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Qatar's Climate Governance Policies and Energy Transition: Practices and Implications

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Abstract

Qatar as part of the Middle East is characterised by tropical desert conditions; including high temperatures, severe drought, low rainfall, limited water resources, and significant land degradation. This region, with the world's largest oil reserves, has faced resource disputes and environmental degradation due to large-scale industrialisation and oil exploitation for economic development. This study examines the effectiveness of the Qatari government's strategies for sustainable development to reduce the effects of climate change. The case study method was used to measure the challenges and outcomes of Qatar's climate governance objectives through the emission reduction contribution of the AI Kharsaah renewable energy station and the scheduled achievements of Qatar's National Strategy 2030 targets. Although there is practice in building up renewable energy stations. Carbon emissions suggest that a significant gap remains between promise and practice. Therefore, it is imperative for Qatar to continuously adapt its national strategy for sustainable development, promoting energy transformation and gradually transitioning its economic model away from fossil fuel exports through bilateral co-operation. Additionally, accelerating the implementation of carbon capture and Storage (CCS) technologies, alongside improving the efficiency of fugitive CO_2 recovery, will be crucial in addressing these changes.

Keywords: *Climate Change, Energy Consumption, Sustainable Development, National Strategy, Qatar.*

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Introduction`

The growing threats associated with using fossil fuels are becoming more pronounced each day. Everything in our environment is changing due to climate change, including the rising sea levels, storm frequency, severe flooding, extreme aridity and heat waves. Recent reports on climate change indicate that rapid and extensive changes to global ecosystems are inevitable, with unknown and unpredictable impacts on human and ecosystem health (IPCC, 2022). As the pace of climate action has been slow – including reducing greenhouse gas emissions, bolstering resilience to a changing climate, and obtaining technological and financial help for vulnerable nations – countries have responded by committing to accelerate action across all areas by 2030 (UNFCCC, 2023).

Deteriorating climate conditions have compelled governments to accelerate the shift from coal to alternative energy sources such as wind and solar power in the upcoming set of promises. The concept of a "Just Transition" emphasises the urgent need for implementing capacity building, climate finance, and technology development and transfer, particularly to support developing countries in their transition pathways. However, while these decisions are commendable, they remain non-binding and continue to weigh heavily on the Middle Eastern countries that are still dependent on oil for their economies.

Qatar had the highest GDP per capita as of 2022 among the GCC nations, bolstered by abundant energy reserves. Qatar shares the same oil-dependent economy as its neighbours. In the first quarter of 2024, total budget revenues amounted to QR 53.4 billion, with QR 47.3 billion from oil revenues – approximately 80% of the government budget for that period (Qatar News Agency, 2024). In terms of per capita carbon emissions, Qatar had the highest in the world in 2022, with carbon dioxide emissions from manufacturing and related petroleum-based products (excluding land-use change) reaching 37.6 tons per person compared to a global average of just 4.7 tons per person (Hannah Ritchie, 2020). In response to the challenges posed by climate change, Qatar has implemented various policies and established institutions to govern the action on environmental protection.

By 2030, the State of Qatar is scheduled to set a national goal to decrease its greenhouse gas emissions (GHG) by 25%. This target is a key objective of Qatar's National Vision 2030, which prioritise the promotion of a broad energy mix, industry and economic diversification, and sustainable projects (International Trade Administration, 2022). Beyond national policy aimed at economic diversification and transformation, Qatar is also investing heavily in technologies that reduce greenhouse gases, including carbon capture and storage (CCS). Qatar has committed to expanding its CCS capacity to over 11 million tons per annum (MTPA) of CO_2 by 2035 (Qatar Energy, 2022).

Climate change governance has become a critical issue in the global policy arena, with a shift towards multilateral governance systems (Rabe, 2007). This shift presents both challenges and opportunities for energy-oriented countries like Qatar to address climate change at various levels of government with relevant stakeholders. Studies on Qatar's climate change governance highlight two divergent perspectives – one emphasising that challenges outweigh opportunities, and the other arguing that opportunities outweigh challenges. Sara A. Al-Mohannadi & Dhabia M. Al-Mohannadi contend that Qatar is positive to lead the climate transition, given its access to transitional fuel and the potential for affordable local mitigation strategies. Qatar's gas exports have contributed to global emissions reductions by swapping out additional fuels (Al-Mohannadi S. A., 2023).

However, the Statistical Review of World Energy 2021 shows that despite Qatar's investments in renewable energy, it remains sceptical about the uncertainties and technological challenges in the global energy market. This scepticism reflects the broader difficulty of structural transformation in the economies of the Middle East, particularly for Qatar, which faces enormous economic and social pressures to implement an energy transition and reduce its dependence on fossil fuels. This view was confirmed by the outcome of COP28, where the issue of "phasing out fossil energy" did not see substantial progress, but some scholars still consider this conclusion too absolute.

Tobias Zumbrägel argues that the perception that oil-exporting countries must "go-green" because they have no other choice is biased (Zumbrägel, 2021). Gulf States seek to

establish their own international influence, which motivates them to encourage the advancement of renewable energy technologies and gradually achieve energy transformation goals. This is the perceived starting point for scholars who support the idea that the opportunities outweigh the challenges. In the past, Gulf States linked climate change to economic negotiations, which led to their role as obstructionists in global climate change governance – a stance that could undermine their influence. Some scholars have offered policy recommendations. Dr. Aisha Al-Sarihi and Dr. Mari Luomi suggest that regional climate governance and cooperation mechanisms are still far from effective enough to meet the future needs for Arab countries. To enhance effective climate action, Arab countries should leverage existing regional arrangements but must work closely together to overcome key weaknesses (Al-Sarihi, A, 2019).

This study analysed the results of Qatar's climate governance, focusing on its mitigation efforts and capacity building for adaptation through its national strategy, institutional setup, and energy projects proposed in recent years. The study also aims to provide lessons for the other energy-dependent countries in the Middle East and beyond by examining Qatar's approach as a microcosm of broader regional trends. The methodology adopted to carry out this study is briefly discussed in the next part. The first section of the study analysed Qatar's National Strategy 2030, focusing on macro-objectives and policy guidance on climate change governance. The second section elaborated on the responsibility of Qatari institutions in managing climate action and policy implementation. And lastly, the research work examined the renewable energy projects already implemented in Qatar, highlighting the importance of global technical cooperation and transformation in climate governance.

Climate Governance Challenges in Qatar

According to a new assessment, there is an 80% chance that the annual average global temperature will temporarily surpass 1.5°C over per-industrial levels for at least one of the next five years. This serves as an evident alarm that we are edging closer to the thresholds outlined in the Paris Agreement on climate change, which calls for long-term temperature

increases over decades rather than one to five years (WMO, 2024). 97% of Qatar's population living in coastal urban areas is likely to be affected by melting glacier and sea level rise caused by global warming according to a recent study by the Centre for Global Development listing Qatar, Bahrain, Kuwait, Tunisia, and the UAE among the top 20 countries threatened by sea-level rise in 2050, the sustainable development of the Gulf states, including Qatar, are at great risk. Secondly, due to geographical area of Qatar only covering 11,521 square kilometres, there are limitations in building renewable energy sources, like solar and wind. And Qatar's renewable energy power consumption only accounts for 0.0001% of the total power consumption from 2016 to 2020, a big difference in numbers compared to the world's 18.15% during the same period.

As global warming intensifies and the effects of climate change become more severe, Qatar's efforts to mitigate these impacts must be significantly increased. Moreover, the on-going "Russia-Ukraine military conflict" has led developed countries to increasingly recognise the importance of reducing dependence on traditional energy sources. This shift in demand, coupled with the advancement of renewable energy technologies, has become a focal point of concern. Qatar, the nation that continues to produce and export the most LNG worldwide, hydrocarbons export accounted for 43.4% of Qatar's GDP in 2022, contributing more than $104.297 billion in the year (Qatar National Planning Council, 2023). The global transition in energy demand poses a challenge to Qatar's economic development structure, making diversification of its economy a critical component of its climate governance strategy.

The proportion of renewable energy in global primary energy consumption is anticipated to increase from 5.7% in 2020 to 45% by 2050, and is expected to rise to 60% for countries achieving carbon peak/carbon neutrality. The replacement of old and new energy sources will not be implemented perfectly and fossil fuels will remain dominant for a while. But for Qatar, facing the economic transformation and domestic stakeholders' limitations will not change the dilemma of how to harmonise the contradiction between economic development and natural conditions become a pre-requisite for Qatar to achieve sustainable development.

The transformation of the economic structure requires Qatar from domestic consumption to export overall regulation, enhance the share of new energy use in the country, and accelerate the pace of substitution of traditional energy consumption.

Meanwhile, in the export of traditional fossil energy, the entire supply chain from extraction, transportation to export needs to make full use of CCUS to minimise carbon dioxide escape during the extraction and transportation process and reduce greenhouse gas emissions. There is still much room for improvement in the measures that Qatar is currently taking, both in terms of infrastructure development and the upgrading of CCUS technology.

Qatar's Climate Change Mitigation Practice

Qatar has demonstrated its vision and commitment to climate governance by actively engaging in global climate governance initiatives, formulating phased policy strategies, establishing specialised institutions, and pursuing international cooperation on renewable energy technologies. These efforts have enabled Qatar to address climate change more effectively and mitigate associated threats.

➢ Qatar Climate Governance Strategy

Qatar has long been committed to addressing climate change challenges and is an active participant in the international community's response to the climate crisis. Qatar signed the Kyoto Protocol in 2005 and Paris Agreement in 2015. The strategy sets a series of targets aligned with the Paris Agreement and initiates a plan to reduce greenhouse gas emissions by 2030. In June 2008, the Amir of Qatar, Hamad, issued Amiral Decree No. 44 approving the Qatar National Vision 2030 plan, which defines future development strategies and implementation plans in human, social, economic and environmental terms.

The main elements of the plan are: managing the exploitation of exhaustible resources, transforming abundant hydrocarbon resources into financial wealth, investing in infrastructure and improving the quality of the workforce, while gradually reducing dependence on the hydrocarbon industry, enhancing the function of the private structure,

expediting the economy's diversification and positioning Qatar as a centre for high-value-added industries and service activities. Qatar develops into a sophisticated society that can continue to evolve and provide its people with high standard life (Qatar Communication Office, 2024), while maintains steady economic growth, emphasises environmental protection and strengthens investment in the fields of education and health.

In detail, seeking a balance between economic development and environmental protection is one of the crucial goals of Qatar National Vision 2030 that government of Qatar intends to reduce the negative impact of economic development on environmental protection by investing in advanced technology and avoiding rapid and unplanned economic growth. As a result of the early stages of a development model that relied on oil, gas, Petro-chemicals and heavy industry, Qatar now attaches importance to the implementation of international environmental protection standards in the design and implementation of industrial projects. It can be a commitment to a future development path that is consistent with the protection of the environment, and compensation for the environmental cost of economic development wherever it is required, by investing in environmentally friendly technologies.

With the alert warning of reducing emission, in October 2021, the Qatar National Environment and Climate Change Strategy 2030 (QNECCS) was launched, which is an important foundation and supplement of QNV 2030 to safeguard Qatar's environment and ensure the country's long-term economic resilience. The QNECCS defines five key priority areas to tackle – climate change and environment degradation: Greenhouse Gas Emissions and Air Quality, Biodiversity, Water Waste Management, Circular Economy and Land Use (Ministry of Environment and Climate Change, 2024).

Figure 1 sums up the climate change risks, challenges, and response framework, highlighting temperature rise, sea-level rise, extreme weather, and flooding as main threats to Qatar's citizens. This study categorises Qatar's policy responses into two aspects – domestic and international response, QNV 2030 and QNESS are domestic guiding strategies for Qatar, and the signature of Kyoto Protocol and the Paris Agreement are international requirements.

However, Qatar has not planned a specific response to climate governance in non-technical areas, either in terms of basic international norms or domestic strategic guidelines. The detailed plans and actions including early warning system, emergency response during the climate change situation, resilience-building, capacity and adaptation do not get adequate focus. Addressing these gaps should be prioritised with a responsive adaptation approach as an urgent necessity (Khan, S. A., 2023).

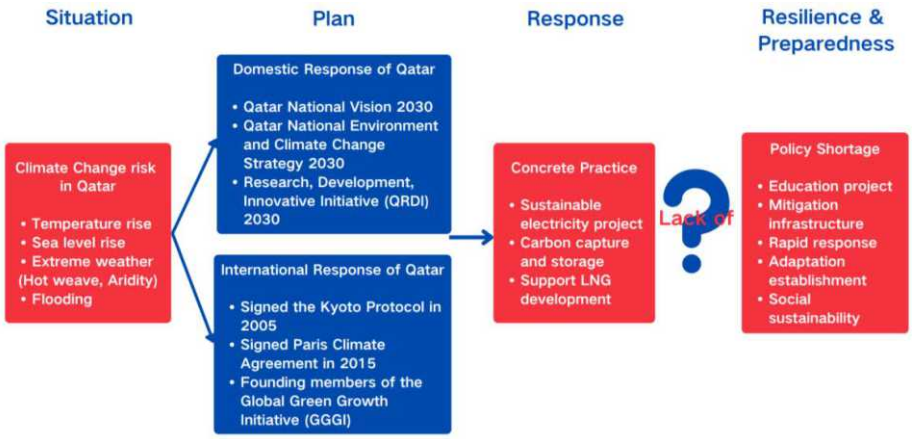

Figure.1: *Qatar's Climate Change Governance info-graphic*
Source: Compiled by Authors.

➢ **Reform and Revolving of Qatar Climate Change Governance Institution**

Qatar has implemented significant reforms at both corporate and governmental levels, guided by its experiences in national development strategies aimed at mitigating global warming. Overall, these measures are intended to harmonise national strategy with specific actions, streamlining regular evaluations of mitigation actions outcomes, and enhance the scalability and effectiveness of strategic approaches. Since 2011, Qatar has enacted a series of policies to address climate change. However, these efforts have faced challenges, particularly in controlling CO_2 emissions from natural gas consumption.

In the NDS from 2011 to 2015, Qatar's government explicitly proposed reducing its share of global carbon dioxide emissions and improving air quality within five years, but in the statistics of the World Bank's database, the Qatar's emissions of carbon dioxide from natural gas flaring in 2011 was 66,736 kilotons, the emissions were 96,145 kilotons in 2016, and the CO_2 emissions from natural gas fuel consumption showed a fluctuating upward trend from 2011-2016 (World Bank, 2024). Emissions of carbon dioxide from 2011-2016 showed an upward trend from year to year (World Bank, 2024). The first NDS target is clearly not being effectively implemented and achieved. In the second NDS from 2018 to 2022, Qatar not only established the Ministry of Environment and Climate Change, but also changed the name of Qatar Petroleum to Qatar Energy, which will focus on energy usage and the use of green technology such as CCS and other related technologies (MOFCOM, 2021).

The Qatar Carbonates and Carbon Storage Research Centre, in partnership with Qatar Energy, Shell, and the Qatar Science and Technology Park, is using $70 million to develop and disseminate CO_2 capture technology, focusing not only on iterative technology but also on training researchers and technicians in the field through grants. With the technology has maturing gradually, CCUS has been put to practical use by a number of Qatar's traditional energy companies, such as the Ras Laffan gas liquefaction project that Qatar Gas currently absorbs 2.1 Mtpa of CO_2 and intends to raise the rate to 5 Mtpa by 2025 (Global CCS Institution, 2023). In 2021, Qatar further strengthened its institutional framework by establishing the Ministry of Environment and Climate Change (MECC).

The Ministry's core functions include proposing and implementing real-time public policies for environmental protection and the lowering of emissions that cause climate change. It is besides promoting the use of technological innovations that advance the environment and safeguard it while embracing sustainable recycling of products, towards a clean and sustainable environment by the year 2030. An awareness raising program was also organised by the Ministry of Environment and Climate Change in an effort to raise an alarm on the threats of climate change. It focused on the importance of protecting the environment by involving all different activists of society, individuals, and institutions, towards rising to

the difficulties of climate change and preserving biodiversity in the environment of Qatar.

In addition to climate and environment specific institutions, Qatar has set up complementary institutions. In 2018, the Council for Research Development and Innovation (QRDI) was set up in order to ideally organise RDI activities in support of the realisation of the national strategy, and it formulated the QRDI 2030 development strategy. The strategy is built around the areas of energy, health, and sustainable development of resources. Thus, it sets out a number of measures for the continued availability of funding to RDI, the enhancement of human creative scientific research aimed at the progress of innovation, and the attraction of domestic and foreign talents to enhance RDI capabilities (MOFCOM, 2023).

➢ **International Cooperation on Renewable Technologies and Projects**

Huge amounts of electricity are produced by the natural gas-fired thermal power stations in Qatar. As of 2022, six companies operated eight natural gas-fired thermal power stations in Qatar, having an installed capacity in total of approximately 1,058 megawatts (MW) and an annual electricity production capability of 54.6 billion kilowatt-hours (kWh). In this regard, Qatar is carrying out renewable projects in the country as part of its policy of diversification in line with sustainable development goals.Target advanced technology partners and their organisations are identified with which to be perused through tenders abroad. At the same time, it is firmly supporting the development of carbon capture technology through QRDI.

First of all, under active development in the construction of photovoltaic power projects, Qatar strives for its target: renewable energy power generation should take up to 20% of the overall power generation. By the end of 2018, the Qatar General Electricity and Water Corporation (QGWEC) officially invited companies to bid on the implementation of a massive solar PV power plant project. The programme site is within the Al-Kharaa area to the west of Doha, covering a land area of 10 km² with a planned overall power generation capacity that will reach 800 MW. The model fosters investor participation through adopting

the PPP investment and financing model; at the same time, it is executed in line with the BOOT model, which stands for Build-Own-Operate-Transfer.

The project implementation and operation will involve Qatar General Electricity and Water Corporation as a domestic strategic investor. The project provides energy support to Qatar with competitive tariffs and reduces the usage of natural gas in power generation, all achieving carbon emissions reduction. The project, implemented in two phases, connected the first 400 MW to the grid in April 2022 and the rest in October 2022, with full capacity. In the end, the 800 MW solar tender was won by the French fossil fuel corporation Total and the Japanese conglomerate Marubeni Corp. The project was constructed by Chinese business.

Though having around 805 MW of installed solar capacity, Qatar had not yet begun to generate electricity from solar energy, instead, all of the country's power was still produced by gas power (Enerdata, 2024). Looking forward, QGWEC is actively purposing additional solar projects, aiming to boost the proportion of solar energy in Qatar's national power generation capacity to 30% by 2030. As for the way forward for this sustainability-based plan, QGEWC "Kahramaa" claimed the launching of the Qatar National Renewable Energy Strategy (QNRES) after coordinating with 22 key actors involved in the energy sector in Qatar, the expansion is a reflection of Kahramaa's efforts to improve its work and to formulate strategies and policies with the belief that Qatar can accomplish its National Vision 2030 and the Third Qatar National Development Strategy 2024-2030 in April, 2024. QNRES intends to expand the application of sustainable energy sources, especially solar energy in Qatar, with a rating of more than 2,000 kWh generated per square meter per year. Qatar has some of the highest worldwide horizontal radiation levels.

By 2030, 4 GW of massive sustainable energy capacity is expected to be added through solar PV (Qatar News Agency, 2024). Qatar, acknowledged as a huge gas and oil reservation country, while diversifying process, will need external assistance from others. Meanwhile, China as the world's biggest energy consumer, has taken a leading role in renewable energy by increasing investments in solar, hydro, and wind power. The energy development paths

of these two countries lay the foundation for mutual cooperation. There are collaborative efforts between China and Qatar, such as Al Kharsaah Solar Power Project. And the cooperation will continue and deepen in near future.

Case Study: Al Kharsaah Solar Power Project

The Al Kharsaah PV power plant is located 80 km west of the capital city of Doha. With an area of 10 square kilometers, it has more than 2 million solar panels, utilising all available local solar resources. It is now the largest of technology and equipment worldwide with a tracing system and double-faced components. POWER CHINA followed green engineering practices and created elaborate plans to protect native flora and wildlife. It also claimed that the project can save carbon dioxide emissions by around 900,000 tons annually and offer Qatar with nearly 1.8 billion kilowatt-hours of clean electricity annually (Power China, 2023). The China-built Khalsa Power Station is the first in Qatar to be powered using non-fossil fuels, and is one of the key projects that will further the country's development of National Vision 2030. This also strongly supported Qatar in hosting a "carbon-neutral" World Cup.

Second, Qatar is among the top three global exporters of natural gas and a significant producer of LNG worldwide. Recognising that the global energy transformation would take time and that it would be prudent for the nation to make such a decision. Qatar has once again declared in recent years that it will greatly boost its capacity to produce LNG. Meanwhile, Qatar is committed to "LNG diplomacy" and is actively expanding its foreign relations through energy cooperation. Qatar has long been a major supplier of LNG to China. Energy cooperation is a pivotal area of bilateral economic and trade relations between China and Qatar. In detail, China imported 15.726 million tons and 16.661 million tons of LNG from Qatar in 2022 and 2023, respectively (Wang, 2024).

Now, where the rest of the world is grappling with energy security issues, especially in the European Union, due to the Russia-Ukraine standoff, it gives a great opportunity for Qatar to hugely expand its LNG market. Besides advocating growth in the LNG projects

within the development framework of Qatar, it is also advancing the development of its carbon capture technologies, having stated that its target is to capture 11mtpa of CO_2 by 2035 and 5mtpa by 2025. It is supposed to be the biggest project of its kind globally, with a purported capacity of 2.1mt pa. QE reports having sequestered 5m tpa of CO_2 between 2019 and 2022 (Oxford Business Group, 2024).

China – Qatar Corporation Trend

In 2022, Petroleum and Gas* were the world's 4th most traded product. Petroleum gas exports increased by 80.5% between 2021 and 2022, from $458B to $827B. 3.49% of global trade is made up of petroleum gas trading. Petroleum Gas ($12.3B), Crude Petroleum ($4.59B), and Refined Petroleum ($2.98B) are Qatar's top exports to China. During the previous 5 years, Qatar's exports to China have increased at a 21.1% rate, from $8.09B in 2017 to $21.1B in 2022 (OEC, 2022). It is expected that through their energy relationship both economies will grow and diversify. Opportunities are thus enormous in mutually beneficial co-operation on projects related to energy and infrastructure development. This cooperation can lead to job creation, technology transfer, and innovation, contributing to sustained economic growth (K. Li, 2019).

The collaboration between the Middle East and East Asia, particularly in the development of renewable energy technologies holds significant promise for both regions. By harnessing China's advanced technological solutions in solar wind, and energy storage, Qatar can boost its renewable energy capacity, reduce its reliance on fossil fuels, and enhance its sustainability. This partnership would not only help Qatar meet its climate goals but also improve resilience against global climate challenges, such as extreme temperatures and resource scarcity. Moreover, the shared innovations and technological solutions can serve as a model for other countries in both regions, advancing global clean energy transitions.

* Petroleum Gas are a part of Mineral fuels, mineral oils and products of their distillation.

Conclusion

This analysis reveals that Qatar has encountered significant challenges in meeting its climate governance goals, particularly in the initial phase of its renewable energy projects, such as the commissioning of solar power plants. The delays and setbacks reflect broader trends seen across Gulf countries, where the realisation of national strategic objectives is often hampered by factors like land size, insufficient technological resources, and the timing of economic development transitions. The quote "Qatar would be ranked much lower if only emissions stemming from consumption were measured," highlights the necessity for Qatar to develop the CCS technologies coupled with LGN exploration process and expand solar power for domestic use to ensure the nation's sustainable development.

Building more renewable energy sources, like solar power plants, and fostering co-development and cooperation through the use of new energy technologies are some of the ways Qatar has integrated green development with its national development vision. After COP 28, the major trend that will be observed is an increase in the output of green energy. This is influenced by the suggested measures to stabilise the consumption of fossil fuels based on the concept of global carbon neutrality.

The contradiction between fossil fuel economy and green development will still coexist and bother the Gulf countries in the future but the green development of Qatar and other Gulf countries will always be in a process of jerking advancement. However, the dependence on conventional energy sources, capacity deficits, and technology constraints will become obstacles to the transition of the economic development paradigm. Despite not yet fully overcoming the challenges of energy transition, Qatar's current strategic and technical responses to climate change provide valuable lessons and implications for other countries grappling with similar issues. Qatar's approach demonstrates that it is technically feasible to reduce emissions from traditional energy sources through innovative technological solutions while maintaining stable employment and preventing the decline of energy companies.

Qatar has strategically prioritised reducing oil extraction and transitioning towards the secularisation of natural gas extraction. Moreover, Qatar is continuously enhancing its own

technological capabilities while actively collaborating with other nations on renewable energy projects. This dual focus ensures that the country's national energy development remains sustainable and that its innovation capabilities are robust in both internal and external contexts. This transformation in structure and strategy is significant for navigating the rapidly evolving energy landscape of the Middle East enabling Qatar to maximising the benefits of international collaborations for regional stability, prosperity, and sustainable development.

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