solar power plants in the world are in the United Arab Emirates, namely the Al Dhafra solar plant, Noor Abu Dhabi solar plant, and Mohammed Al-Maktoum solar plant, receiving investment from Chinese investors. The Mohammed Al-Maktoum solar project received the most investment from Chinese investors. In Saudi Arabia, Chinese investment is also concentrated in solar projects. China is also investing in a hydroelectric power plant project in Iran, namely the Taleqan Reservoir. Based on this data, the increased Chinese investment in the region correlates with the declining US influence in the Middle East. This can be seen as most megaprojects are done by Chinese companies rather than US companies.

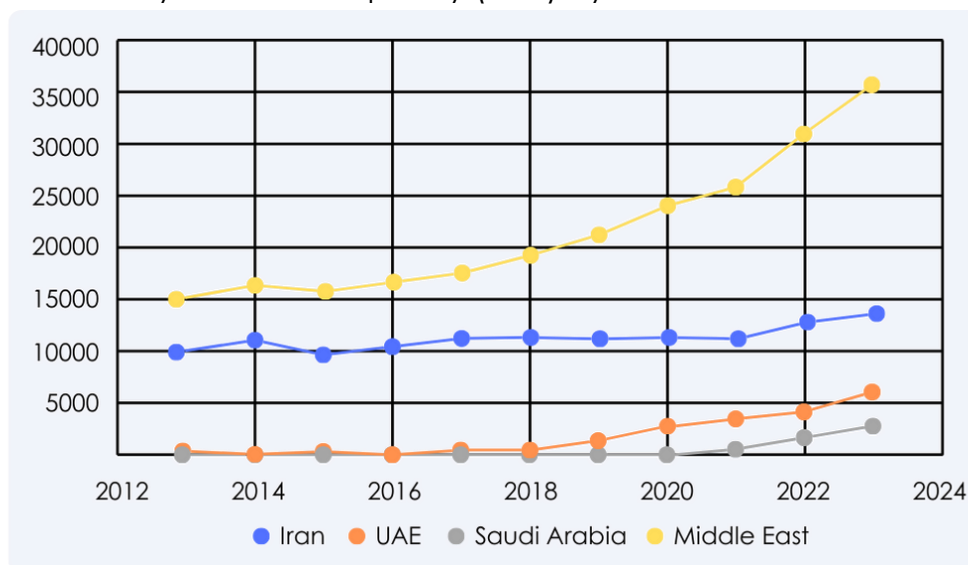
Figure 2. Chinese Investments in UAE, Saudi Arabia, and Iran Renewable Projects

UAE					
Power Plant Name	Total Investment Amount (\$ Million)	Installed Capacity (MW)	Commissioning Year	Primary Fuel	Equity Investor
Al Dhafra Pv2	288,75364	1584	2022	solar pv	Jinko Solar Co Ltd
Mohammed Al Maktoum-Iv	1182,2	700	2021	solar csp	Silk Road Fund
Mohammed Al Maktoum-Iv	252,6			solar csp	
Mohammed Al Maktoum-Iv	196,74	250	2021	solar pv	Silk Road Fund
Mohammed Al Maktoum-Iv	315,76			solar pv	
Mohammed Al Maktoum-Iv	46,61	900	2023	solar pv	
Noor Abu Dhabi	36,24	1177	2019	solar pv	Jinko Solar Co Ltd
Saudi Arabia					
Power Plant Name	Total Investment Amount (\$ Million)	Installed Capacity (MW)	Commissioning Year	Primary Fuel	Equity Investor
Sakaka Solar	74	300	2020	solar pv	
Ar Rass		700	2021	solar pv	State Power Investment Corp Ltd
Saad		300		solar pv	Jinko Solar Co Ltd
Iran					
Power Plant Name	Total Investment Amount (\$ Million)	Installed Capacity (MW)	Commissioning Year	Primary Fuel	Equity Investor
TALEQAN DAM	121,55	17,8	2006	hydro	

Source: China Overseas Finance Inventory (COFI)

Based on the graph below, Iran, the UAE, Saudi Arabia, and the Middle East region experienced increased installed electricity capacity from renewable energy. Among the three countries, Iran has the largest installed capacity, 12,653.34 MW in 2023, compared to the UAE, with 6052,495 MW and Saudi Arabia, with 2688,638 MW in 2023. The Middle East region experienced a significant increase in 2023, namely 30485.33 MW from the previous year, which was 25876.34 MW.

Figure 3. Electricity Installed Capacity (MW) by Total Renewable, 2013-2023



Source: IRENA (2024), Renewable Capacity Statistics 2024, International Renewable Energy Agency (IRENA), Abu Dhabi & IRENA (2024), Renewable Energy Statistics 2023, International Renewable Energy Agency (IRENA), Abu Dhabi

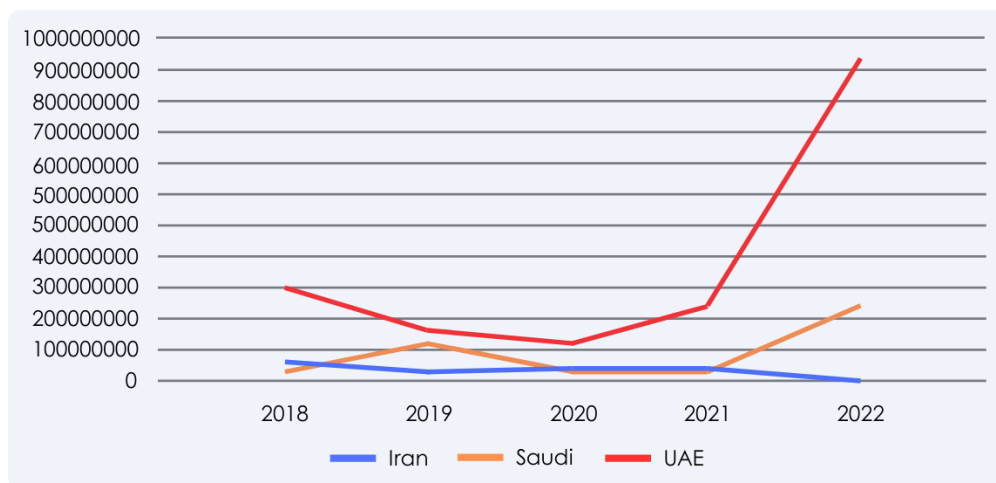
From 2018 to 2022, China's solar panel exports to Saudi Arabia increased. In 2019, China's solar panel exports amounted to 113,147,217 US dollars, an increase from the previous year, which amounted to 22,963,284 US dollars. In 2020, there was a decrease to 23,762,596 US dollars; the following year, it also decreased to 23,198,941 US dollars. In 2022, China's solar panel exports increased significantly to 314,895,470 US dollars. The year 2022 is China's largest solar panel export to Saudi Arabia.

From 2018 to 2022, China's solar panel exports to the UAE increased. In 2018, China's exports to the UAE were 400,246,081 US dollars. In the 2019–2020

period, the value of exports decreased, namely in 2019 with 241,490,034 US dollars and in 2020 with 127,070,471 US dollars. Then, the export value increased again in 2021, amounting to 225,006,408 US dollars. In 2022, there is an increase to 947,131,292 US dollars, making it the year with the largest export value during 2018–2022.

The value of China's solar panel exports to Iran decreased during the 2018–2022 period. In 2018, the export value was 87,251,126 US dollars, the largest export value during 2018–2022. Then, the following year, there was a drastic decline to 14,505,841 US dollars. In 2020, it increased to 23,779,497 US dollars. Then, in 2021, there was a slight increase to 24,450,026 US dollars. In 2022, the export value decreased to 10,364,961 US dollars.

Figure 4. China's solar panel exports to Saudi Arabia, UAE, and Iran, in US dollars



Source: GACC

The results of this research show that China and the Middle East are interdependent on renewable energy cooperation. This could change the technological, geopolitical, and economic balance in the Middle East. As countries increasingly turn to China for strategic alliances in the renewable energy sector, technological cooperation, innovation, and the economy, the United States' influence will decline regionally and globally.

6. Conclusion

The interdependence of China and Middle Eastern countries provides many benefits to each party. China can export solar equipment, expand its influence in the Middle East region, and further diminish US influence. Middle Eastern countries, on the other hand, can increase their economic growth by collaborating with China in the renewable energy sector. Saudi Arabia, the UAE, and Iran can also boost their renewable energy mix. The Chinese presence in Saudi Arabia is crucial to the kingdom's energy diversification and reduction of its dependence on oil. China could take advantage of opportunities in Saudi Arabia to expand the manufacturing base of its renewable energy companies at the current time of tension with the United States and its allies. In the UAE, Chinese investment funds financed many renewable energy megaprojects. Renewable energy projects undertaken by both parties supply a lot of electricity to the UAE population. Iran, China's strategic partner in the West Asia region, also holds various collaborations in the renewable energy sector, including solar, hydro, and wind power. Chinese cooperation with Middle Eastern countries helps achieve their national interests and vice versa. In the interdependence between the two parties, interactions between countries, businesses with countries, and businesses have all taken place and various renewable energy projects have all been agreed upon. This cooperation provides both sides an opportunity to reduce the US' unipolarity. Compared to fossil fuels, renewable energy provides strategic and economic value. It is also a cleaner and more stable source of revenue. With renewable energy being a practical new form of diplomacy and critical energy, China may take the US' superpower position much sooner.

Declaration of conflicting interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Notes

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