

Beyond clean energy technological fixes: A critical assessment on the hydrogen partnerships between Germany and Arab Gulf states

Dr. Tobias Zumbraegel, University of Hamburg & Center for Applied Research in Partnership with the Orient (CARPO), Bonn

Overview

Climate change is considered to be one of the ‘grand challenges’ of the 21st century. A special role is dedicated to the Arab Gulf states. While they are highly dependent on selling fossil fuels and pressured to change this hydrocarbon-based path dependency, they are also well-equipped to undertake their climate transitions. Recently announced net-zero targets by countries such as Saudi Arabia, the United Arab Emirates or Bahrain appear promising and could be an appealing example to other nations in the region. However, it needs to be seen whether these states are able to comply to their self-given goals. In fact, the recent climate announcements were and still are, as we argue in this policy paper, driven by a techno-optimist vision and a need to protect and maintain economic and political power in a decarbonized world. I take the approach of ‘technological fixes’ as conceptual springboard to show how it undermines the plausibility of deep decarbonization in the region.

In order to achieve their deep decarbonization targets and maintain their economic and political power in a carbon-constrained world, Gulf states rely heavily on technology and innovation. Pursuing cutting-edge technology and innovation have always been important for the Gulf states but, over the last decade, sustainable technology and green solutions have been prioritized and gradually dovetailed with other existing industrial areas and structures. Two key areas are of utmost importance in the ecological modernization approach of the Gulf states (Reiche 2010): On the one hand, diversifying energy sources (renewable energy such as solar, wind and hydropower but also atomic power) and, on the other hand, decarbonization efforts (above all Carbon Capture, Utilization and Storage, CCUS). In this regard, environmental sustainability has emerged as a new ‘playground’ to enhance partnerships with other countries and foster technological buy-in. Transfer of innovation and technology is almost exclusively undertaken unilaterally with foreign nations or consultancy companies from industrialized regions that are collaborating with local companies and businesses. Transfer of innovation and technology is almost exclusively undertaken unilaterally with foreign nations or consultancy companies from industrialized regions that are collaborating with local companies and businesses.

Over the last two years, hydrogen has been presented as the new ‘technological fix’. Especially, green and blue hydrogen is seen as the “holy grail of decarbonization” and “part of a long-term hedging strategy” for a time when the age of fossil fuels is over (Seznec and Mosis 2020). Governments in Oman, Saudi Arabia and the United Arab Emirates have all announced ambitious projects to produce hydrogen in large amounts in the near future. Meanwhile, the German government is very keen on this technology in order to achieve its net-zero targets. Hydrogen is seen as an important element for electrifying key sectors such as aviation, shipping and heavy-duty transport, when renewables cannot match the capacity. Consequently, hydrogen diplomacy have become a new key element between Germany and some Arab Gulf states. In the scope of the German-Saudi Energy Dialogue in 2021, both countries signed a memorandum of understanding towards a closer hydrogen partnership. It is planned that Germany provides the technology for hydrogen projects in Saudi Arabia and receives green hydrogen exports from the kingdom. A further cornerstone was the establishment of a German-Saudi hydrogen diplomacy office in Riyadh. At the same time, Germany also signed a declaration of intent to establish an Emirati-German Hydrogen Task Force in November 2021. This paper takes a critical perspective on these late developments and argues that there are still uncertainties and open questions that should be solved.

This article takes an historical analysis on discourses of technological fix and ecological modernization to discuss the Gulf monarchies’ approach to climate change. It uses the example of hydrogen infrastructure and diplomacy to critically assess such a techno-optimistic perspective, which often misses to address other social, ecological and economic dimensions.

Methods

This research includes qualitative methods such as ethnographic observation from various trips to the region including, ethnographic action research and Conversations with stakeholders at global and regional governance-related events. It further includes textual analysis based on secondary sources.

Results

While policy makers in Germany and some Arab Gulf states are equally perceive hydrogen as the new solution there are unresolved questions. **First**, despite recent promises and targets to produce large quantities of hydrogen (green and blue), hydrogen technology is years away from becoming a global commodity (Dourian 2021). This is mainly

because it is currently too costly and energy-intensive. **Second**, there are doubts over the availability of the renewable energy and water resources required to produce green hydrogen. Until today, the installed renewable energy capacity of the Arab Gulf states is far beyond their self-given targets. By 2020, the total share of Renewables in the Energy Mix was very low with 0.1% in Bahrain, 0,5% in Kuwait, 1,3% in Oman, 0,3% in Qatar, 0,5% in Saudi Arabia and 7,3% in the UAE (Al-Sarihi and Mansouri 2022). Even if considering that especially countries like Saudi Arabia and the UAE might scale up their capacities within a short period of time, they need even more renewable energy when they want to use large quantities of it to export green hydrogen. Additionally, it is barely discussed, where the large amounts of water shall come from that are needed to produce green hydrogen. Relying on desalination, which most countries almost exclusively do, creates new ecological problems: For instance growing brine discharge leads to further salinisation of the sea (and ultimately also the soil), which, in turn, demands more highly energy-intensive desalination plants. Furthermore, growing rise in temperature in the Persian waterway also stimulates the growth of “harmful algal blooms that can block desalination plants and coastal industrial cooling systems” (Tolley 2021).

Third, supposed ecological risks have not been taken into account in this new hydrogen hype between the West and the Gulf. According to recent studies, there are indirect warming impacts as the oxidization of hydrogen in the atmosphere leads to increasing concentrations of greenhouse gases. It is estimated that hydrogen emissions (H₂) could be “200 times that of carbon dioxide and larger than that of methane” (Ocko and Hamburg 2022, 9350). With regard to blue hydrogen, new, allegedly promising technology such as CCUS are questionably as they consume additional energy, leading to more emissions (Theeyattuparampil et al. 2013). CCUS combined with enhanced oil recovery, where gas or other chemicals are reinjected to extract more crude oil, creates more emissions and leads to potential soil erosions, toxicity, eutrophication, and acidification (Roefs et al. 2019). In terms of blue hydrogen, additional amounts of carbon dioxide (CO₂) and methane (CH₄) can escape through leakages, venting and purging across the value chain (Ocko and Hamburg 2022).

Conclusions

Investing in hydrogen infrastructure and engaging in hydrogen diplomacy have been a new key element between Germany and some Arab Gulf states. However, there are many open questions regarding this hydrogen partnerships in terms of commercial feasibility, capacities and unintended ecological risks. This paper argues that policymakers in Germany and the Arab Gulf states need to pay more attention to these unresolved issues before engaging in this ‘enthusiasm’ of hydrogen as new technological fix towards a climate-sensitive energy transition. If not, hydrogen, will remain a distant and unlikely prospect.

References

- Ansari, Dawud (2022): The Hydrogen Ambitions of the Gulf States. Achieving Economic Diversification while Maintaining Power, *SWP Comment* 44. Retrieved from: <https://www.swp-berlin.org/publikation/the-hydrogen-ambitions-of-the-gulf-states>
- Al-Sarihi, Aisha, and Noura Mansouri (2022): Renewable Energy Development in the Gulf Cooperation Council Countries: Status, Barriers, and Policy Options. *Energies* 15 (5): 1923.
- Dourian, Kate (2021): *Gulf countries gear Up for a net-zero world*. AGSIW Issue Paper 5. Retrieved from <https://agsiw.org/gulf-countries-gear-up-for-a-net-zero-world/>
- Ocko, Ilissa and Hamburg, Steven, P. (2022): Climate consequences of hydrogen emissions, *Atmospheric Chemistry and Physics* 22, 9349-9368, DOI: <https://doi.org/10.5194/acp-22-9349-2022>
- Reiche, Danyel (2010): Energy Policies of Gulf Cooperation Council (GCC) countries — possibilities and limitations of ecological modernization in rentier states. *Energy Policy* 38, 2395-2403.
- Roefs, Pieter, Moretti, Michele, Welkenhuysen, Kris, Piessens, Kris, & Compennollea, Tine (2019): CO₂-enhanced oil recovery and CO₂ capture and storage: An environmental economic trade-off analysis. *Journal of Environmental Management* 239, 167-177. <https://doi.org/10.1016/j.jenvman.2019.03.007>
- Seznec, Jean-François & Mosis, Samer (2020): *The ACWA power-air products joint venture for green hydrogen: A new Saudi Energy policy?* Atlantic Council. Retrieved from <https://www.atlanticcouncil.org/blogs/energysource/the-acwa-power-air-products-joint-venture-for-green-hydrogen-a-new-saudi-energy-policy/>
- Theeyattuparampil, V., Zarzour, O., Koukouzas, N., Vidican, G., al-Saleh, Y., & Katsimpardi, I. (2013). Carbon capture and storage. State of play, challenges and opportunities for the GCC countries. *International Journal of Energy Sector Management*, 7(2), 223-242.
- Tolley, G. (2021, September 21). Gulf waters already changing 'dramatically' due to global warming, research finds. *The National*. <https://www.thenationalnews.com/uae/environment/2021/09/29/gulf-waters-already-changing-dramatically-due-to-global-warming-research-finds/>