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12 MAY, 2025

How the CCUS initiative will empower Malaysia`s energy transition journey

The Edge, Malaysia

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> Ultimately, CCUS is key in our new economic paradigm narrative in order to develop a more resilient Malaysia. Through strategic investments, policy support and technological innovation, Malaysia can lead the way in carbon management, which reflects our unwavering commitment to building a greener, more resilient nation — one that is ready to meet the challenges and opportunities of the future."
>
> — Datuk Seri Rafizi Ramli, Minister of Economy

In the face of climate change, increasing adverse global weather conditions, a rising global population and the ever-changing geopolitical dynamics, the urgency to drive environmental sustainability while ensuring equitable socioeconomic advancement has never been greater. Alhamdulillah, as nations worldwide strive towards sustainable development, Malaysia stands at the forefront of adopting the innovative solution that is carbon capture, utilisation and storage (CCUS) to transition towards a net zero future.

After more than one year of effort by the Ministry of Economy, and with the support of multiple parties within the government and the private sector, our nation's ground-breaking CCUS initiative has taken shape with the establishment of the Carbon Capture Utilisation Storage Act 2025 (CCUS Act). This Act, the first in the region, will guide the way forward for this promising new industry, as an integral part of Malaysia's journey towards the next phase of economic growth.

Malaysia committed to climate action

As a signatory to the Paris Agreement, Malaysia's commitment to contribute towards limiting global temperature rise is exemplified through the establishment of various economic and environmental sustainability policies that incorporate greenhouse gas emission-reduction strategies. They include the National Energy Transition Roadmap (NETR), which spells out Malaysia's strategy to net off and reduce hydrocarbon emissions and transition to low-carbon energy sources; the Circular Economy Policy Framework, which entails sustainable manufacturing best practices; the National Policy on Climate Change 2.0; and the Nationally Determined Contributions (NDCs).

However, the road to decarbonisation requires more than just renewable energy adoption and sustainability practices. It necessitates solutions that are comprehensive and scalable, and which make use of Malaysia's unique position and strategic advantage.

This is where CCUS technology comes into play: It allows us to physically capture carbon dioxide (CO_2) emissions from hard-to-abate industries such as power generation, oil and gas (O&G) and manufacturing, and repurpose them for commercial use or store them securely underground, thereby physically reducing large volumes of greenhouse gas and mitigating the impact of emissions on our planet. These sectors, which produce 70% of Malaysia's CO_2 emissions, have been key engines of growth for the country. In order for them to continue to be significant contributors to Malaysia's GDP, we must transition these sectors to become regional champions with higher value-add along their respective industry value chains. This can only be achieved sustainably with CCUS in the picture to address the emissions factor in these industries.

Located outside of the Pacific Ring of Fire, Malaysia is blessed with significant and high-quality geological storage potential along its sedimentary basins, with huge reserves from depleted O&G reservoirs and deep saline aquifers seated in a stable tectonic setting suitable for underground CO_2 storage. Within the context of the CCUS Act, this feature is particularly concentrated in the East Coast of Peninsular Malaysia; and this sets the stage for a just economic development as it empowers the East Coast region to attract the increasingly emission-conscious heavy industries within its vicinity, compared with the more developed West Coast, which in the past benefited from higher connectivity along the Straits of Malacca.

In addition, CCUS will offer opportunities to create new environmentally sustainable businesses, including hydrogen and ammonia industries, which are major fuels in the global energy transition aspirations. Further, today we are seeing CCUS rising as a potential driver of new circular economies such as production of CO_2-based synthetic fuels (e-methanol), concrete curing and even algae production.

As a nation, we stand firm with our commitment to reduce carbon intensity by 45% by 2030, relative to 2005 levels. With CCUS, Malaysia could continue to meaningfully uphold its climate action commitments, and balance environmental responsibility with industrial competitiveness. Malaysia's domestic industries could save US$120 billion (RM532 billion) to US$130 billion in capex from now to 2025 by implementing CCUS, according to a study by Rystad Energy. And by integrating CCUS into our energy transition and economic development strategy, we ensure that hard-to-abate industries continue to thrive while aligning with the wider climate goals.

Driving regional economic and net zero agenda

It is important to point out that the rollout of Malaysia's CCUS initiative is not just an environmental imperative; it is also an economic opportunity that spans beyond the country and extends to the entire region. Malaysia, with a population of 35 million and rising, is expected to see a healthy GDP growth rate of above 3% until the mid-2030s, according to a World Bank Group forecast. Similarly Asean, which has emerged as the fourth-largest economic bloc globally, will continue to grow in value and relevance. In this context, CCUS is critical as since 2000, almost 90% of Southeast Asia's energy demand growth has been met by fossil fuels. At the same time, CO_2 emissions from the region's industrial facilities would amount to more than 33 gigatonnes over the next five decades if they were to continue to operate until the end of their technical lives, according to the International Energy Agency. The Intergovernmental Panel on Climate Change found that, on average, it would be 138% more expensive to reach global climate goals without the deployment of carbon capture and storage (CCS) facilities.

Consequently, it is imperative that CCUS advances rapidly in Malaysia and help put Asia's fast-growing economy — seen taking up 50% of global CCUS demand by 2050 — on track for net zero within the same timeline. Our unique geological formations and corresponding quality in expertise in adjacent offshore industries provide a strategic advantage in establishing CCUS infrastructure, with the potential to serve both domestic industries and international stakeholders looking for reliable carbon storage solutions, not just in Asean but also over in the Far East. At the same time, Malaysia's vision of being a successful CCUS hub relies on greater regional cooperation, especially in the area of shared transport infrastructure.

More importantly, CCUS has emerged as a key feature that enables and empowers Malaysia's energy transition journey. The nation is one of the world's largest exporters of natural gas — a transition fuel that multiple agencies expect to remain significant in the global energy mix by 2050. To support domestic development and global growth, we must continue to play our role in the natural gas space, and CCUS enables us to decarbonise existing fossil fuel-based industries, which have contributed the lion's share of Malaysia's economy, without compromising energy security while we continue to scale up renewable energy.

All these potential points allude to a huge advantage for Malaysia, in terms of attracting long-term investments across energy-intensive industries and high-value sectors including manufacturing and petrochemicals that are otherwise hindered by global emissions standards, ensuring marketability and sustainability of the products. At the same time, under the NETR, Malaysia could see up to US$250 billion in gross value-add from CCUS over the next 25 years. The massive CCUS prospects — of at least 10 million tonnes per annum of storage capacity in the first phase alone — would allow regional sectors to invest in Malaysia to decarbonise and contribute towards making the CCUS ecosystem more cost-competitive for domestic participants.

In terms of regulations, Malaysia's CCUS Act encompasses the entire ecosystem from capturing to transport, utilisation and storage of CO_2. To ensure sustainability is not compromised, an emphasis is given on the responsibilities of storage site operators from the aspects of environmental protection, as well as management of risk and liability, to regulate the entire life cycle of the CCUS infrastructure.

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Accelerating CCUS adoption

The government recognises the need for multi-stakeholder engagement to drive CCUS adoption. In forming the legislation, the federal government has conducted multiple engagements with state governments, members of parliament (MP), academia, select committees, private sector participants and civil society organisations, in an effort to take into account all considerations, and in particular to ensure that CCUS activities are carried out safely, responsibly and in compliance with international standards.

Malaysia is unique as it has two distinct types of CCUS implementations — CCUS hubs in the East Coast of Peninsular Malaysia, in particular in Kerteh, Terengganu and Gebeng, Pahang benefit from the presence of depleted O&G fields, which are suitable to decarbonise industries, while East Malaysia's ongoing CCUS aspiration is part and parcel of the existing O&G developments in the states. While the CCUS Act is currently applicable to Peninsular Malaysia and Labuan, the ultimate goal is to accelerate the development of all potential CCUS hubs in the country. Indeed, the CCUS Act is the most comprehensive law in the region, and will be useful when the harmonisation of regulations happens over time as the industry matures. Flexibility in regulatory development is key, as Malaysia further improves its capabilities and capacity to cater to more CCUS activities in the years to come.

The CCUS Act is crucial in Malaysia's journey to compete with other nations to become the preferred regional CCUS hub. This requires early and long-term facilitation to entice global investors, and decades-long commitments to establish the billions-dollar integrated infrastructure that would be required. Any delay, as such, could result in Malaysia losing the market to competitors and its early mover position.

As we embark on this transformative journey, I urge all stakeholders to embrace CCUS as a cornerstone of Malaysia's sustainability journey. Malaysia is indeed moving aggressively to become a regional and global leader in CCUS. The government is balancing economic development, sustainability and practical policy implementation. The timeline is tight and pragmatic decisions are necessary to stay competitive.

Ultimately, CCUS is key in our new economic paradigm narrative in order to develop a more resilient Malaysia. Through strategic investments, policy support and technological innovation, Malaysia can lead the way in carbon management, which reflects our unwavering commitment to building a greener, more resilient nation — one that is ready to meet the challenges and opportunities of the future.

I look forward to witnessing the successful implementation of Malaysia's CCUS initiative and the positive impact it will have on our economy, environment and global standing. Together, let us chart a course towards a sustainable, low-carbon future for generations to come.