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12 MAY, 2025

Balancing growth, sustainability and industry competitiveness

The Edge, Malaysia

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Malaysia's push to develop its own carbon capture, utilisation and storage (CCUS) ecosystem has been welcomed as a game changer among industry players, including potential beneficiaries in hard-to-abate sectors and service providers supporting the development and operations of CCUS projects.

At the same time, those involved in the CCUS value chain are looking forward to better clarity on operational efficiency of CCUS technology, a supportive ecosystem — from financial to policies — to facilitate project execution and offtake, as well as prioritising both local talents in the rollout of the projects and local offtakers for the available carbon storage capacity.

> **Policy and regulatory frameworks, along with incentives, will be crucial in determining the feasibility and scalability of CCUS adoption in the long term."**
> — Mohd Fadzil, strategy and ventures chief at Tenaga

Local collaboration

Malaysia's maiden CCUS projects are located offshore, taking advantage of depleted oil and gas (O&G) reservoirs to store the excess carbon. Naturally, developing such infrastructure would require tapping the capabilities of O&G service and equipment (OGSE) providers currently serving the offshore sector.

The newly passed CCUS Act presents a tremendous opportunity for local OGSE companies to play a role in advancing the country's decarbonisation and energy transition efforts, says Malaysian Oil, Gas and Energy Services Council (MOGSC) president Syed Saggaf Syed Ahmad.

As key players in the energy ecosystem, it is "imperative that local OGSE players are given significant opportunities to participate actively" in CCUS projects, he says. Local OGSE players "already possess the technical expertise and operational experience" to support CCUS initiatives, he adds.

Similarly, carbon utilisation has been practised through Enhanced Oil Recovery (EOR) techniques such as the Water-Alternate-Gas (WAG) method, while storage or sequestration activities, including subsurface studies, drilling and the eventual plugging and abandonment of wells post-carbon injection, are "well within the existing capabilities of Malaysian OGSEs", Syed Saggaf points out.

"It should be made mandatory for any foreign technology providers to transfer their expertise to local players, with a well-defined roadmap and timeline. This transfer of knowledge and capabilities should be closely monitored and integrated into project evaluation criteria to ensure meaningful localisation," he adds.

Malaysia Offshore Support Vessel Owners' Association (Mosva) president Jamalludin Obeng says Malaysia's CCUS venture also "ensures the longevity of the traditional OGSE industry, which would otherwise face a decline amid the global shift towards low- or zero-emission projects".

"Beyond environmental benefits, CCUS projects will create significant opportunities for employment and EPCC (engineering, procurement, construction and commissioning) contracts during the construction phase. The marine sector, particularly OSVs and Mosva members, will play a crucial role in providing logistics and support during offshore operations," he says.

"To maximise these opportunities, Mosva must collaborate closely with the project's main contractors to understand their vessel requirements and align our capabilities to support their needs."

Indeed, CCUS capitalises on established expertise in the O&G business and readily available technical capabilities, says Petroliam Nasional Bhd (Petronas) head of carbon management Emry Hisham Yusoff.

The CCUS pivot "represents a natural extension and a reverse step of the industry's existing operations" says Emry, who pinpoints multiple practices required in the field to shape effective frameworks for industry and society.

> **CCUS is about more than just capturing carbon dioxide. It involves redesigning operations, rethinking investments, reshaping supply chains and reskilling our workforce."**
> — Emry, head of carbon management at Petronas

This ranges from geoscientists for subsurface storage, engineers to retrofit plants, data scientists for real-time emissions tracking, climate economists for carbon markets, and policy experts, he says.

"CCUS is about more than just capturing carbon dioxide. It involves redesigning operations, rethinking investments, reshaping supply chains and reskilling our workforce," says Emry.

"Hence, our approach is collaborating with the companies/consortiums from Japan, South Korea, the UK and others to ensure the CCS (carbon capture and storage) activities are carried out safely, responsibly and in compliance with international standards."

> **It is imperative that local OGSE players are given significant opportunities to participate actively in CCUS projects."**
> — Syed Saggaf, president of MOGSC

Support ecosystem is key

For hard-to-abate sectors that are the ideal offtakers of CCUS capacity in the country, there are still a number of issues to be ironed out to ensure the feasibility of an industry-wide integration.

YTL Cement head of sustainability Clarisse Loh, on behalf of The Cement & Concrete Association of Malaysia (C&CA), one of the biggest non-power sector emitters, says the CCUS programme rollout "is likely to stimulate investment in modernising existing cement plants, thereby contributing to the economic activity of suppliers and contractors". "Other potential impacts include technology transfers and the upskilling of staff through exposure to new technologies," she says.

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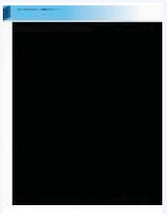

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> It is essential that policies take into account the specific challenges faced by the iron and steel industry to ensure a balanced approach between environmental objectives, economic goals and industry competitiveness."
> – Roshan, president of Misif

> Beyond environmental benefits, CCUS projects will create significant opportunities for employment and EPCC contracts during the construction phase."
> – Jamalludin, president of Mosvia

> No cement company can independently finance a CCUS project without substantial government subsidies covering a significant portion of the capex."
> – Clarisse Loh, head of sustainability at YTL Cement (on behalf of C&CA)

At the same time, C&CA points to several key concerns in view of CCUS needing capital expenditure (capex) grants, technology maturity and whether renewable energy supply is adequate to support the carbon capture plant operations.

"Every CCUS project announced globally has been largely financed by government funds. No cement company can independently finance a CCUS project without substantial government subsidies covering a significant portion of the capex," explains Loh.

Further, CCUS installation "significantly impacts" plant configurations, she says. "Until these [CCUS] technologies are proven and commercially viable, investing in them remains a risky decision, both financially and operationally."

The Malaysian Iron and Steel Industry Federation (Misif) also commends the government on "forward-looking policies that aim to address environmental challenges" like the CCUS adoption, says its president Roshan Abdullah.

Acknowledging the importance of supporting the nation's sustainability goals, it is however "essential that these policies take into account the specific challenges faced by the iron and steel industry to ensure a balanced approach between environmental objectives, economic goals and industry competitiveness", says Roshan.

While the government has not finalised the carbon injection levy rate yet, Misif says "it is important that the iron and steel industry is not subject to further financial burden that might compromise its competitive edge against foreign-based steel manufacturers that are not subject to these levies", he adds.

"Hence, to ensure a level playing field for the Malaysian iron and steel industry, CCUS levies should only be considered after the CBAM (Carbon Border Adjustment Mechanism) is implemented in Malaysia," says Roshan.

Similarly, C&CA flags higher end prices as a result of the decarbonisation efforts, which could affect costs for developers and manufacturers alike.

"For the business ecosystem to truly support decarbonisation, other regulatory frameworks on carbon must be implemented to guide the industry. These frameworks should be holistic, targeting both upstream suppliers and downstream markets," Loh says.

"Further innovation and technology transfers must be supported by the government. Without such support, foreign original equipment manufacturers (OEMs) will dominate the technology sphere, leading to higher costs due to exchange rates and intellectual property protections. This would limit the nation's long-term benefits."

Long-term decarbonisation journey

Leading up to the CCUS adoption, Malaysian industries have taken big early steps to decarbonise at the operations level.

For power plants, CCUS allows them to operate with lower emissions, supporting energy security while meeting decarbonisation targets, says Tenaga Nasional Bhd strategy and ventures chief Dr Mohd Fadzil Mohd Siam.

Tenaga has conducted various pilot projects since 2011, he says. "Our recent project demonstrates post-combustion carbon capture at one of Tenaga's thermal power plants, Stesen Janakuasa Tuanku Muhriz (Jimah Power Plant). The captured carbon dioxide is utilised for microalgae cultivation, crop enrichment and e-fuel production," he explains.

Steel and iron industry players, known for using coal, have begun adopting natural gas in the manufacturing process. Cement and concrete players have reinvested in upgrading their plants to improve energy efficiency and reduce the release of carbon dioxide.

In the cement industry, companies are actively collaborating with various government departments, agencies and trade associations in the construction sector to advocate for lower-carbon intensity cement and concrete, says C&CA.

"In our feedback on the CCUS Bill last year, we highlighted the need for policy support to enable cement companies to use alternative fuels and raw materials, including fly ash from coal-fired power plants," Loh says.

With CCUS, various opportunities "are being explored" overseas to utilise captured carbon dioxide, such as synthetic fuels and sequestration into cement. "However, these opportunities will require significant government support, focus and funding for R&D to make them viable locally," she adds.

For national oil company Petronas, net zero is a priority, as exemplified by being Asia's first O&G firm to pledge net zero by 2050.

CCUS is "both a duty and a bold chance", says Petronas' Emry.

"We invest in CCS not just to comply, but to create a new economic sector. By making Malaysia a regional hub, we open doors for partnerships, innovation and investment," he adds.

"We see it as a triple win. First, it allows Petronas to future-proof our business resiliency in a changing global landscape. Second, it helps the industries and the region to decarbonise effectively. Third, it strengthens Malaysia's role in shaping a net zero future and becomes a catalyst for the region.

"Our commitment to both Malaysia and the region's energy security and a just transition requires us to address the challenge of high carbon dioxide content in remaining untapped resources. Petronas' long-term vision as a responsible energy player is to position Malaysia as a leading regional CCUS hub in Asia-Pacific."

For the wider industry, there are challenges, including the high cost of CCUS deployment, infrastructure requirements and uncertainties over who will bear the financial burden — whether it will be industries, governments or consumers, says Tenaga's Mohd Fadzil.

The recently approved CCUS Act could support the development of policies, such as for carbon markets used to trade captured emissions, which in turn supports the wider carbon ecosystem, he says.

Tenaga is constantly evaluating the optimal approach to ensure that its emissions reduction targets align with the energy trilemma — affordability, security and sustainability, says Mohd Fadzil.

"Policy and regulatory frameworks, along with incentives, will be crucial in determining the feasibility and scalability of CCUS adoption in the long term. With the right policies in place, it can drive innovation, infrastructure growth and industry collaboration, helping us decarbonise while ensuring energy security and competitiveness," he adds.