

The Gulf New Deal

POWER, COMPETITION, AND THE RENEWABLE-ENERGY TRANSITION
IN THE ARAB MONARCHIES

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Climate action will enhance competitiveness, spark innovation, and create millions of high-quality jobs. Young people, both in the kingdom and the world, are demanding a cleaner, greener, and more inclusive future, and we owe it to them to deliver on this.

—Crown Prince Mohammed bin Salman of Saudi Arabia, March 27, 2021¹

Climate change and our environmental challenges are one of the biggest existential threats to our way of life. Not just as a nation, but as a world. And in order for us to combat that threat, we must be as ambitious and innovative in our solution as possible.

—Rep. Alexandria Ocasio-Cortez (D-NY), February 7, 2019²

As political figures, the Crown Prince of Saudi Arabia and the representative of New York's Fourteenth Congressional District could not be more different. One is the heir to the world's most powerful absolute monarchy and the guardianship of Islam's most holy places, while the other is a progressive, self-titled democratic socialist who was elected to Congress. Despite this distinction, in recent years, both Representative Alexandria Ocasio-Cortez and the crown prince have championed their own ambitious and environmentally conscious agendas. Ocasio-Cortez's commitment to a comprehensive economic and social response to climate change is well documented. The crown prince, however, is less known for his environmental bona fides. Indeed, some commentators have dismissed Saudi Arabia's recent environmental overtures as green window dressing from a deeply illiberal regime.³

However, this perspective overlooks the subtle but high-stakes political battleground that the global renewable-energy transition has created in the Gulf. Rather than existing as a policy afterthought, the regional race to develop low-carbon economies strikes at the very heart of regime stability and geopolitical security among the Arab Gulf monarchies. Once known by the moniker *petrostates*, the Gulf monarchies are in the midst of navigating a global energy transition toward decarbonization that has the potential to disrupt—or end—their status quo.

This essay makes three primary arguments about the Gulf Arab monarchies within the global renewable-energy transition. The first is that the rise of lower-carbon energy



sources, and the corresponding relative downfall of carbon fuels, poses a significant threat to the Gulf monarchies' political survival. The second argument is that Gulf leaders are aggressively pursuing an all-out renewable-energy development effort to get ahead of this threat. In a context of increasing economic competition among the Gulf Cooperation Council (GCC) countries, the race to claim the title of regional renewable vanguard risks severing the monarchies' otherwise integrated and cooperative renewable-energy industries. The third argument is that the impetus to develop non-fossil fuel sources of energy has led to the creation of advanced civilian nuclear programs, which significantly increases the risks associated with military and militant activities in the region.

For American policy makers, the forthcoming challenges of the Arab monarchies pose a potential flash point for the United States' interests abroad. Among the members of the GCC, who have long served as American partners, global decarbonization has the potential to ignite domestic unrest, internecine diplomatic fissures, and the proliferation of delicate nuclear facilities in a volatile region. Despite an increasingly popular mantra of withdrawal and restraint from the Middle East, the success or failure of this energy transition will ameliorate or exacerbate American economic, diplomatic, and security interests in the Gulf—irrespective of whether American troops are present or not.

This essay proceeds as follows: The first section outlines the central role fossil fuels have played in the stability of the domestic political-economic system of the Gulf monarchies. The second section sheds light on the Gulf's ambitious efforts to spur a domestic energy transition, and the increasing non-oil economic competition among the GCC members. The third section details the recent advances of the Gulf Arab nuclear energy programs and their security implications. The final section traces this essay's conclusions and policy implications.

The Oil Marathon Becomes a Renewable Sprint

The global energy transition toward lower-carbon fuels constitutes a monumental challenge for the Gulf Arab states. More so than in any other region on earth, the profits of fossil fuels have underwritten the construction of both physical infrastructure and a cautious political balance that mixes generous welfare policies with autocratic, monarchical rule. While the Gulf states have for decades weathered the volatility of the oil market through a marathon of continual low-price production, a permanent global shift away from fossil fuels represents a looming challenge to their political and economic status quo. The recognition of this pending disruption has been the silent starting pistol for the sprint toward renewable energy.

Fueling the Status Quo

For the members of the GCC—namely, Saudi Arabia, the United Arab Emirates (UAE), Bahrain, Qatar, Kuwait, and Oman—it is difficult to overstate the importance of hydrocarbons over the past fifty years. This is not because of an innate fascination with or affinity for fossil fuels but, rather, because fossil fuel revenues have afforded nearly everything from education to roads. From a fiscal perspective, the rapid and sustained influx of petrodollars has supercharged infrastructural development. Political scientist Terry Lynn Karl describes the initial oil boom in the 1970s as “the most radical transfer of wealth to occur without war.”⁴ In the 1930s, for example, the Saudi state budget was reliant upon the fluctuating revenues that pilgrims would bring to the holy cities of Mecca and Medina.⁵ By contrast, in 2020, Saudi Arabia held sufficient economic clout to host the G20 annual meeting.

In addition to roads, schools, and military hardware, hydrocarbon revenues have enabled the creation of magnificently generous welfare states. World-class health care, tuition at American universities, and a culture of public employment from cradle to grave are all commonly cited as rights that Gulf citizens have come to expect from their governments.⁶ Energy is subsidized to power air-conditioning through the hot Arabian summers, desalinated water is subsidized to make desert life possible, and taxation has long been kept to an absolute minimum. The scale of this resource-backed development is starkly evident across the international borders of the Middle East. Nowhere else in the world does a highly developed, highly educated welfare state such as Saudi Arabia share a border with such a chronically impoverished nation blighted with misery and famine as Yemen.

Behind this rapid economic development, however, lies the James Otis–style bargain of petro-autocracy. In exchange for the states’ largess, Gulf citizens live under monarchical rule with comparatively few political rights or fiscal duties.⁷ Without taxation, there is no representation. This political arrangement is more formally known as the rentier state, in which public spending is funded through the external sale of natural resources, few of the citizenry work directly in the extraction of natural resources, and taxation and political representation are kept to a minimum.⁸ While Gulf monarchies and societies each have their own unique character and political arrangements, since the 1970s they have nonetheless formed diverse iterations of this general model.⁹

From Kyoto to Paris

For a system built upon extracting and distributing the profits of oil and gas, global interest in renewable energy marks a departure from the status quo. While volatility in energy markets is as old as the markets themselves, historically the Gulf Arab states have ridden out the turmoil through two strategies. The first has been collective action



through the Organization of the Petroleum Exporting Countries (OPEC). Even when a rise in oil production outside of the cartel, such as within the United States, has limited OPEC's ability to reduce supply, the cartel has collaborated with other major oil producers such as Russia to moderate global production.¹⁰ The second strategy, particularly when collective action fails, is a reliance upon the Gulf's low cost of production. Through economies of scale, technical expertise, and an abundance of natural resources, the national oil companies (NOCs) of the Gulf are among the world's most cost-efficient oil and gas extractors.¹¹ In practice, when the market endures a downturn, the Gulf monarchies can take a marathon-like approach to production with the knowledge that they can outlast their competitors until the market once again shifts favorably.

In contrast with these long-held strategies among the Gulf NOCs, the renewable-energy industry has been notable for its recent rapid change and upheaval. Slashed costs, higher efficiency, and remarkable technological advances have all been made in recent years. This renewable-energy revolution can be delineated into three main trends: increased renewable-energy generation (such as solar or wind), efforts to increase energy efficiency, and efforts to electrify otherwise non-renewably powered technology (such as electric cars).¹²

Compared to a temporary market swing, the ongoing renewable-energy revolution constitutes a distinct challenge. In the simplest terms, there is a concerted effort to stop buying what the Gulf monarchies are selling. While there is a divergence of opinion over when peak oil demand may occur, and whether the peak itself is actually relevant, it is difficult to interpret enthusiasm for reducing carbon emissions as a strictly positive sign for the future of the global hydrocarbon industry.¹³ Similarly, there is little indication that the energy transition will vanish in due course, like an oil market downturn. More broadly, the issue of greenhouse-gas emissions has increasingly become an internationalized, multilateral issue. The Kyoto Protocol of 1997, for example, largely overlooked developing countries in its effort to limit global emissions. The Paris Agreement of 2015, however, has near-universal participation. It is because of this enduring and intensifying global interest and commitment to renewable and alternative energy that this trend is termed an energy *transition*. For the Gulf Arab monarchies that may want to avoid potential environmental pariah status, there is decreasing leeway to ignore the implications of this global trend.

There are nonetheless important caveats to this narrative of decline. While oil demand is expected to trend downwards in the long run, there will still be residual demand for oil and oil-based products (such as plastics). Spencer Dale and Bassam Fattouh note, "Even after oil demand has peaked, the world is likely to consume substantial quantities of oil for many years to come."¹⁴ As low-cost producers, the Gulf NOCs

are well positioned to capture this residual demand. Similarly, Thijs van de Graaf argues that it will not be the Gulf producers that will be saddled with climate-induced stranded assets but, rather, “the most expensive, risky and polluting fields, such as the Arctic, the ultra-deepwater fields, and the tar sands.”¹⁵ An additional caveat is that the burden of the energy transition will fall unevenly across the Gulf states. Qatar, for example, derives the majority of its external revenues from the sale of natural gas, which is often billed as a transition fuel.¹⁶

Challenge Accepted

What does the global transition toward lower-carbon energy mean for the Gulf Arab states? With a political and social system forged in a context of seemingly endless oil and gas revenue, Gulf monarchies are facing down a potential upheaval of their fifty-year status quo. This possible trajectory is mapped by the academic theory known as the “authoritarian bargain.”¹⁷ Autocrats can offer their subjects economic benefits to shore up their own rule, but when the coffers run dry, they are forced to concede political rights to meet their citizens’ demands. For the Gulf Arab monarchies, the first side of this authoritarian bargain was particularly evident during the Arab Spring, in which King Abdullah of Saudi Arabia unveiled a massive \$130 billion spending plan and the GCC pledged \$20 billion for Bahrain and Oman.¹⁸

Predicting the future is, of course, a perilous task. Despite these indications, the fervor of the green energy revolution may wither, and the status quo may well prevail. For the Arab Gulf monarchies and their autocratic leadership, however, the stakes are too high to rely on hope. The words of President Jimmy Carter in Tehran provide a historic lesson about the pitfalls of a lack of forward thinking. Toasting Shah Mohammed Reza Pahlavi on New Year’s Eve, 1977, President Carter described imperial Iran as “an island of stability in a turbulent corner of the world.”¹⁹ Little more than a year later, Pahlavi fled the country on the eve of Ayatollah Khomeini’s Islamic revolution.

Faced with the prospect of potential upheaval, the Gulf Arab monarchies have embraced the challenge of the energy transition. If the Gulf monarchies can succeed in reforming their economies and societies before the global economic winds of change do, they can perhaps chart a future that, unlike the one Pahlavi’s Iran encountered, includes them at the helm.

The Gulf’s Solar Boom

Recognizing the potential domestic political threat of the global transition to low-carbon energy, the Gulf Arab monarchies have launched an unbridled effort to spearhead the domestic development of renewable-energy industries. Renewable-energy generation eases the fiscal cost of subsidizing power, while the labor needed to develop, oversee, and potentially manufacture these projects eases the demand on unproductive



Table 1. Total renewable-energy capacity in megawatts (MW)

Country	2015	2016	2017	2018	2019	2020	5-year increase (%)
Bahrain	6	7	7	7	10	10	66.67
Kuwait	6	33	44	55	106	106	1,666.67
Oman	2	2	8	8	59	159	7,850.00
Qatar	42	43	43	43	43	43	2.38
Saudi Arabia	24	24	37	87	413	413	1,620.83
UAE	136	142	356	599	1,919	2,540	1,767.65

Source: Calculations are the author's own, using data from the annual report of the International Renewable Energy Agency (IRENA), *Renewable Capacity Statistics 2021*.

public sector positions. This renewable push parallels other reform initiatives that seek to slim public spending, cut subsidies, and raise revenues through value-added sales taxes.²⁰ While the full-throttled pursuit of renewable energy has produced an unspoken competition among GCC members, it stands in contrast to an increasingly overt, seemingly zero-sum, internecine rivalry for non-oil economic growth. With such high stakes, it remains to be seen if, and how, Riyadh and Abu Dhabi will share the mantle of the Middle East's renewable vanguard.

Powering the Status Quo

In addition to subsidized natural gas and gasoline, electricity subsidies are a hallmark of the traditional Gulf social contract.²¹ The punishing heat of the Arabian Peninsula necessitates potent air-conditioning for much of the year. Consequently, households and businesses typically enjoy access to subsidized electricity, the price of which bears little relation to the cost of generating it.²² While each of the Gulf monarchies has experimented with electricity tariff reform since the spectacular plunge in the price of oil in 2014, few customers pay an unsubsidized rate.²³ Although electricity subsidies drain the public coffers, the Gulf monarchies' hesitancy to liberalize prices is politically savvy; public protests over the cost or lack of electricity have erupted in recent years in Jordan, Lebanon, and Gaza.²⁴ Similarly, protests over the cost of living have lately occurred in Tunisia, Turkey, Iran, and even in the GCC's own Oman.²⁵

By providing a cost-competitive alternative to burning oil or gas, which could otherwise be sold on the international market for a handsome profit, renewable energy provides a potential route to maintaining the status quo of the Gulf's generous welfare systems.²⁶ Given this high potential, the GCC countries have produced a renewable-energy boom in recent years. This rapid development is evident in Table 1, which outlines the GCC countries' renewable generation capacity since 2015, the year of the Paris climate accord.

Table 2. Solar share of renewable generation capacity (%)

Country	2015	2016	2017	2018	2019	2020
Bahrain	83.33	85.71	85.71	85.71	90.00	100.00
Kuwait	50.00	93.94	72.73	78.18	87.74	87.74
Oman	100.00	100.00	100.00	100.00	15.25	68.55
Qatar	9.52	11.63	11.63	11.63	11.63	11.63
Saudi Arabia	100.00	100.00	91.89	96.55	99.03	99.03
UAE	98.53	99.30	99.72	99.83	99.95	99.96

Source: Calculations are the author's own, using data from IRENA's annual report, *Renewable Capacity Statistics 2021*.

Solar power (more specifically, utility-scale photovoltaic solar) has become the leading form of renewable-energy generation among the Gulf Arab monarchies. This is due to three primary reasons—the first being the very intuitive fact that the region enjoys an almost unrivaled amount of sunshine. Secondly, aside from Bahrain and Kuwait, each of the monarchies has a significant expanse of sparsely inhabited arid territory in which to place the cumbersome solar installations. Finally, solar-power technology is sufficiently advanced to rival the cost of conventional fossil-fuel power generation. Table 2 illustrates the central role of solar power in the GCC's renewable-energy boom.

With a maximum capacity of approximately 2,539 megawatts (MW), the United Arab Emirates currently holds the leading position in the Gulf for solar-energy generation potential.²⁷ To contextualize this figure, more than a third of the greater Middle East's renewable-energy capacity is located within the UAE. The nation's flagship development is the Mohammed bin Rashid Al Maktoum Solar Park, located approximately thirty miles south of Dubai. It is expected to generate 5 gigawatts (GW) of power by 2030. While the park is the world's largest single solar facility, it is also unique for its combination of technologies, employing photovoltaic arrays, parabolic troughs, and a concentrated solar tower that utilizes molten salt technology.²⁸

The scale of these initiatives can be partially attributed to the potential of, and enthusiasm for, renewable technology, yet they are, nonetheless, only the latest incarnation of a popular approach to infrastructural development in the Gulf that was forged during the 1970s oil boom.²⁹ As expensive, physically expansive, and generally ambitious projects, these state-led renewable initiatives dwarf American private projects. Juergen Braunstein observes, "On average, a solar project in the GCC costs \$3.2bn, whereas an average solar project in the US costs \$283mn, which is slightly below the world average costs of \$322mn."³⁰



The “Saudi Arabia” of Renewable Energy?

With such large, similar investments within relatively close geographic proximity, there is, unsurprisingly, significant interaction between the largest actors in the Gulf’s solar-power industry. This interaction cannot be divorced from regional politics, as many of these locally based actors, such as Abu Dhabi’s Masdar and Saudi Arabia’s ACWA Power, are either completely or partly state owned. Due to the renewed close relations among the GCC countries, particularly after the Al Ula declaration of January 2021, these green “national champions” appear to have developed projects in neighboring countries without dispute. Despite this ostensible harmony, there is an unspoken competition among the GCC countries for the title of regional renewable powerhouse. Coupled with an expanding movement to domesticate non-oil economic growth within individual GCC countries, the soft rivalry and collaboration that has characterized the renewable-energy industry may not endure the broader headwinds of mercantilism.

A prominent arena of economic competition among the GCC states is the effort to initiate the world’s most cost-competitive solar project. As a point of reference, according to the federal Energy Information Administration’s *Annual Energy Outlook 2021*, basic solar facilities that will come online in 2026 in the United States have an average cost of 3.278 cents per kilowatt hour (/kWh) of electricity produced.³¹ By contrast, in November 2019, the Dubai Electricity and Water Authority announced the world’s then lowest tariff of 1.6953 cents/kWh for the fifth phase of the Dubai Solar Park.³² This title was later usurped by the Al Kharsaah project in Qatar in July 2020 with a cost of electricity announced at 1.449 cents/kWh.³³ However, by December 2020, the Abu Dhabi National Energy Company declared a new world record tariff of 1.32 cents/kWh.³⁴ Although Saudi Arabia initially pursued a more cautious approach, prioritizing successful completion over world titles, it too was eventually drawn into the regional race.³⁵ In early 2021, Crown Prince Mohammed bin Salman announced that the 600 MW Shuaibah solar project would take the global pole position with an electricity cost of 1.04 cents/kWh.³⁶ These announcements often alternate between announcing the cost of a project or the tariff, which hinders a precise, apples-to-apples comparison.³⁷ They rarely omit the claim of a world title, however. While each subsequent announcement claims the title of world’s most cost-competitive or affordable solar-power project, in reality this competition is primarily among the neighboring GCC states.

Although these attention-grabbing figures are indicative of industrial policy bravado among the Arab monarchies, they also provide an important indication of government commitment to the development of renewables. How can electricity tariffs sink lower and lower in such a short period of time, maintaining a yawning

gap with US prices? There are three factors at play: industrial maturity, creative accounting, and government support. Firstly, improved technology, economies of scale in manufacturing, cheaper hardware, and increased developer experience have all helped decrease the cost of utility-scale photovoltaic solar by 82 percent from 2010 to 2019.³⁸ Secondly, a much lower headline price can be achieved by excluding or absolving certain costs from a project's balance sheet, such as land, roads, and grid infrastructure.³⁹ For example, Amro Elshurafa notes that ACWA Power's 2015 record-shattering tariff of 5.84 cents/kWh for a 200 MW project in the Dubai Solar Park was achieved, in part, by conveniently excluding the cost of the park's preexisting infrastructure.⁴⁰ Finally, government support is integral to these low prices. Public utilities guarantee that they will purchase the electricity, and state-owned enterprises are often involved in the development of the projects. The profound involvement of state actors, particularly for projects that have an expected lifetime of over twenty years, has provided access to very generous project financing and, consequently, low electricity prices.⁴¹ These prices suggest that, rather than simply permitting and championing utility-scale renewables from the sidelines, the Gulf monarchies and their public institutions are playing an unmistakably aggressive role in their development.

Keeping Up with the Al Maktoums

The soft rivalry among the Gulf solar projects stands in contrast with an increasing trend toward localizing non-oil economic growth at the expense of fellow GCC members. Historically, the economy of Saudi Arabia presented a near caricature of the challenges that have hindered the Gulf's non-oil economic development. While each economy within the GCC is at least partially reliant upon oil and gas revenues, Saudi Arabia combined this reliance with restrictive social regulations, an uncompetitive business climate, and the absence of a tourist visa program. Women were barred from driving, the kingdom was the last GCC member to join the World Trade Organization, in 2005, and the first monarch of modern Saudi Arabia, Ibn Saud, was reported to have pinned his kingdom's survival upon making it so difficult to access that "the foreigner will have no other aim, with his task fulfilled, but to get out."⁴²

While Saudi authorities in earlier decades engaged the challenge of social and economic reforms, the political rise of Crown Prince Mohammed bin Salman marked the beginning of an unparalleled push for change.⁴³ This agenda, which includes the development of the renewable-energy sector, is termed Vision 2030. By rapidly paring back social restrictions, slashing red tape, and spurring the creation of domestic tourism and entertainment industries, the crown prince's reform initiatives generated speculation that he was setting up the once-conservative kingdom as a rival to its relatively liberal neighbors, such as the UAE.⁴⁴



This largely unspoken competition burst out of the shadows and into the headlines in February 2021, when Saudi authorities announced that foreign companies would need to base their regional headquarters within the kingdom from 2024 onward in order to bid on government contracts.⁴⁵ While there were earlier reports that Riyadh would seek to boost its expatriate business community, the announcement of the “HQ program” was widely interpreted as a direct effort to lure international businesses from Dubai (ruled by the Al Maktoum clan), which is the Gulf’s primary hub for international business and tourism. Additionally, the move casts other Saudi reform initiatives in an increasingly adversarial light. For example, by developing a domestic entertainment industry, the Vision 2030 plan seeks “to increase household spending on cultural and entertainment activities inside the Kingdom from the current level of 2.9% to 6%.”⁴⁶ Within a context of heightened GCC rivalry, this objective may be seen as a move against Dubai and Bahrain, which have long served as entertainment hubs for Saudis.

Despite this simmering competition, the renewable-energy industry has remained relatively cooperative. Saudi Arabia’s ACWA Power has been involved in various solar projects in Bahrain, Dubai, and Oman, while the UAE’s Masdar has developed wind-power projects in both Oman and Saudi Arabia. Given the diverse experiences and expertise of the two companies, the recent history of cross-border projects is most likely the product of genuine opportunities for regional collaboration. As the industry matures, both in terms of successful domestic projects and individual institutional know-how, it remains to be seen whether the renewable-energy industry will succumb to mercantilist pressures.

The development of renewable energy thus provides a potential remedy to the forthcoming challenge of providing affordable electricity within the Gulf monarchies. Particularly through huge utility-scale photovoltaic solar-power facilities, the GCC member states have eagerly sought to take advantage of this opportunity. However, within a context of increasing pressure to localize non-oil economic growth, this culture of international collaboration may give way to protectionist restrictions.

Nuclear Risks and Rewards

For at least the past decade, discussions, negotiations, and concerns about nuclear technology in the Middle East have focused primarily on the actions and intentions of the Islamic Republic of Iran. In the shadows of this international attention, however, several Gulf monarchies have pushed ahead with their own nuclear programs. Operating with comparatively little international fanfare or opprobrium, some two hundred miles from the Iranian coast on the other side of the Gulf, the Arab world’s first civilian reactor is producing nuclear energy in Abu Dhabi. Nuclear power straddles traditional dichotomies of energy types, and because it does not consume a fossil fuel, it produces minimal greenhouse emissions. However, by relying upon finite

sources of uranium, nuclear power cannot be termed renewable. Nonetheless, nuclear power offers an immensely reliable source of twenty-four-hour energy for the Gulf monarchies. While the race to develop reliable, low-carbon sources of energy preempts domestic social and economic pressures, the advent of a nuclear-powered Gulf introduces otherwise unparalleled regional security risks.

The Potential for Nuclear Success

Nuclear-power generation offers a variety of unique benefits for the GCC states. While solar power takes advantage of the Middle East's comparatively abundant sunshine (or, more technically, solar irradiance), substantial energy storage facilities are required to stockpile this energy for nighttime electricity demand.⁴⁷ Technological advancement, particularly in battery storage and thermal-energy storage within concentrated solar facilities, has made progress in addressing this challenge. However, it remains costly and relatively underdeveloped. Conversely, nuclear power offers a reliable source of electricity around the clock. Nuclear power also provides a hedge against the varying price of inputs. Although nuclear power is often more expensive on a per-kilowatt basis than solar, and a mix of solar and natural gas may be more efficient in the near future for countries like Saudi Arabia, only 5 percent of the cost of nuclear power is associated with the price of uranium.⁴⁸ This suggests that the price of nuclear power will be less reliant upon unknown and potentially volatile natural gas prices. Rather than a substitute, nuclear power can serve as a complementary source of energy during peak demand for a portion of the year, while similarly saving oil and gas for revenue-earning export.⁴⁹

Given the potential benefits of nuclear power, several Gulf monarchies have embarked on nuclear development initiatives. Over the past decade, Kuwait, Bahrain, and Saudi Arabia have each explored if and how nuclear power could be added to its domestic energy mix.⁵⁰ With the first completed nuclear-power facility in the Arab world, as of August 2020, the United Arab Emirates initiated operations at the Barakah nuclear-power plant.⁵¹ Located within the western part of the Emirate of Abu Dhabi, the four-reactor Barakah plant is expected to eventually have a maximum capacity of 5.6 GW and will meet 25 percent of the UAE's electricity demand. The contract for constructing the light-water reactors was awarded to Korea Electric Power Corporation.

The Potential for Nuclear Disaster

In addition to conventional concerns about the environmental and health risks associated with nuclear power, the volatile security situation within the Gulf means that nuclear facilities pose a unique risk. While attacks upon energy facilities have the potential to debilitate a city's or a region's ordinary function, or even cause loss of life, a targeted or misguided attack on a nuclear facility risks creating a much broader problem.



The Barakah plant became the target of the UAE's regional adversaries before it was even completed. In December 2017, media services associated with the Yemen-based Houthi movement (also termed Ansar Allah) announced that the group had fired a cruise missile at the plant.⁵² Emirati authorities quickly denied the reports, and commentators labeled it a media stunt.⁵³ While there remains little evidence that the attack did in fact occur, other attacks on energy facilities are well documented. On September 14, 2019, a drone attack on Saudi oil facilities in Abqaiq and Khurais temporarily reduced Saudi oil production by 50 percent. While the Houthis initially claimed responsibility for the attack, international observers have attributed it to Iranian-backed militias in southern Iraq. At a most basic level, these two discrete incidents demonstrate that hostile entities within the Middle East have the capability to cause significant damage to energy facilities, and that Gulf nuclear facilities constitute a potential target.⁵⁴

An intentional attack upon a Gulf nuclear facility would constitute a deliberate and unprecedented escalation of conflict, but the mere presence of nuclear facilities in the region raises the stakes of any strategic miscalculation. One recent and disastrous miscalculation was the January 8, 2020, attack on Ukraine International Airlines flight 752. Reportedly mistaken for an incoming missile strike, the aircraft was shot down by Iranian authorities, with 176 civilians killed.⁵⁵ A similar incident occurred during the Iran-Iraq war in July 1988, when the USS *Vincennes* reportedly mistook Iran Air flight 655 for a fighter jet. Civilian deaths numbered 290. Further afield, a potentially catastrophic miscalculation was averted just years before, in 1983, when the Soviet Union's nuclear early-warning system erroneously reported four American incoming missiles. These select examples demonstrate that a strategic miscalculation is, regrettably, a possibility and, given that the Barakah has already been identified as a potential target by the UAE's adversaries, the construction of civilian nuclear facilities increases the potential devastation of such a miscalculation.

Due to the close proximity of the Gulf countries to one another, and the catastrophic damage associated with a nuclear incident, the development of the Barakah facility has provoked a critical response from some neighboring states. In 2019, amid the Gulf diplomatic crisis, Qatari authorities called on the International Atomic Energy Agency to intervene over their country's concerns that the Barakah plant would pose an environmental and security threat in the Gulf region.⁵⁶ Conventional nuclear-power plants utilize water as an industrial coolant, and consequently, most are located close to a large body of water. With the Barakah plant situated on the Emirati coast, the Qatari complaint highlighted how a radiation leak into the Gulf would adversely impact neighboring countries' access to desalinated water. Additionally, with the Barakah facility geographically closer to the Qatari capital, Doha, than the closest Emirati city, Abu Dhabi, any air- or waterborne nuclear materials would quickly

reach Qatar. While these concerns may have been raised at the height of a diplomatic dispute, they nonetheless illustrate some of the spillover implications of an incident at a civilian nuclear-power plant within the region.

Nuclear power has the potential to be a consistent source of low-emissions energy in the Gulf. Particularly in the interim, while renewable-energy storage technologies are still developing, the landmark Barakah plant in the Emirate of Abu Dhabi will meet a significant portion of the UAE's electricity demand during periods when renewable generation is intermittent. However, the volatile nature of physical security in the Gulf introduces a raft of unique pitfalls. Whether by malfunction, an intentional attack, or a strategic miscalculation, an abnormal incident at a Gulf nuclear facility could generate significant adverse ramifications for both the host country and its neighbors.

Conclusion and Policy Recommendations

In the midst of a global energy transition, the Gulf Arab monarchies of the GCC find themselves in a unique situation. As the most developed countries of the world chart a future to lower greenhouse emissions, the GCC members are forced to reckon with a global movement that seeks to buy less of the resources that have fueled their state-building and economies for fifty years. This essay consequently makes three primary arguments about the Arab monarchies and the global energy transition.

The first is that the political stability of the Arab monarchies is based, at least in part, upon the use of oil and gas subsidies to provide low-cost water, gas, and electricity to their citizens. Without this fossil-fuel revenue, and faced with the inability to subsidize these basic utilities, these countries are at rising risk of political unrest. Recognizing this fragility, at least in principle, would help American policy makers and diplomats to effectively maintain informed and collaborative diplomatic relations with the Gulf monarchies.

The second argument is that, in an effort to head off this fragility, the Gulf Arab monarchies are embarking on an aggressive push to develop utility-scale renewable-energy projects. While various Gulf renewable companies have developed projects in neighboring countries, increasing competition to localize non-oil economic growth may fragment this dynamism. American policy makers should seek to support the openness of the Gulf renewable-energy markets. By facilitating the rapid deployment of renewable energy, the openness of these markets serves the United States' interests in limiting global carbon emissions. Moreover, as the most cohesive regional bulwark against Iranian adventurism, the GCC and its ability to maintain its integrity advances regional stability. Non-oil economic disputes and rivalry risk diminishing this cohesion.



The third argument is that the race to produce reliable low-emissions energy has spurred the development of the Gulf Arab nuclear-power programs, which introduces a variety of security risks unparalleled by other forms of low-emissions energy. If the Gulf Arab monarchies persist with their nuclear programs, American policy makers should support efforts to ensure that the host states can adequately protect these facilities and mitigate any potential fallout of an abnormal nuclear incident.

NOTES

- 1 “Crown Prince Unveils Saudi Green, Green Middle East Initiatives,” *Saudi Gazette*, March 27, 2021, <https://saudigazette.com.sa/article/604892/SAUDI-ARABIA/Crown-Prince-unveils-Saudi-Green-Green-Middle-East-Initiatives>.
- 2 “Alexandria Ocasio-Cortez, Democrats Unveil Green New Deal Plan: Full Speech,” YouTube, February 7, 2019, <https://www.youtube.com/watch?v=EYc9ualT0oo>.
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