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Journal Article

From Deserts to Diversification: Climate Resilient Strategy of the Gulf

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Abstract

The Gulf countries have long been recognised around the world as the 'oil powerhouses'. But now they are beginning to take centre stage on the international climate change agenda with projects like the UAE's Al Maktoum Solar Park, BeSolar in Qatar and many more. Internationally, Gulf participation in the ISO-GHG Protocol collaboration and the Voluntary Carbon Market Integrity (VCMI) initiative indicates an increasing interest from the region in global carbon governance. It looks like serious attempts at mitigating the hold of an oil-past.

This research article presents a comparative analysis of the Gulf countries' position in climate governance. It is framed using the Multi-Criteria Decision-Making (MCDM) approach. It examines the tendencies in climate policies from the year 2000 to the present. It uses the Sustainability Index dataset from 2019 to 2022. The main methodical instrument used is the normalised TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). The statistical results hint that climate resilience is a factor of not just expenses made but of the overall ratio between different contributing factors. This explains why Bahrain and Oman are placed above Qatar.

In an effort to provide a complete picture, analysis combines a quantitative scoring of results with a qualitative interpretation of policy based on ecological modernisation theory and post-rentier approaches.

Keywords: Gulf policy, MCDM approach, TOPSIS model, energy transition, ecological modernisation, post-rentierism

From Deserts to Diversification: Climate Resilient Strategy of the Gulf

It's hard to imagine oil-rich Gulf states as the classroom for studying a green transition. Yet the truth is that the Gulf region is rapidly changing. Once famed for their oil wealth, these countries are now pouring money into renewable energy, green finance, and green technology. The six GCC members, Saudi Arabia, the United Arab Emirates, Qatar, Kuwait, Bahrain, and Oman, are trying to break free from the hydrocarbons-focused future. And the shift isn't only about money or emerging markets. Climate change is real for the Gulf. It's among the hottest, driest places on Earth, facing rising temperatures, water shortages, and desertification. So it's become quite important for these oil exporters to sit at the big tables and push toward carbon neutrality.

Closer observation of Saudi Arabia's Vision 2030, the UAE's Net Zero 2050, or Qatar's National Climate Change Action Plan, reveals that climate policy has become interwoven into core state planning. These plans are supported by serious investments, think Dubai's Mohammed bin Rashid Al Maktoum Solar Park or Oman's green hydrogen ventures. They show that efforts beyond mere talk, must go down to concrete ones.

Still, questions linger about the depth and sincerity of such transitions. Much of the conversation emphasis focuses on the success stories or broad national visions. But direct, apples-to-apples comparisons between the Gulf states are rarer. We know they're pouring money into renewables and green finance, but how far have they actually come toward climate resilience? Which countries are pulling ahead, which lag-and why? How do these various national strategies stack up against global standards of sustainability and carbon governance frameworks?

This paper explores using a regional, data-driven approach to answer these questions. It assesses the GCC states based on selected sustainability indicators through the multi-criteria decision-making method called TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). The method integrates hard data with policy interpretation. In return it identifies which country comes closest to the ‘ideal’ model of climate-resilient governance.

However, beyond the technical aspects, the research explores how the Gulf is also creating a new identity for itself. For this, the research uses the post-rentier and Ecological Modernisation Theory (EMT). The post-rentier paradigm explores how resource-wealthy countries change their logic when the original rentier structures do not always ensure stability. On the other hand, EMT helps identify how patterns of growth are balanced today through a proper blend of protecting the environment and providing for growth.

This research article tries to highlight some of the trends, successes, and gaps within these transitions. But overall it seeks to enrich the discourse on how developing resource-dependent regions can balance growth with sustainability.

There are six sections in this article. Section one gives an overview of literature on diversification in Gulf states, governance of climate, green finance, and multi-criteria decision-making in environmental research. Section two introduces the research methodology and analytical framework. Section three focuses on data tabulations and interpretations. Section four deals with the discussion, developing the theoretical argument arising from quantifiable findings. Section five offers policy implications and lessons. While the last section concludes, with reflections on future research directions within the context of its limitations.

Literature Review

Like it is impossible to understand the entirety of an art piece just by a brush stroke, so is climate governance. Climate resilience emerges at the intersection of state, the role of capital, and deployment of international best practices. Hence, the following literature review connects dots in the areas of politics, finance, governance, and its measurement in the Gulf paradigm.

Rentier State Seated Transition: Political Economy

A grasp of transformation in the Gulf demands that one assess the degree to which the Rentier system influences its political economy. Beblawi (1987), who saw a rentier state as one that sustains itself mainly on external rents gives a classic definition of the rentier state. Within this region, this rent is based on oil exports. This influences the relationship between work and reward, with only 2-3 per cent of its workforce being productively active. However, a large proportion, estimated around 85-90 per cent, is involved in the rent consumption

chain. The implication is that in such a system, the government becomes the central distributor of resources, employment, and advantages. Beblawi referred to this as the ‘rentier mentality’.

Some scholars have challenged the definitiveness of such a path. A case in point is by Luciani (2017) in his work Oil rent and regional economic development in MENA. He argued that resources and rent are not inherently a blessing or a curse: when appropriately invested in the long run. Resource wealth can be the source of many advantages. Oil rents can be an engine of industrialisation instead of industrial stagnation.

Luciani’s assertions, which are supported by evidence from energy-demanding industries, indicate a paradigm shift. Today, the GCC is a major supplier of aluminum worldwide. They account for approximately 9 to 10 per cent of global aluminium production (Bank of Bahrain and Kuwait, 2012). Such indicators illustrate the practicality of diversification based on its relative advantage in energy. And all this was achievable by effectively reinvesting the respective rent. Diversification is less a function of hydrocarbons, as it is a reuse of hydrocarbon rent.

However, political imperatives remain. As pointed out by Hvidt (2013), any event of sociological or geopolitical tension leads back to the ideology of redistribution of rent, making it challenging for any kind of reform. Not too long ago, during the Arab Spring of 2011, this was witnessed again. For instance, following the Arab Spring, Saudi Arabia pledged two financial packages worth a total of US$130 billion to its population, encompassing cash hand-outs, public sector pay raises, and job creation. Similarly, Kuwait increased governmental spending by 3 per cent of GDP by distributing cash grants and free food, while Oman created 41,000 jobs in the public sector. These expenditures, often costing 3-19% of the respective country's GDP, were not planned and directly undermined the diversification goal of transferring employment creation to the private sector. It demonstrates political priority to maintain a rentier state model rather than fiscal responsibility. Developing on this further, recently, Malik (2017) widened the notion of rentier states from oil rents to include regulatory rents, state-created privileges, and even money flows of regions. Thus, any switch to the condition of climate resiliency has to be embedded in such a rentier setup.

Green Issuance Framework in the Gulf: Finance

Green finance in a rentier economy, as it is in the Gulf, is one of the key drivers in this green transition. Green investments worth $2 trillion (approx.) have been identified in the Gulf region as per Green and Sustainability Sukuk Report 2022. However, on an international level, it amounts to just 2 per cent of total green foreign direct investment, reflecting the gap between what is financially and politically aspirated and what is possible given the constraints of the domestic policies.

One of the most innovative developments in this field is the emergence of Green Sukuk. According to Alam et al. (2016), Green Sukuk is a hybrid instrument that combines the tenets of Islamic finance with sustainable goals to direct faith-based financing towards supportive climatic projects. There appears to be robust enthusiasm among investors in such initiatives, indicating that Islamic Green Finance has the potential to significantly influence the mobilisation of low-carbon developmental financing (Nour, 2025). Some studies suggest that it is still a shallow market in terms of depth because of regulatory variations in the region.

Although the Gulf's rigidity and flexibility of governance structure is a major challenge. The unequal success of PPPs and the absence of clear regulations in the GCC are significant hindrances to a standardised development of markets (Damayanti, 2025). Scholars are increasingly calling for international structuring of taxonomies and integrity frameworks to overcome these hurdles. This will improve the integration of the Gulf green financial market into international sustainable financial markets.

Climate Administration and International Cooperation: Governance

The Gulf states climate governance is located at the nexus of several influences relating to both political economy, diversification, and green investments. However, this relationship is asymmetrical. You can see layers of agreements, markets, and non-binding practices intersecting within this nexus. The 'regime complex' illustrated by Keohane and Victor (2010) captures this dynamic, demonstrating that Gulf states instead choose to couple multiple levels of governance with more lenient approaches rather than subscribing to one rigid call.

In such an environment, there has been an increase in hybrid governance mechanisms that have been embraced (Bäckstrand et al., 2017). Non-state actors and voluntary processes have largely facilitated these occurrences. Carbon markets have been considered flexible governance instruments that have been used as an experiment, without having rigid

commitments. During the post-Kyoto era, prior to Copenhagen, (Newell et al., 2013) observed that there were limitations in the centrally organised carbon markets, resulting in voluntary processes, which have been very pertinent in Gulf regions as well. A voluntary process would be fitting, considering the differential capacity in Gulf countries themselves.

But again at the domestic level, the underlying structure of climate governance in the Gulf is directed by a centralised state development pattern. Instead of dealing in a redistributive or participatory climate policy, the Gulf states place importance on the deployment of heavyweight infrastructures. This is a display of the Gulf's regulatory ambition, led by the state. Knowing these is important as it is under this framework the Gulf's climate change transformation is placed.

Quantitative Approaches to Sustainability Assessment: Measurement

To understand the complex and multi-levelled climate approaches of the Gulf states, quantitative methods and figures are essential. They have the ability to combine different variables of an environmental and financial kind in a way that cannot easily be reproduced through mere qualitative comparisons. For that reason, multi-criteria decision-making (MCDM) approaches are so valuable. Among these approaches, the TOPSIS tool is distinguished by its transparency and ease of interpretation.

From an application standpoint, TOPSIS has proven suitable for comparing energy transitions. However, much of the former research is not conceptualised within a theoretical framework. It is often driven by large cross-national datasets that ignore the specific characteristics of hydrocarbon-based economies. It is an aim of this research to address this gap, by bringing theory and fact closer.

Research methodology and analytical framework

This research employs a mixed-method and comparative research design to study the following six Gulf countries: the Kingdom of Saudi Arabia, the United Arab Emirates, the State of Qatar, the State of Kuwait, the Kingdom of Bahrain, and the Sultanate of Oman. It combines MCDM numerical analysis results with interpretation based on political economy theories. Simply put, the results give a rank to each of the countries analysed. The theory explains the results of the ranks obtained by the numbers.

For the MCDM aspect, the methodological approach that is applied extensively is that of Technique for Order Preference by Similarity to the Ideal Solution, or TOPSIS. This method allows decisions to be made by ordering alternatives based on their similarity. Then the final score is compared to the ideal alternative. The method is often applied in sustainability research because it allows each indicator to be expressed using different units.

The procedure takes four steps. First, the decision matrix is normalised, ensuring that there are no unit differences between the indicators. Second, equal weightings are imposed on the values obtained from normalisation. This eliminates the injection of personal values or biases. Third, the maximum positive solution, or the best solution, and the negative solution, or the worst solution, are identified. This depends on the sign of the indicators, which hinges on whether the indicators are maximised or minimised. Last, the Euclidean distance from each country towards both solutions is calculated.

Higher values means it is closer to the ideal sustainability profile, while lower values depict the opposite, which makes it easy to rank accordingly. This way, TOPSIS ensures that no single criterion tends to overshadow the entire performance in sustainability assessment.

The study culls data from averages of 2019-2022. This was chosen deliberately as it captures the post-Paris implementation phase, when climate commitments in the Gulf translated into concrete policies, financial instruments, and institutions. Moreso, this period also stimulated external stress from Covid to start of the Russia-Ukraine war, creating conditions for Gulf states resilience under global shocks.

This study employs six indicators, which ranges from environmental performance to innovation, financial mobilisation, to the level of commitment. These indicators were picked based on the availability of data, their relevance to the study of climate transition, and their ability to be compared across countries. They are listed below:

(1) renewable electricity share,

(2) carbon dioxide emissions per capita (excluding land-use change and forestry),

(3) energy intensity of GDP,

(4) research and development expenditure as a percentage of GDP,

(5) cumulative green bond and green sukuk issuance, and

(6) a composite climate policy index capturing the presence of core governance instruments.

Data for indicators 1-4 has been taken from the World Bank's World Development Indicators. Multi-year averages have been selected for the years spanning 2019-2022. Each indicator represents benefits or costs. Benefit indicators signal better performance by showing higher values. While, the cost indicators signal better performance by showing lower values. This study treats CO_2 per capita and energy intensity as costs, and all other indicators as benefits.

Cumulative data of green bond and sukuk issuance were acquired from various sources, including national issuance summaries and official announcements on public debt. To maintain comparability over time, the dataset in this study considers issuances till 2022 only. One important differentiation to be denoted is that the 'green issuance' in this study includes only sustainable debt instruments, namely, green bonds and Sukuk. The concept of green investment flows is exclusive and hence has been kept out of the ambit of this study.

The climate policy index, the sixth indicator, was constructed by using a binary scoring system. Each country receives 0 for no and 1 for yes across five governance components.
(1) net-zero pledge,

(2) updated Nationally Determined Contribution (NDC) up to 2022

(3) renewable energy targets,

(4) carbon market or offset mechanisms, and

(5)the presence of a dedicated climate strategy or governing body.

Note: This index captures institutional readiness rather than policy ambition or effectiveness.

For any methodology section to be worthwhile, the selection criteria also needs to be explained. So, for this, TOPSIS was selected for three reasons. First, it allows the study to be compared across diverse dimensions. Second, unlike single-index or regression-based methods, TOPSIS provides an intuitive and comprehensible ranking that is accessible to scholars and policy analysts alike. Third, the method has been broadly used in the fields of

sustainability, energy policy, and environmental governance studies, which provides a high degree of methodological validity and makes it particularly suitable for exploratory comparative analysis.

As a part of its analytical framework, to ground these floating numbers and rankings, the study draws on the theoretical bases of post-rentier political economy and Ecological Modernisation Theory (EMT). It views climate transition as an institutional and political-economic process shaped by state capacities, innovation strategies, and inherited energy structures.

EMT studies the attempt of states to find a balance to ensure development and environmental protection simultaneously on a higher level. It means that protecting the climate and boosting economic development aren't opposing factors. Rather, they support and enhance each other in their development. However, EMT's application to the Gulf region is conditioned by the persistence of rentier political systems. This is where bringing in the frame of post-rentier theory becomes essential.

Post-rentier theory, therefore, adds to EMT by arguing how resource-states adjust their governance structures based upon rent. This is why the GCC's climate policies are instead, state-controlled because the legacy of rentiers is not shaken out of its roots. Hence the transition of energy unfolds in a centralised, state-controlled manner.

Drawing on these theories, the framework links abstract concepts to measurable indicators. To measure the factors of EMT, this paper examines variables including the share of renewable electricity, R&D expenditure, issuance of green finance, and use of climate policy instruments. Conversely, indicators such as carbon emissions per capita and energy intensity are used in the statistical test as proxies for structural dependence on the oil-based rentier legacies.

Note that the analytical framework does not presuppose linear or causal associations between indicators and outcomes. Instead, the framework is configurational in nature. It implies that higher TOPSIS scores indicate economically modernised development. While lower scores reflect closer alignment with traditional rentier structures and carbon-heavy growth paths.

Scores in between suggest hybrid trajectories whereby ecological modernisation coexists with ongoing rentier constraints.

Results Tabulation and Interpretation

Below are the key tabulations presented to the reader by organising them into three core tables. Table 1 has the definition of each indicator and its orientation. Table 2 is the raw decision matrix displaying the averages or final values culled from data collected from 2019 to 2022. Table 3 presents the final TOPSIS score and the ranking of the states in descending order, with an ensuing corresponding bar graph, Figure 1, of the same data.

There are more tables in the appendix for detailed follow-through calculations. The normalised decision matrix is shown in Appendix Table A1. The weighted decision matrix is in Appendix Table A2. Whereas, Appendix Table A3 maps each state's distance from the Ideal/Negative, which leads to the final TOPSIS score.

Table 1 - Indicator Definitions and Data Sources

Indicator	Description	Source	Direction
Renewable Energy Share	% of renewable electricity output	World Bank	Benefit
Carbon dioxide emissions per capita	tCO_2 per capita excl. LULUCF)	World Bank	Cost
Energy intensity	Energy/GDP	World Bank	Cost
R&D expenditure	% of GDP	World Bank/Imputed	Benefit
Green issuance	Cumulative green bonds and Sukuk (USD)	National Policy Documents	Benefit
Climate Policy Index	Composite (0-5)	Benefit	Author's compilation

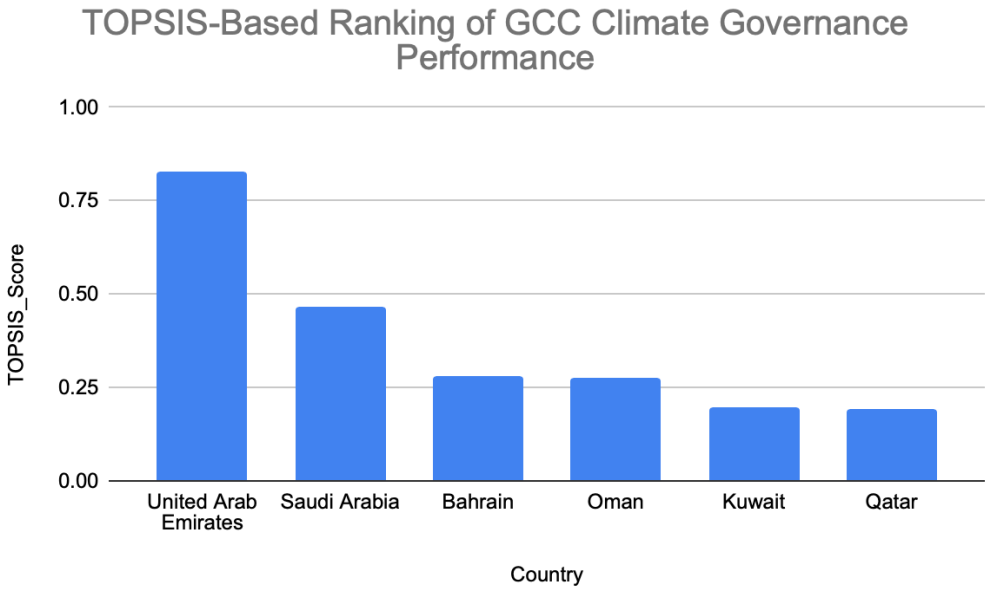
Table 2 - Raw Decision Matrix (Averages/Final Values)

Country	Ren. Share	CO_2 pc	Energy Int.	R&D GDP	Green Issuance	Policy Index
UAE	3.543	20.489	5.33	1.431	USD $1.8	5
Saudi Arabia	0.067	19.008	5.84	0.467	USD $2.8	5
Bahrain	0.035	25.039	9.11	0.603	USD $0.9	4
Oman	0.837	18.987	6.9	0.288	0	4
Kuwait	0.142	22.046	7.58	0.150	0	3
Qatar	0.272	44.587	7.03	0.680	0	3

Table 3 - Final TOPSIS Scores and Ranking

Rank	Country	TOPSIS SCORE
1	UAE	0.826
2	Saudi Arabia	0.467
3	Bahrain	0.282
4	Oman	0.274
5	Kuwait	0.198
6	Qatar	0.193

Figure 1 - Bar Chart based on the TOPSIS Scores



These results show important variation in climate governance and sustainability performance across the Gulf (Table 3). The United Arab Emirates stands as the clear leader. It obtained the highest TOPSIS score, 0.82, reflecting consistently strong performance in almost all of the indicators. In particular, the UAE stands out regarding renewable energy deployment, climate policy architecture, and green finance activity. In factm it was as early as in Nov 2017, UAE adopted the National Climate Change Action Plan (2017-2050). The same year, the National bank of Abu Dabi became the first issuer of green bond worth USD $5 Billion. UAE's early adoption of net-zero targets (in Oct 2021 for 2050) and updated NDC commitments made its mark. This active participation in global climate governance gave the UAE an edge. Clearly, such commitments can also be seen in the UAE hosting COP28 in 2023. All these cumulatively translate into its position very close to the ideal solution. This high score clearly positions the UAE as the most advanced case of ecological modernisation within the GCC.

Saudi Arabia is second with a score of 0.46. It indicates a moderate but uneven sustainability profile. The Kingdom of Saudi Arabia (KSA) performs well in green finance issuance and climate policy initiatives, including participating in the voluntary carbon markets. For instance, KSA in October 2022 raised around $3 Billion in their green bond debut. They launched a Saudi Green Initiaitve in 2021 which supports KSA's ambition to reach net zero emissions by 2060 through the Cicrcular Carbon Economy approach and is also accelerating

the country's transition to a green economy. On part of Voluntary Carbon Market, in Oct 2022, KSA held the largest auction, selling more than 1.4 million tonnes of carbon credits. These developments, however, are offset by KSA's persistently high carbon emissions per capita. And the high energy intensities also disrupt the green balance. Thus, though Saudi Arabia has made substantial institutional and financial commitments to climate transition, the structural legacy is a matter of concern. KSA's hydrocarbon-based economy continues to weigh heavily on its overall performance.

Bahrain is in the middle position, with a TOPSIS score of 0.28. Bahrain has strong alignment with climate policy. They also have a committed net-zero pledge and updated NDC. What sets them apart from richer states is their green finance activity. They took this head start in 2022 by creating a comprehensive Sustainability Finance Framework under the aegis of the National Bank of Bahrain in 2022. This was followed by the first issuance of Bahrain's Green Sukuk, by Infracorp, valued at USD $900 million, in March 2022.

Oman ranks fourth with a TOPSIS score of 0.27. This ranking reflects moderate outcomes across most indicators. Oman flaunts particular strengths in climate policy commitments and renewable energy planning. They adopted a National Strategy for an orderly transition to net zero by 2050, in Nov 2022. This position benefits from early institutional alignment provided by Vision 2040 and its commitment to net zero. However, it is held back by very limited green finance activity and relatively low R&D expenditure. Such results made indicate that Oman is a classic case of reform-oriented late mover. They possess much-needed growing institutional readiness but have limited financial scale.

The lowest places have been closely occupied by Kuwait and Qatar, with a score of 0.198 and 0.193, respectively. Both stand very close to the negative ideal. The dependence on crude oil and natural gas is very high respectively. On one hand, where Kuwait remains heavily dependent on oil, with the sector accounting for almost 50% of their GDP, and roughly around 90-94% of export revenues leading up to major portion of government income. On the other hand, in Qatar, hydrocarbon revenues accounted for roughly 87% of government revenues between 2017-2021. Contrary to diversifying away from gas, Qatar is 'doubling down' by expanding its north Field production, which will further increase LNG production capacity from current 77 Million to 142 Million per annum (mtpa) by 2030. Both of them represent a case study of high energy intensity and delayed climate governance reforms. Both

have minimal green finance activity during the study period. While renewable energy targets and updated NDCs exist, what lacks is the carbon market instruments. What further makes Qatar drop one rank lower, is the absence of a net-zero pledge. Interestingly even till today in 2026, Qatar has not made commitments towards selecting a net-zero target. This weakens their overall policy index score. They represent the persistence of traditional rentier dynamics and slower adaptation to emerging governance norms.

In sum, the TOPSIS results show a clear hierarchy in the GCC: the UAE and Saudi Arabia are leading the transition, while a middle group of reform-oriented but constrained states like Bahrain and Oman are trying to catch up slowly, and the last ones - Kuwait and Qatar - are still trying to push through their comfort zone. This quantitative study clearly suggests that climate-resilient transformation is uneven in the Gulf. Moreover, the numbers confirm that the outcome depends on an interaction of policy ambition, financial capability, and structural economic legacies, rather than being one-dimensional.

Discussion: theoretical grounding to quantitative results

As mentioned in former sections, EMT postulates that environmental improvement can be achieved along with economic growth. They do not stand juxtaposed to each other. The need is to further systematic eco-innovation, regulatory reform, and market-based instruments within existing economic systems (Jänicke, 2008; Julkovski et al., 2021). The GCC is a critical test case for this proposition. Being rentier state structures, the Gulf states have always given priority to distributive capacity over extractive or regulatory authority. It makes these states stand at the intersection of change and traditional rentier bargain. This bargain is nothing but what Beblawi (1987) described as a social contract where hydrocarbon revenues (oil rent) were exchanged for political acquiescence. According to Ulrichsen (2017) & Reiche (2010), the above-described rentier logic has restricted the government's will to impose redistributive climate policies. They face friction and resistance when it comes to the question of taxation, subsidy removal, or demand-side regulation. This creates a functional wedge in their reality and aspirations.

The metadata hints are somewhat suggestive of this commitment. The high per capita and energy intensity in several GCC nations continues to weigh in the balance. It even jeopardises the existing climate commitment. The mid-range TOPSIS result of 0.46 in the case of Saudi

Arabia aptly depicts this contradiction. It aligns with Bakari's (2014) notion of ecological modernisation being a form of sustainability resting on a 'weak' foundation. He pointed to this contradiction where technological upgrades coexist with growth-driven economic pressures, making it difficult to reach climate commitments. Despite this, the focus on transforming underlying consumption and production systems is the bare minimum. Thus, rather than breaking through the rentier logic, it creates a base for neo-rentierism.

Neo-rentierism represents an environment in which even innovation becomes a statecraft-controlled field. Tsai's (2018) theory on 'neo-rentierism' covers this complexity effectively. He called this an additional complication. He argued that rather than reform, state control gets further extended from hydrocarbons into new renewable energy and green industries as well. In other words, instead of reducing state control, state authorities manage climate projects through state oil companies, sovereign wealth funds, or state-owned enterprises. This confirms Sim's (2020) argument that low-carbon projects in Gulf countries have reinforced state control rather than liberalising markets or encouraging state-society engagement. Such environments limit innovation. The TOPSIS rankings clearly reflect this logic.

The UAE's leadership position (0.82) represents the most advanced expression of this model. High scores across variables indicate a consolidated form of top-down ecological modernisation. Based on EMT terminology, the UAE is very close to the 'ideal' state. But what makes the UAE have scores much higher than others? There must be more underlying? This is driven by an underlying logic of technopolitics, prestige and 'extrinsic' drivers. Al-Saidi (2020) argues that the nuclear and renewable energy megaprojects of the region are not only driven by economic logic but represent a 'prestige project'. The most prominent ones in the lineup includes the Mohammed bin Rashid Al Maktoum Solar Park (Dubai) and the Barakah Nuclear Energy Plant (Abu Dhabi). The UAE's dominant TOPSIS score is mirroring the success of this strategy. They carefully laid their cards through large-scale solar projects, climate finance initiatives, and international norm-setting. This thereby enhances both domestic legitimacy and global standing.

However, this technopolitical approach explains why the process of ecological modernisation does not occur evenly. Bahrain (0.28) and Oman (0.27) lag, despite policy commitments and technological capacity, due to limited green finance activity and narrower governance

frameworks during the study period. Their results suggest that prestige-driven infrastructure alone is insufficient without sustained institutional and financial integration. Thus, it must balance the ‘external’ and ‘internal’ aspects.

One of the more revealing findings is Bahrain and Oman’s position above wealthier states such as Qatar and Kuwait. This distinctly shows how the sequencing of institutions may be more significant than the level of the GDP. Their early ambition in the field of climate change allowed Oman and Bahrain to comfortably surpass its more financially wealthy counterparts in the Gulf, who are trapped in a rigid rentier state structure. This is in line with Tsai’s notion from 2018. He argued that fiscal constraints, instead of hindering the state, may trigger governance reforms, leading to a renegotiation of the rentier bargain with sincerity. That's exactly what Oman and Bahrain also highlight.

The ranking of TOPSIS score hits hard at the reality of structural limits and the boundaries of ecological modernisation, amid visible progress. The paradox of the N-curve formulated by Jänicke (2008) is evident in the same, where the ecological optimisation on one level can be nullified by the emission rise on another level. The country of Saudi Arabia represents this paradox. In KSA, modernisation advances without proportional environmental relief. Similarly, Kuwait and Qatar’s low score reflects entrenched rentier inertia. They reinforce Sim’s (2020) claim that energy democracy and decentralisation remain actively constrained in the region.

Combined, GCC climate strategies continue to focus more on ‘hardware’ than on ‘software’ (Minić & Filipović, 2024). In other words, they focus on large infrastructure and megaprojects rather than on behaviour-altering measures, deepening regulation, or involving broad societal participation. Such a course of action enables rapid implementation and smooth regime operation but renders sustainability performance dependent on centralised capacity and continuous fiscal might. Ecological modernisation in the Gulf, therefore, reads best as a state-led and selective process framed within a shifting rentier political economy.

Policy Implications: Lessons from the Gulf

Even though the GCC states operate under different political and fiscal conditions, the lessons from this study are fairly transferable. They are of particular importance for countries that seek to balance growth, commitments, and climate resilience. One takeaway is rather clear: economic heft alone does not dictate climate performance. In addition to resource wealth, there have to be some must-have essentials. A coherent climate governance framework, alignment between energy policy and financial tools, and transparent long-term targets take the success a long way. These reduce policy uncertainty and attract investment. Building on this, India should push for strong cross-ministerial coordination to deliver streamlined results. For example, it might require the establishment of joint climate task forces that involve energy, finance, and environment ministries. Where resources are scattered, and redundant efforts are made, they might end up being wasted. They scale down efficiency and dilute the outcome even when ambitious targets exist.

This study also points that financial instruments alone cannot overcome the deeply rooted issue of emissions intensity. With investments, simultaneous demand-side reform and emission management are required. Early alignment of institutions does make a difference. It would be helpful to sequence the process of change and give priority to the governance structure before attempting to tap the power of large-scale capital flows.

Examples such as the case of Bahrain, which performs better than Kuwait and Qatar, can be seen as illustrating this. For India, which has deepened its green bond market rapidly, the takeaway can be very significant. While green finance can be expanded, this needs to be achieved in a manner that complements system-wide decarbonization and not just focus on showcase projects. The focus must also be on system upgrade and industrial sector efficiency. Ultimately, financial innovations need to support structural transformation instead of just covering up emissions growth.

The tale from the Gulf states is pretty clear. One cannot achieve big infrastructure projects without investing in smarter rules, deeper regulation, and broad societal buy-in to sustain real progress. Attention-grabbing mega-projects signal intent; often, they do not drive lasting cuts unless they are combined with the ‘software’ reforms. And these include reforming prices, tightening efficiency standards, and shaping people's incentives. A lesson India must also heed.

Gulf states also illustrate how robust state capacity can accelerate climate action, particularly in the early years of any transition. A firm, focused nudge from the state can get the entire endeavour off to a running start. But too much centralisation can trample innovation and discourage private sector involvement emerging from the crowding out effect. The key is to capture the benefits of state leadership while gradually opening doors to market-driven solutions. For India's mixed economy, that balance comes relatively naturally and fits the context.

Finally, climate resilience isn't only about economics or the environment. It has a geopolitical upside, too. The UAE's track record demonstrates that climate action can align with border and strategic interests, boosting international credibility, attracting foreign investment, and strengthening a country's geopolitical standing. Climate governance, when part of a nation's development story, can reverberate outward with positive global influence. It projects one as a responsible power. Hence, for India, which seeks to position itself as a global leader on climate change, climate diplomacy becomes crucial.

The Gulf experience, when taken together, reveals that climate-resilient growth and development are neither technical tasks alone nor mere ideological pursuits. They are political-economic endeavours - an equal blend of capacity, finance, and intention. Climate change initiatives work when they are not seen as a condition, but beyond the canvas of larger growth policies.

Limitations and Scope for Future

Like every other research, this one too has its own share of limitations, which can be used to open the scope for similar future studies. Gaps in data from particular indices created obstacles. For example, renewable power generation figures from 2022 were not included in the World Bank Open Data. Hence, the multi-year mean until 2021 was used. Similarly, Bahrain’s figures regarding research and development expenditures at the country level could not be retrieved. Therefore, the GCC-average as an imputational mean was used. It is a common practice in cross-national studies on sustainability, though in the process, fluctuations and particular idiosyncrasies in different countries may get overly-smoothed.

Another limiting factor is the short timeframe of the analysis, which primarily focuses on the last few years to retain validity and comparability of the data. Indeed, it does limit the way we are able to trace the longer-term trends. It can miss those transitional inflection points, especially for late-emerging indicators, such as green finance. For example, in 2024, Kuwait and Qatar, while in 2025 Oman made their debut in the sovereign green bond market. Thus, the meta data which results up to 2022 and has been set to zero, would now be different.

Third, indicator selection inevitably reduces the complexity of policy reality. Even with several indicators in use, there is room to add more variables-particularly ones that capture the areas of regulatory enforcement, social acceptance, and subnational differences. They remain hard to quantify, which is why they were excluded from this model. Fourth, giving all indicators equal weight may not be reflective of how different dimensions actually matter. This is a chosen trade-off for clarity and avoidance of subjective bias. If one uses alternative weighting, one may end up with very different rankings, which opens up a path for robust testing in future work.

Fifthly this study theoretically opens a discussion where the Ecological Modernisation theories need to evolve more syncretically. They need to recognize countries with heavy oil rentierism. Because here, otherwise the conventional EMT may not stand the ground. This can be another area of further development.

Ultimately, TOPSIS is a diagnostic approach rather than a causal one. It identifies relative performance, but it does not verify how definite policies produce specified results. The next step may involve enhancing the current approach through econometric studies, dynamic panel data models, or case-study methods, exploring causal processes further. The current research presents a straightforward way to examine cases, but future research can take the approach further by increasing the scope, depth, or temporal focus.

References

Alam, N., Duygun, M., & Ariss, R. T. (2016). Green sukuk: An innovation in Islamic capital markets. In A. Dorsman, Ö. Arslan-Ayaydin, & M. Karan (Eds.), Energy and finance (pp. 167–185). Springer. https://doi.org/10.1007/978-3-319-32268-1_10

Al-Saidi, M. (2020). From economic to extrinsic values of sustainable energy: Prestige, neo-rentierism, and geopolitics of the energy transition in the Arabian Peninsula. Energies, 13(21), 5545. https://doi.org/10.3390/en13215545

Assadiki, R., Merlin, G., Boileau, H., Buhé, C., & Belmir, F. (2022). Status and prospects of green building in the Middle East and North Africa (MENA) region with a focus on the Moroccan context. Sustainability, 14(19), Article 12594. https://doi.org/10.3390/su141912594

Bäckstrand, K., Kuyper, J. W., Linnér, B.-O., & Lövbrand, E. (2017). Non-state actors in global climate governance: From Copenhagen to Paris and beyond. Environmental Politics, 26(4), 561–579. https://doi.org/10.1080/09644016.2017.1327485

Bakari, M. E.-K. (2014). Sustainability's inner conflicts: From "ecologism" to "ecological modernization." Journal of Sustainable Development Studies, 6(1), 1–28.

Bank of Bahrain and Kuwait. (2012, February 2). GCC to produce 10% of global aluminum production. https://www.bbkonline.com/gcc-to-produce-10-of-global-aluminum-production/

Beblawi, H. (1987). The rentier state in the Arab world. Arab Studies Quarterly, 9(4), 383–398.

Bentouati, S. (2019). Green investment in the Arab region. NAFAS International LLC. https://www.unescwa.org/sites/default/files/event/materials/s4-1.pdf

Climate Action Tracker. (2024). United Arab Emirates: Net zero targets. https://climateactiontracker.org/countries/uae/net-zero-targets/

Consultancy-ME. (2025, September 25). $2 trillion green finance opportunity awaits GCC nations. https://www.consultancy-me.com/news/11729/2-trillion-green-finance-opportunity-awaits-gcc-nations

Damayanti, Y. E. (2025). Green sukuk for a better earth: Integrating Sharia and sustainability. International Journal of Advances in Engineering and Management, 7(7), 933–939. https://doi.org/10.35629/5252-0707933939

ESG News. (2025, August 14). Qatar expands green finance strategy with first sovereign green bonds. https://esgnews.com/qatar-expands-green-finance-strategy-with-first-sovereign-green-bonds/

Environment Authority (Oman). (2022, November). The Sultanate of Oman's national strategy for an orderly transition to net zero. https://www.ea.gov.om/media/xdvpdu1w/oman-net-zero-report-2022_screen.pdf

Gelan, A. U., & Salih, S. A. (2025). Beyond black gold: Rethinking fiscal policy for a diversified future in Kuwait's oil-dependent economy. Resources Policy, 108, 105679. https://doi.org/10.1016/j.resourpol.2025.105679

Global Ethical Finance Initiative. (2022). Green and sustainability sukuk report 2022: Financing a sustainable future. https://www.globalethicalfinance.org/wp-content/uploads/2022/10/Financing_A_Sustainable_Future_Web.pdf

Gray, M. (2011). A theory of "late rentierism" in the Arab states of the Gulf (Occasional Paper No. 7). Center for International and Regional Studies, Georgetown University School of Foreign Service in Qatar. https://doi.org/10.2139/ssrn.2825905

Hertog, S. (2014). State and private sector in the GCC after the Arab uprisings. Journal of Arabian Studies, 3(2), 174–195. https://doi.org/10.1080/21534764.2013.863678

Hvidt, M. (2013). Economic diversification in GCC countries: Past record and future trends. The Kuwait Programme on Development, Governance and Globalisation, London School of Economics and Political Science. https://eprints.lse.ac.uk/55252/1/Hvidt%20final%20paper%2020.11.17_v0.2.pdf

Infracorp B.S.C. (2022, March 1). "Infracorp" lists US$ 900 million green sukuk on London Exchange. https://infracorp.bh/infracorp-lists-us900-million-green-sukuk-on-london-exchange/

Jänicke, M. (2006). Ecological modernisation: New perspectives. In M. Jänicke & K. Jacob (Eds.), Environmental governance in global perspective: New approaches to ecological and political modernisation (pp. 9–29). Freie Universität Berlin, Environmental Policy Research Centre.

Julkovski, D. J., Sehnem, S., Bennet, D., & Leseure, M. (2021). Ecological modernization theory (EMT): Antecedents and successors. Indonesian Journal of Sustainability Accounting and Management, 5(2), 324–338. https://doi.org/10.28992/ijsam.v5i2.303

Keohane, R. O., & Victor, D. G. (2010). The regime complex for climate change (Discussion Paper No. 2010-33). Harvard Project on International Climate Agreements. https://www.belfercenter.org/publication/regime-complex-climate-change

Keskes, H., & Haytayan, L. (2023, November 30). Energy transition in the Middle East and North Africa: The road to COP28. Natural Resource Governance Institute. https://resourcegovernance.org/publications/energy-transition-middle-east-and-north-africa-road-cop28

Korniyenko, Y., & Xin, W. (2025). Gulf Cooperation Council diversification: The role of foreign investments and sovereign wealth funds (IMF Working Paper No. 2025/174). International Monetary Fund. https://doi.org/10.5089/9798229019514.001

Luciani, G. (2017). Oil rent and regional economic development in MENA. In G. Luciani (Ed.), Combining economic and political development: The experience of MENA (pp. 211–230). Brill | Nijhoff. https://doi.org/10.1163/9789004336452_012

Malik, A. (2017). Rethinking the rentier curse. In G. Luciani (Ed.), Combining economic and political development: The experience of MENA (pp. 41–57). Brill | Nijhoff. https://doi.org/10.1163/9789004336452_004

Minić, A., & Filipović, S. (2024). On the path to sustainability in Gulf Cooperation Council states: Readiness for energy transition. The European Journal of Applied Economics, 21(1), 143–163.

NBK News and Announcements. (2024, June 2). Kuwait: NBK pioneers sustainable finance with USD 500 million debut green bonds. National Bank of Kuwait.

https://www.nbk.com/news-and-insights/Media-Relations/news.html?news=nbk-pioneers-sustainable-finance-with-usd500-million-debut-green-bonds

Newell, R. A., Pizer, W. A., & Raimi, D. (2013). Carbon markets: Past, present, and future (Duke Environmental and Energy Economics Working Paper EE 13-01). Duke University Nicholas Institute for Environmental Policy Solutions. https://doi.org/10.3386/w18504

Nour, A. (2025, August 11). Sustainable finance: From ethical choice to a key driver of profitability in global markets. Asharq Al-Awsat. https://english.aawsat.com/business/5174014-sustainable-finance-ethical-choice-key-driver-profitability-global-markets

Raman, R., Ray, S., Das, D., & Nedungadi, P. (2025). Innovations and barriers in sustainable and green finance for advancing sustainable development goals. Frontiers in Environmental Science, 12, Article 1513204. https://doi.org/10.3389/fenvs.2024.1513204

Reiche, D. (2010). Energy policies of Gulf Cooperation Council (GCC) countries—possibilities and limitations of ecological modernization in rentier states. Energy Policy, 38(5), 2395–2403. https://doi.org/10.1016/j.enpol.2009.12.031

Saba, Y. (2022, October 5). Saudi wealth fund raises $3 billion with debut green bonds. Reuters. https://www.reuters.com/markets/asia/saudi-arabias-wealth-fund-gives-initial-guidance-debut-green-bonds-document-2022-10-05/

Saudi Vision 2030. (n.d.). Saudi Green Initiative. https://www.vision2030.gov.sa/en/explore/projects/saudi-green-initiative

Sim, L.-C. (2020). Low-carbon energy in the Gulf: Upending the rentier state? Energy Research & Social Science, 68, 101752. https://doi.org/10.1016/j.erss.2020.101752

Springborg, R. (2013). GCC countries as “rentier states” revisited [Review of The Gulf region: Economic development and diversification (Vols. 1–4), edited by G. Luciani, S. Hertog, E. Woertz, & R. Youngs]. Middle East Journal, 67(2), 301–309. https://www.jstor.org/stable/43698051

The Arabian Stories. (2025, October 23). OETC achieves major milestone with successful $750 million 5-year green sukuk issuance. https://www.thearabianstories.com/2025/10/23/oetc-achieves-major-milestones-with-successful-750-million-5-years-green-sukuk-issuance/

Tsai, I.-T. (2018). Political economy of energy policy reforms in the Gulf Cooperation Council: Implications of paradigm change in the rentier social contract. Energy Research & Social Science, 41, 89–96. https://doi.org/10.1016/j.erss.2018.04.028

Ulrichsen, K. C. (2017). Post-rentier economic challenges. India Quarterly: A Journal of International Affairs, 73(2), 210–226. https://doi.org/10.1177/0974928417700800

United Nations Economic and Social Commission for Western Asia (ESCWA). (2025). Progress towards the sustainable development goals in the Arab region: Arab Sustainable Development Report 2025. https://www.unescwa.org/sites/default/files/pubs/pdf/progress-towards-sdgs-arab-region-2025-english.pdf

United Nations; International Energy Agency; International Renewable Energy Agency; United Nations Statistics Division; World Bank; World Health Organization. (2025). Tracking SDG7: The energy progress report 2025. https://unstats.un.org/unsd/energystats/pubs/documents/sdg_7_2025.pdf

U.S. Energy Information Administration. (2025). Qatar: Country analysis brief. https://www.eia.gov/international/analysis/country/QAT

Voluntary Carbon Market Company (VCM). (n.d.). About. https://vcm.sa/en/about/

World Bank. (2023). CO_2 emissions (metric tons per capita) [Data set]. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators

World Bank. (2023). Energy intensity level of primary energy (MJ/$2017 PPP GDP) [Data set]. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators

World Bank. (2023). Renewable electricity output (% of total electricity output) [Data set]. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators

World Bank. (2023). Research and development expenditure (% of GDP) [Data set]. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators

Zawya. (2017, March 30). UAE's NBAD bank launches first green bond in the Middle East. https://www.zawya.com/en/press-release/uaes-nbad-bank-launches-first-green-bond-in-the-middle-east-iefnl9ba

Appendix

Appendix Table A1 - Normalised Decision Matrix Used in TOPSIS Analysis

Country	R_Renewable	R_CO_2	R_Energy	R_RnD	R_Green	R_Policy
UAE	0.9695351137	0.3145688623	0.3080273218	0.7999538605	0.5220133115	0.5
Saudi Arabia	0.01840979474	0.2918287446	0.3370792429	0.2615525781	0.8120207068	0.5
Bahrain	0.009594836491	0.3844163812	0.5258205313	0.3374685004	0.2610066558	0.4
Oman	0.2290579836	0.291505026	0.3982614342	0.1611654624	0	0.4
Kuwait	0.03907997128	0.3384679036	0.4378951808	0.08427215311	0	0.3
Qatar	0.07467180147	0.684522285	0.4057649105	0.3803984478	0	0.3

Appendix Table A2 - Weighted Normalised Decision Matrix

Country	W_Renewable	W_CO_2	W_Energy	W_RnD	W_Green	W_Policy

UAE	0.1615891856	0.05242814372	0.05133788697	0.1333256434	0.08700221858	0.08333333333
Saudi Arabia	0.003068299123	0.04863812411	0.05617987381	0.04359209636	0.1353367845	0.08333333333
Bahrain	0.001599139415	0.06406939686	0.08763675521	0.05624475007	0.04350110929	0.06666666667
Oman	0.0381763306	0.048584171	0.0663769057	0.0268609104	0	0.06666666667
Kuwait	0.006513328547	0.05641131726	0.07298253013	0.01404535885	0	0.05
Qatar	0.01244530025	0.1140870475	0.06762748508	0.06339974129	0	0.05

Appendix Table A3 - Distance to Ideal/Negative

Country	Distance to Ideal (D+)	Distance to Negative Ideal (D-)	TOPSIS Score
UAE	0.04848717753	0.2315697013	0.8268666789
Saudi Arabia	0.1822208239	0.1599231735	0.4674148157
Bahrain	0.204468208	0.08032856454	0.2820557404
Oman	0.213038652	0.0807620894	0.2748872893
Kuwait	0.2413156001	0.05971084848	0.1983574824
Qatar	0.2260899478	0.05434947251	0.1938011156