How the Arabian Gulf Could Become the World's Clean Hydrogen Hub

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Overview

Hydrogen has received a lot of attention lately due to its potential for decarbonizing hard-to-abate sectors. Multiple countries in the Middle East have recently updated their Nationally Determined Contributions (NDCs) to the United Nations Convention on Climate Change (UNFCCC) to include more hydrogen. Two of these countries are the Kingdom of Saudi Arabia and the United Arab Emirates (UAE). The two largest members of the Organization of Petroleum Exporting Countries (OPEC) in the Middle East have shown keen interest in being leaders in the new hydrogen economy. Saudi Arabia has announced multiple hydrogen Giga-sized projects in the past two years. Saudi Aramco, the Kingdom's national oil company, also exported the first shipment of blue ammonia to Japan in 2020. Ammonia has been looked at as a long distance hydrogen transport method. UAE has announced its Hydrogen Leadership Roadmap during the 26th Conference of Parties to the UNFCCC (COP26). Due to their natural resources, gulf countries have immense potential to lead the global export of green and blue hydrogen.

This paper analyses how Gulf countries could utilise their natural resources and current oil and gas infrastructure to become global exporters of hydrogen. We specifically look at the following questions:

- How can some current natural gas facilities be coupled with carbon capture and storage to produce blue hydrogen?
- How can gulf countries use their current oil and gas infrastructure (pipelines, ports, oil and gas tankers) to export hydrogen?
- What are the economic and geopolitical implications of a transition towards hydrogen for the gulf countries?

Methods

This paper provides an analysis of how gulf countries could benefit from the global transition towards hydrogen. A discussion provides an analysis of how current oil and gas infrastructure; including pipelines, ports, and oil and gas tankers; could be upcycled for hydrogen production and export. An exploration of the implications of Russia's invasion to Ukraine is provided, with a special emphasis on how some of the future European gas imports could be displaced with hydrogen from the Middle East.

Results

Hydrogen can provide a solution that solves many climate and geopolitical challenges to both Europe and Asia. Gulf countries possess a tremendous amount of resources which can be utilised to export clean hydrogen to these markets.

The gulf has huge reserves of gas which can be used for the production of blue hydrogen. This gas is present in the eastern part of the gulf, which could facilitate the easy export of hydrogen to growing Asian markets. Ample cheap renewable energy (mainly wind and solar) is also present in the northwest side of the gulf. These resources could be utilised to produce and export green hydrogen to European markets.

Petrochemical companies' expertise in drilling could also be utilised in the production of renewable geothermal energy, which can be used to produce clean hydrogen.

Conclusions

The Arabian Gulf region possesses both the geographical location and natural resources that could allow it to be a leader in clean hydrogen exportation.

References

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