



**HOW COULD NUCLEAR ENERGY IMPACT  
THE OIL AND GAS MARKET  
IN THE MIDDLE EAST?**

**GEOPOLITICAL REPORT VOL.2/2022**

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**ASRIE ANALYTICA**

## Geopolitical Report

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This is the second report of the project “[Geopolitics of Nuclear Energy in Eurasia](#)” whose purpose is to focus the attention on the role of nuclear energy in Eurasian countries’ policies and economic strategies and understand future challenges and possible threats.

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## Abstract

### English

Nuclear power is slowly but massively entering the Middle East region as more and more countries that can afford to implement it financially choose to build nuclear power capacity. Nuclear energy is the only way to balance their energy systems and to guarantee sufficient supplies that can satisfy the rapidly growing energy needs of all the countries from the region. Nuclear energy is safe, clean, and constant, making it an ideal balancing source in the energy mixes, especially if there is a considerable percentage obtained from renewables as they are not always a constant and predictable energy source. At the same time, nuclear energy brings technical progress and creates highly skilled jobs. However, due to increased energy demands worldwide, the oil and gas market in the region will continue to operate, and fossil fuels, in short and middle-term perspectives, will continue to be obtained, exported, and consumed. Economic profitability is the decisive factor for this, as well as the international climate legislation and to what extent the countries from the region will apply and observe it.

**Key Words: nuclear energy, Middle East, geopolitics, oil & gas**

### Italiano

L'energia nucleare sta lentamente ma massicciamente entrando nella regione del Medio Oriente poiché sempre più paesi che possono permettersi finanziariamente di implementarla, scelgono di costruire capacità di energia nucleare. L'energia nucleare è l'unico modo per bilanciare i sistemi energetici dei paesi mediorientali per garantire forniture sufficienti in grado di soddisfare il fabbisogno energetico in rapida crescita di tutti i paesi della regione. L'energia nucleare è sicura, pulita e costante, il che la rende una fonte di equilibrio ideale nei mix energetici, i quali possono avere una percentuale considerevole di energia prodotta da fonti rinnovabili la cui quantità, però, non è sempre costante. Allo stesso tempo l'energia nucleare porta progresso tecnico e crea posti di lavoro altamente qualificati. Tuttavia, a causa dell'aumento della domanda di energia in tutto il mondo, il mercato del petrolio e del gas nella regione continuerà a funzionare e i combustibili fossili in una prospettiva a breve e medio termine continueranno ad essere estratti, esportati e consumati. La redditività economica può essere vista come il fattore decisivo sul largo sfruttamento dell'energia nucleare a cui si deve aggiungere la legislazione internazionale sul clima.

**Parole chiave: energia nucleare, Medio Oriente, geopolitica, petrolio, gas naturale**

## **Author**

**Ivelina Dimitrova** is a contributor at Eurasia – Rivista di Studi Geopolitici, CeSEM – Centro Studi Eurasia Mediterraneo, and other international analytical magazines. With experience in national security, the oil and gas industry and the international financial sector, her interests span from economic development through energy policies to geopolitics as she considers the economy very much connected to national security and geopolitics. Her current interests include the geopolitics of energy and the new realities and possible scenarios of global economic and financial systems.

## Introduction

Nuclear energy, although still causing some controversies in the European Union on whether or not to be recognised as green energy, is generally considered worldwide as carbon-neutral energy (excluding the nuclear waste disposal, which is also progressing and improving the technologies for its recycling) that can be used as the energy for transition in the achievement of carbon neutrality and sustainability.<sup>1</sup> Nuclear energy is also used as balancing capacity, especially in economies with a considerable percentage of renewable energy production, for example, from wind or solar sources, as the most significant disadvantage of these energy sources is that they cannot deliver constant levels of energy supply either throughout the year or throughout the day.

The advantages of nuclear energy are numerous such as the high capacity of energy production, and it is also considered inexhaustible, although the element used to produce the nuclear fuel, the uranium, is an ore; hence it is exhaustible just like the fossil fuels. Another essential characteristic of nuclear energy is that its production cycle is highly technological and requires deep knowledge and specialists to construct and operate nuclear plants.<sup>2</sup>

The countries of the Middle East, especially the ones from the Persian Gulf zone, have always been involved in oil and gas production and played a crucial role in the 20<sup>th</sup> century as oil dominated the world economy to a great extent. Many predicted that the 21<sup>st</sup> century would be the century of natural gas, but it seems that other sources of energy, including renewable energy and nuclear one gain more and more popularity including in the region of the Middle East, which for almost a century has produced more than one-third of the world's oil.<sup>3</sup> Amongst the biggest producers there, Saudi

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<sup>1</sup> Samuel M. Hickey, Salaheddin Malkawi, Ayman Khalil (2021) Nuclear power in the Middle East: Financing and geopolitics in the state nuclear power programs of Turkey, Egypt, Jordan and the United Arab Emirates, *Energy Research & Social Science Vol.74*, 101961, ISSN 2214-6296. Available at: <https://doi.org/10.1016/j.erss.2021.101961>; Mark Hibbs (2022) *Amid Energy Crisis, EU Fights Over Whether Nuclear Is Green*, Foreign Policy. Link: <https://foreignpolicy.com/2022/01/13/nuclear-energy-green-europe-eu-climate/>.

<sup>2</sup> Advantages and Challenges of Nuclear Energy (2021) US Office of Nuclear Energy. Link: <https://www.energy.gov/ne/articles/advantages-and-challenges-nuclear-energy>.

<sup>3</sup> Majid Jafar (2019) *Why natural gas is the fuel of the 21st century*, The National News. Link: <https://www.thenationalnews.com/business/comment/why-natural-gas-is-the-fuel-of-the-21st-century-1.811256>.

Arabia, the UAE, Iran, Iraq, Qatar, and Kuwait can be indicated. For centuries the oil and gas deposits in the region have turned the whole area into the hottest geopolitical place in the world, with military conflicts and wars breaking out one after another and political instability marking the region for decades.<sup>4</sup>

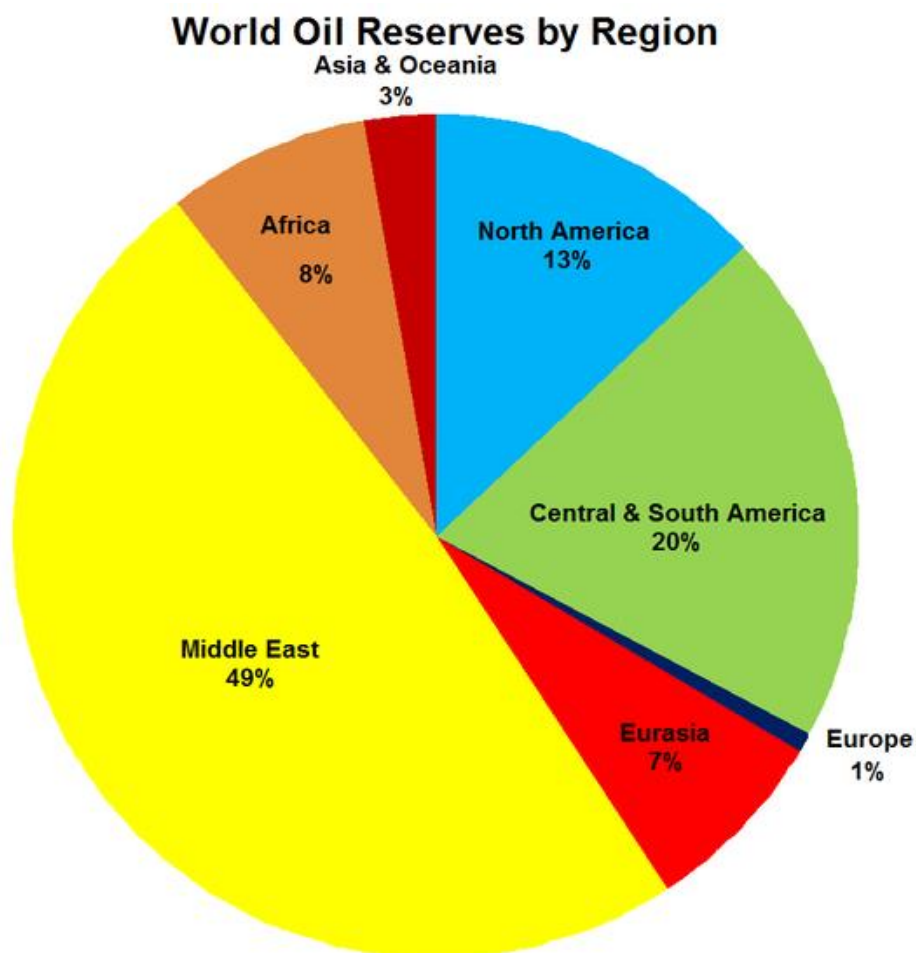


Figure 1 The graphics show the Middle East's importance in the oil market as it holds nearly half of the oil reserves worldwide. Source: US Energy Information Administration (2013)

<sup>4</sup> Jacob Mundy (2020) *The Oil for Security Myth and Middle East Insecurity*, Middle East Research and Information Project. Link: <https://merip.org/2020/06/the-oil-for-security-myth-and-middle-east-insecurity/>.



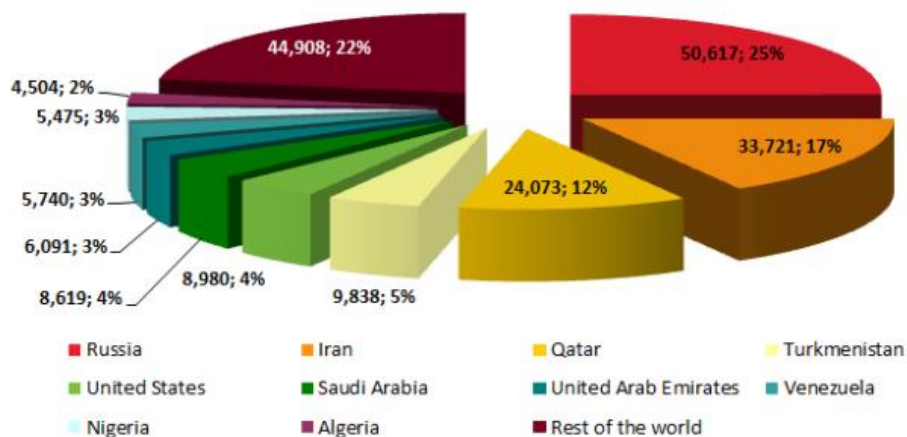


Figure 2 The Middle East holds nearly 40 % of the world's total proven gas reserves. Source: ENI, World Gas and Renewables Review (2018).

Independently from the vast oil and gas reserves available in the region, many countries do not rely only on fossil fuels and diversify their energy mixes, especially by developing nuclear energy. The reasons for these aspirations are various, but amongst the most important ones are the following:

- Reduction of reliance on fossil fuels in the energy mix.
- The Middle East would like to achieve new levels of technological development, especially the rich oil and gas countries from the Gulf.
- The development of nuclear energy is connected to sustainability and the ousting of fossil fuels (especially oil) from the energy mixes.

### **Nuclear power plants and nuclear energy in the Middle East**

Presently, the situation with the development of nuclear plants in the Middle East is as below indicated. One fully operational nuclear plant in Iran, three in construction and three planned.



Figure 3 The Nuclear Power Plants (NPP) in the Middle East. Source: Energy Information Administration, International Energy Statistics (2018)

### *The Islamic Republic of Iran*

The country with the most developed nuclear energy in the region is Iran, as it started its nuclear programme to produce energy in the 1970s. Although its nuclear plant in Bushehr-I was destroyed during the war with Iraq in the mid-80s, it was rebuilt in co-operation with Russia, VVER-1000 reactors were installed, and it has been operational since 2010, while in 2013, the complete operational control of the facilities was transferred to Iran. The joint venture with Moscow helped recover this nuclear plant and make it fully operational. In 2014 the two countries signed an agreement to build two new nuclear reactors at the Bushehr plant with the option of building six more. The construction works of this project started in 2017. Recently, Russia and Iran discussed the construction of new units in the Bushehr Nuclear Power Plant (NPP).<sup>5</sup>

<sup>5</sup> *Russia to build Iran atomic reactors at Bushehr* (2014) BBC. Link: <https://www.bbc.com/news/world-middle-east-30015464>; *Lavrov says construction of new Bushehr units discussed with Iranian counterpart* (2021) TASS. Link: [https://tass.com/economy/1249015?utm\\_source=neimagazine.com&utm\\_medium=referral&utm\\_campaign=neimagazine.com&utm\\_referrer=neimagazine.com](https://tass.com/economy/1249015?utm_source=neimagazine.com&utm_medium=referral&utm_campaign=neimagazine.com&utm_referrer=neimagazine.com).

Iran is by far the Middle East country with the most developed nuclear technologies, some of which aim to produce nuclear weapons and are breaching the nuclear deal agreement it had with the United States. In the context of the nuclear aspirations of Iran, the nuclear plants for energy production could be a step forward towards these ambitions of Teheran as they deliver substantial 'know how' in the nuclear sector that can be used both for civil and military purposes. It should also be mentioned that Iran's nuclear facilities remain vulnerable to cyber-attacks, with the last one being in 2021. Teheran accuses Israel of them as it is most concerned about transforming its geopolitical enemy into nuclear power.<sup>6</sup>

### *The United Arab Emirates*

The United Arab Emirates is another country quite ahead in developing nuclear facilities. Although possessing large oil deposits and sufficient natural gas, the country wants to diversify its energy mix and energy reliance, mainly due to its growing consumption demands. Unlike Iran, the UAE developed its programme in close cooperation with the international nuclear regulators, and it signed a treaty with the US for the use of nuclear energy for peaceful purposes. The authorities of the Emirates well evaluated the construction of nuclear facilities prior to making the decision, and the Emirates Nuclear Energy Corporation described nuclear energy as safe, clean, stable, and proven technology. Another reason, apart from meeting the growing energy needs of the Emirates, which are consequences of its economic development, is climate sustainability. For this reason, in 2012, the UAE started the construction of the Barakah Nuclear Energy Plant, which should meet 25 % of the energy supplies and has four APR-1400 units, which are Korean advanced reactors with a total capacity of 5600 MW.<sup>7</sup>

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<sup>6</sup> Martin Chulov (2021) *Israel appears to confirm it carried out a cyberattack on Iran nuclear facility*, The Guardian. Link: <https://www.theguardian.com/world/2021/apr/11/israel-appears-confirm-cyberattack-iran-nuclear-facility>.

<sup>7</sup> *ENEC Begins Construction Of UAE's First Nuclear Energy Plant* (2012) Emirates Nuclear Energy Corporation. Link: <https://www.enec.gov.ae/news/latest-news/enec-begins-construction-of-uaes-first-nuclear-energy-plant/>; *UAE First "Newcomer" In 27 Years To Start Nuclear Power Plant Construction* (2012) International Atomic Energy Agency. Link: <https://www.iaea.org/newscenter/news/uae-first-newcomer-27-years-start-nuclear-power-plant-construction>.

A cooperation agreement between the Korea Electric Power Corporation (KEPCO) and the Emirates Nuclear Energy Corporation (ENEC) was signed in 2009, and the construction began in 2012. By 2021 the first unit was operational, and the second unit was completed and started operations in August 2021. In November 2021, the United Arab Emirates also completed the third unit of the NPP.<sup>8</sup> The Barakah Nuclear Power Plant is the first for the country and the Arab world. In less than a decade, the UAE started from scratch and constructed the already operational facility with external help. This way, the Gulf country managed to achieve various purposes- technological progress, transition to sustainable and clean energy and diversification of its technological mix.<sup>9</sup>

Qatar will not be analysed, as being a prominent gas exporter, it does not develop nuclear power now, and relations with the UAE for the construction of its first nuclear plant have been tense as Doha does not have a financial interest for such projects to be developed in the region.

### *The Kingdom of Saudi Arabia*

The oil-rich Saudi Arabia does not exclude implementing alternative energy sources in its energy mix and the development of new technologies. Moreover, we should underline that the Kingdom wants to include nuclear energy in its energy mix and aspires to develop a complete nuclear strategy that would make the country entirely independent from fossil fuels. In 2017, the initial plan of the country consisted of two 2.8 GW reactor unit plants in Umm-Huwayd and Khor Kuweihin. Westinghouse, Rosatom, EDF, South Korea's Kepco and Chinese nuclear company are interested in the project.

Nevertheless, Riyadh also plans to develop and construct several small scales modular advanced reactor technology (Smart) nuclear power plants in cooperation with South

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<sup>8</sup> UAE completes construction of Barakah 3 (2021) Nuclear Energy International. Link: <https://www.neimagazine.com/news/newsuae-completes-construction-of-barakah-3-9225088>.

<sup>9</sup> Aaron Larson (2021) *A Newcomer to Nuclear Power, UAE Has Showcase Facility in Barakah*, Powerman. Link: <https://www.powermag.com/a-newcomer-to-nuclear-power-uae-has-showcase-facility-in-barakah/>.

Korea. The third pillar of the nuclear energy strategy of Saudi Arabia includes the mining of uranium resources which must fuel future plants. The latest news is on the topic is that KSA will use the technical expertise of Chinese state-owned companies to process uranium ore. The ambitions of Riyadh are by 2040 to cover between 15 % to 20 % of its energy needs with nuclear. The country plans to construct also smaller nuclear power plants for seawater desalination, as this is generally the way KSA obtains its water supplies. For this reason, infrastructure for the construction of Korean SMART reactors is in progress.<sup>10</sup>

There are also agreements with China in nuclear plant development and maintenance. An agreement between CNNC and KA-CARE was also signed for human resources development. There is an agreement between KA-CARE and the Russian Rosatom, and in 2019 Rosatom proposed a feasibility study on building VVER-600 reactors to construct VVER-1200 units eventually. There are also agreements for nuclear cooperation with the UAE and Jordan and, of course, with the USA, a partner of primary importance for Riyadh.

From the data mentioned above, a conclusion could be made that KSA has very ambitious plans in the nuclear field which aim to transform the country from an exporter of oil to a holder of nuclear technology knowledge. Nuclear technologies would bring the country to a much higher technological level as it has been considered only an oil exporter relying on petrodollars for a long time. The nuclear programme would also guarantee the increasing energy needs of the country and the desalination of seawater and will release more oil, now used for domestic needs, to be exported, which will generate more incomes. Finally, this decision of KSA is also a geopolitical one, as the country does not want to lag behind its major geopolitical rival in the region – Iran.

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<sup>10</sup> Silvia Boltuc (2021) Geopolitics of the Saudi Nuclear Program, *Geopolitical Report Vol.4*, ASRIE Analytica. Link: <http://www.asrie.org/2021/06/geopolitics-saudi-nuclear-program/>.

## *Turkey*

Rapidly growing population, now approaching 85 million (being 27.5 million in 1960) with growing economy although often experiencing inflation-related difficulties and currency problems, it has enormous energy needs which cannot be met only by the import of energy resources such as oil and gas. Furthermore, although Turkey tried to guarantee its gas imports with the pipelines Blue Stream and Turk Stream (Turkish Stream), which transport natural gas from Russia, the country does not want to rely on one energy resource coming predominantly from the Russian Federation.<sup>11</sup> For this reason, Turkey launched a programme to build its nuclear power capacities. The first Turkish nuclear plant in Akkuyu with an installed capacity of 4800 MW is planned to enter into exploitation in 2023 and become operational in 2026. It is constructed by the Russian nuclear company Rosatom and should meet 10 % of its electricity consumption. An important fact to note is that Recep Tayyip Erdogan announced in November last year that after completing the Akkuyu nuclear power plant, Turkey will immediately start the construction of two more nuclear power plants. Erdogan describes nuclear energy as Ankara's contribution to fighting climate change and the construction of Akkuyu to compensate for a decades-long delay in the use of nuclear energy.<sup>12</sup>

Turkey aims to diversify its energy mix with more reliance on renewable and internal energy sources and is considering increasing its renewable energy with plans to install 10000 MW in wind and solar parks in 2027.

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<sup>11</sup> *TurkStream: Russia's Southern Pipeline to Europe* (2021) Congressional Research Service. Link: <https://sgp.fas.org/crs/row/IF11177.pdf>; Stuart Elliot (2021) *Russia's TurkStream link continues to redraw SE European gas map*, S&P Global. Link: <https://www.spglobal.com/commodity-insights/en/market-insights/latest-news/natural-gas/020821-russias-turkstream-link-continues-to-redraw-se-european-gas-map>.

<sup>12</sup> Sinem Koseoglu (2021) *Turkey's nuclear power dilemma*, Al Jazeera. Link: <https://www.aljazeera.com/news/2021/3/10/turkeys-nuclear-dilemma>.

### *The Kingdom of Jordan*

The Kingdom of Jordan demonstrated its interest in developing a national nuclear energy program as it imports most of its energy (over 95%) and seeks more energy security, foreseeable energy prices and security of the supplies.<sup>13</sup> Jordan is currently developing plans to build nuclear capacities, although these programs have passed through some difficulties like protests from environmental activists, delays, and a strategy shift. Jordan is rich in uranium and phosphorite deposits, it is considering to continue developing its nuclear programme, but instead of the planned 2000 MW power plant which had to be built in cooperation with Rosatom, in 2018, Amman announced plans together with Rosatom to develop small modular reactors (SMR) due to cost-saving.<sup>14</sup> Jordan, just like the UAE, has various signed agreements for cooperation in this field with countries like France, Canada, the UK, Russia and China, and its nuclear programme includes the construction of facilities for both power supply and desalination. Due to the country's heavy reliance on the importation of natural gas, small modular reactors can be a good solution for more energy independence and cost-saving to meet the country's increasing energy needs. In addition, the development of the nuclear programme will boost the technological development of the country and will create jobs for highly skilled professionals.<sup>15</sup>

### *Egypt*

With its population of over 100 million people and continues to grow, although rich in fossil fuels, Egypt is also planning to diversify its energy mix. According to data from

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<sup>13</sup> *To Meet Growing Demand, Jordan Turns to Nuclear Energy* (2015) World Politics Review. Link: <https://www.world-politicsreview.com/trend-lines/15410/to-meet-growing-demand-jordan-turns-to-nuclear-energy>; Sinamees Hajarat (2019) *Overview of Jordan's Nuclear Energy Program*, Presentation INPRO. Link: [https://nucleus.iaea.org/sites/INPRO/df17/VI.9-Jordan\\_Sinamees%20Hajarat.pdf](https://nucleus.iaea.org/sites/INPRO/df17/VI.9-Jordan_Sinamees%20Hajarat.pdf).

<sup>14</sup> Charles Digges (2018) *Jordan turns down a Rosatom plant but dangles possible small reactor collaboration with Russia*, Bellona. Link: <https://bellona.org/news/nuclear-issues/2018-06-jordan-turns-down-a-rosatom-plant-but-dangles-possible-small-reactor-collaboration-with-russia>.

<sup>15</sup> Beithou, N. & Abdelkader, Mohammed (2015). Nuclear Energy Production In Jordan: Opportunities And Threats, *European Scientific Journal Vol.11*, pp. 294-307.



the US International Trade Administration, hydrocarbon production accounts for approximately 13.6% of the country's GDP in 2018.<sup>16</sup> The country is the largest non-OPEC oil producer in Africa as per data from the US Energy Information Administration (Nigeria and Angola are OPEC members) and the third-largest natural gas producer in Africa. The country also benefits from its well-developed energy infrastructure and the fact that it is used as a transit route for shipment of oil from the Persian Gulf to Europe and the USA but crucial is the fact that the country is the transit route between the oil and gas-rich Gulf region and the Mediterranean. Egypt also has one of the largest oil refining capacities on the continent, although it is not fully used.<sup>17</sup> Although it found and explored extensive deposits of natural gas in the Mediterranean, a severe problem for the country is that the country's consumption is exceeding its production capacity. For this reason, Egypt is also developing its renewable energy capacity.<sup>18</sup>

At the same time, the country seeks to develop its nuclear technologies as its renewable energy potential is not increasing fast enough. Egypt, just like Turkey, planned to construct a nuclear plant decades ago, but the political turmoil and changes did not allow this to happen at the time. In June 2021, the Egyptian Nuclear Power Plants Authority (NPPA) had applied for construction permits for units 1-2 and later also for construction permits for units 3-4 of the El-Dabaa nuclear power plant, which will be situated in the Matrouh province on the Mediterranean Coast, 190 miles northwest of Cairo. The project's main contractor is the Russian Rosatom, and the subcontractor is Atomstroyexport which is applying for licensing documentation together with NPPA.<sup>19</sup>

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<sup>16</sup> *Egypt - Country Commercial Guide* (2021) US International Trade Administration. Link: <https://www.trade.gov/country-commercial-guides/egypt-oil-and-gas-equipment>.

<sup>17</sup> *Egypt's Refineries: A Complete Picture* (2017) Egypt Oil & Gas. Link: <https://egyptoil-gas.com/features/egypts-refineries-a-complete-picture/>; Charné Hundermark (2021) Top Ten: Oil Refineries in Africa by Capacity, Energy Capital & Power. Link: <https://energycapitalpower.com/top-ten-oil-refineries-in-africa-by-capacity/>.

<sup>18</sup> *Egypt aims to generate 42% of renewable power by 2030* (2021) Reuters. Link: <https://www.reuters.com/business/sustainable-business/egypt-aims-generate-42-power-renewables-by-2030-2021-11-04/>.

<sup>19</sup> *Construction of El Dabaa NPP in Egypt to begin in July — Rosatom* (2022) TASS. Link: [https://tass.com/economy/1389379?utm\\_source=startpage.com&utm\\_medium=referral&utm\\_campaign=startpage.com&utm\\_referer=startpage.com](https://tass.com/economy/1389379?utm_source=startpage.com&utm_medium=referral&utm_campaign=startpage.com&utm_referer=startpage.com).



El-Dabaa is planned to consist of four Generation III + VVER -1200 reactors, and the first unit is scheduled to become operational in 2026. Russia has been lending Egypt 25 billion dollars for the construction (which is 85 % of the total cost and the remaining 15 % being financed by Egypt itself) for 22 years with a 3 % annual interest rate, and it is also constructing and implementing technology in it. The facility's total capacity is planned to be 4800 MW with a 1200 MW power generation capacity for each unit. The construction of this plant will make Egypt the first country in the region to possess Generation III + reactors.

### ***The Syrian Arab Republic***

As per the situation in Syria, the country tried to develop nuclear production capacities, but the continuous war and airstrikes carried out to the country, including by neighbour Israel are deemed to have stopped any similar projects from further development. Israel is very sensitive to the development of nuclear programmes, even declared civilian ones by rivals like Syria and Iran, as it considers it a threat to its national security.

### ***Israel***

Israel does not have a nuclear power plant, but it has nuclear technologies, and although it has never disclosed its atomic arsenal, experts believe it is between 100 and 300 nuclear warheads. Israel also has a Nuclear Research Centre near the town of Dimona.<sup>20</sup> However, the country does not use nuclear energy in its energy mix because a nuclear power plant could be an easy target for terrorist attacks, so the country primarily relies on fossil fuels, including coal and, to a lesser extent, renewables (around 4 %).

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<sup>20</sup> Judah Ari Gross (2019) *Israel's Dimona nuclear reactor is not Chernobyl but does have vulnerabilities*, The Times of Israel. Link: <https://www.timesofisrael.com/israels-dimona-nuclear-reactor-isnt-chernobyl-but-does-have-vulnerabilities/>.

### ***Lebanon***

Lebanon does not have nuclear power plants nor has officially announced plans to build any soon. The country relies considerably on oil, with many households relying on private generators to guarantee their consumption.

### ***Iraq***

The last country of the region to be reviewed is Iraq – a very oil-rich country, OPEC's biggest oil exporter but heavily hit economically and socially by continuous wars and instability. The news from 2021 was that the oil-rich country has nuclear ambitions, and due to widespread blackouts, which have caused social unrest, it has plans to build nuclear facilities.<sup>21</sup> It is expected that by the end of the decade, the country will have a 50 % increase in the demand which also has to be met. In search of a sustainable solution that can compensate for this energy gap, it announced its intention to build eight nuclear reactors with a total capacity of approximately 11 GW. Talks and negotiations are with the Russian Rosatom, the Korean KEPCO, and French and US companies.

### **Conclusion**

The above-described energy situation in the Middle East leads to the following conclusions that can be made concerning the tendencies in the energy sector and the oil and gas market in the region, which is impacted by these tendencies:

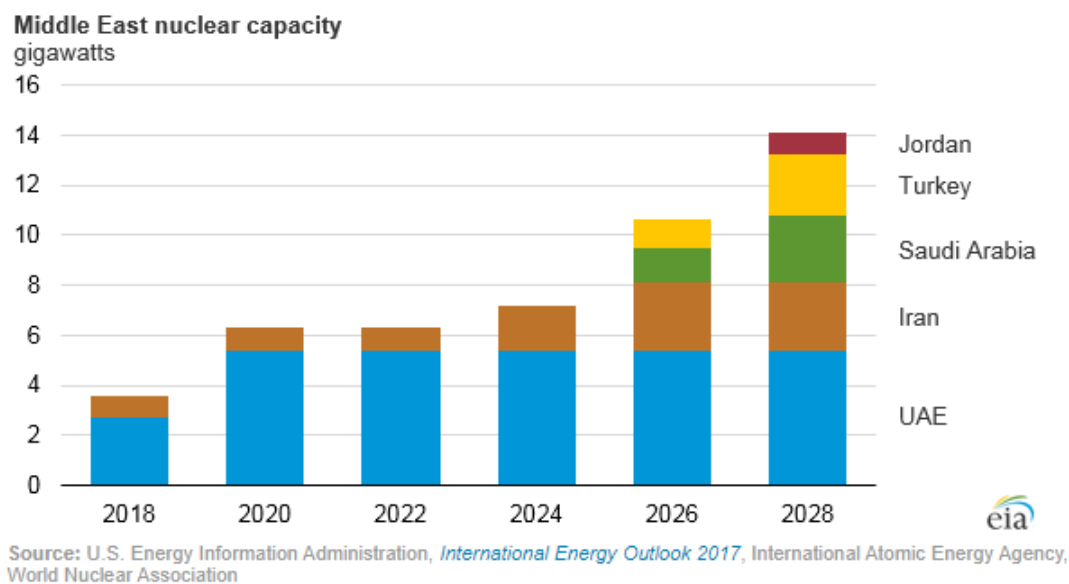
- Although quite rich in oil and gas, the region is transforming its energy sector, decreasing reliance on fossil fuels and diversifying its energy mix.
- All the region is with highly increasing population hence the energy consumption needs are increasing.

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<sup>21</sup> Khalid Al-Ansary & Anthony Di Paola (2021) *Iraq plans nuclear power plants to tackle electricity shortage*, Al Jazeera. Link: <https://www.aljazeera.com/economy/2021/6/8/iraq-plans-nuclear-power-plants-to-tackle-electricity-shortage>.

- Many of the countries from the Middle East (although not all as some like Iraq and Syria still suffer the heavy consequences of the war) are constantly enlarging and developing their economies, consequently increasing their energy demand.
- The countries from the region, being generally with a young and growing population, want to guarantee more highly skilled vacancies. The nuclear energy sector requires a highly qualified labour force, which is one more reason for developing the sector.
- Another reason is that the countries want to increase their technological presence to become familiar with the management of new technologies, and nuclear energy is a good starting point for such development.
- Environmental sustainability and the decrease of use of fossil fuels, especially oil and coal, are other reasons for developing nuclear projects in the region. Nuclear energy is generally considered clean energy, not harmful to the environment, and can help diminish carbon emissions.
- Nuclear energy is characterised by the continuity of the supplies, which is not valid for renewable energy sources such as solar or wind.
- The construction of nuclear power capacity will allow many countries to export more significant quantities of their oil and gas deposits, which are now consumed internally and generate more income for the budget and investments.
- The region generally disposes of sufficient quantities of uranium ore from which the nuclear fuel of the plants is produced. This means that with the development of the mining and technological process, the region could satisfy its needs for this ore without being dependent on imports.

Considering all these factors, it is not surprising that the region has big plans to develop nuclear energy. The US Energy Information Administration below shows that by 2028 five countries from the Arab peninsula plus Egypt will become nuclear countries.



Source: US Energy Information Administration, *International Energy Outlook 2017*, International Atomic Energy Agency, World Nuclear Association.

A significant observation to make is that the implementation of nuclear technologies is entirely connected to the geopolitical orientation of the countries.

Choosing which nuclear country to help construct the facilities is more geopolitical than a technical question. Due to its importance and dual-use capabilities, nuclear energy is a state enterprise – controlled and used for geopolitical purposes, and it guarantees energy security and independence.

Considering the above, we can conclude that the great world powers dominate the Middle East. The Russian Federation has strategic ties with Iran, Egypt, Turkey and possibly Iraq. The UAE, KSA and possibly Jordan (although no definite information on its projects is known yet) have different geopolitical orientations and are more affiliated to the USA, although China and South Korea are gaining presence.

But how could the development of nuclear energy production influence the oil and gas market? It can, at least in the region, as the countries from the Middle East want to diversify their energy mix and not rely on a single source, although many of them possess it in abundance. All of the countries will continue to export and consume oil and gas- to export until possible to generate more incomes and consume -as their energy

consumption needs will continue to increase in the years to come. However, the message is clear- the world energy map is changing, and the importance of fossil fuels is fading, partially due to climate sustainability policies and requirements, partially due to the fact they are not renewable (millions of years are necessary for them to be formed again once extracted) and the countries from the region do not want to rely solely on a single source that makes them vulnerable and dependant in many senses. Moreover, most importantly, the Middle East does not want to be accepted as simply an exporter of oil and gas; it wants to develop high technologies and science and transform from a simple supplier of crude resources to an independent and technologically developed place that creates value-added products. Export of natural resources never gives sufficient margin for the exporter, nor does it create highly skilled workplaces.

Oil and natural gas will remain important in the energy market and national economic strategies for different reasons that are not subject to the present analysis. However, the energy mix in the region will be different – more diversified, more stable and predictable and less reliant on foreign supplies. The Middle East is part of the energy transformation around the globe, and it aims to meet the new energy era technologically prepared.



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