Energy Transition in Saudi Arabia

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Kingdom of Energy

In the last couple of months, the Kingdom of Saudi Arabia has been at the forefront of the environmental and energy news. Big changes are happening in Saudi Arabia. Since 1933, when oil was first discovered in Saudi Arabia, the Kingdom has been perceived as a Kingdom of oil. As biggest producer of oil for long time, Saudi Arabia was always in the news whenever the topic of oil is considered.

The big change that we are witnessing, however, is the bold steps taken by Saudi Arabia, especially when appreciating the transformative reforms introduced as part of the Vision 2030 and the energy-specific initiatives pursued by the Ministry of Energy. As such, the Kingdom should no longer be seen only as a Kingdom of oil but recognized as a Kingdom of energy. As a global oil producer, Saudi Arabia plays a critical role in supplying energy to the world economy in a reliable and secure manner. At the same time, the Kingdom recognizes its responsibility in the fight against climate change and its role in the net-zero transition. Recognizing the need in mitigating the climate crisis, Saudi Arabia is already engineering innovative energy solutions to become an international leader in addressing the energy trilemma (providing energy in a secure, affordable and sustainable manner).

Clearly, Saudi Arabia has long-standing role in the energy world and as such plays a critical role for global trade and commerce. This gives the Kingdom an advantage that the Kingdom can utilize while transitioning to new sources of energy. The bold plans described below show the commitment that the Kingdom is undertaking to achieve its goal of becoming the biggest producer of energy, not just in oil but also in gas, renewables, hydrogen and the circular carbon economy as a whole, whilst be a key player in fighting climate change at home and abroad.

Saudi Green Initiative and COP26

In October 2021, Saudi Arabia held its own regional environmental conference, the Saudi Green Initiative ("SGI") conference. SGI oversees all the Kingdom's work to combat climate change. As a bold goal of SGI, Saudi Arabia announced in the SGI conference a "net-zero" greenhouse gas emissions plan by 2060.

Announced jointly with SGI, the Middle East Green Initiative ("MGI") amplifies SGI's efforts on an international scale, in coordination with Gulf Cooperation Council ("GCC") countries, MENA region countries, and other international countries.

SGI brings together environmental protection, energy transformation and sustainability programs to work towards three goals: 1) reduce carbon emissions by more than 4% of global contributions, 2) plant 10 billion trees across Saudi Arabia, and 3) raise protected areas to more than 30% of total marine and land area.

Recognizing the complexity of reaching a "net-zero" emissions, Saudi Arabia is placing the circular carbon economy ("CCE") framework at the heart of its climate change strategy. The CCE was a centerpiece of Saudi Arabia's G20 presidency in 2020 and was endorsed by G20 leaders. It enables countries to manage their carbon emissions in their own way, at their own pace, while considering their own national economic and social circumstances. The CCE is based on four pillars: ***reduce, reuse, recycle and remove*** **carbon emissions**.

Saudi Arabia already started its CCE transition. The think-tank KAPSARC (King Abdullah Petroleum Studies and Research Center) has developed the CCE Index, which was unveiled to COP26 participants. The purpose of the index is to present common metrics that can be applied to the different countries and keep track of their gradual progress. Saudi Arabia participated in COP26 in Glasgow and emphasized the Kingdom's keenness on climate change and environmental protection, as well as energy transition.

Carbon Capture and Reduction Technologies

Saudi Arabia is one of the largest oil and natural gas producers in the world with one of lowest costs in oil production and with Saudi oil being one of the lowest CO2 emitting crude grades globally. The Kingdom has developed also innovative and cost-effective technologies for carbon management, focusing on Carbon dioxide capture and sequestration, Carbon dioxide emissions reduction, and energy efficiency.

The Kingdom has presented its advances in the Carbon dioxide capture, utilization and storage technologies, removing 200 million tons of carbon emissions from the environment through the "reduce, reuse, recycle and remove" strategy. While having the lowest intensity of gas burning in gas plants in the world (less than 1%), Saudi Arabia plans to totally eliminate gas burning by 2030.

Renewable Energy

The National Renewable Energy Program (NREP) aims to significantly increase the share of renewable energy production. Saudi Arabia plans that by the year 2030, renewable energy and natural gas contribution to the overall national energy mix reaches 50%. It aims to stop burning oil for electricity by 2030; and have gas power half the grid and solar and wind power the rest. The Kingdom aims to produce 27.3GW of renewable energy by 2024 and to reach 58.7GW of renewable energy by 2030.

The Ministry of Energy's Renewable Energy Project Development Office has been issuing RFPs (three rounds so far) to develop 30% of the 2030 target.

- The first round of renewable energy projects was in 2017. It included Sakaka (300 MW solar PV, now connected to the national electricity grid) and Dumat Al Jandal (400 MW wind, currently under construction, expected to be in commercial operation in 2022) projects.
- The second round was in 2019. It comprised of six solar PV projects amounting to 1,470 MW. The projects were divided into two categories: Category A, which target smaller companies, includes Rafha (20 MW solar PV) and Madinah (50 MW solar PV) projects.

Category B includes Qurrayat (200 MW solar PV), Rabigh (300 MW solar PV), South Jeddah (300 MW solar PV) and Al Faisaliyah (600 MW solar PV) projects.

- The third round was in 2020. The projects were also divided into two categories. Category A includes Layla (80 MW solar PV) and Wadi Al Dawaser (120 MW solar PV) projects. Category B includes Saad (300 MW solar PV) and Ar Rass (700 MW solar PV) projects.

The Public Investment Fund ("PIF") is committed to develop the remaining 70% of the 2030 target.

Hydrogen Energy

Saudi Arabia plans to become the largest hydrogen energy exporter, according to the Minister of Energy. Saudi Arabia has big potential producing blue hydrogen from its gas plants and it can make the world's cheapest green hydrogen.

In July 2020, Neom, ACWA Power and Air Products announced plans to build the largest green hydrogen plant, powered by 4 GW of wind and solar energy, and producing 650 tons of green hydrogen daily for export to global markets. The plant will be based in Neom, a futuristic smart city located along the coast of the Red Sea in the Northwest of Saudi Arabia and is planned to be operational by 2025. Neom aims to be powered 100 percent by renewable and green hydrogen energy.

Saudi Arabia said it would use its Jafurah natural gas project to make blue hydrogen. Jafurah, one of the world's biggest natural gas projects, is estimated to hold 200 trillion cubic feet of gas. A large portion of this gas will be used for blue hydrogen, according to the energy minister. The Kingdom's national oil company, Saudi Aramco, stated that its large-scale blue hydrogen exports will probably begin after 2030. In 2020, Aramco exported the world's first shipment of blue ammonia, which is produced by converting hydrocarbons to hydrogen then to ammonia and capturing the carbon dioxide byproduct. Aramco exported 40 tons of high-grade blue ammonia to Japan. Aramco is also investing in green hydrogen. In October 2021, Aramco Signed an MoU to develop a green hydrogen project in Saudi Arabia.

In 2019, Saudi Aramco and Air Products jointly built Saudi Arabia's first hydrogen fueling station. This project as well as other research by different research centers in Saudi Arabia demonstrate the potential of hydrogen in the Kingdom's transport sector. In December 2021, Aramco announced collaboration with French companies including a deal with Gaussin to explore manufacturing of hydrogen vehicles in Saudi Arabia.

Nuclear Energy

The King Abdullah City for Atomic and Renewable Energy ("KACARE") was established in 2010 with the goal of developing an ambitious nuclear and renewable energy program. In 2017, the Kingdom launched the Saudi National Atomic Energy Project ("SNAEP"). The project focuses on four objectives: 1) large nuclear power reactors, 2) small modular reactors, 3) nuclear fuel cycle, and 4) legislative and regulatory framework. In 2018, Saudi Arabia issued the National Policy for the Kingdom's Atomic Energy Program, the Law of Nuclear and Radiological Control, and the Law of Civil Liability for Nuclear Damage and established the Nuclear & Radiological Regulatory Commission (NRRC) as an independent agency monitoring nuclear energy and radiological emissions. The Kingdom also established the Saudi Nuclear Energy Holding Company (SNEHC), as an independent legal entity, to achieve the goals of the SNAEP by participating and investing in economically viable projects locally and internationally.

In 2019 the IAEA stated in its final report of its integrated nuclear infrastructure review (INIR) mission in Saudi Arabia that "significant progress" has been made in the Kingdom, including the establishment of a legislative framework and development of nuclear infrastructure.

Saudi Arabia plans to build two large nuclear reactors. In late 2021, news agencies reported that K.A.CARE is about to determine the winning technical advice bidder for its first nuclear power program.

Conclusion

While Saudi Arabia recognizes that oil and gas will continue to play a vital role in the global energy mix in the coming decades, the energy transition to cleaner sources of energy is already underway and the Kingdom will play a major role in this transition. Instead of being an observer, Saudi Arabia is taking the lead in this transition. With bold plans and initial steps, Saudi Arabia is diversifying its energy mix by adding hydrogen, renewable and nuclear energy to the existing oil and gas industry and is investing in innovative and cost-effective technologies for carbon management. Saudi Arabia is opening these projects to local and foreign investors. This makes Saudi Arabia an attractive market for energy companies that would like to be part of this big transition.

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