

The role of industrial clusters in advancing the energy transition

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During COP26 in Scotland last year, the World Economic Forum, in collaboration with Accenture and Electric Power Research Institute, launched the initiative Transitioning Industrial Clusters towards Net Zero in a bid to accelerate the transition of industrial clusters globally towards net zero.

Accenture, an [information technology](#) and consulting company, defines industrial clusters as [geographic areas](#) that comprise co-located companies representing either a single or multiple industries.

Because of high [energy consumption](#), use of raw materials and complex [global supply chains](#), industrial manufacturers are among the world's biggest emitters of greenhouse gases. Fossil fuel combustion and industrial purposes in the UAE produced 203 million metric tons of CO₂ emissions in 2020.

Although this was the third consecutive year that emissions in the UAE have declined, there is still a long way to go.

As nearly 70 percent of the global economy committed to net zero, I believe industry leaders and governments will need to explore solutions that could accelerate this transition while ensuring profitability.

As such, industrial clusters will have a key role to play. The proximity of multiple industrial energy consumers creates an opportunity to scale low-carbon technologies through multi-stakeholder collaboration and can yield sizeable economic opportunities.

In fact, McKinsey's research suggests that next-generation climate technologies could attract \$1.5 trillion to \$2 trillion of [capital investment](#) per year by 2025.

Luckily, climate technologies can help implement net-zero solutions for industrial clusters. If deployed widely, these technologies could deliver about 60 percent of emissions abatement by 2050.

As my work involves extensive research about industrial clusters and climate technologies, I have found that some of the main technologies that could help lower industrial emissions include carbon capture,

utilization and storage (CCUS), hydrogen, and electrification.

CCUS technologies

According to the Center for Climate and Energy Solutions, CCUS technologies can capture more than 90 percent of CO₂ emissions emitted from industrial facilities by capturing the CO₂ before it is released into the atmosphere and storing it underground.

CCUS technologies are particularly beneficial in decarbonizing sectors with heavy emissions. Some industrial clusters are geographically advantaged in that their [geological features](#) allow them to pursue undersea storage for [carbon capture](#) and storage, such as in Scotland.

At present, the deployment of CCUS is still limited due to costs, equipment requirements and energy consumption.

However, further investment in R&D as well as additional incentives can make CCUS more economical.

Last year, ADNOC announced a partnership with French oil major Total to explore opportunities in CO₂ emission reductions and CCS. This was sought after as the UAE announced its goal to reduce its carbon intensity by 25 percent over the next decade.

Hydrogen

As a clean-energy carrier and a fuel, hydrogen could play a significant role in decarbonization.

High-energy density and zero-carbon combustion makes hydrogen well suited to address a large percentage of GHG emissions that would be

hard to abate with electricity alone. This includes sectors such as aviation and shipping, industry, buildings, and road transport.

Hydrogen has the potential to satisfy 15 to 20 percent of energy demand. In fact, green hydrogen was featured in emissions reduction pledges at the UN Climate Conference, COP26, as an important pillar of a net-zero economy.

It has been recently announced that German companies have signed agreements with firms in the UAE to build up a hydrogen supply chain. This is one of the many steps that the UAE has been taking to advance its transition to net-zero.

Electrification

According to IRENA's Electrification with Renewables report in 2019, electrification could cut annual carbon emissions nearly in half by 2050.

As the prices of renewable electricity has dropped in recent years, the opportunity for electrification is significant as it allows industrial companies to lower their overall costs and emissions simultaneously.

This is particularly beneficial for industrial sectors such as cement, chemicals, and steel as they consume the most energy in comparison to other sectors. Electrification is expected to feed 48 percent of global energy demand.

The proximity of businesses to each other not only creates opportunities for systemic efficiencies and sustainable technologies, but it is a true opportunity to bring together supporters and stakeholders across the value chain.

Additionally, industrial clusters can generate new jobs in underserved

areas, and significantly improve air quality and health.

Cross-sector collaboration and building research and innovation ecosystems is essential for the energy transition of the industrial clusters.

Most importantly, this is a theme for what is required to achieve net-zero goals and mitigate climate change: partnership, awareness and collaboration are key in this scenario.

Provided by Heriot-Watt University

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