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A RAIA profile on:

Mohamed Bin-Zayed

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Mohamed Bin-Zayed

Introduction

The 21st of September, 2016, went down as a milestone for the United Arab Emirates (UAE) when the country ratified the Paris Agreement, joining 192 other nations in the battle to fight climate change. This made the UAE the first Arab country to sign the accords, illustrating how a major petrostate, producing an average of 3 million barrels of petroleum and gas per day, now chooses to act as a pioneer in addressing environmental concerns. Behind this grand vision and strong commitment stands an omnipotent figure: Sheikh Mohamed bin Zayed bin Sultan Al Nahyan, president of the UAE and Crown Prince of Abu Dhabi.

Sheikh Mohamed bin Zayed (MBZ) is a significant climate leader in the MENA region because of his frontrunner status in international engagement, leading to a renewable energy program complementing the progressive phase-out of oil. Two main reasons illustrate the importance of MBZ's environmental agenda. Firstly, the UAE is one of the main petroleum producers in the world, recognizing the effects of climate change and preparing for the consequences- although it is against their direct interests. Secondly, MBZ is spearheading a leadership role for the UAE in the Arab world on environmental issues, when this was not initially a policy priority.

MBZ is the third son of Sheikh Zayed bin Sultan Al Nahyan, who was the founding father of the UAE in 1971. Growing up when his country experienced an exponential growth of wealth due to the discovery of oil, MBZ was sent by his father to Morocco for study at the age of 14. Given a different passport by sheihk Zayed to disguise his royal identity, MBZ spent a tough time working as a waiter and leading an independent life abroad. He later on continued his study at military academies, notably Royal Academy Sandhurst in England, where he was trained in armour, helicopter flying, tactical flying and paratroops. Upon graduation, MBZ played a leading role in the Emirati air force and became the crown prince of Abu Dhabi in 2004 when his father passed away. During the reign of his brother sheikh Khalifa, MBZ worked as the chairman of Abu Dhabi Executive Council, managing the daily affairs of the emirate. MBZ subsequently became the de facto ruler of Abu Dhabi in 2014 after his brother suffered a stroke. Following the death of Sheikh Khalifa in May 2022, MBZ was officially appointed by the federal council as the president of the UAE.

Mohamed bin-Zayed's upbringing in a family with a tradition of conservationism, coupled with the Islamic culture of sustainability and responsible management of the environment, has exerted influence on his environmental agenda. MBZ's father, Sheikh Zayed, is widely known as a world conservationist who dedicated

his lifetime to the sustainable development of the UAE and strongly advocated environmentally friendly practice.[1] A famous example of Sheikh Zayed's influence on MBZ is his interest in falconry, a long-lasting tradition associated with pride and unity for Emiratis. This love for falconry was passed on to MBZ and prompted the president to establish conservation programs for falcons. Sheikh Zayed is also famous for his ambitious vision of turning the UAE's desert into a green haven.[2] The love for nature and environment was then passed on to Sheik Khalifa. According to the Khaleej Times, the UAE's longest-running English daily newspaper, Sheik Khalifa's pioneering environmental efforts were inherited from his father who also shaped his love for hobbies such as fishing and falconry.[3] Throughout his lifetime, Sheikh Khalifa showed strong support for conservation and sustainability and put environmental protection at the forefront of his policies. In addition, the Islamic culture of environmental protection and sustainability also produces an influence on MBZ's environmental agenda. Many teachings about the environment in the Qur'an emphasize that humans must endeavor to develop the environment with care and wisdom and conservationism is a part of Arab culture.[4] Therefore, MBZ's environmental agenda has been influenced by Islamic culture and his family's focus on conservationism.

Having assumed more power as the de facto ruler, MBZ quickly presented himself as a secular-leaning and pragmatic leader, with a strong desire of turning the UAE into a major power in the Arab world, part of which is translated via his environmental agenda. In particular, the substantial investment in renewable energy, with more than $40 billion in clean energy over the last 15 years, enables MBZ to maintain the status of the UAE as a pioneer in the energy sector in the post-oil world.[5] The massive oil producing capacity of the UAE allows the country to wield significant influence in the world. For example, the UAE's membership in OPEC as a major oil producer enables the country to have a strong voice in the

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[1] Community Journalist Sanya Nayeem, "Zayed Vision: Transforming Desert into Green Haven," Environment – Gulf News (Gulf News, July 24, 2019), https://gulfnews.com/uae/environment/zayed-vision-transforming-desert-into-green-haven-1.132209.

[2] Community Journalist Sanya Nayeem, "Zayed Vision: Transforming Desert into Green Haven," Environment – Gulf News (Gulf News, July 24, 2019), https://gulfnews.com/uae/environment/zayed-vision-transforming-desert-into-green-haven-1.132209.

[3] Rasha Abu Baker, "Sheikh Khalifa and His Eternal Love for Nature and Wildlife," Khaleej Times (Khaleej Times, May 16, 2022), https://www.khaleejtimes.com/environment/sheikh-khalifa-and-his-eternal-love-for-nature-and-wildlife.

[4] Norshariani Abd Rahman and Muhammad Hilmi Jalil, "Awareness of the Role of 'Religious People' in Environmental Conservation from the Perspective of Islamic Studies Students," *Creative Education* 12, no. 08 (2021): pp. 1755-1772, https://doi.org/10.4236/ce.2021.128133.

[5] Gulf News Report, "The UAE Has Invested over $40 Billion in Clean Energy over the Last 15 Years," news (Gulf News, May 27, 2022), https://gulfnews.com/business/corporate-news/the-uae-has-invested-over-40-billion-in-clean-energy-over-the-last-15-years-1.1653561468563.

organization which controls the oil prices and its demand supply market in the world. Having strongly invested in clean energy projects, MBZ is showing that he will not relinquish this powerful position of his country when the oil depletes. The need for economic diversification also plays an important role behind his environmental agenda. In order to reduce dependence on the crude oil sector, MBZ has been focusing on the clean energy transition which will generate new job opportunities when the oil reserves exhaust in the UAE.

Another reason that motivates MBZ to push forward his environmental policies is to mitigate the detrimental impacts of climate change on the UAE. The petrostate is predicted to be one of the most vulnerable countries to the effects of climate change such as higher sea levels, droughts, and less rainfall.[6] MBZ is therefore committed to his environmental policies in order to alleviate the imminent danger resulting from climate change. MBZ's environmental agenda, especially his conservation projects, also reflects his effort in maintaining the legacy of sheikh Zayed and sheikh Khalifa who both had an eternal love for nature and wildlife. It is often said that "MBZ is well-known for his passion for hunting and falconry, a love which was passed on to him by his father, the late Sheikh Zayed bin Sultan Al Nahyan".[7]

The final driving force behind MBZ's environmental policies is the pressure from the international community. Over the past few decades, there has been a decline in political acceptance of fossil fuels in favor of sustainable energy in the world. This shift in global perception towards hydrocarbons has then motivated MBZ to carry out the clean energy transition in the UAE. In the future, his success in the energy transition would earn him international recognition as a climate leader in the region as the UAE would be one of the first Arab countries to move forward to renewables. At the same time, this clean energy transition also allows MBZ and his country to maintain the status of a major energy provider in the world.

In order to push forward his environmental agenda, MBZ has focused on the following climate actions: *oil/ gas phase-out, the UAE clean energy transition, conservation projects, and global engagement in the fight against climate change*. Realizing the impacts of oil prices fluctuation on the UAE, especially after the oil crash 2014, and also the imminent depletion of this resource, MBZ is adamant

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[6] United Arab Emirates Ministry of Climate Change and Environment, "The UAE State of Climate Report: A Review of the Arabian Gulf Region's Changing Climate & Its Impacts," 2021, https://www.moccae.gov.ae/assets/download/8fb9d5bb/61a79c31.pdf.aspx

[7] Crown Prince Court, "Personal Interests of HH Sheikh Mohamed Bin Zayed Al Nahyan (MBZ)," Personal Interests of HH Sheikh Mohamed bin Zayed Al Nahyan (MBZ), accessed August 12, 2022, https://www.cpc.gov.ae/en-us/thecrownprince/HHsBiography/Pages/PersonalInterests.aspx?TSPD_101_R0=086da99dd7ab20003b5a030a297ba60f3b90256382feb6c2deca80b370631f4558aee8d4173d639208704151e81430005cae694279702 0ff5e29a74826d975230fe15927ef9debfa86dfffdf48bdd023661870c852d4847c61341f6b1333fffe.

that oil/ gas phase-out is now a part of his environmental agenda.[8] As one of the world's most oil-dominated economies to declare oil phase-out, MBZ wants to present the UAE as a different and forward-looking nation in the region. His second major policy lies in the clean energy transition, which is closely associated with the previous one. MBZ has substantially invested in this transition in order to diversify the economy and enhance the energy security for a growing population in the country.[9] This policy is also a part of his effort in maintaining the UAE's global competitive advantage as a global supplier in the energy sector. The third major focus in his environmental agenda is the array of conservation projects on a domestic, regional and international scale. MBZ's conservation efforts reflect the influence of Sheikh Zayed and Sheikh Khalifa's visions. Both the former presidents of the UAE had been working to promote environmental sustainability and biodiversity during their reigns. MBZ clearly shows that he wants to follow his father and brother's footsteps in preserving a diverse and rich environment as a national legacy of the UAE. MBZ's conservation projects also play a central role in promoting the future image of the UAE as an ecotourism destination, which would be a significant sector for the country in the post-oil world. Finally, the UAE president's active global engagement via signing international treaties and hosting global conferences also plays a major role in his environmental agenda. Via ratifying treaties on climate change and proposing to host environmental conferences such as COP28 or the World Energy Summit, MBZ wants to project the UAE as a pioneer in the Gulf region for innovations in fighting climate change. The active global engagement also allows MBZ and the country to gain international prestige as responsible members of the international community sharing its environmental concerns and responsibilities to address them.

This paper seeks to illustrate that MBZ is a regional climate leader because of his leadership position in international engagement in the fight against climate change. The paper is structured as follows. It begins with an overview of environmental challenges to MBZ and the UAE, which seeks to analyze the driving forces behind his environmental agenda. The second section then proceeds with the analysis of a defining moment that marked the emergence of MBZ as a climate leader. The third section explains major solutions and policies that MBZ is pushing towards to mitigate climate change. The final section provides a comprehensive assessment of MBZ's major environmental policies, evaluating the agenda's impact.

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[8] The National News, "The Future Will Not Come through Oil," The National (The National, June 15, 2021), https://www.thenationalnews.com/opinion/the-future-will-not-come-through-oil-1.59773.
[9] Arabian Business, "UAE President's $50bn Commitment to Scale up Climate Action over the ...," UAE President's $50bn commitment to scale up climate action over the next decade is 'yet another milestone,' June 18, 2022, https://www.arabianbusiness.com/politics-economics/extra-50-billion-to-scale-up-climate-action-is-another-milestone-for-uae.

Mohamed Bin-Zayed's Stake

This section will provide an analysis of four main environmental challenges that MBZ and the UAE has to face and resolve. It is instrumental to look at the environmental challenges in depth to have an insight into a set of factors and motives that drive MBZ's environmental agenda. The section first addresses the problem of oil depletion and a global oil phase-out, which is considered one of the most pressing environmental challenges for MBZ. It then proceeds with desertification and air pollution, both of which are high on the environmental agenda of the Gulf country. The last part of this section focuses on threats to wildlife in the UAE and analyzes why wildlife protection is one of the priorities for the president and the country.

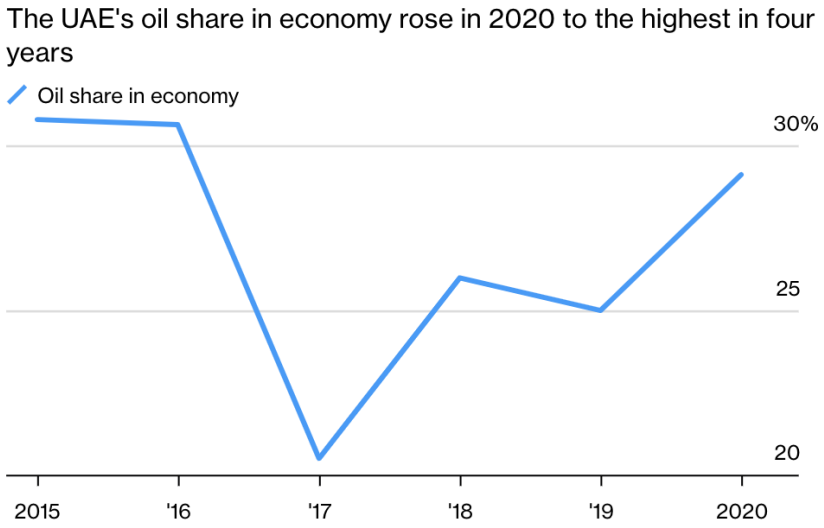
As a country with the seventh largest oil and natural gas reserves in the world, the UAE generates nearly 4 million barrels of oil per day and derives approximately 30% of its GDP from oil and gas production.[10] The profits and royalties from the oil industry have long been a major source of revenue for the government. This heavy reliance on oil is posing two major threats to the Gulf country: a global effort in oil phase-out in the short term and the inevitable depletion of oil in the long term. "Oil-exporting countries may need to be ready for a post-oil future sooner rather than later," says the report The Future of Oil and Fiscal Sustainability in the GCC Region.[11] Top ministers of the UAE warned: "The world is running out of energy capacity at all levels and lack of investment could lead to a potential oil shortage in future".[12]

The consequences of oil depletion for the UAE

The world's efforts in oil phase-out and the inevitable exhaustion of oil reserves would bring about severe economic and political implications for the UAE. The first and foremost impact of the oil depletion could be seen in the economic growth of the country. The oil industry has been the backbone of the UAE's economy and played a central role in the economic boom since the first commercial oil was discovered in 1958. In 2020, oil exports accounted for about 30% of the total GDP of the UAE.[13] Considering the fact that about one third of the

[10] U.S. Energy Information Administration, "Frequently Asked Questions (Faqs) - U.S. Energy Information Administration (EIA)," Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA), May 10, 2022, https://www.eia.gov/tools/faqs/faq.php?id=709&t=6.
[11] Tokhir Mirzoev et al., "The Future of Oil and Fiscal Sustainability in the GCC Region," Departmental Papers / Policy Papers 18, no. 12 (June 2020), https://doi.org/10.5089/9781513525907.087.
[12] Ashwani Kumar, "UAE: Energy Ministers Warn of Possible Oil Shortage Due to Lack of Investment," Khaleej Times (Khaleej Times, May 10, 2022), https://www.khaleejtimes.com/energy/abu-dhabi-energy-ministers-warn-of-possible-oil-shortage-due-to-lack-of-investment.
[13] International Trade Administration, "United Arab Emirates - Oil and Gas," International Trade Administration | Trade.gov, July 26, 2022, https://www.trade.gov/country-commercial-guides/united-arab-emirates-oil-and-gas.

jobs are related to the energy sector, oil production is central to the UAE's development, accounting for about 29% of gross domestic product in 2020.[14] This heavy reliance on oil poses a significant long-term challenge for the country's economy in the context of the inevitable oil depletion.



Source: Federal government bond prospectus

Secondly, the oil depletion could adversely affect the position of the UAE as a global energy provider and hence reduce the political influence of the country in the international community. The position of a leading oil manufacturer has granted the UAE leverage over other major powers in the world such as the US. In March this year, the Arab Gulf state rejected the Biden Administration's request to pump up its oil production to drive down the soaring oil prices and inflation rates caused by the conflict between Russia and Ukraine.[15] The reticence from the UAE could be explained by the reorientation of the US away from the Middle East to Asia, prompting the Gulf government to look elsewhere for political support. In order to convince the UAE to increase its oil production, the Biden Administration may need to make some concessions to address the security concerns of the UAE such as redesignating the Houthis as a terrorist group and renewing its commitment to settle the Yemen war in a way that suits the UAE. In short, the major oil production capacity has allowed the UAE to exert its influence in the world and the exhaustion of the natural resource would deprive the country of the leverage over other major powers in the world.

[14] Abeer Abu Omar, "UAE Oil Reliance at Multi-Year High Despite Lower Production," Bloomberg.com (Bloomberg, October 4, 2021), https://www.bloomberg.com/news/articles/2021-10-04/uae-oil-reliance-at-multi-year-high-despite-lower-production.
[15] Jackie Northam, "Getting More Oil from Saudi Arabia or the UAE Could Require U.S. Concessions," NPR (NPR, March 31, 2022), https://www.npr.org/2022/03/30/1089774493/us-oil-saudi-arabia-uae-opec-russia.

Thirdly, the world's oil phase-out and the depletion of this resource in the future also affects the UAE's leading membership in the Organization of the Petroleum Exporting Countries (OPEC), which is also a major source of power for the country. Firstly, as one of the primary members of OPEC with large per capita oil reserves, the UAE can influence global oil prices. To illustrate, oil prices witnessed the sharpest decline to $16.84, or 13.2%, at $111.14 a barrel in two years after the Gulf country expressed its support for pumping more oil into the market disrupted by the Russian invasion in Ukraine.[16] In addition, the UAE can wield political influence over other OPEC members. As an important member, the UAE has a strong voice in the organization and can often voice up its preference about oil policies of OPEC. While the OPEC+ alliance declined to pump up more oil, in March 2022, the UAE was the first member to encourage the other fellow members to increase oil production.[17] The support for an output increase by the UAE could be considered one of the contributing factors to the final decision of OPEC in June to "increase monthly overall production for the month of August by 648,000 barrels per day". [18]

The consequences of oil depletion for MBZ

The depletion of oil as a major source of power has severe implications for MBZ regarding his presidency and Abu Dhabi's leadership in the UAE. Firsty, the exhaustion of oil as a natural resource would deprive MBZ of significant financial capabilities. He currently controls sovereign wealth funds worth $1.3 trillion, more than any other country.[19] After the death of Sheik Khalifa, MBZ is expected to become the chairman of Abu Dhabi Investment Authority (ADIA), a major sovereign fund whose revenue is mainly generated from the oil industry of the country.[20] MBZ is also the chairman of Mubadala Investment Company, a state-owned holding company whose revenue is also driven by investment in

[16] Shariq Khan, "Oil Prices Fall Most in 2 Years as UAE Supports Output Hike," Reuters (Thomson Reuters, March 9, 2022), https://www.reuters.com/business/oil-extends-rally-after-us-bans-russian-imports-prompting-supply-fears-2022-03-09/.
[17] Derek Brower, "United Arab Emirates to Nudge OPEC Allies to Increase Oil Production," Subscribe to read | Financial Times (Financial Times, March 10, 2022), https://www.ft.com/content/cd26f107-6217-4c8d-befe-11772b40ca66.
[18] Sam Meredith, "OPEC+ Sticks with Planned Oil Production Hike as Supply Concerns Weigh on Energy Markets," CNBC (CNBC, July 5, 2022), https://www.cnbc.com/2022/06/30/opec-sticks-with-planned-oil-production-hike-supply-concerns-linger.html.
[19] David Kirkpatrick, "The Most Powerful Arab Ruler Isn't M.B.S. It's M.B.Z.," The New York Times (The New York Times, June 2, 2019), https://www.nytimes.com/2019/06/02/world/middleeast/crown-prince-mohammed-bin-zayed.html.
[20] James Chen, "Abu Dhabi Investment Council (ADIC)," Investopedia (Investopedia, July 25, 2022), https://www.investopedia.com/terms/a/abu-dhabi-investment-council.asp.

oil.[21] Besides, MBZ works as the chairman of the board of directors of Abu Dhabi National Oil Co. (ADNOC), a leading diversified energy and petrochemicals group which is wholly owned by the state and pumps most of the oil in the UAE.[22] It hence can be seen that oil is a source of revenue for those companies and sovereign wealth funds, which gives MBZ enormous financial capabilities to implement his policies and projects such as the Gulf Railway connecting all six Gulf Cooperation Council member states. Therefore, the depletion of oil would affect the revenues of sovereign wealth funds and major companies in the UAE, reducing his financial power to enact his policies.

Secondly, oil depletion would undermine the power of the al-Nahyan family of Abu Dhabi in the federation. Since the UAE was founded as a federation, the head of the al-Nahyan family has served as the president of the country. Holding the majority of the UAE's oil reserves, the ruling family of Abu Dhabi has exerted its influence over the other emirates via the heavy dependence on oil revenues as a primary source of funding. A clear example could be seen in the rivalry between Abu Dhabi and Dubai, with the former being the political center and the latter being the major trade hub of the UAE. Within the federation, Abu Dhabi and Dubai are the two most important emirates and often have different viewpoints regarding the expansion policies inside and outside the country. However, the al-Nahyan family and Abu Dhabi started gaining more political leverage over Dubai after the 2008 financial crisis when they used their oil money to provide Dubai with a $10bn bail-out.[23] Thus, the oil depletion in the future would threaten the legitimacy of MBZ's royal family with the other emirates.

Finally, the depletion of oil reserves would undermine MBZ's efforts in consolidating his position as an influential leader. Since MBZ started acting as a de facto ruler in 2014, he has been trying to expand his power beyond the border of the UAE. Oil production has laid a solid foundation for MBZ's power. An example of MBZ directly exerting his power via the oil wealth is the recent rebuff of the UAE at the request of the US to pump up oil production. This has shown how the natural resource grants MBZ certain political leverage with other states.[24]

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[21] Massoud A Derhally, "Mubadala Reports Record Annual Income, Driven by Investments and Assets across Various Sectors," The National, May 6, 2021, https://www.thenationalnews.com/business/mubadala-reports-record-annual-income-driven-by-investments-and-assets-across-various-sectors-1.1217632.

[22] Herman Wang and Dania Saadi, "Ruler of UAE Dies, with Prince Who Led Abu Dhabi's Energy Transformation Set to Take Over," S&P Global Commodity Insights (S&P Global Commodity Insights, May 13, 2022), https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/oil/051322-ruler-of-uae-opecs-third-largest-crude-oil-producer-dies.

[23] Davide Barbuscia, Saeed Azhar, and Pamela Barbaglia, "Exclusive: Abu Dhabi in Talks with Dubai for Support through State Fund Mubadala - Sources," Reuters (Thomson Reuters, May 15, 2020), https://www.reuters.com/article/emirates-economy-mubadala-idINKBN22R23J.

[24] Jackie Northam, "Getting More Oil from Saudi Arabia or the UAE Could Require U.S. Concessions," NPR (NPR, March 31, 2022), https://www.npr.org/2022/03/30/1089774493/us-oil-saudi-arabia-uae-opec-russia.

Besides, oil revenues are important to the creation of the UAE's defense industry and military, allowing MBZ to lead an interventionist foreign policy in the Arab world, which is exemplified in his backing General el-Sisi's coup in Egypt in 2013 and later in the civil war in Yemen in 2015.[25] This illustrates how oil revenues can indirectly benefit MBZ's foreign policies. Therefore, the oil industry in the UAE is a means for MBZ to exert his influence as a major leader in the international community.

To conclude, the strong reliance on oil production has made the UAE vulnerable to the global efforts in oil phase-out and the depletion of the resource in the future. This would reduce the UAE's revenues generated from the oil sector and therefore affect the national economic growth. Besides, the depletion of oil money reduces MBZ's financial capabilities to implement his policies inside and outside the country. The decline of the oil sector as a major source of funding would also undermine the position of the house of Nahyan as the most important ruling family in the UAE and MBZ's position as an influential leader on a domestic, regional, and international scale. Recognizing this challenge, MBZ has actively sought to diversify the UAE's economy, by making the country a financial hub, key link in international supply chains with free ports, tourism center and renewable energy leader.

Desertification

Desertification is another dire environmental threat, with 80% of the area in the UAE being desert.[26] According to the United Nations Convention to Combat Desertification (UNCCD), desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic variations and human activities.[27] "Desertification and land degradation in parts of UAE is driven by a number of natural and anthropogenic factors, including wind erosion, salinisation, waterlogging, vegetation loss, expansion of built-up areas, excavation and landfilling. There has been a constant increasing pressure on natural resources with the fast pace of urbanization and encroachment on arable land.

[25] Karam Shahrour, "The Evolution of Emirati Foreign Policy (1971-2020): The Unexpected Rise of a Small State with Boundless Ambitions," 2020, https://www.sciencespo.fr/kuwait-program/wp-content/uploads/2021/02/Shahrour-Karam-The-evolution-of-Emirati-foreign-policy-1971-2020.pdf.

[26] The United Arab Emirates' Government portal, "Combating Desertification - U.ae," Combat desertification, accessed August 11, 2022, https://u.ae/en/resources//-/media/case-studies-3-10-2019/Combating-Desertification-V5.ashx.

[27] United Nations Convention to Combat Desertification, "UNCCD FAQ," UNCCD, accessed August 12, 2022, https://www.unccd.int/unccd-faq.

With an increase in population and food consumption systems, land degradation and desertification are becoming rampant."[28]

Desertification, which is mainly caused by human activities and the overexploitation of natural resources, has severe implications for the UAE. Firstly, it is one of the contributing factors to a biodiversity loss by exacerbating the living conditions of many species. The loss of forest cover in the UAE caused by desertification means that many species are losing their favorable living environments: "Over the last few decades, the UAE has lost most of its big fauna and is witnessing the remaining Arabian leopard, Mountain Gazelle, Arabian Tahr, Arabian Sailfish, groupers and shark populations at the brink of extinction".[29] In addition, the heightened rates of desertification also leads to food insecurity due to crop failure. Desertification, along with shrinking freshwater resources, rising temperatures, is a major threat posed to the food security of the country.[30] "In the last 20 years, the UAE's loss of valuable land has been stark. According to the World Bank, the UAE had 75,000 hectares (290 sq miles) of arable land in 2002, but by 2018 had only 42,300 hectares (163 sq miles). The data also indicated that, in the same timeframe, the percentage of agricultural land in the UAE fell from 7.97% to 5.38%".[31] Thirdly, desertification has caused a shortage of drinking water in the Gulf country. Land plays an important role in refining the drinking water; therefore, it is difficult to meet the demand of a growing population if the amount of productive land continues to decrease because of desertification.

MBZ's policies in fighting desertification reflects the influence from his family and his efforts in maintaining the long-term survival of his country. Firstly, MBZ's father, also known as Sheikh Zayed, devoted his lifetime to mitigating the adverse impacts of desertification.[32] In particular, Shaikh Zayed developed extensive projects to level dunes and sand hills and cover surface areas with mud. He set up green belts around farms to protect them against the wind and to stabilize the

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[28] The United Arab Emirates' Government portal, "Combating Desertification - U.ae," Combat desertification, accessed August 11, 2022, https://u.ae/en/resources//-/media/case-studies-3-10-2019/Combating-Desertification-V5.ashx

[29] Christophe Tourenq and Frédéric Launay, "Challenges Facing Biodiversity in the United Arab Emirates," Management of Environmental Quality: An International Journal (Emerald Group Publishing Limited, April 18, 2008), https://www.emerald.com/insight/content/doi/10.1108/14777830810866428/full/html?skipTracking=true.

[30] The United Arab Emirates' Government portal, "Food Security," Home - the official portal of the UAE Government, accessed August 12, 2022, https://u.ae/en.

[31] Joseph Phelan, "How Dubai Is Pushing Back Its Encroaching Deserts," BBC Future (BBC, January 25, 2022), https://www.bbc.com/future/article/20220125-how-dubai-is-pushing-back-its-encroaching-deserts.

[32] Community Journalist Sanya Nayeem, "Zayed Vision: Transforming Desert into Green Haven," Environment – Gulf News (Gulf News, July 24, 2019), https://gulfnews.com/uae/environment/zayed-vision-transforming-desert-into-green-haven-1.132209.

soil. Additionally, he worked to protect cities against sandstorms and restrict humidity ratio by ensuring that forests were set up around city borders.[33] Sheikh Zayed's enduring efforts in reversing desertification are now carried on by MBZ and his environmental agenda. Secondly, MBZ's endeavor to combat desertification is also to maintain the sustainable development and long-term survival of the UAE. In a country with already nearly 80% of the area being desert, the increased rate of desertification is a dire threat to the survival of people there. A lack of arable land, drinking water scarcity, food insecurity, drought, and sand storms resulting from desertification could make the UAE an inhabitable place in the future. When desert encroaches cities, it could destroy the tourism sector, induce migration, create social unrest and hence challenge MBZ's rule in the country.

Air pollution

Air pollution is another severe environmental issue that is high on the environmental agenda of the UAE, which is reflected in the UAE National Vision 2021. The Gulf country has one of the highest levels of air pollution in the world, ranking 15th out of 118 countries surveyed in 2021.[34] Apart from natural factors such as sandstorms and naturally born dust, industrial activities from the oil and gas sectors are one of the primary contributing factors to air pollution in the UAE. The UAE National Air Emissions Inventory Project 2019 identified the stationary energy and transport sectors as the dominant sources of air pollutants, followed by agriculture and waste sectors.[35] In order to cater for the demand of a growing population, there has been an increase in construction of houses and infrastructures, which necessitates the increased exploitation of natural resources and thus exacerbates air pollution in the country.

Air pollution is a grave concern for the UAE and MBZ due to its detrimental impacts on public health, the environment and economy. Exposure to air pollution has been one of the leading contributors to premature deaths in the UAE. Analyses in 2012 suggested that "...indoor air pollution is a considerable risk to public health in the United Arab Emirates (UAE), accounting for at least 77,000 excess visits to health-care facilities in 2008 in addition to the 280 excess deaths. In terms of mortality, indoor air quality ranks second only to outdoor air pollution

[33] Community Journalist Sanya Nayeem, "Zayed Vision: Transforming Desert into Green Haven," Environment – Gulf News (Gulf News, July 24, 2019), https://gulfnews.com/uae/environment/zayed-vision-transforming-desert-into-green-haven-1.132209.
[34] IQAir, "United Arab Emirates Air Quality Index (AQI) and Air Pollution Information," IQAir, accessed August 12, 2022, https://www.iqair.com/united-arab-emirates.
[35] UAE Ministry of Climate Change and Environment, "UAE National Air Emissions Inventory Project - Moccae.gov.ae," 2019, https://www.moccae.gov.ae/assets/download/fa2f8dd4/Air%20Emissions%20Inventory%20Report.pdf.aspx?view=true.

as a cause of environmentally related diseases in the UAE".[36] Although substantial progress has been made in combating air pollution, it is still a severe environmental risk to public health in the Gulf country. A case report in 2019 in the UAE indicated that "...regular exposure to ambient air pollutants contributes to increased odds of cardiovascular diseases (CVD) and cardiometabolic disease. Air pollution from particulate matters size 2.5 Mm (PM2.5) increases the risk of premature death from stroke (19%) and coronary heart disease (13%)."[37] Apart from the human cost, the UAE is also bearing a huge economic cost resulting from high levels of air pollution. "The human and economic cost of air pollution and degraded seas and coastlines is immense, estimated to be more than 3% of GDP in some countries of the Middle East and North Africa (MENA)".[38] The implications of air pollution are not limited to public health but extended to economic growth as well; thus, alleviating air pollution is a priority for the UAE now.

Reducing air pollution not only allows MBZ to address public health issues but also mitigate environmental injustice within the country. The effects of air pollution not only illustrate health-related concerns but also reflect intense social injustice. With a lack of green and open spaces, unprivileged densely populated neighborhoods are often home to facilities such as industries, landfills, and biological treatment plants which discharge a considerable amount of air pollutants into the atmosphere.[39] Air quality in these areas are then greatly degraded. In other words, urban dwellers do not equally enjoy environmental quality. This social injustice regarding environmental quality is a challenge to MBZ's governance in the UAE. Therefore, it is essential for MBZ not only to tackle air pollution and improve public health but also to mitigate environmental inequalities. Finally, improving the air quality in the UAE's major urban hubs is key to MBZ's image as an environmental leader. MBZ knows clean cities are a quantifiable and observable strategy to project successful environmental policy and carbon goals on the world stage, an image that is very important to Abu Dhabi's ruler.

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[36] Jacqueline MacDonald Gibson et al., "Burden of Disease from Indoor Air Pollution," Environmental Science and Technology Library, 2012, pp. 109-132, https://doi.org/10.1007/978-94-007-5925-1_5.
[37] Akshaya Srikanth Bhagavathula and Abdulla Shehab, "Ambient Air Pollution: A Major Modifiable Cardiovascular Risk Factor in the UAE?," Journal of Cardiovascular Disease Research 10, no. 3 (October 2019): pp. 99-99, https://doi.org/10.5530/jcdr.2019.3.20.
[38] "MENA's Polluted Skies And Seas Hurt Economies, Livelihoods," MENA's Polluted Skies And Seas Hurt Economies, Livelihoods, February 7, 2022, https://www.worldbank.org/en/news/press-release/2022/02/07/mena-s-polluted-skies-and-seas-hurt-economies-livelihoods.
[39] Anastasia Dimitriou and Vasilia Christidou, "Causes and Consequences of Air Pollution and Environmental Injustice as Critical Issues for Science and Environmental Education," The Impact of Air Pollution on Health, Economy, Environment and Agricultural Sources, 2011, https://doi.org/10.5772/17654.

Wildlife conservation

Wildlife protection plays an important role in the environmental agenda of the Gulf country. The UAE government has been pushing forward conservation projects of endangered species to reduce biodiversity loss. The varied terrain of the UAE, including the coast, offshore islands, mangrove areas, mudflats, salt pans, sand and gravel plains, sand dunes, has been home to a rich array of wildlife. However, the rapid urbanization, high levels of pollution, and climate change have posed severe threats to the vibrant wildlife there. "Almost half of all mammals in the UAE are endangered, according to new government research that looked at the extinction risk for 1,167 species in the country".[40] Now, six of the most vulnerable creatures found in the UAE are hawksbill turtle, Arabian leopard, Arabian tahr, spiny-tailed lizard, socotra cormorant, houbara bustard.[41]

A significant decline in animal population has both environmental and economic implications for the country. Firstly, the gradual disappearance of threatened species is a major contributing factor to biodiversity loss of the UAE which directly and indirectly affects human life. The World Health Organisation shows that "biodiversity loss can have significant direct human health impacts if ecosystem services are no longer adequate to meet social needs. Indirectly, changes in ecosystem services affect livelihoods, income, local migration and, on occasion, may even cause or exacerbate political conflict".[42] Secondly, the economic cost of a decline in vibrant wildlife is also enormous for the Gulf state. This is primarily because wildlife plays an essential role in the tourism industry of the UAE. Creating eco attractions is one of the economic goals of the country to boost tourism.[43] Aside from environmental benefits, some plants such as coral reefs and mangroves also bring about economic benefits for the country. "For example, mangroves serve as habitat for a variety of organisms; help in pollution control; provide a source for lumber and energy, and offer recreational and educational opportunities".[44] Mangrove forests in Abu Dhabi are a popular eco-tourist attraction where people often flock there for birdwatching, snorkeling,

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[40] Nick Webster, "UAE Says Almost Half of All Mammals in the Country Are Endangered," The National (The National, March 9, 2022), https://www.thenationalnews.com/uae/2022/03/06/uae-says-almost-half-of-all-mammals-in-the-country-are-endangered/.

[41] Deputy Readers Editor Sanya Nayeem, "How You Can Help Save the UAE's Endangered Species," Community – Gulf News (Gulf News, October 29, 2018), https://gulfnews.com/lifestyle/community/how-you-can-help-save-the-uaes-endangered-species-1.1430372.

[42] World Health Organization, "Biodiversity and Health," World Health Organization (World Health Organization, June 3, 2015), https://www.who.int/news-room/fact-sheets/detail/biodiversity-and-health.

[43] Special to Gulf News Mohamed Abdel Raouf, "Ecotourism Is the Future for UAE," Op-eds – Gulf News (Gulf News, November 1, 2018), https://gulfnews.com/opinion/op-eds/ecotourism-is-the-future-for-uae-1.2116410.

[44] Tareefa S. Alsumaiti, Khalid Hussein , and Ameena Saad Al-Sumaiti, Mangroves of Abu Dhabi Emirate, UAE, in a Global Context: A Review, 2017.

kayaking and other recreational activities. Therefore, wildlife extinction not only results in environmental damage but also economic loss for the UAE.

Apart from a desire to mitigate environmental impacts caused by animal extinction in the country, MBZ's efforts in pushing forward wildlife protection also reflects the influence of his family and his desire in economic diversification. Growing up in an environment with a tradition of falconry, MBZ soon developed an interest in hunting and equestrianism. MBZ's passion for hunting and falconry was passed on to him by his father, the late Sheikh Zayed bin Sultan Al Nahyan.[45] Sheik Zayed, the founding father of the federation, was always fascinated by falconry and made tremendous efforts in preserving this heritage sport. He is also known as one of the world's greatest conservationists whose vision was to transform deserts into a green haven. During his lifetime, Sheik Zayed had been pushing forward agriculture and wildlife conservation to mitigate desertification, change the face of the UAE and give the country an environmental conscience.[46] Sheik Khalifa, the second president of the UAE, then continued the legacy and environmental agenda of his father, establishing environmental protection as a cornerstone of the legislative system and government policies.[47] "His vision of conservation and sustainability was demonstrated through his support for path-breaking environmental conservation initiatives, including breeding and release programmes for falcons and the Houbara Bustard (a protected bird species in the UAE) in the Arabian Peninsula and Central Asian regions. His commitment to environmental conservation also prompted him to appoint a Minister of Environment in the first Cabinet formed under his Presidency."[48] Therefore, MBZ's efforts in environmental protection are not only prompted by current concerns in international public opinion but also by the legacy of his family who attached great importance to conservationism as an essential part of their culture.

Secondly, wildlife conservation is also an important part of MBZ's efforts in diversifying the economy and reducing the UAE's heavy reliance on the oil and gas sector. MBZ knows the paradox in his conservation policy: the UAE's oil and

[45] Crown Prince Court, "Personal Interests of HH Sheikh Mohamed Bin Zayed Al Nahyan (MBZ)," Personal Interests of HH Sheikh Mohamed bin Zayed Al Nahyan (MBZ), n.d., accessed August 12, 2022.
[46] Community Journalist Sanya Nayeem, "Zayed Vision: Transforming Desert into Green Haven," Environment – Gulf News (Gulf News, July 24, 2019), https://gulfnews.com/uae/environment/zayed-vision-transforming-desert-into-green-haven-1.132209.
[47] Rasha Abu Baker, "Sheikh Khalifa and His Eternal Love for Nature and Wildlife," Khaleej Times (Khaleej Times, May 16, 2022), https://www.khaleejtimes.com/environment/sheikh-khalifa-and-his-eternal-love-for-nature-and-wildlife.
[48] Rasha Abu Baker, "Sheikh Khalifa and His Eternal Love for Nature and Wildlife," Khaleej Times (Khaleej Times, May 16, 2022), https://www.khaleejtimes.com/environment/sheikh-khalifa-and-his-eternal-love-for-nature-and-wildlife.

gas exploitation are the main drivers for negative environmental impacts on biodiversity and pollution. However, he is faced with the reality that his position as ruler of Abu Dhabi, President of the UAE and power position on the world stage depends almost entirely on oil and gas. Thus, environmental concerns will never outweigh the exploitation of fossil fuels while there is still a global demand. Nevertheless, he uses the massive proceeds from this industry to mitigate the environmental impact and try to contain the negative externalities to specific zones. Thus, MBZ's conservation projects reflect his desire to present the Gulf country as a global ecotourism hub. Therefore, it is sufficient to say that wildlife conservation is a crucial part of MBZ's environmental agenda.

In conclusion, MBZ and the UAE are currently facing four major environmental challenges: Oil depletion and a potential global oil phase-out, desertification, air pollution, and threats to wildlife. Firstly, due to the heavy dependence on oil production, the petrostate is highly susceptible to the global efforts in oil phase-out and the depletion of the resource in the future. This would have severe implications for the country by affecting the national revenues of the UAE, hampering its position as a major energy provider and power player regionally and internationally. Furthermore, this challenge would impact MBZ's financial capabilities, and the al-Nahyan family's leadership position within the federation. Desertification is the second major concern for MBZ when over 80% of the country is already desert. Encroaching deserts threaten the long-term survival of the country and also act as a significant obstacle that disrupts economic activities, triggers migration, creates social unrest and hence challenges MBZ's rule in the country. Thirdly, the UAE is one of the countries in the world with the highest level of air pollution. The air contamination is a grave concern as its impacts are not limited to public health but extended to economic growth as well, as well as hampering MBZ's image as a world climate leader. Finally, dangers to wildlife and a gradual disappearance of threatened species have both environmental and economic implications by resulting in a biodiversity loss and hindering the development of eco-tourism in the UAE. The following section "The Defining Moment" will analyze the event that catapulted MBZ as an environmental leader on the regional stage, before presenting the solutions to the challenges outlined above in "Part 4: Policy Outlook".

Mohamed Bin-Zayed's Defining Moment

This section seeks to analyze the defining moment in MBZ's environmental agenda which refers to a pivotal event in life that shaped him into a climate leader in the MENA region and in the world. September 2016 is hence a milestone for the UAE when MBZ ratified the Paris Accords, making the UAE the first Arab Gulf country to accept the climate deal which is the first-ever universal, legally binding global climate change agreement. The ratification is pivotal as it

reaffirms to the world how MBZ sees climate action not only as a responsibility for the environment but also as an essential preparation for his country in a post-oil world and hence a national priority. The agreement is also an effective vehicle for the president to gain more international recognition and consolidate his power in the region.

The 2014-2016 oil prices crisis

Between 2014 and 2016, the world witnessed one of the sharpest declines in oil prices in modern history when "prices (on a monthly average basis) fell from over US$100 per barrel in July 2014 to less than half that by January 2015".[49] According to the World Bank, "the 70 percent price drop during that period was one of the three biggest declines since World War II, and the longest lasting since the supply-driven collapse of 1986".[50] There are two main reasons for this oil price drop: the growth of US shale oil production and the low demand from the oil-importing markets.[51]

Plummeting global oil prices severely hit the UAE and led to a subsequent dwindle in the country's hydrocarbon exports and revenues. The US Energy Information Administration (EIA) suggested that the Gulf country underwent a decrease by half in terms of real oil export revenue between 2014 and 2015 alone.[52] The oil price crash in 2014 had a greater magnitude and duration than any other oil shocks before, thus exerting more significant impacts on public finances in the UAE.[53] In response to the oil price volatility and its impacts, the UAE decided to cut expenditures and implement tax reforms such as goods or services tax to compensate for the loss of government revenues.[54]

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[49] Francesco Grigoli, Alexander Herman, and Andrew Swiston, "A Crude Shock: Explaining the Short-Run Impact of the 2014–16 Oil Price Decline across Exporters," *Energy Economics* 78 (2019): pp. 481-493, https://doi.org/10.1016/j.eneco.2018.11.025.

[50] Marc Stocker, John Baffes, and Dana Vorisek, "What Triggered the Oil Price Plunge of 2014-2016 and Why It Failed to Deliver an Economic Impetus in Eight Charts," World Bank Blogs, January 18, 2018, https://blogs.worldbank.org/developmenttalk/what-triggered-oil-price-plunge-2014-2016-and-why-it-failed-deliver-economic-impetus-eight-charts.

[51] Marc Stocker, John Baffes, and Dana Vorisek, "What Triggered the Oil Price Plunge of 2014-2016 and Why It Failed to Deliver an Economic Impetus in Eight Charts," World Bank Blogs, January 18, 2018, https://blogs.worldbank.org/developmenttalk/what-triggered-oil-price-plunge-2014-2016-and-why-it-failed-deliver-economic-impetus-eight-charts.

[52] Laura El-Katiri, "Vulnerability, Resilience, and Reform: The GCC and the Oil Price Crisis 2014-2016," Vulnerability, resilience, and reform: The GCC and the oil price crisis 2014-2016, December 2016, https://energypolicy.columbia.edu/sites/default/files/Vulnerability%2C%20Resilience%20and%20Reform%3A%20The%20GCC%20and%20the%20Oil%20Price%20Crisis.pdf.

[53] Marc Stocker et al., "The 2014–16 Oil Price Collapse in Retrospect: Sources and Implications," 2018, https://doi.org/10.1596/1813-9450-8419.

[54] Laura El-Katiri, "Vulnerability, Resilience, and Reform: The GCC and the Oil Price Crisis 2014-2016," Vulnerability, resilience, and reform: The GCC and the oil price crisis 2014-2016, December 2016,

For MBZ, this oil crash in 2014 heightened how the UAE's economy is strongly dependent on fossil fuels production and hence highly vulnerable to the oil price fluctuation. At that time, the UAE was the only Arab country that managed to considerably reduce the contribution of oil to the national GDP, with fossil fuels accounting for 38.9% of GDP in the UAE, compared to 45.1% and 54.4% in Saudi Arabia and Qatar respectively.[55] Although economic diversification had been well underway during the reign of Sheikh Zayed and Sheikh Khalifa, the oil shocks in 2014 struck MBZ that it was crucial for him to accelerate his commitment of shifting the UAE economy towards multiple sources of revenues other than oil. MBZ's strong focus on environmental agenda such as the array of renewable energy and the conservation projects plays an important part in his efforts in diversifying the UAE economy, fighting climate change, gaining international recognition as a climate leader and consolidating the UAE's position in the international community.

The Paris Accords 2016

When the Paris Agreement was adopted in 2015, it received huge resistance from major oil-producing countries, especially Saudi Arabia, as the agreement posed threats to their main revenue source and would undermine their position as one of the world's largest oil producers.[56] As the de facto ruler of OPEC and an influential country in the region, Saudi Arabia voiced its strong opposition to the Paris Accords.[57] Bearing this in mind, petrostates such as Qatar and the UAE were expected to be reluctant to diverge from Saudi Arabia's position in terms of the climate deal, especially since the two countries were close allies of Saudi Arabia in dealing with the Yemen conflict and the Islamic State at that time. Yet, amidst the oil prices shock from 2014 to 2016, MBZ still took bold action by ratifying the Paris Agreement in 2016, making the UAE the first Gulf state to enter the climate deal. The Paris Agreement is a milestone for both MBZ and the UAE, mainly driven by MBZ's policies of economic diversification to reduce the country's vulnerability to oil shocks, the need to fight climate change inherited from the

https://energypolicy.columbia.edu/sites/default/files/Vulnerability%2C%20Resilience%20and%20Reform%3A%20The%20GCC%20and%20the%20Oil%20Price%20Crisis.pdf.

[55] Laura El-Katiri, "Vulnerability, Resilience, and Reform: The GCC and the Oil Price Crisis 2014-2016," Vulnerability, resilience, and reform: The GCC and the oil price crisis 2014-2016, December 2016, https://energypolicy.columbia.edu/sites/default/files/Vulnerability%2C%20Resilience%20and%20Reform%3A%20The%20GCC%20and%20the%20Oil%20Price%20Crisis.pdf.

[56] Suzanne Goldenberg, "Saudi Arabia Accused of Trying to Wreck Paris Climate Deal," The Guardian (Guardian News and Media, December 8, 2015), https://www.theguardian.com/environment/2015/dec/08/saudi-arabia-accused-of-trying-to-wreck-the-paris-climate-deal.

[57] Pilot Clark, "Become an FT Subscriber to Read: Climate Deal: Carbon Dated?," Subscribe to read | Financial Times, December 16, 2015, https://www.ft.com/content/58ecb88c-a30e-11e5-8d70-42b68cfae6e4.

Nahyan family, and his desire to gain more international recognition and bolster the position of the UAE in the international community.

The Paris Agreement is a legally binding international treaty on climate change and a landmark in the multilateral climate change process because, for the first time, a binding agreement brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects.[58] The first key aspect of the Paris Agreement is the Long-term Temperature Goals which aim to limit global temperature increase to well below 2 degrees Celsius and preferably 1.5 degree Celsius.[59] The second one is Global Peaking and 'Climate Neutrality', with parties trying to reach global peaking of greenhouse gas emissions (GHGs) as soon as possible.[60] The third aspect of the agreement is Mitigation which is manifested via a nationally determined contribution (NDC), in which each party establishes its domestic policies to fight climate change and achieve the binding commitments of the agreement. Every country communicates their NDCs every 5 year and the successive NDC represents a progression beyond the previous one and reflects the highest possible ambition.[61]

In 2016, on behalf of the UAE government, Dr Thani Ahmad Al Zeyoudi, the Minister of Climate Change and Environment, signed the Paris Climate Agreement in New York. The participation of the UAE in the Paris Accords signified the Gulf state's commitment to combat climate change and its tireless efforts in diversifying the economy to reduce its heavy reliance on fossil fuels. During the ceremony, the minister said "The Paris Agreement is the world's first truly durable response to climate change. It allows each country to contribute climate actions in accordance with their own economic and development priorities. For the UAE, this means solutions which create new social and economic opportunities and support our ambitious agenda towards economic diversification".[62]

The Paris Agreement came as a natural step for the UAE as the Gulf country had been focusing on environmental protection for years. The founding father of the federation, Sheikh Zayed, had long ago realized the coming future of energy

[58] United Nations Climate Change, "The Paris Agreement," Unfccc.int, 2016, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.
[59] United Nations Climate Change, "Key Aspects of the Paris Agreement," Unfccc.int, 2016, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/key-aspects-of-the-paris-agreement.
[60] United Nations Climate Change, "Key Aspects of the Paris Agreement," Unfccc.int, 2016, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/key-aspects-of-the-paris-agreement.
[61] United Nations Climate Change, "Key Aspects of the Paris Agreement," Unfccc.int, 2016, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/key-aspects-of-the-paris-agreement.
[62] The Gulf News Report, "UAE Ratifies Paris Climate Agreement," Environment – Gulf News (Gulf News, October 29, 2018), https://gulfnews.com/uae/environment/uae-ratifies-paris-climate-agreement-1.1900434.

transition and therefore laid a solid foundation for the country's progressive approach to sustainability and climate change. Sheikh Zayed's vision was then continued by his son, Sheikh Khalifa, who played a key role in successfully diversifying the economy, boosting non-oil revenues, and developing an array of environmental initiatives. That is to say, long before signing the Paris Accords, the Nahyan family had shown their strong commitment to economic diversification and considerable efforts in environmental conservation. This is demonstrated by the Mazda city project and their investment in clean energy projects such as the solar parks and the nuclear energy plants. Having carried out these projects for years, the UAE wants to present itself as a catalyst in the renewable energy transition.

How does MBZ view the Paris Agreement?

MBZ considers the ratification of the Paris Agreement as a milestone that heightened his commitment to accelerate economic diversification and combat climate change. In the Government Summit in 2015, one year before the UAE joined the Paris climate deal, MBZ delivered the main address speech, expressing his vision about the oil depletion in the future: "In 50 years, when we might have the last barrel of oil, the question is: when it is shipped abroad, will we be sad? If we are investing today in the right sectors, I can tell you we will celebrate at that moment."[63] The statement is significant as it shows how well MBZ is aware of the future oil exhaustion in the petrostate and how clear he is about what to prepare for his country in that future. One year later, the UAE officially ratified the Paris Agreement, joining the other 192 countries in the fight against climate change. Having inherited the tradition of his family in environmental conservation and implemented numerous environmental policies before, MBZ saw the Paris Agreement as a natural step proclaiming that now the UAE is ready to actually pledge for the target of net zero by 2050. For the Emirati president, the UAE's pledge for net zero by 2050 builds on the country's past decades of climate efforts and represents a strategic target for its future. From MBZ's perspective, the Paris Agreement is a strong reminder for him and Emirati people that in order to secure the post-oil future, it is urgent for the country not only to step up its economic diversification, especially after the oil price crash in 2014, but also to reaffirm its commitment in combating climate change.

The Paris Agreement is also an ideal vehicle for MBZ to gain more international credit and increase his influence in the region. As the first Gulf state to commit to

[63] UAE News, "His Highness Sheikh Mohamed Bin Zayed Keynote Remarks at the 2015 Government Summit in Dubai: UAE Embassy in Washington, DC," His Highness Sheikh Mohamed bin Zayed Keynote Remarks at the 2015 Government Summit in Dubai | UAE Embassy in Washington, DC, February 13, 2015, https://www.uae-embassy.org/news/his-highness-sheikh-mohamed-bin-zayed-keynote-remarks-2015-government-summit-dubai.

a national drive net zero, the UAE received a lot of acclaim for taking the initiative and setting an outstanding example for countries in the region to follow:

> *Alok Sharma, President of COP26, tweeted "I am delighted that the UAE has announced it will reach net zero carbon by 2050. As the first net zero carbon commitment in the Gulf, this is a historic announcement. I look to others in the region to also announce ambitious climate action commitments ahead of".*[64]
>
> *Tanzeed Alam, climate change and energy director at Emirates Wildlife Society – WWF said "This is great news because the UAE has now become a positive example to others in the region and farther afield".*[65]

This bold move by MBZ and the UAE has put more pressure on countries in the region, especially Saudi Arabia, to push forward their environmental agenda and be a part of the solution to climate change. The ratification therefore elevates MBZ and the UAE's standing and distinguishes it as a global climate leader in the MENA region which is still dominated by fossil fuels. Secondly, the ratification of the Paris Agreement allows the UAE to gain more support from the US and facilitates the cooperation between the two countries in the environmental sector. In April 2021, US Special Presidential Envoy for Climate John Kerry praised the UAE's climate leadership: "It's remarkable to find the UAE trying to lead many other nations in the search of new technology to address the global climate challenge and in transitioning to the new economy while facing this crisis."[66] Although the two countries had been collaborating in environmental projects before, the cooperation was further promoted after the UAE joined the Paris Accords in 2016. To illustrate, the Massachusetts Institute of Technology (MIT) was central to establishing and advancing the Masdar Institute of Science and Technology, a graduate institute dedicated to renewable energy research that is today part of Khalifa University.[67] Aside from that, the two countries jointly initiated the Agriculture Innovation Mission for Climate (AIM for Climate) to accelerate innovation and research and development in agriculture and food

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[64] Natasha Turak Dan Murphy, "UAE Receives Praise and Skepticism after Revealing First Net-Zero Pledge in the Region," CNBC (CNBC, October 7, 2021), https://www.cnbc.com/2021/10/07/uae-wins-plaudits-and-skepticism-for-first-net-zero-pledge-in-region.html.

[65] Nadeem Hanif, "UAE a 'Positive Example for Gulf Countries' after Agreeing to Ratify Paris Climate Agreement," The National (The National, August 5, 2021), https://www.thenationalnews.com/uae/environment/uae-a-positive-example-for-gulf-countries-after-agreeing-to-ratify-paris-climate-agreement-1.226338.

[66] Embassy of the United Arab Emirates Washington DC, "Climate & Energy: UAE Embassy in Washington, DC," Climate & Energy | UAE Embassy in Washington, DC, accessed August 13, 2022, https://www.uae-embassy.org/discover-uae/climate-and-energy.

[67] Embassy of the United Arab Emirates Washington DC, "Climate: UAE Embassy in Washington, DC," Climate | UAE Embassy in Washington, DC, accessed August 13, 2022, https://www.uae-embassy.org/uae-us-cooperation/climate-energy.

systems in order to spur low-carbon growth and enhance food security.[68] As a significant global investor in sustainable energy, the UAE is building solar and wind projects across the US, collaborated with the US to establish Mission Innovation, a partnership to double clean energy R&D within 5 years, and is working together with the US on implementation of the $50 million UAE-Caribbean Renewable Energy Fund, which is building solar power plants in 16 countries.[69] Such cooperation with the US is instrumental to the UAE's environmental agenda and economic diversification.

To conclude, the ratification of the Paris Accords is a pivotal moment in MBZ's environmental agenda. It made the UAE the first state in the Gulf to accept the Paris climate deal and pledge for net zero by 2050, signifying MBZ's commitment in continuing his family's legacy in conservationism and accelerating economic diversification. The ratification also reflects his desire to acquire more international credit as a climate leader and reinforce the UAE's position in the region.

Mohamed Bin-Zayed's Solutions

Oil depletion and a potential global oil phase-out

As a major petrostate in the world, the UAE is currently facing two enormous problems: a global effort in oil phase-out in the short term and the inevitable depletion of oil in the long term (See Part 2: "Their Stake"). To counter such challenges and prepare the UAE for a post-oil world, MBZ has been carrying out a range of policy solutions to reduce the country's heavy reliance on this natural resource. MBZ's general approach to the disappearance of oil focuses on clean energy transition and economic diversification which both aim at reducing the contribution of the oil sector to national GDP.

Clean energy transition

Since joining the Paris climate deal, MBZ has been increasingly vocal about his ambition to transform the UAE from a petrostate to a major renewable and hydrogen powerhouse in the world. At COP21 United Nations Climate Change Conference in December 2015, the UAE affirmed its plan of producing 24% of its electricity from clean energy sources.[70] In addition, after pledging for net zero

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[68] Embassy of the United Arab Emirates Washington DC, "Climate: UAE Embassy in Washington, DC," Climate | UAE Embassy in Washington, DC, accessed August 13, 2022, https://www.uae-embassy.org/uae-us-cooperation/climate-energy.

[69] Embassy of the United Arab Emirates Washington DC, "Climate & Energy: UAE Embassy in Washington, DC," Climate & Energy | UAE Embassy in Washington, DC, accessed August 13, 2022, https://www.uae-embassy.org/discover-uae/climate-and-energy.

[70] UAE News, The UAE's response to climate change - the official portal of the UAE Government, accessed August 13, 2022, https://u.ae/en/information-and-services/environment-and-energy/climate-change/theuaesresponsetoclimatechange.

emissions by 2050, the Gulf country declared plans to increase the contribution of clean energy in the total energy mix from 25% to 50% by 2050 in the UAE Energy Strategy 2050, the first unified energy strategy in the Gulf state.[71] In the UAE Energy Strategy 2050, the country set the target of an energy mix including: 44% clean energy, 38% gas, 12% clean coal, and 6% nuclear.[72] In order to carry out the energy transition, the Gulf country mainly focuses on renewable energy and nuclear energy projects.

Solar power

Solar power has been the predominant source of renewable energy and hence the primary focus of the UAE in the energy transition, with three of the world's largest solar power plants located there.[73] The Al Dhafra Solar PV project, expected to be one of the world's largest solar power plants, is currently under construction in Abu Dhabi and will be in full operation at the end of 2022. With a capacity of two gigawatts and about 3.5 million solar panels, the Al Dhafra Solar PV IPP will generate enough electricity for approximately 160,000 homes across the UAE. It will mitigate 2.4 million tonnes of carbon dioxide annually.[74] The Al Dhafra Solar PV plays a key role in fulfilling the UAE's ambition of having 44% of its power sourced from clean energy by 2050.

Apart from large-scale solar power plants as mentioned above, the UAE also focuses on installing small-scale solar facilities and programs. Firstly, the Abu Dhabi government has launched the solar rooftop plan as an incentive to make solar PV deployment on rooftops more feasible for the owners of commercial buildings. In addition, it is popular to install solar canopy structures for car parks in the UAE which not only generate green energy but also protect cars and people from solar heat outside.[75] Thirdly, solar energy is harnessed to power water heating facilities in major hotels such as the Aloft Hotel in Abu Dhabi, the Masdar

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[71] UAE news, "UAE Energy Strategy 2050," UAE Energy Strategy 2050 - the official portal of the UAE Government, accessed August 13, 2022, https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/uae-energy-strategy-2050.

[72] UAE news, "UAE Energy Strategy 2050," UAE Energy Strategy 2050 - the official portal of the UAE Government, accessed August 13, 2022, https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/uae-energy-strategy-2050.

[73] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.

[74] Masdar, Abu Dhabi Future Energy Company, "Al Dhafra Solar PV," Masdar Clean Energy - Deploying Renewable Clean Energy Worldwide, accessed August 13, 2022, https://masdar.ae/en/Masdar-Clean-Energy/Projects/Al-Dhafra-Solar-PV.

[75] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.

Institute in Abu Dhabi, the Burj Khalifa in Dubai, and the Palm Jumeirah in Dubai.[76] Also, some areas in the UAE such as Masdar and Abu Dhabi are using solar panels for street lighting.

In short, the Gulf state has been pushing forward the construction of major solar power plants, especially the Al Dhafra Solar PV, and the installations of small-scale solar facilities such as solar rooftop plan and parking lot solar canopy structures. This demonstrates the importance of solar power for the UAE authorities in implementing the clean energy transition and slashing out carbon emissions to meet the commitment of the Paris Agreement by 2050.

Nuclear energy

Knowing that renewables alone cannot meet future energy demand, MBZ has focused on nuclear energy programs as another instrumental part of the energy transition in the UAE due to its high power density. Expected to generate massive quantities of carbon-free electricity compared with other alternative sources, nuclear energy will be the main source for generating non-hydrocarbon based electricity, provide a growing Emirati population with affordable energy, and hence enhance energy security.

At the heart of the UAE's nuclear journey is the construction of the Barakah nuclear power plant, which has been supervised by MBZ.[77] Comprising four units, the Barakah project was officially launched in 2012 and November 2021 marked the completion of the third unit's construction.[78] The Barakah nuclear power plant is considered a landmark development for MBZ, the UAE and the entire region for three main reasons. Firstly, this elevates MBZ's standing in the MENA region as he managed to launch the first operational nuclear reactor in the Gulf. In a 2020 visit to the Barakah plant, MBZ emphasized that "the Barakah Nuclear Power Plant is a historically significant project for the UAE, which will consolidate its leadership position and role in the growing clean energy sector".[79] Secondly, Barakah is expected to be a vital part of the country's clean energy transition by providing up

[76] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.
[77] Raúl Redondo, "Mohammed Bin Zayed Al-Nahyan Supervises the Excellent Development of the Barakah Nuclear Power Plant," Atalayar, June 12, 2020, https://atalayar.com/en/content/mohammed-bin-zayed-al-nahyan-supervises-excellent-development-barakah-nuclear-power-plant.
[78] World Nuclear News, "Third Unit Completed at Barakah," Third unit completed at Barakah : New Nuclear - World Nuclear News, November 4, 2021, https://www.world-nuclear-news.org/Articles/Third-unit-completed-at-Barakah.
[79] Raúl Redondo, "Mohammed Bin Zayed Al-Nahyan Supervises the Excellent Development of the Barakah Nuclear Power Plant," Atalayar, June 12, 2020, https://atalayar.com/en/content/mohammed-bin-zayed-al-nahyan-supervises-excellent-development-barakah-nuclear-power-plant.

to 25% of the electricity for the country upon completion.[80] Finally, the successful operation of the Barakah plant is a test for the potential nuclear energy industry for the whole region and provides a huge incentive for other neighboring countries such as Saudi Arabia and Qatar to develop similar nuclear programs.

The construction of the first nuclear power plant in the turbulent region entails a whole range of hurdles for MBZ. Amidst worrying concerns of nuclear proliferation in the Middle East, MBZ needed to take deliberate measures to reassure the international community, especially the US and Israel, that the Barakah plant complies with the highest standards of nuclear safety and security, without risk for nuclear proliferation. In particular, apart from participating in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and the International Atomic Energy Agency (IAEA) Convention on Nuclear Safety, the UAE has concluded nine bilateral nuclear cooperation agreements with responsible and experienced nuclear countries.[81] MBZ has also worked closely with the US in this nuclear journey. Apart from the UAE-US 123 Agreement, which provides a legal framework for commerce in nuclear energy technology between the two countries, a number of US companies play an important role in the UAE's nuclear program by providing major components, instrumentation, and technical transfer.[82]

The Barakah nuclear power plant has attracted severe criticisms from regional powers and environmentalists as they consider it a major threat to stability of the region, which is already tense with various conflicts. Qatar, which already has a strained relationship with the UAE, voiced its objection to the Arab's first nuclear plant and expressed its grave concern over nuclear safety. In 2019, Qatar's Foreign Affairs ministry sent a letter to IAEA Director General Yukiya Amano, saying that "Qatar believes that the lack of any international co-operation with neighboring states regarding disaster planning, health and safety and the protection of the environment pose a serious threat to the stability of the region and its environment".[83] Iran, a close ally of Qatar in the region, also expressed its concern about the UAE nuclear power plant. Head of Iran's Civil Defense Organization Brigadier General Gholamreza Jalali urged the UAE to address the regional states'

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[80] UAE Embassy in Washington, DC, "UAE Energy Diversification: UAE Embassy in Washington, DC," UAE Energy Diversification | UAE Embassy in Washington, DC, accessed August 14, 2022, https://www.uae-embassy.org/discover-uae/climate-and-energy/uae-energy-diversification.
[81] Elisabeth Dyck and Ayhan Evrensel, "From Consideration to Construction: The United Arab Emirates' Journey to Nuclear Power," IAEA (IAEA, February 3, 2015), https://www.iaea.org/newscenter/news/consideration-construction-united-arab-emirates-journey-nuclear-power.
[82] UAE Embassy in Washington, DC, "UAE Energy Diversification: UAE Embassy in Washington, DC," UAE Energy Diversification | UAE Embassy in Washington, DC, accessed August 14, 2022, https://www.uae-embassy.org/discover-uae/climate-and-energy/uae-energy-diversification.
[83] Geert De Clercq, "Exclusive: Qatar Asks Iaea to Intervene over 'Threat' Posed by UAE Nuclear Plant," Reuters (Thomson Reuters, March 20, 2019), https://www.reuters.com/article/us-qatar-emirates-nuclearpower-exclusive-idUSKCN1R120L.

concerns about the safety and security of the power plant.[84] However, these criticisms must be taken with a grain of salt, as Qatar and Iran are the UAE's main regional rivals and seek to weaken the Emirates. For example, despite expressing concern about the safety and security of Barakah, Iran has supplied Houthis with cruise missiles, which were later used to target the nuclear site. Apart from neighboring states, some nuclear energy specialists express disapproval of the Barakah plant as they are afraid the reactors are not only a potential environmental disaster but also a contributing factor to a nuclear arms race between regional rivals.[85] Paul Dorfman, a senior researcher at the international expert body Nuclear Consulting Group (NCG), said "While the UAE has signed non-proliferation treaties and ratified International Atomic Energy Agency (IAEA) agreements, i.e. the UAE's programs cannot be used to develop atomic bombs, there is still the risk it could share its knowledge with others not bound by similar deals."[86]

On the other hand, some believe that the Barakah nuclear power plant poses little threat. In a visit to Barakah, the de facto ruler of Saudi Arabia and also a close ally of the UAE, Mohammed bin Salman Al Saud publicly claimed the nuclear power plant is "a pioneering project" and its operation "comes in line with the growing awareness of the importance of nuclear energy".[87] Mark Hibbs, a senior associate at the Carnegie's Nuclear Policy Program, said "there is no risk of proliferation" as the UAE "has a record of complete transparency" and "has ratified all IAEA recommendations".[88] The Nuclear Threat Initiative, a global security organization which focuses on reducing nuclear and biological threats imperiling humanity, reported that the UAE is "often referred to as a model for nuclear newcomers."[89]

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[84] Fars News Agency, "Iran Voices Concern about Safety of UAE's N. Reactor: Farsnews Agency," Iran Voices Concern about Safety of UAE's N. Reactor | Farsnews Agency, 2021, https://www.farsnews.ir/en/news/14000121000675/Iran-Vices-Cncern-ab-Safey-f-UAE%E2%80%99s-N-Reacr.

[85] Patricia Sabga, "Nuclear Gulf: Experts Sound the Alarm over UAE Nuclear Reactors," Nuclear Energy | Al Jazeera (Al Jazeera, July 15, 2020), https://www.aljazeera.com/economy/2020/7/15/nuclear-gulf-experts-sound-the-alarm-over-uae-nuclear-reactors.

[86] Vivian Yee, "U.A.E. Becomes First Arab Nation to Open a Nuclear Power Plant," The New York Times (The New York Times, August 1, 2020), https://www.nytimes.com/2020/08/01/world/middleeast/uae-nuclear-Barakah.html.

[87] Emirates Nuclear Energy Corporation, "Saudi Ministry of Energy Delegation Visits Barakah Nuclear Energy Plant," Emirates Nuclear Energy Corporation, November 16, 2021, https://www.enec.gov.ae/news/latest-news/saudi-ministry-of-energy-delegation-visits-barakah-nuclear-energy-plant/.

[88] Tom Allinson, "UAE: Arab World's First Nuclear Power Plant Raises Stakes in the Persian Gulf," DW.COM, February 18, 2020, https://www.dw.com/en/uae-arab-worlds-first-nuclear-power-plant-raises-stakes-in-the-persian-gulf/a-52411432.

[89] Tom Allinson, "UAE: Arab World's First Nuclear Power Plant Raises Stakes in the Persian Gulf," DW.COM, February 18, 2020,

Government's actions to facilitate the energy transitions

The MBZ-led government has been introducing a whole range of policies, incentives, and tax credits to facilitate the energy transition, especially in terms of solar and nuclear energy. Firstly, the UAE has made some changes to statutory provisions to attract more foreign investors in the solar power sector of the country. In 2020, the UAE cabinet issued Resolution No. 16 of 2020 to allow foreign shareholders to own up to 100% of companies in certain designated sectors, one of which is renewables.[90] This is a huge incentive for foreign investors to explore the UAE markets, especially regarding the solar panels production and green technology. Secondly, some emirates such as Abu Dhabi and Dubai have adopted the Independent Power Producer (IPP) model, which allows private entities to own and operate facilities to generate power and sell it in the open market.[91] The IPP model has been the go-to model for the UAE as it enables the country to meet rapidly rising electricity demand by encouraging the private sector's participation and international investment in energy projects in the country. In addition, the UAE government also creates favorable conditions for the development of solar energy by setting one of the most cost-competitive tariffs for solar energy set at AED 4.97 fils per kilowatt hour.[92]

Aside from domestic policies, the UAE has been actively building their presence in the clean energy sector via huge investments in renewables abroad.[93] The Gulf state reaffirmed its plan to provide fundings for thousands of megawatts of solar-energy projects in countries across the world.[94] In May 2022, a senior minister at the World Economic Forum in Davos, Switzerland said "The UAE has invested more than $40 billion in clean energy over the last 15 years, and has plans to invest an additional $160 billion in clean and renewable energy sources

https://www.dw.com/en/uae-arab-worlds-first-nuclear-power-plant-raises-stakes-in-the-persian-gulf/a-52411432.

[90] UAE News, "Foreign Direct Investment (FDI) in the UAE," Foreign Direct Investment - the official portal of the UAE Government, June 9, 2021, https://u.ae/en/information-and-services/finance-and-investment/foreign-direct-investment.

[91] Government of Dubai, "Dewa's IPP Projects Enhance Promising Investments Flow to the UAE and Dubai," Dubai Government Media Office, July 17, 2022, https://www.mediaoffice.ae/en/news/2022/July/17-07/DEWA-IPP-projects-enhance-promising.

[92] UAE News, Solar energy - the official portal of the UAE Government, May 17, 2022, https://u.ae/en/information-and-services/environment-and-energy/water-and-energy/types-of-energy-sources/solar-energy.

[93] Rory Jones, "The Hottest Investor in Renewables Is a Big Oil Producer," The Wall Street Journal (Dow Jones & Company, June 28, 2022), https://www.wsj.com/articles/the-hottest-investor-in-renewables-is-a-big-oil-producer-11656408600.

[94] Rory Jones, "The Hottest Investor in Renewables Is a Big Oil Producer," The Wall Street Journal (Dow Jones & Company, June 28, 2022), https://www.wsj.com/articles/the-hottest-investor-in-renewables-is-a-big-oil-producer-11656408600.

over the next three decades on the road to net zero".[95] In April 2021, MBZ received Iraq's Prime Minister, Mustafa Al Kadhimi in the UAE and announced a $3 billion investment in the country, part of which is allocated for the clean energy sector. In May 2022, the UAE-owned Masdar company started the construction of a 230-megawatt (MW) Garadagh Solar PV Plant in Azerbaijan which is the first foreign investment-based independent solar power project in the country.[96] Masdar is also investing in clean energy in Morocco via the construction of an 800MW solar power plant there.[97]

The emergence of the UAE as a major investor in renewables reflects two things. Firstly, MBZ wants to position the UAE at the center of the global energy transition. He wants to increase his political clout and establish diplomatic relations with those countries by helping them achieve their climate goals. Secondly, investing in clean energy in other countries allows MBZ to acquire more international credit, consolidate his image of a global climate leader, and reaffirm his desire to be a part of the solution to climate change. In addition, MBZ wants to build the UAE's widespread presence in the renewable business abroad, which promises the country a lot of economic opportunities during the energy transition and in the post-oil world. Finally, the substantial investment in renewables abroad is a part of the UAE's long-term plan to enhance its energy security. In other words, as a major global investor in renewables, the UAE can secure itself sufficient energy supplies in a post-oil world.

Economic diversification

Aside from the clean energy transition, MBZ is leading economic diversification with a focus on the tourism sector, financial hub, and supply chain links; however, these will not be addressed in depth as they do not fit the analysis angle of the report. The UAE authorities have launched an array of tourism initiatives and hugely invested into infrastructures to promote the tourism sector, which contributed 11.6% to the GDP of the UAE in 2019.[98] In addition, MBZ also focuses on the development of the UAE, especially Abu Dhabi, as a key financial hub of the region by attracting multinationals into the country. The emirate, which is already home to many multinational corporations and international businesses,

[95] Trade Arabia Business News Information, "UAE to Invest $160bn in Clean, Renewable Energy Sources in next 30 Years," UAE to invest $160bn in clean, renewable energy sources in next 30 years, May 26, 2022, http://www.tradearabia.com/news/OGN_396814.html.
[96] Masdar News, "Masdar Celebrates Groundbreaking on 230 MW Solar Plant in Azerbaijan and Signs Four New Project Agreements," March 16, 2022, https://news.masdar.ae/.
[97] Fareed Rahman, "UAE's AMEA Power Wins Contract to Build Two Solar Plants in Morocco," The National (The National, April 20, 2022), https://www.thenationalnews.com/business/energy/2022/04/20/uaes-amea-power-wins-contract-to-build-two-solar-plants-in-morocco/.
[98] United Arab Emirates Ministry of Economy, "Tourism Indicators," Ministry of Economy UAE, accessed August 14, 2022, https://www.moec.gov.ae/en/tourism-indicators.

has tailored its tax and legal system to create a dynamic destination and attract more foreign direct investment.

Desertification

Desertification has remained high on the environmental agenda of MBZ and the UAE due to its threat to the long-term survival of the country. Apart from being a member of the United Nations Convention to Combat Desertification (UNCCD), the UAE has established a National Environmental Strategy (NES) as a guideline to mitigate desertification.[99] A highlight in the UAE's fight against desertification is its efforts in "greening the desert" or "turning natural desert into productive agricultural land", which is different from the approaches of other countries and the UNCCD.[100] In particular, in order to push back the encroaching desert, the Gulf state has been focusing on three main areas: agricultural land development, soil resources management, and water resources management.

Firstly, afforestation lies at the core of the UAE's plan in developing agricultural land. The country has been pushing forward forestry plantations to promote soil fixation and stop sand from encroaching. In addition, the country has built an array of green belts in urban areas and along roadsides to increase vegetation cover, stop and reverse the land degradation.

Secondly, the UAE has made great efforts in managing soil resources. The Abu Dhabi government created a scientific soil inventory, which provides reliable information on soil and landscapes and helps develop a land degradation map in the area.[101] The inventory has proved important for effective land management in the country. In addition, Abu Dhabi has developed salinity mapping and monitoring as a major part of soil resources management.[102] A better understanding of salinity in affected agricultural lands allows the authorities to identify potential management-related problems. The effective soil management and afforestation will accelerate MBZ's efforts in greening deserts in the UAE.

Finally, since the misuse of water is a contributing factor to desertification, MBZ has focused on the integrated management of water resources, including groundwater, desalinated water, and treated wastewater. The country has

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[99] Mahmoud Ali Abdelfattah, Mohamed Abdel Hamyd Dawoud, and Shabbir Ahmed Shahid, "Soil and Water Management for Combating Desertification – towards Implementation of the United Nations Convention to Combat Desertification from the UAE Perspectives," February 2009.
[100] Mahmoud Ali Abdelfattah, Mohamed Abdel Hamyd Dawoud, and Shabbir Ahmed Shahid, "Soil and Water Management for Combating Desertification – towards Implementation of the United Nations Convention to Combat Desertification from the UAE Perspectives," February 2009.
[101] Mahmoud Ali Abdelfattah, Mohamed Abdel Hamyd Dawoud, and Shabbir Ahmed Shahid, "Soil and Water Management for Combating Desertification – towards Implementation of the United Nations Convention to Combat Desertification from the UAE Perspectives," February 2009.
[102] Mahmoud Ali Abdelfattah, Mohamed Abdel Hamyd Dawoud, and Shabbir Ahmed Shahid, "Soil and Water Management for Combating Desertification – towards Implementation of the United Nations Convention to Combat Desertification from the UAE Perspectives," February 2009.

implemented a national program to protect groundwater resources via establishing and monitoring a groundwater database.[103] In addition, the Emirati government has been constructing desalination plants and decreasing the prices of desalinated water for people.[104] It is estimated that approximately 70% of treated wastewater is distributed for irrigation purposes in national parks, forests, and gardens.[105] All these approaches allow the UAE to improve their water resources management and alleviate the impacts of desertification.

In short, MBZ and the UAE have focused on agricultural land development, soil management, and water resources management to offset the effects of desertification and further implement the greenification policy driven by Sheikh Zayed and Sheikh Khalifa. The greening efforts reflect MBZ's deep concerns about the long-term survival of the UAE and his desire to continue the conservation legacy of his family.

Air pollution

With one of the highest levels in the world, air pollution is another key issue on MBZ's environmental agenda. MBZ's efforts in curbing air pollution are reflected in the National Agenda of the UAE Vision 2021 which aims to improve the air quality from the current level to 90% by 2021.[106] In order to achieve this, MBZ and his Ministry of Climate Change and Environment have focused on "developing and enhancing the national standards for air pollution and compliance control, the transition to a green economy, and increasing the use of clean energy in different fields, the sustainability of the transport sector, the development of an air quality control network and the reliance on intelligent technologies and solutions in monitoring types of pollutants".[107] A notable example for this cross-sectoral solution is the zero-carbon Masdar City Project, which was initiated in 2006 and later pushed forward by MBZ.

Masdar City project

[103] Mahmoud Ali Abdelfattah, Mohamed Abdel Hamyd Dawoud, and Shabbir Ahmed Shahid, "Soil and Water Management for Combating Desertification – towards Implementation of the United Nations Convention to Combat Desertification from the UAE Perspectives," February 2009.
[104] Mahmoud Ali Abdelfattah, Mohamed Abdel Hamyd Dawoud, and Shabbir Ahmed Shahid, "Soil and Water Management for Combating Desertification – towards Implementation of the United Nations Convention to Combat Desertification from the UAE Perspectives," February 2009.
[105] Mahmoud Ali Abdelfattah, Mohamed Abdel Hamyd Dawoud, and Shabbir Ahmed Shahid, "Soil and Water Management for Combating Desertification – towards Implementation of the United Nations Convention to Combat Desertification from the UAE Perspectives," February 2009.
[106] UAE News, Improving air quality - the official portal of the UAE Government, accessed August 14, 2022, https://u.ae/en/information-and-services/environment-and-energy/improving-air-quality.
[107] UAE Ministry of Climate Change and Environment, "Air Quality | Knowledge | UAE Ministry of Climate Change and Environment," accessed August 14, 2022, https://www.moccae.gov.ae/en/knowledge-and-statistics/air-quality.aspx.

Masdar City project is an outstanding example of a cross-sectoral approach to sustainability, based on 7 principles: energy efficiency, sustainable transportation system, water efficiency, energy efficiency, outdoor comfort, zero waste, and high quality of life.[108] Masdar City reflects the economic diversification efforts of MBZ to accelerate the clean energy transition and develop a knowledge-based economy. In 2008, MBZ announced that the government of Abu Dhabi would contribute $15 billion to Masdar, part of which was for developing the world's first carbon-neutral, zero-waste city.[109] Later when MBZ visited Masdar in 2011, he further emphasized the importance of continuing the far-reaching vision of Sheikh Khalifa to ensure the development of a diversified energy mix via the Masdar project.[110]

From the environmental perspective, the project is significant as upon operation, it will be the first community in the world where the carbon emission is zero with no vehicles powered by fossil fuels. The full carbon-neutrality of Masdar city with a focus on solar power and other renewables will play a major role in curbing air pollution in the country, acting as a catalyst toward sustainable cities and green technologies in the UAE and in the MENA region. Expected to be the world's first zero-carbon city, the project is a major part of MBZ's plan to push forward the model of environmental sustainability for other countries to replicate.

Mangroves plantation

MBZ and the UAE are pushing forward the plantation of mangroves as major carbon sinks. In addition to protecting the country from rising sea levels and enhancing biodiversity, mangroves also serve as powerful carbon sinks.[111] They can soak up a significant amount of carbon dioxide in the atmosphere and store it in their roots and branches; mangroves are believed to have the carbon absorption capacity 10 times larger than forests.[112] Compared to forests which keep carbon in biomass and release carbon back to the environment when the

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[108] Walid Fouad Omar, "Zero Carbon City- Masdar City Critical Analysis," BAU Journal - Health and Wellbeing 1, no. 3 (October 2018).
[109] Emirates News Agency, "Mohamed Bin Zayed: A Leader-Born President," wam, May 14, 2022, http://wam.ae/en/details/1395303047646.
[110] "Mohamed Bin Zayed: Led by President Khalifa, the UAE Is Becoming a Hub for the Development and Deployment of Renewable Energy Technologies," Khalifa University, December 11, 2019, https://www.ku.ac.ae/mohamed-bin-zayed-led-by-president-khalifa-the-uae-is-becoming-a-hub-for-the-development-and-deployment-of-renewable-energy-technologies.
[111] Georgia Tolley, "COP26: UAE Pledges to Plant 100 Million Mangroves by 2030," The National (The National, November 10, 2021), https://www.thenationalnews.com/uae/environment/2021/11/09/cop26-uae-pledges-to-plant-100-million-mangroves-by-2030/.
[112] Karen McVeigh, "Blue Carbon: The Hidden CO2 Sink That Pioneers Say Could Save the Planet," The Guardian (Guardian News and Media, November 4, 2021), https://www.theguardian.com/environment/2021/nov/04/can-blue-carbon-make-offsetting-work-these-pioneers-think-so.

trees die, mangroves sequester carbon in the soil and sediments and hence air pollutants can stay there for millenia if undisturbed.[113]

Realizing the huge environmental values of these plants, the UAE pledged to plant 100 million mangroves by 2030 at COP26 in Glasgow.[114] In February 2022, Khaled bin Mohamed bin Zayed, MBZ's son, had a meeting with Prince William to launch the Abu Dhabi Mangrove Initiative to enhance the mass scaling of mangrove recovery.[115] By expanding the mangrove cover as a blue carbon ecosystem, the country can reduce significant carbon emissions and mitigate climate change.

Wildlife conservation

In an attempt to continue the nature conservation tradition of the Nahyan family, preserve biodiversity of the UAE, and develop the tourism sector, MBZ has led significant conservation efforts to protect wildlife.

Firstly, MBZ played a central role in the establishment of the Environmental Agency - Abu Dhabi which is the environmental regulator of the emirate and has been actively involved in conservation projects in the UAE. A highlight of his conservation efforts is the establishment of Mohammed Bin Zayed Conservation Fund which awards grants to species conservation initiatives not only in the UAE but also all around the world. By creating this fund with a global focus, MBZ wants to recognize leaders in the field and elevate the importance of conservation. MBZ also managed to form a partnership with Mubadala Investment Company, the Abu Dhabi-based sovereign investor, to increase the capacity of the fund and support other initiatives. In addition to the fund, MBZ has been continuing Sheikh Zayed's efforts in protecting Arabian Oryx which is considered the official national animal of the UAE. In 2007, following the directives of his father, MBZ launched the Sheikh Mohamed Bin Zayed Arabian Oryx Reintroduction Programme to increase the animal's population and save it from extinction.

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[113] Karen McVeigh, "Blue Carbon: The Hidden CO2 Sink That Pioneers Say Could Save the Planet," The Guardian (Guardian News and Media, November 4, 2021), https://www.theguardian.com/environment/2021/nov/04/can-blue-carbon-make-offsetting-work-these-pioneers-think-so.

[114] Georgia Tolley, "COP26: UAE Pledges to Plant 100 Million Mangroves by 2030," The National (The National, November 10, 2021), https://www.thenationalnews.com/uae/environment/2021/11/09/cop26-uae-pledges-to-plant-100-million-mangroves-by-2030/.

[115] Abu Dhabi Government Media Office, "Khaled Bin Mohamed Bin Zayed and Prince William Meet in Abu Dhabi to Discuss Sustainability Agenda," المكتب الإعلامي لحكومة أبوظبي, February 10, 2022, https://www.mediaoffice.abudhabi/en/government-affairs/khaled-bin-mohamed-bin-zayed-and-prince-william-meet-in-abu-dhabi-to-discuss-sustainability-agenda/.

Mohamed Bin-Zayed's Impact

This section provides an impact assessment of MBZ's policy solutions to the major environmental challenges in the UAE.

Clean energy transition

Since joining the Paris climate deal, MBZ and the UAE have been increasingly vocal about its ambition of transforming from a petrostate to a major renewable and hydrogen powerhouse in the world. Although the Gulf state launched clean energy projects more than 15 years ago, the renewables generation was only accelerated after the ratification of the Paris Accords: indeed, the proportion of renewables jumped from well below 0.5% in 2015 to over 3.5% in 2020 (Figure 1).[116] In breakdown, most of the renewable energy was used for residential and commercial purposes, each of which accounted for 44% while the industrial sector consumed only 9% in 2019 (Figure 2).[117]

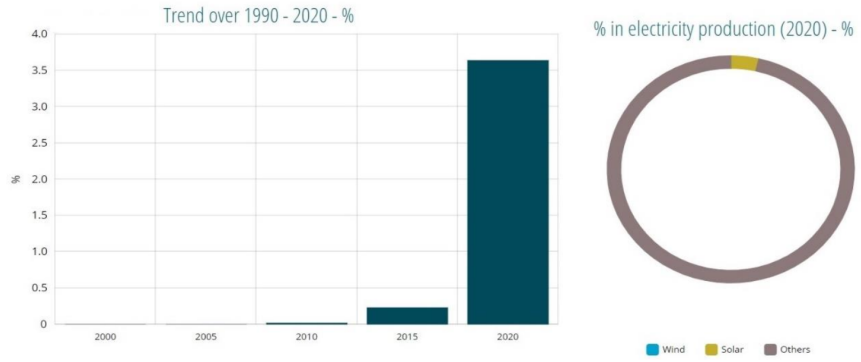
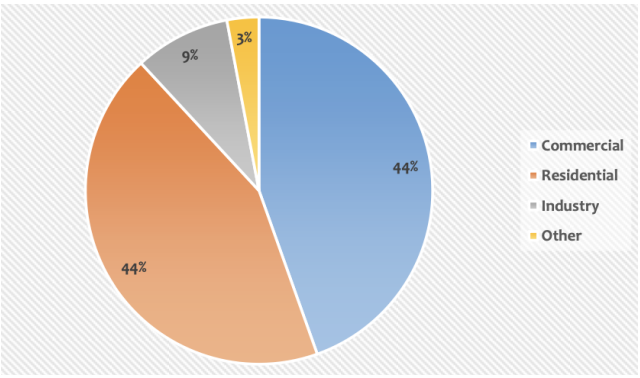


Figure 1. UAE renewable power generation percentage (1990-2020) and power generation mix in 2020.



[116] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.
[117] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.

Figure 2. Final renewable energy demand by UAE economic sector 2019.

In addition, after pledging for net zero emissions by 2050, the Gulf country declared to increase the contribution of clean energy in the total energy mix from 25% to 50% by 2050 in the UAE Energy Strategy 2050.[118] In particular, the country set the target of an energy mix including: 44% clean energy, 38% gas, 12% clean coal, and 6% nuclear.[119]

The UAE has become one of the most active countries in the clean energy transition in the region by aiming for a decrease in emissions of 23.5% below business as usual (BAU) in 2030. Similarly, Qatar targets a 25% cut in greenhouse gas emissions by 2030 under the climate plan and Saudi Arabia aims to generate half its domestic energy sustainably by 2030.[120] By contrast, Oman claims to reduce only 7% in emissions by 2030, which is far short of the 50% reduction proposed by scientists; Iraq, the OPEC's second-largest oil producer, commits only 1-2% emissions reduction.[121]

Solar power

After the ratification of the Paris Accords, there was a remarkable growth in the installed capacity of solar power in the UAE, from around 100MW in 2015 to more than 2500MW in 2020 (Figure 3).[122] Noor Abu Dhabi, the largest single-site solar power plant in the world using 3.2 million solar panels, generates nearly 1.2 gigawatts of power which covers the needs of 90,000 people.[123] Considered a landmark in the energy transition of the UAE, Noor Abu Dhabi is significant in reducing gas-based electricity generation and resulting in a carbon footprint reduction of 1 million metric tons per year, which is equivalent to taking 200,000

[118] UAE news, "UAE Energy Strategy 2050," UAE Energy Strategy 2050 - the official portal of the UAE Government, accessed August 13, 2022, https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/uae-energy-strategy-2050.
[119] UAE news, "UAE Energy Strategy 2050," UAE Energy Strategy 2050 - the official portal of the UAE Government, accessed August 13, 2022, https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/uae-energy-strategy-2050.
[120] Maya Gebeily, "Analysis: Gulf Energy Giants Pledge Net Zero - but Plan to Stick with Oil," Reuters (Thomson Reuters, October 28, 2021), https://www.reuters.com/business/cop/gulf-energy-giants-pledge-net-zero-plan-stick-with-oil-2021-10-28/.
[121] Maya Gebeily, "Analysis: Gulf Energy Giants Pledge Net Zero - but Plan to Stick with Oil," Reuters (Thomson Reuters, October 28, 2021), https://www.reuters.com/business/cop/gulf-energy-giants-pledge-net-zero-plan-stick-with-oil-2021-10-28/.
[122] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.
[123] Emirates Water and Electricity Company, "Noor Abu Dhabi," Noor Abu Dhabi | Emirates Water and Electricity Company (EWEC), accessed August 15, 2022, https://www.ewec.ae/en/power-plants/noor-abu-dhabi.

cars off the road.[124] Noor Abu Dhabi and the Al Dhafra Solar PV project, which will be another world's largest solar power plant to be in full operation by the end of 2022, play a critical role in fulfilling the UAE's ambition of having 44% of its power sourced from clean energy by 2050.

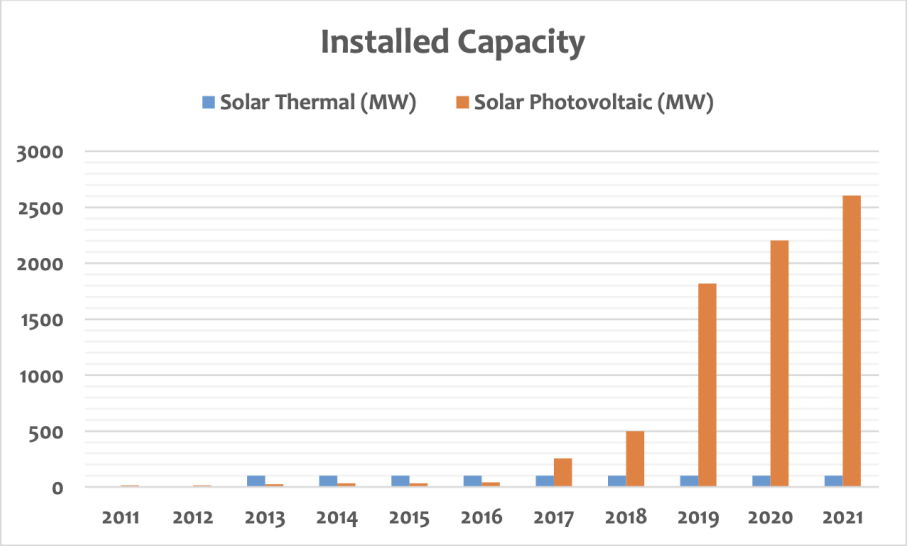


Figure 3. UAE solar energy generation installed capacity (2011-2021).

In addition to large-scale solar power plants, minor solar facilities and programs are also pushed forward as a part of the grand plan of reducing reliance on fossil fuels. The solar rooftop plan, which was launched by the Abu Dhabi government, led to an annual electricity output of 4.025 GWh and mitigation of 3220 tons of CO2 emissions in 2017.[125] The parking lot solar canopy installations, which include 105 parking places, generate 343 MWh/year with 300 units of CO2 savings per year.[126] The domestic solar water heating facilities in such places as the Aloft Hotel and the Masdar Institute in Abu Dhabi provide a capacity of 4 MW solar power.[127]

Thanks to technological innovation and favorable geographical position, the Gulf country has managed to generate cheap solar energy, driving down the cost from 5.84 US cents in 2015 to 2.94 US cents in 2017 (Figure 4). As the cheapest

[124] Emirates Water and Electricity Company, "Noor Abu Dhabi," Noor Abu Dhabi | Emirates Water and Electricity Company (EWEC), accessed August 15, 2022, https://www.ewec.ae/en/power-plants/noor-abu-dhabi.
[125] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.
[126] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.
[127] Mohsen Salimi, Morteza Hosseinpour, and Tohid N.Borhani, "Analysis of Solar Energy Development Strategies for a Successful Energy Transition in the UAE," MDPI (Multidisciplinary Digital Publishing Institute, July 8, 2022), https://doi.org/10.3390/pr10071338.

operational solar plant in the world, Noor Abu Dhabi provides solar power at a cost of 2.94 US cents per kilowatt-hour, compared to fossil fuels with 4-6 US cents per kWh.[128] This demonstrates the cost competitiveness of solar power over fossil fuels which will encourage people to switch to solar power for residential and commercial purposes.

In short, the UAE has become one of the regional frontrunners in renewable energy development. In 2019, the UAE pioneered the development of concentrated solar power (CSP) as the only country to have the CSP technology in the Gulf Cooperation Council.[129] With one of the world's largest solar power plants, coupled with other small-scale projects within the country, the UAE has managed to achieve the world-record solar prices and maintain its leading status in the region. The completion of the Al Dhafra Solar PV project as another largest solar power plant at the end of 2022 will further consolidate the UAE's position in the renewables sector in the MENA region.

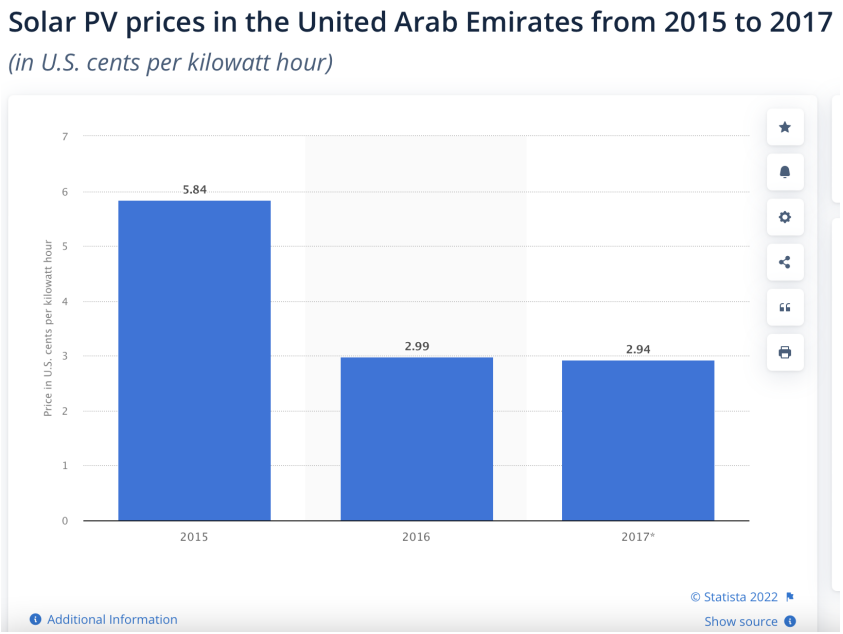


Figure 4. Solar PV prices in the United Arab Emirates from 2015 to 2017.

Nuclear energy

In 2020, Unit 1 of the Barakah nuclear power plant was successfully started, making the UAE the first country in the Arab world to operate a nuclear power

[128] Erica Solomon, "How the UAE Is Succeeding in Generating Cheap Solar Energy," Khalifa University, July 29, 2019, https://www.ku.ac.ae/how-the-uae-is-succeeding-in-generating-cheap-solar-energy.
[129] Sania Aziz Rahman, "Is UAE Leading the Way for Concentrated Solar Power in the Gulf?," Eco (Eco-Business, May 11, 2019), https://www.eco-business.com/news/is-uae-leading-the-way-for-concentrated-solar-power-in-the-gulf/.

plant.[130] Following that, March 2022 marked the start of commercial operations of Unit 2 at the Barakah plant which provides another 1,400 megawatts of zero-carbon emission electricity to the national grid. In total, the operation of the Barakah nuclear power plant now generates 2,800 megawatts of electricity, which further enhances energy security and advances the UAE's commitment to the Paris Accords.[131] Unit 3 and 4 are in the final stages of commissioning and expected to be in full operation in the next two years. Since the start of the construction in 2012, the Barakah nuclear power plant project has strictly followed the timeline, sometimes even ahead of the schedule. This clearly demonstrates MBZ's determination in diversifying the energy sources and advancing the UAE's sustainability goals over the past decade.

The Barakah nuclear power plant is a landmark development in the clean energy transition of the UAE. When the two remaining units are in full commercial operation, the energy capacity of the Barakah plant will be raised to 5,6000 megawatts, accounting for nearly 25% of the electricity needs in the country.[132] This full operation of the plant will remove 22.4 million tons of carbon emissions annually, equivalent to the emissions of 4.8 million cars.[133] The official Emirates News Agency estimated that the Barakah plant will supply well over 85% of Abu Dhabi Emirate's clean electricity and be the biggest contributor to reducing Abu Dhabi's carbon emissions by 50% by 2050.[134]

Apart from playing a central role in the energy diversification of MBZ, the success of the Barakah project has produced great incentives for other countries in the Arab world to adopt their own nuclear programs. Turkey started the construction of their first nuclear power reactor at the Akkuyu nuclear power plant in 2018.[135] Egypt has applied for the construction permit of the El-Dabaa nuclear power

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[130] Al-Monitor Staff, "UAE Expands Nuclear Power Plant, Doubles Electricity Production," Al-Monitor, March 24, 2022, https://www.al-monitor.com/originals/2022/03/uae-expands-nuclear-power-plant-doubles-electricity-production.

[131] Esraa Ismail and Rola Alghoul, "Barakah Doubles Clean Electricity Generation with Start of Commercial Operations at Unit 2," Emirates News Agency, March 24, 2022, https://www.wam.ae/en/details/1395303033006.

[132] Esraa Ismail and Rola Alghoul, "Barakah Doubles Clean Electricity Generation with Start of Commercial Operations at Unit 2," Emirates News Agency, March 24, 2022, https://www.wam.ae/en/details/1395303033006.

[133] Esraa Ismail and Rola Alghoul, "Barakah Doubles Clean Electricity Generation with Start of Commercial Operations at Unit 2," Emirates News Agency, March 24, 2022, https://www.wam.ae/en/details/1395303033006.

[134] Esraa Ismail and Rola Alghoul, "Barakah Doubles Clean Electricity Generation with Start of Commercial Operations at Unit 2," Emirates News Agency, March 24, 2022, https://www.wam.ae/en/details/1395303033006.

[135] World Nuclear Association, "Nuclear Power in Turkey," Nuclear Power in Turkey | Nuclear Energy In Turkey - World Nuclear Association, July 2022, https://world-nuclear.org/information-library/country-profiles/countries-t-z/turkey.aspx.

plant.[136] Saudi Arabia currently has no nuclear power capacity but the country has established the Nuclear Holding Company early this year to develop nuclear programs.[137]

Assessment of the UAE's compliance with the Paris Accords

Despite an array of renewable and nuclear energy programs to reduce the use of fossil fuels, MBZ and the UAE have been criticized for being inconsistent with the Paris Agreement's 1.5°C temperature limit.[138] In 2020, Dubai launched the construction of the coal-powered Hassyan power plant, which is contradictory to the need to phase out coal from electricity production in order to meet the net zero targets by 2050.[139] The reason behind the emergence of this coal-fired plant is the UAE's heavy reliance on gas imports from such countries as Qatar, which can be interrupted by the soured relationship between the two countries.[140] Therefore, the UAE wants to diversify its fuel supply and build its own coal plant to bring down the costs, which signifies its priority of energy security over meeting climate goals. In addition, the UAE's decision to ramp up oil production in March 2022 also met with criticism for not advancing its commitment to environmental sustainability.[141] According to the 2021 Production Gap Report, by leading research institutes and the UN Environment Programme (UNEP), global coal, oil and gas production must start declining immediately and steeply to be consistent with limiting long-term warming to 1.5°C.[142] In response, Dr. Sultan Al Jaber, the UAE's climate envoy, said "We can't just switch off the energy system, as current events show", referring to rising fuel prices driven by the Russian

[136] Meed, "Agency Applies for Egypt Nuclear Construction Permit," Power Technology, January 14, 2022, https://www.power-technology.com/comment/egypt-nuclear-construction/.
[137] World Nuclear Association, "Nuclear Power in Saudi Arabia," Nuclear Power in Saudi Arabia - World Nuclear Association, April 2022, https://world-nuclear.org/information-library/country-profiles/countries-o-s/saudi-arabia.aspx.
[138] Climate Action Tracker, "Policies & Action," Policies & action | Climate Action Tracker, accessed August 15, 2022, https://climateactiontracker.org/countries/uae/policies-action/.
[139] Jon Gambrell, "In Dubai, Oil-Rich UAE Sees a New Wonder: A Coal Power Plant," ABC News (ABC News Network, October 22, 2020), https://abcnews.go.com/International/wireStory/dubai-oil-rich-uae-sees-coal-power-plant-73754906.
[140] Paul Cochrane, "Gas and the Gulf Crisis: How Qatar Could Gain the Upper Hand," Middle East Eye, June 27, 2017, https://www.middleeasteye.net/big-story/gas-and-gulf-crisis-how-qatar-could-gain-upper-hand
[141] Sue Surkes, "UAE Aims to Go Green While Continuing to Produce Oil," The Times of Israel, March 29, 2022, https://www.timesofisrael.com/uae-aims-to-go-green-while-continuing-to-produce-oil/.
[142] "Governments' Fossil Fuel Production Plans Dangerously Out of Sync with Paris Limits," Governments' Fossil Fuel Production Plans Dangerously Out of Sync with Paris Limits, October 21, 2021, https://unfccc.int/news/governments-fossil-fuel-production-plans-dangerously-out-of-sync-with-paris-limits.

invasion in Ukraine.[143] He continued to emphasize that "Weaning the world off hydrocarbons will be gradual and needs sober planning; it cannot be rushed".[144]

In short, apart from the operation of three world's largest solar power plants and the development of nuclear programs, there is still a lack of information regarding the UAE's concrete plans to carry out the clean energy transition. Despite MBZ's efforts in accelerating the transition with a strong focus on renewables and nuclear energy, the UAE continues to heavily rely on fossil fuels, with the majority of energy produced still being oil and gas.[145] There is still a gap between the UAE government' planned production of coal, oil and gas and the global production levels consistent with meeting the Paris Agreement temperature limits.[146] From MBZ's perspective, the UAE could not transition to net zero unless they continued to produce oil.[147] MBZ believes that oil and gas will remain the spinal cord of the UAE to meet energy requirements in the future and provide major financial resources for the country to carry out the clean energy transition. The president places importance in balancing fossil fuel production, which is the base of the UAE's economy and international power, with environmental projects that will accelerate alternative energy generation; in other words, the energy transition is not feasible without the hydrocarbon industry. This reflects MBZ's desire in maintaining the UAE's position as a major energy supplier in the region, whether it is hydrocarbon or alternatives. This vision of MBZ means that the UAE's net zero commitment doesn't signify a significant movement away from fossil fuels, which will remain crucial in decades to come. Therefore, the continued expansion of fossil fuels-based sources of electricity is a hindrance to the UAE's climate goals by 2050.

Desertification

"Greening the desert" or turning natural desert into productive agricultural land stands out as a major approach in combating desertification in the UAE, which was originally driven by the founding father Sheikh Zayed and furthered by MBZ later on. In order to implement the greenification policy, MBZ and the UAE have been focusing on agricultural land development which is complemented by soil

[143] Sue Surkes, "UAE Aims to Go Green While Continuing to Produce Oil," The Times of Israel, March 29, 2022, https://www.timesofisrael.com/uae-aims-to-go-green-while-continuing-to-produce-oil/.
[144] Sue Surkes, "UAE Aims to Go Green While Continuing to Produce Oil," The Times of Israel, March 29, 2022, https://www.timesofisrael.com/uae-aims-to-go-green-while-continuing-to-produce-oil/.
[145] IEA, "United Arab Emirates - Countries & Regions," November 28, 2018, https://www.iea.org/countries/united-arab-emirates.
[146] SEI et al., "The 2021 Production Gap Report," October 2021, https://productiongap.org/2021report/.
[147] Maya Gebeily, "Analysis: Gulf Energy Giants Pledge Net Zero - but Plan to Stick with Oil," Reuters (Thomson Reuters, October 28, 2021), https://www.reuters.com/business/cop/gulf-energy-giants-pledge-net-zero-plan-stick-with-oil-2021-10-28/.

resources management and water resources management (See Part 4: "Policy Outlook").

The Global Forest Resources Assessment reported that the UAE witnessed a remarkable increase of forest area from 245,000 hectares in 1990 to 322,600 hectares in 2015, which is considered a major achievement of the country in pushing back encroaching desert.[148] In June 2022, a study was released with surprising findings: the satellite images showed that there had been a constant growth in vegetation cover in the UAE from 1972 to 2021.[149]

At the same time, some costly real estate projects are reported to hinder the country's attempts in mitigating desertification. In 2016, Dubai Holding planned the construction of Jumeirah Central on the site of the One Million Trees initiative which was launched in 2010 to promote afforestation and mitigate desertification. The massive, unsustainable and costly real estate developments are reported by the Guardian to have wrecked the One Million Trees initiative, with the perish of nearly 80% of the trees.[150]

In general, although there are some studies indicating the increase in agricultural land and vegetation cover in the UAE, there is still a lack of research that provides a comprehensive evaluation of the country's combat against desertification. It is recommended that there should be further research focusing on integrated data collection related to desertification assessment in the UAE.

Air pollution

This section provides an impact assessment of the Masdar City project and the Mangroves plantation, both of which play important roles in the UAE's efforts in curbing air pollution.

Masdar City project

The initial goal of Masdar City was to create a self-sustaining zero-carbon city powered exclusively by renewable energy while exhibiting the highest levels of energy efficiency, which in full operation is expected to curb air pollution significantly in Abu Dhabi. There are three main reasons why the Masdar City project has failed to achieve its goal of promoting urban environmental

[148] Food and Agriculture Organization of the United Nations, "Global Forest Resources Assessment 2015," 2015, https://www.fao.org/3/az364e/az364e.pdf.
[149] Daniel Bardsley, "UAE Desert Has Grown Greener amid Urban Rise, 50-Year Study Shows," The National (The National, June 18, 2022), https://www.thenationalnews.com/uae/environment/2022/06/18/uae-desert-has-grown-green-amid-urban-rise-50-year-study-shows/.
[150] Richa Syal, "From 1m Trees to a Tree Graveyard: How Dubai's Conservation Plans Went Awry," The Guardian (Guardian News and Media, August 24, 2021), https://www.theguardian.com/environment/2021/aug/24/1m-trees-tree-graveyard-dubai-conservation-plans-desertification-real-estate.

sustainability: stagnant progress, expected marginal impacts, and goal scale-down.

Stagnant progress: The completion of the city was originally intended to be in 2016 but has been pushed back to between 2025 and 2030.[151] Although the project is still underway, it shows stagnant progress when in 2020, only one out of seven phases of the project was finished.[152] Conceived to be a residence for 50,000 people, there were only 1,300 dwellers who were barely visible in the city in 2020.[153]

Marginal impact: Research suggests that "the carbon debt of Masdar City in the form of greenhouse gas emissions will be high, primarily through the offsite planning, design and commissioning of the city and further through procuring solar panels, wind and geothermal energy equipment and technology required".[154] In other words, the project's aspiration of creating the first world's zero-carbon city could only be achieved through excluding contributory factors from outside the city.[155] In 2016, the Guardian reported that "Masdar City is nowhere close to zeroing out its greenhouse gas emissions now, even at a fraction of its planned footprint. And it will not reach that goal even if the development ever gets fully built, the authorities admitted".[156]

Even upon completion, Masdar City is anticipated to yield a marginal impact in mitigating greenhouse gases (GHG) in Abu Dhabi. The emirate's population in 2022 is 1,5 million, which is predicted to climb to 1,8 million by 2035.[157] The Masdar City project was conceived to host 50,000 people upon completion. As a result,

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[151] Christopher Stanton, "Masdar City Completion Pushed Back, but Total Cost Falls," The National (The National, June 25, 2021), https://www.thenationalnews.com/uae/environment/masdar-city-completion-pushed-back-but-total-cost-falls-1.532529.

[152] Anthony Flint, "What Abu Dhabi's City of the Future Looks Like Now," Bloomberg.com (Bloomberg, February 15, 2020), https://www.bloomberg.com/news/articles/2020-02-14/the-reality-of-abu-dhabi-s-unfinished-utopia.

[153] Anthony Flint, "What Abu Dhabi's City of the Future Looks Like Now," Bloomberg.com (Bloomberg, February 15, 2020), https://www.bloomberg.com/news/articles/2020-02-14/the-reality-of-abu-dhabi-s-unfinished-utopia.

[154] Kasim Randeree and Nadeem Ahmed, "The Social Imperative in Sustainable Urban Development," Smart and Sustainable Built Environment 8, no. 2 (July 2019): pp. 138-149, https://doi.org/10.1108/sasbe-11-2017-0064.

[155] Kasim Randeree and Nadeem Ahmed, "The Social Imperative in Sustainable Urban Development," Smart and Sustainable Built Environment 8, no. 2 (July 2019): pp. 138-149, https://doi.org/10.1108/sasbe-11-2017-0064.

[156] Suzanne Goldenberg, "Masdar's Zero-Carbon Dream Could Become World's First Green Ghost Town," The Guardian (Guardian News and Media, February 16, 2016), https://www.theguardian.com/environment/2016/feb/16/masdars-zero-carbon-dream-could-become-worlds-first-green-ghost-town.

[157] World Population Review, "Abu Dhabi Population 2022," Abu Dhabi Population 2022 (Demographics, Maps, Graphs), accessed August 15, 2022, https://worldpopulationreview.com/world-cities/abu-dhabi-population.

the project will exert negligible impacts on curbing GHG emissions in Abu Dhabi which has one of the highest per capita carbon footprints in the world.

Goal scale-down: The financial crisis in 2008 led to a fundamental change in the project, reducing Masdar City's initial aim of being "zero-carbon" (no carbon dioxide emission) to "carbon- neutral" (no net release of carbon dioxide into the atmosphere).[158] This indicates Masdar developers have scaled back their environmental ambitions.

Mangroves plantation

Apart from serving as natural habitats for wildlife and recreation grounds for people, mangroves also act as green lung for major cities such as Abu Dhabi and Dubai. The UAE government has engaged in the restoration and protection of mangroves forests as major carbon sinks for the country. A clear illustration of the UAE's efforts could be seen in the establishment of eco-reserves such as Al Wathba Wetland Reserve and Mangroves National Park and the country's commitment to accelerate mangroves plantation at COP26.

As a result, there has been a steady growth in mangroves cover in the UAE, with an estimated 800-1200 ha of mangroves planted since 1972.[159] Covering roughly 180 square kilometers in the UAE, mangroves are estimated to capture 43,000 tonnes of CO2 per year.

In general, in an effort to curb air pollution, the Gulf country has engaged in a wide range of projects, notably the clean energy transition, the Masdar City project, and the mangrove plantations. However, research that comprehensively evaluates the UAE's efforts in alleviating air pollution is still limited. More studies therefore need to be conducted to provide a clearer idea about the UAE's fight against air pollution.

Wildlife conservation

The Mohamed bin Zayed Species Conservation Fund is one of the most important tools for MBZ to promote species conservation on a domestic, regional, and international level. By providing microfinancing without bureaucracy and red tape, the fund seeks to empower conservationists in the fight against the extinction crisis; up to now, it has awarded over 2,300 grants to a diverse range of species in over 160 countries.[160] These grants are essential in supporting over

[158] Kasim Randeree and Nadeem Ahmed, "The Social Imperative in Sustainable Urban Development," Smart and Sustainable Built Environment 8, no. 2 (July 2019): pp. 138-149, https://doi.org/10.1108/sasbe-11-2017-0064.
[159] Food and Agriculture Organization of the United Nations, "Global Forest Resources Assessment 2015," 2015, https://www.fao.org/3/az364e/az364e.pdf.
[160] "Who We Are," The Mohamed bin Zayed Species Conservation Fund, accessed August 15, 2022, https://www.speciesconservation.org/.

1500 species and subspecies in the world.[161] The MBZ fund also entered into a partnership with Mubadala Investment Company, the Abu Dhabi-based sovereign investor, which provides the fund with $1.5 million annually to be directed towards supporting endangered flora and fauna in Africa and Asia.[162]

In addition to the fund, MBZ also initiated the Arabian Oryx reintroduction programme, following his father's directives in protecting the animal. The programme's activities mainly revolve around breeding and protecting the wild animals from extinction, while reintroducing them back into their natural habitat. The programme has been critical in protecting the Arabian Oryx, preserving it from extinction and increasing its numbers in the wild. As a result, the Arabian Oryx's status on the Red List of the International Union for Conservation of Nature was changed from 'endangered' to 'vulnerable to extinction' in 2011.[163] This is regarded as a significant moment in the field of the reintroduction of species on a global level, which empowers other conservationists to continue to work in the field.

Acting as the largest environmental regulator in the Middle East, the Environmental Agency - Abu Dhab is another important agent carrying out the environmental agenda of MBZ. One of the most significant achievements of the agency is the establishment of the Sheikh Zayed Protected Areas Network, recording 100 unknown invertebrate species and leading the region in banning gargour fishing nets.[164] In addition, the agency also works closely with other regional and international organizations in the conservation field. In 2021, the agency announced that, in collaboration with The Middle East's largest aquarium, the National Aquarium located at Al Qana in Abu Dhabi, it has successfully treated and pre-released a Loggerhead turtle.[165]

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[161] "Who We Are," The Mohamed bin Zayed Species Conservation Fund, accessed August 15, 2022, https://www.speciesconservation.org/.
[162] Nasreen Abdulla, "Sheikh Mohamed Bin Zayed: A Keen Environmentalist and Wildlife Conservationist," Khaleej Times (Khaleej Times, May 14, 2022), https://www.khaleejtimes.com/uae/sheikh-mohamed-bin-zayed-a-keen-environmentalist-and-wildlife-conservationist.
[163] Nasreen Abdulla, "Sheikh Mohamed Bin Zayed: A Keen Environmentalist and Wildlife Conservationist," Khaleej Times (Khaleej Times, May 14, 2022), https://www.khaleejtimes.com/uae/sheikh-mohamed-bin-zayed-a-keen-environmentalist-and-wildlife-conservationist.
[164] "About Us," Environment Agency – Abu Dhabi, accessed August 15, 2022, https://www.ead.gov.ae/en/about-us.
[165] "Environment Agency – Abu Dhabi and The National Aquarium Team up to Rescue Endangered Loggerhead Turtle," Environment Agency – Abu Dhabi and The National Aquarium Team up to Rescue Endangered Loggerhead Turtle, April 4, 2021, https://www.ead.gov.ae/Media-Centre/News/042021-LoggerHead-Turtle.

Conclusion

This paper analyzed MBZ's climate leadership in the MENA region from five different angles: an overview of major environmental threats in the UAE, the Paris Agreement ratification as a snapshot of MBZ's defining moment in his journey to become a climate leader, MBZ's policy solutions to alleviate the aforementioned challenges, and an impact assessment of his climate actions over the past decade. The five angles allow for a comprehensive insight into MBZ's environmental agenda, illustrating how his pioneering efforts have consolidated his status as a climate leader in the region.

The paper is relevant to the climate field for two main reasons. It demonstrated how MBZ's leading environmental policies influence the agenda of other neighboring countries, indicating a gradual progress in climate change recognition in a region which has been slow in climate measures. Moreover, the analysis provided a better understanding of the climate outlook and the idea of environmentalism for major petrostates such as the UAE. However, the paper did not establish direct comparisons between MBZ's environmental agenda with other regional leaders'. Furthermore, there was a lack of concrete data regarding the impacts of MBZ's policies in fighting desertification and air pollution. It is therefore important that more studies be conducted for a more comprehensive impact assessment.

MBZ is a climate leader in the MENA region, as his frontrunner status in climate actions have provided great incentives for other MENA countries to combat climate change. One of the major accomplishments of MBZ as an environmentalist is his ratification of the Paris Agreement in 2016, making the UAE the first country in the Arab world to join this global climate deal. In a region where many oil-producing countries used to resist the tough agreement of curbing carbon emissions, the ratification is regarded as a leadership move of MBZ as it urges other petrostates to reconsider their outlook on climate change. Consequently, there has been a surge of new net zero pledges from major countries in the region, such as Saudi Arabia, Qatar, Bahrain, Oman, and Iraq. In addition, MBZ's position as a climate leader is illustrated via his launch of the first nuclear power plant in the volatile Middle East, overcoming all the hurdles related to the regional and international community's concerns over nuclear proliferation. MBZ's successful construction of the Barakah plant as a part of the energy transition has urged other countries to adopt their own nuclear programs, such as Turkey, Egypt, and Saudi Arabia. By advancing the nuclear programs, MBZ wants to maintain the position of a major energy provider and continue to sell energy to other countries in the region, which would help them to reduce their reliance on fossil fuels. Thirdly, MBZ's relentless pursuit of renewable energy is well demonstrated with various ground-breaking projects such as the Al Dhafra

Solar PV project and Abu Dhabi's Shams Solar Park as the first utility-scale solar plant in the Middle East. Such massive solar endeavors in the UAE are pushing other countries such as Saudi Arabia to advance their own renewables programs. Finally, MBZ's implementation of the Masdar City project as the first zero-carbon city in the world has incentivized Saudi Arabia to build a similar megacity NEOM in 2017. Despite limited success up to now, Masdar City is a step towards sustainable cities and developing green technologies.

For the next decades, MBZ will further his international engagement in the climate field by hosting COP28. This engagement contrasts the ramping up of oil production, although it helps the country achieve energy security and create more financial resources for the energy transition. For MBZ, oil production remains the backbone of the UAE's economy and international power. Therefore, he will balance fossil fuel production with other environmental projects as part of the energy transition. The continued expansion of oil production will hamper the impacts of his climate actions and his commitment to net zero, which ultimately undermines his credibility as a climate leader in the international community. However, within MENA where other petrostates face similar challenges, this poses little threat to MBZ's position as a regional climate leader; MBZ will continue to set himself and the UAE apart by his pioneering environmental efforts in the region.

In sum, MBZ's pioneering climate actions have had a major influence in the Gulf region and help consolidate his status as a regional climate leader with international aspirations, although his position is tarnished by the petrostate status.

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