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WHITE PAPER

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CCUS Regulation and Incentives in the Asia-Pacific Region: A Comparative Table for Strategic Decision-Making

Carbon capture utilization and storage ("CCUS") refers to technologies that enable carbon dioxide ("CO2") emissions from industrial sources to be captured and either used in a way that limits or prevents them from being emitted into the atmosphere or enables them to be sequestered underground or otherwise stored for long-term (ideally permanent) isolation from the atmosphere.

The ability to capture and permanently store CO2 is expected to play a vital role in reducing global CO2 emissions and achieving "net zero" carbon emissions, which is a key goal for corporations, industries, and governments.

This *White Paper* will explore:

- The fundamentals of CCUS technologies;
- CCUS's role in the energy transition;
- The CCUS value chain;
- CCUS business models; and
- CCUS in the Asia-Pacific ("APAC") region, including recent developments, opportunities and risks, and future outlook.

WHAT IS CCUS?

CCUS broadly comprises of three distinct approaches and associated technologies:

- Carbon capture and storage ("CCS");
- Carbon capture and utilization ("CCU"); and
- Carbon dioxide removal ("CDR") or "negative emissions technologies."

While sharing common elements, CCS, CCU, and CDR can be distinguished by:

- The source of captured CO2;
- The destination of captured CO2; and
- Ultimately, whether the approach has reduced CO2 emissions or removed CO2 already emitted into the atmosphere (i.e., "net negative").

Many of the technologies underpinning CCUS are mature and have been implemented for decades, such as conventional CCS and CCU used in enhanced oil recovery. However, as the importance of meeting emissions reduction targets increases, novel applications of existing technologies and nascent technologies are emerging, backed by significant public and private investment. Unfortunately, many of the positive policy initiatives announced in recent years that would have otherwise improved financing prospects for CCUS projects have been offset by rising inflation, high interest rates, increasing project lead times, and permitting delays.

While deployment has trailed behind expectations, momentum has been growing in the development of a global CCUS industry. As of July 2024, there were 628 projects in various stages of development and production across the value chain, including 50 operational facilities and 44 under construction.[1] Although CCUS development has increased significantly in recent years, there is a long road ahead. Operational projects around the globe have an aggregate annual capture capacity of 51 million tons per annum ("Mtpa"), with a further 365 Mtpa of projects in the pipeline.[2] The International Energy Agency ("IEA") *Net Zero Roadmap*, which sets out global cross-industry targets for achieving net zero CO2 emissions by 2050, currently estimates that 6,040 Mtpa of CO2 will need to be captured by 2050 (3,736 Mtpa from fossil fuel and industrial processes, 1,263 Mtpa from bioenergy, and 1,041 from direct air capture).[3]

CCUS AND THE ENERGY TRANSITION

The reality of the situation is that the world is unable to entirely avoid production of CO2, but the continuing development of new technologies can help reduce carbon emissions in hard-to-abate sectors while significant sources of CO2 emissions, such as fossil fuel-based power generation and transportation, are phased out and replaced with low-carbon alternatives.

As policymakers around the world accelerate their decarbonization efforts, there is a growing social acceptance that CCUS has a major role to play in achieving net zero emissions. This has been apparent in the scientific community for some time: Both the United Nations' Intergovernmental Panel on Climate Change and the IEA have outlined a fundamental role for CCUS in reaching net zero emissions by 2050,[4] in particular for hard-to-abate sectors like cement, steel and fertilizer production, power generation, and natural gas processing. According to the IEA, "reaching net zero will be virtually impossible without CCUS."[5]

The IEA has identified four critical roles CCUS can play in the transition to net zero:

- Tackling emissions from existing energy assets;
- As a solution for sectors where emissions are hard to abate;
- As a platform for clean hydrogen production; and
- Removing carbon from the atmosphere to balance emissions that cannot be directly abated or avoided.

CCUS is by no means a silver bullet and will need to be deployed alongside other solutions, including renewables and battery technologies, sustainable fuels, and "green" hydrogen (noting that CCUS technologies also enable the production of "blue" hydrogen[6]). CCUS has, however, a number of advantages that complement these other solutions:

- It is cost-effective (at least for certain industrial and power generation applications);
- It relies in part on established technologies and knowledge; and
- It can be deployed to offset stubborn emissions that renewables struggle to replace.

CCUS VALUE CHAIN

The CCUS Value Chain is divided into four key areas: capture, transport, storage, and utilization.

Capture

In order to capture CO_2, it must be separated from other gases produced during industrial processes or fossil fuel combustion. Capturing carbon is often the most significant cost component of CCUS processes, but also represents the best opportunity for value creation through increased efficiency and technological innovation. Different capture methods and technologies are available or in development that are suited to different applications.

Transport

Once captured, CO_2 is transported to a storage or utilization site. In order to do so, CO_2 needs to be compressed, with the increased pressure causing the dense-phase CO_2 to behave like a liquid. The compressed CO_2 is then dehydrated before being sent to a transport system, typically a pipeline.

Pipelines are the most common mode of transport for CO_2, largely because they already operate as part of enhanced oil recovery activities; however, small-scale shipping of liquid CO_2 via road and rail has already been undertaken. Large-scale shipping of CO_2 is emerging as a key transport option and is not expected to face any significant technical barriers, given the experience of the gas industry in shipping gaseous fuels and cryogenic liquids.

Development of transport infrastructure for CCUS is crucial in expanding the availability of storage to industries that operate away from storage sites. Companies with experience in the transport and storage of fossil fuels are already playing a key role in the development of CO_2 transport infrastructure.

Storage

Storage involves sequestering CO_2 by injecting the captured CO_2 into geological formations that are typically at least one kilometer underground. These formations include saline aquifers, oil and gas reservoirs, and formations of porous rock such as basalt and shale.

No.	CCUS Technology	Description
1.	Pre-combustion processes	Converts fossil fuels into a mixture of hydrogen and CO_2 before combustion. CO_2 is separated and captured, which allows for the hydrogen to be burned as a fuel source without producing CO_2. The main technology to achieve this is the use of physical solvents that operate at high pressures. Various adsorption and membrane technologies are also under development.
2.	Post-combustion processes	Captures CO_2 from the exhaust gases produced during fossil fuel combustion. This process typically involves the use of solvents that can absorb CO_2. The solvents are then heated to create a stream of high-purity CO_2 for capture. Membrane separation technology is also under development for large-scale use. Post-combustion technology is less efficient that pre-combustion capture but can be more readily retrofitted to existing industrial applications (such as power plants) than other processes.
3.	Oxy-fuel combustion processes	Burns fuel in a nearly pure-oxygen environment, which produces a concentrated stream of CO_2 that is easier to capture. The downside of this process is that oxygen production is highly energy intensive, and boiler and material redesign is often required.
4.	Direct air capture ("DAC") processes	Uses filter or chemical technology to capture carbon dioxide from the atmosphere directly, which is then concentrated for transport or storage. Because CO_2 is much more dilute in the atmosphere, current DAC technology is more expensive and energy intensive than other capture methods.

The higher temperatures and pressure in deep underground formations mean that CO2 will stay in a concentrated state, allowing for the storage of greater volumes.

Oil and gas reservoirs have unique strengths as storage sites as there may be opportunity to adapt existing production infrastructure, and extensive geological surveying of sites has already been undertaken.

Utilization

As an alternative to storage, CO2 utilization technology, also known as carbon conversion or carbon recycling, aims to reuse captured CO2 in existing processes or as an ingredient in new products, thereby displacing additional fossil fuel use.

In addition to CO2 use in enhanced oil recovery, CO2 utilization technologies are currently deployed in the production of fuel alternatives, plastics, biofertilizers, and building materials.

Where the captured carbon's utilization results in a closed loop over many decades or centuries (e.g., when incorporated into building materials), CCU may be considered removal. However, many CCU applications merely delay the emission of carbon into the atmosphere, which will not positively impact emissions reduction targets.

CCUS BUSINESS MODELS

CCUS business models generally fall into two project types: full-chain and part-chain. These project types reflect how much of the CCUS value chain is owned or managed by a single entity and the extent of the integration of the CCUS value chain within a single project. Within these business models, project ownership can be public/state-owned, private, or public–private partnership, and financing can be provided through either government or private sources.

It is also important to understand the economic values derived from carbon capture. While captured CO2 has limited value as a commodity, there is still high potential for revenue gains. These values differ for emitters (parties who supply CO2) and transport and storage operators.[7] Opportunities also exist for generation of carbon credits, depending on how the captured CO2 is managed and the specific market or trading standard involved.

Full-Chain

The full-chain model represents the majority of CCUS projects currently in operation, with oil and gas companies operating the majority of these. ExxonMobil, Chevron, Shell, and Occidental account for around 80% of CCUS projects currently in operation. This is not surprising given the vast technical and financial resources required to vertically integrate a CCUS supply chain within one organization.

In the full-chain model, the entire CCUS value chain is integrated into one project. The project manages the capture, transport, and storage of CO2 from one emitter, often at a single site, to one injection facility.

The full-chain model is well suited to first-of-a-kind projects. The obvious advantage of the full-chain model is that there are fewer synchronization requirements. However, the cost and risk of these projects is immense, and, as a result, we anticipate (and have already begun to see) the full-chain model becoming less relevant. As CCUS technology and infrastructure matures and more participants are able to enter the industry and specialize in certain aspects of the supply chain, this should in turn reduce overall supply chain costs and risk for project proponents. In addition, breaking up the CCUS supply chain mitigates the risk of monopolistic behaviors by large industry players—this is reflected by a surge of government interest in public–private partnerships for the development of shared infrastructure for CCUS hubs.

Part-Chain

In a part-chain model, participants focus on innovation and expertise in specific technologies or operations that form part of the CCUS value chain. The benefit of the part-chain model is that there are fewer technical and financial barriers to entry. This allows for more participants to emerge, facilitating access to the expertise and infrastructure needed to support decarbonization, bolstering innovation and reducing costs across the value chain.

Companies with complementary expertise are also able to drive CCUS innovation by expanding into part-chain projects that leverage their experience. For example, companies in the LNG industry are adapting their expertise to the transport and storage of CO2, and specialist chemical and engineering companies are developing proprietary capture solutions.

However, part-chain models involve increased cross-chain and coordination risk. These models are also difficult to finance due to the certainty required by emitters as to where captured CO2 will be stored, and by transportation and storage operators as to the number of emitters committed to investing in capture plants. Government involvement may be necessary to provide financial and regulatory support.

A number of part-chain models have emerged whereby emitters outsource certain aspects of the CCUS value chain to specialist providers, or license capture technology from them, including:

- Self-capture with third-party CO2 offtake;
- CO2 transport and/or storage-as-a-service; and
- Capture-as-a-service.

The key advantages of these services include:

- Flexibility and customization;
- Less upfront expenditure;
- Risk sharing; and
- Possible development of new revenue streams.

Drawbacks include:

- Risks associated with reliance on specialized service providers;
- Price variance between long-term contracts and spot prices;
- Uncertainty surrounding earning and allocating carbon credits; and
- Potential for long lead times and significant upfront expenditure without commitment from counterparties.

Hub-and-Spoke Model

The hub-and-spoke model for CCUS offers a solution to challenges faced by actual and prospective participants in the CCUS industry by fostering collaborations between CO2 emitters and other stakeholders. Under this model, emitters transport CO2 from different sources to a central storage facility or cluster of industrial users (the hub) through a shared pipeline network (the spokes). Ideally, multiple co-located or clustered emitters would utilize shared transportation infrastructure to transport CO2 to the hub.

The hub-and-spoke model has a number of advantages:

- Cost efficiency through consolidation of CO2 transport and storage infrastructure;
- Risk sharing across multiple stakeholders;
- Reduction in per-unit costs through scalability and shared networks;
- Accelerated deployment of CCUS infrastructure through collaboration between industries, streamlining planning and permitting and reducing duplication of effort;
- Flexibility through versatile infrastructure that is able to support a wide variety of industries; and
- Innovation and knowledge-sharing through collaboration across industries and regions.

However, there are also a number of drawbacks to consider:

- High initial investment required to establish the hub-and-spoke model infrastructure;

- Regulatory challenges in coordinating across jurisdictions with differing regulatory requirements;
- Dependency on initial and continuing collaboration between stakeholders;
- Transportation risks where CO2 is being transported over long distances;
- Long-term effectiveness and viability of CCUS hubs depends on continued technological advancements, regulatory support, and market conditions, which may not always align;
- Resistance or concerns from local communities regarding the construction of CO2 storage sites or pipelines, particularly if the risks are not well understood or communicated; and
- Geographic limitations in regions that are not suitable for CCUS hubs. CCUS requires the availability of suitable geological formations for CO2 storage, and the infrastructure needs to be in proximity to major emitters, which may not always be the case.

Despite these drawbacks, we anticipate the hub-and-spoke model (together with clustering of CCUS-linked industries and participants) will emerge as a key medium for the effective deployment of CCUS going forward.

Business Model for Emitters

The financial benefits of carbon capture stem from regulatory frameworks that enable emitters to generate revenue, offsetting the costs of installing and operating capture systems while covering storage expenses. These include compliance carbon markets and voluntary carbon markets.

Compliance carbon markets stem from government-mandated mechanisms for carbon management. Europe currently leads the way with this approach, with ambitious projects including the CCUS Longship project in Norway[8] and the CCS Infrastructure Fund in the United Kingdom.[9]

Frameworks employed by governments to facilitate development of revenue streams for emitters include:

- Tax credits for investment or production, to support emission reductions;

- Carbon tax schemes that incentivize emitters to reduce emissions;
- A cap-and-trade system limiting emissions, requiring excess emitters to buy credits; and
- Subsidies or grants covering carbon capture costs, either per ton or as a fixed amount.[10]

In the absence of a compliance market, another mechanism for creating revenue is the voluntary carbon market, where emitters participating in a CCUS hub may generate certified emissions reductions, allowing them to sell carbon credits to other parties. In the United States, demand for durable high-quality credits surged in 2023, which drove revenue for projects that offer long-term carbon sequestration through CCUS, instead of lower-quality carbon credits commonly associated with renewable energy and conservation projects.[11]

While there is some way to go in tightening legislation around regulating credits produced by CCUS projects and the voluntary international trading of carbon credits, the voluntary carbon market remains a viable option for emitters to benefit from revenues to support CCUS projects.

Business Model for Transporters and Storage Facilities Operators

The business model for CCUS transporters and storage facility operators involves providing infrastructure and services for capturing, transporting, and securely storing CO_2. Revenue is typically generated in three ways:[12]

Contractor to the government: Investments are funded by the government, and the development and operations are managed by transporters and storage operators (Phase 1 of Norway's Longship project).

Hybrid enabled market: An economic regulatory regime is linked to a user-pays revenue model that includes a government support package and a government-mandated open access network (the United Kingdom's East Coast cluster projects).

Liberalized free market: This is used when market and policy incentives are widely available, and private companies develop CCUS projects with minimal government intervention (the Liberty Louisiana hub in the United States).

As carbon prices are low and the demand for low-carbon products is still in the early stages, it is evident that the selection of business models for all participants of the value chain largely depends on what government support and policy incentives are available to make the project profitable.

In the next section, we look at the varying regulatory and policy regimes across different jurisdictions in the APAC region.

CCUS IN APAC

Despite a flurry of CCUS activity in the APAC region in recent years from both government and industry, Europe and North America continue to lead the way in terms of the number of operational and planned CCUS projects, largely reflective of the more supportive policy environments in these regions. The United States has the largest number of CCUS facilities in development, operation, and construction. Some of these projects have cited the Inflation Reduction Act, which offers tax credits of US$85 per ton of captured CO_2, as a driving force in accelerating their launch.[13] In Western Europe (in particular the North Sea), the CCUS industry is benefiting from legislative support, subsidies, and inflated emissions trading scheme prices, which have improved the business case for some projects.

The APAC region faces the challenge of achieving economic growth while reducing carbon emissions in an energy system still heavily dependent on fossil fuels. To meet climate targets while keeping up with rising energy demand, CCUS is emerging as a key solution, supported by collaboration, strong policies, and innovative financing strategies. Interest in CCUS is gaining momentum across the region, with countries such as Australia, Japan, China, India, South Korea, New Zealand, and members of ASEAN making significant progress toward developing the industry.

This growth is driven by ambitious net zero commitments and regulatory frameworks designed to expand CCUS deployment. Within the APAC region, the establishment of the Asia Zero Emission Center has helped promote CCUS through policy coordination and public–private partnerships. The Economic Research Institute for ASEAN and East Asia hosts the Asia CCUS Network, which facilitates knowledge-sharing and the development of regional storage networks.

In the APAC region, there is also a strong focus on enabling cross-border CCUS value chains. Agreements between states and development of domestic legal and regulatory regimes will continue to facilitate hub development between trans-national partners and enable CO2 import and export activities.

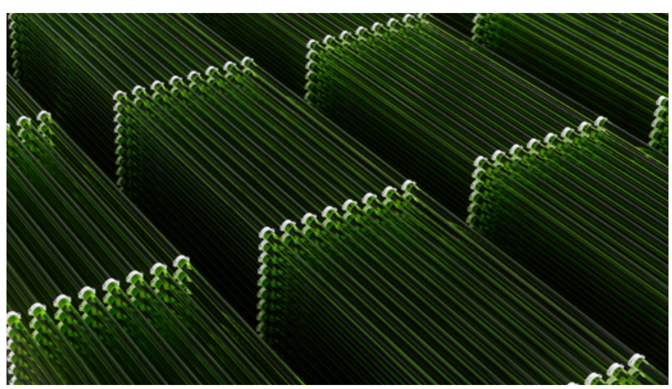
Regulatory/Policy Environment in APAC

To explore each jurisdiction's policy preparedness for a CCS/CCUS project deployment, we set out below a traffic light report for key APAC countries, with **red** indicating no to low levels of policy developments (not ready-to-go), **amber** for low to medium levels of policy developments (almost ready-to-go), and **green** for established regulations (generally ready-to-go).

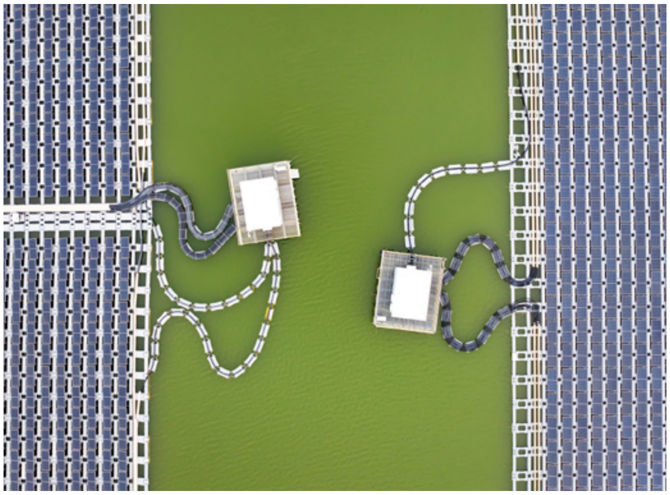
Country	Regulatory/Policy Developments
● **Australia**	While there are no CCUS-specific regulations in Australia, there is a strong framework of existing state and federal laws applicable to CCUS, including: • The Environment Protection (Sea Dumping) Act 1981, amended in 2023 to enable a permit to be granted for the export of CO2 for sequestration in sub-seabed geological formations. • The Offshore Petroleum and Greenhouse Gas Storage Act 2006. • The Petroleum Legislation Amendment Act 2024 (WA), which provides a legislative framework for the transport and geological storage of CO2 in Western Australia. Key government initiatives aimed at fostering industry development include: • The "Interim National Action List for offshore carbon dioxide sequestration," which provides a screening tool to assess suitability for disposal of CO2 into sub-seabed geological formations. • The Carbon Capture Technologies Program, which provides grants of up to AU$15 million for research into carbon capture, especially in hard-to-abate sectors such as cement manufacturing.[14] Current projects in operation include the Chevron-operated Gorgon CCS Project in Western Australia and the Santos-operated Moomba CCS in South Australia. Other projects in the pipeline include the offshore multi-user CCS hub in the Pilbara and the proposed Angel CCS project in Western Australia, which aims to capture up to five million tons of CO2 annually.[15] Despite Australia's policy readiness, there is still some room for improvement. Bilateral trading arrangements to export CO2 have yet to be agreed with other nations, and domestically, CCUS technology has been facing an increasing amount of public criticism for being ineffective for achieving Australia's net zero goals.[16]
● **Brunei**	Brunei Darussalam has implemented several policies to address carbon emissions, focusing on both reduction and sequestration strategies, but currently there are no CCUS-specific policies or regulations. Under Strategy 6 of the Brunei National Climate Change Policy, Brunei plans to implement carbon pricing mechanisms by 2025. This strategy aims to impose a price on carbon emissions for industrial sectors, serving as a deterrent for excessive greenhouse gas emissions.[17] Brunei has also embarked on collaborative efforts to explore and develop CCUS projects. In October 2022, Shell Eastern Petroleum and Brunei Shell Petroleum signed a memorandum of understanding ("MoU") with the aim to explore the feasibility of carbon transport and storage options for Brunei Darussalam and Singapore, which could potentially form part of a CCUS hub in Southeast Asia.[18]

Country	Regulatory/Policy Developments
China	China has been actively enhancing its policies and legislation to advance CCUS as part of its commitment to achieving net zero emissions by 2060. Of 12 operational CCUS projects in the Asia region, 11 are in China. With the most-developed CCUS industry in the region, China is primarily focused on its domestic CCUS endeavors. Currently, China has established regulatory frameworks to support CCUS projects, focusing on environmental impact assessments, safety standards, and monitoring mechanisms to ensure effective implementation and operation of CCUS facilities. The government has also introduced financial incentives, such as subsidies and tax benefits, to encourage investment in CCUS technologies, facilitating the commercialization and scaling of these projects. Noteworthy policy developments include: • CCUS integration into key national strategies, including the Outline of the 14th Five-Year Plan (2021–2025) for National Economic and Social Development and Vision 2035. These plans emphasize the development and deployment of CCUS technologies to reduce greenhouse gas emissions. • Three policies issued in 2024 setting out an implementation plan for low-carbon technologies (including CCUS), guidance on standards for direct air capture for CCUS, and CCUS technologies added into the 2024 catalogue for green-transition-related industries.[19] This push from the government has spurred a large number of CCUS projects in China. Sinopec's Megaton-Scale CCUS Project has been operating since January 2022, with plans to continue expansion into further research and development. Led by China National Petroleum Corporation and the Oil and Gas Climate Initiative, a proposed CCUS hub in Xinjiang aims to capture at least 10 million tons of CO_2 annually by 2060. Although China has had notable momentum in the CCUS policy space, there are still significant legal and regulatory gaps, creating uncertainties for project developers in China. What remains to be included in the regulations include establishing a structured permitting process and authority and defining pore space rights (rights relating to underground spaces, which may conflict with other land or mineral exploration rights).[20]
India	While still in the infancy stage, India is actively developing its CCUS policy framework to align with its climate goals of reducing emissions intensity to 45% below 2005 levels by 2030 and achieving net zero emissions by 2070. India has begun formulating a National CCUS Mission to establish comprehensive policy and regulatory frameworks, facilitating large-scale deployment of CCUS technologies across various sectors.[21] This initiative is designed to not only promote the adoption of CCUS but also work with industry and academia to develop a CCUS domestic framework. As part of this, the government think tank NITI Aayog has released a policy framework recommending a phased approach, with carbon credits and incentives to promote early adoption of CCUS, and gradually transitioning to a carbon tax system post-2050. The framework emphasizes the development of regional hubs and clusters to achieve economies of scale and outlines the roles of various stakeholders in the CCUS value chain. The Ministry of Petroleum and Natural Gas has also initiated efforts to implement CCUS in the oil and gas sector, including the establishment of a task force and collaboration with academic institutions for research and development.[22] To continue international collaboration, India is engaging in international partnerships, such as the Asia CCUS Network, to share knowledge and resources for the development and deployment of CCUS technologies.[23] While India is making progress in establishing a CCUS policy framework, challenges remain in terms of financing, infrastructure development, and public acceptance. The high capital costs associated with CCUS projects necessitate the creation of supportive financial mechanisms and incentives to attract private investment. A recent report projects that India will account for 15% of CCUS capacity in APAC by 2050 but will need US$4.3 billion in government support to ensure the viability of the projected capacity.[24] Developing the necessary infrastructure for CO_2 transport and storage, as well as ensuring regulatory clarity and public awareness, will also be essential for the successful implementation of CCUS in India.

Country	Regulatory/Policy Developments
Indonesia	Indonesia has made significant progress in developing policies for CCUS, positioning itself as a leader in Southeast Asia. A key policy development is the establishment of Indonesia's first CCUS-specific legislation, Prudential Regulation 14/2024, which provides a framework for CCUS activities across multiple Indonesian sectors.[25] The regulations mandate a 30% cap on foreign CO2; establish processes for storage permitting, environmental safety, monitoring, and post-closure liability; and include tax incentives, allowances for storage operators to monetize activities through fee charging and provide the basis for the implementation of carbon pricing associated with CCUS activity. Indonesia also introduced PTK-070 in 2024, a technical regulation issued by the Special Working Unit for the Organization of Upstream Oil-and-Gas Business Activities. It provides technical guidelines for upstream oil and gas contractors developing CCUS projects.[26] Indonesia has also initiated cross-border collaborations, signing a letter of intent with Singapore in February 2024 and signing mutual recognition arrangement with Japan under Japan's Joint Crediting Mechanism (discussed below). On the public–private sector front, state-owned oil and gas company Pertamina has signed agreements with: • ExxonMobil, to evaluate the potential for a hub in the Java Sea; • Chevron, to collaborate on CCUS in East Kalimantan; and • Three South Korean energy companies, to research CCUS feasibility and conversion of offshore oil platforms.[27] Indonesia has laid a solid foundation for CCUS through its regulatory frameworks and strategic initiatives. However, expanding the scope of these regulations will be crucial for the successful implementation of CCUS technologies across all relevant sectors. The current scope of the regulations focuses on the oil and gas sector and excludes other sectors such as electricity, where there are further opportunities for CCS.[28]



Country	Regulatory/Policy Developments
● Japan	Japan has made significant strides in advancing CCUS through comprehensive policy developments aimed at reducing emissions by 46% by 2030 and achieving net zero emissions by 2050. In May 2024, Japan enacted the CCS Business Act, establishing a licensing system for CCS operations.[29] This legislation outlines procedures for storage and exploration drilling rights, and sets business and safety regulations for storage companies and CO2 pipeline transportation businesses. Test drilling permits at potential CCS sites are valid for four years, and the Ministry of Economy, Trade, and Industry ("METI") will designate suitable geological storage areas as "specified areas" granting licensed operators prospecting and storage rights. The legislation also imposes notification requirements and other obligations to ensure the safe and regulated operation of CO2 pipeline transportation. For instance: • Businesses transporting CO2 via pipelines, including for storage at overseas sites, must notify the METI with details of their operations; • Operators providing CO2 pipeline transportation services for third parties must establish and disclose terms and conditions, including pricing and service requirements, under which they operate; and • Pipeline operators are required to adhere to a range of safety regulations. On the sustainable finance front, Japan issued the world's first sovereign climate transition bond through the Climate Bonds Initiative—a 10-year, US$130 billion climate bond.[30] Proceeds must go to specific projects aligned with the Green Transformation Promotion Strategy, which sets out Japan's path to net zero emissions. Japan has been a leader in cross-border emissions reduction projects, establishing the Joint Crediting Mechanism, which aims to facilitate the diffusion of decarbonizing technologies and infrastructure though agreements with partner countries and investment by Japanese entities.[31] Additionally, Japan is exploring specific CCUS projects with international partners, including an agreement between eight Japanese companies and Malaysian state-owned PETRONAS, to develop storage for CO2 emitted by Japanese industry in offshore Sarawak, Malaysia.[32] These concerted efforts reflect Japan's commitment to establishing a robust policy and regulatory environment conducive to the development and deployment of CCUS technologies, both domestically and in collaboration with international partners. An area for improvement is Japan's current carbon pricing mechanisms, such as the Global Warming Countermeasure Tax and emerging emissions trading schemes. These are currently too modest to make CCUS economically viable. To accelerate adoption, Japan needs to raise its carbon price to better reflect the true cost of carbon abatement, introduce long-term incentives like tax credits or contracts for difference, and transition from voluntary to mandatory carbon markets.



Country	Regulatory/Policy Developments
Malaysia	Malaysia has recently advanced its CCUS policy framework with the enactment of the Carbon Capture, Utilization and Storage Act 2025 ("CCUS Act") on March 25, 2025.[33] This comprehensive legislation regulates the entire CCUS value chain, including the capture, transportation, utilization, and permanent storage of CO2 within Peninsular Malaysia and the Federal Territory of Labuan. Notably, the states of Sabah and Sarawak are excluded from this act, as they have established their own regulations governing CCUS activities.[34] Malaysia has made significant effort to foster international collaboration, with both the Malaysian government and PETRONAS entering into a range of agreements to facilitate CCUS development, including: • A MoU between Singapore and Malaysia relating to carbon credits and carbon capture signed in January 2025; and • A joint study agreement between Japanese energy company JERA and PETRONAS to investigate the feasibility of separation and transport of JERA's emissions for storage in Malaysia, signed in April 2024. To fully unlock the potential of CCUS in Malaysia, the government should harmonize regulations across states, particularly with Sarawak and Sabah, to create a unified national framework. This would ensure consistent policies and facilitate cross-state collaboration in CCUS projects. Additionally, Malaysia should develop a comprehensive national CO2 transport and storage infrastructure plan, identifying strategic storage basins and establishing CO2 transport corridors. By incentivizing the creation of shared, open-access infrastructure, Malaysia could significantly lower costs and increase the feasibility of CCUS for smaller emitters, accelerating nationwide adoption.
New Zealand	New Zealand is actively developing its CCUS policy framework as part of its strategy to achieve net zero emissions by 2050. The government recognizes that the implementation of CCUS would reduce New Zealand's net CO2 emissions by an estimated 4.65 megatons between 2026 and 2035.[35] Following a consultation process by the Ministry of Business, Innovation and Employment completed in 2024, the government plans to introduce legislation in 2025 to establish a comprehensive CCUS regulatory regime, which will likely be modeled on Australian and EU legislation.[36] This framework will regulate carbon storage activities and integrate CCUS into the New Zealand Emissions Trading Scheme, allowing businesses to earn emissions credits for captured and stored CO2.[37] While the development of a CCUS regulatory framework is a positive step, challenges remain. These include addressing oversight of environmental risks such as potential CO2 leakage from storage sites. Additionally, the success of CCUS in New Zealand will depend on the commercial viability of projects and the establishment of clear guidelines to attract investment.[38] As in Australia, critics have been vocal about the viability of CCUS technologies and the risk that CCUS investment reduces incentives to phase out fossil fuels altogether.
Singapore	While not as advanced as some APAC counterparts, Singapore has made significant strides in developing its CCUS policy framework, recognizing CCUS as a vital component in its strategies to achieve net zero emissions by 2050, and its National Hydrogen Strategy, under which Singapore aims to produce 50% of its energy from low-carbon hydrogen by 2050.[39] The Singapore government has conducted feasibility studies on CCUS technologies and launched the Low Carbon Energy Research Funding Initiative in 2021 to support research and development in areas including CCUS.[40] In collaboration with industry leaders, Singapore is exploring cross-border carbon capture and storage projects. For instance, the S-Hub consortium, comprising Shell and ExxonMobil, is working with the government to develop a CCS project aimed at capturing and storing at least 2.5 million tons of CO2 annually by 2030.[41] However, Singapore has yet to announce any CCUS-specific legislation, and this could be due to the key challenge of geological constraints. Singapore's limited geological storage capacity necessitates reliance on cross-border storage solutions. To mitigate this, Singapore has signed several MoUs relating to cooperation on cross-border carbon capture with neighboring countries including Malaysia, Japan, and Indonesia.[42] While progress has been made, further development of comprehensive regulations and incentives is essential to support large-scale deployment of CCUS technologies.

Country	Regulatory/Policy Developments
South Korea	South Korea has committed to lowering its greenhouse gas emissions by 40% compared to 2018 levels by 2030 and achieving net zero emissions by 2050.[43] As a part of this, South Korea enacted the Carbon Dioxide Capture, Usage and Storage Act, which came into effect in January 2025. The legislation outlines processes around permitting and financial support mechanisms, and provides a framework for activities including operations, safety standards, and monitoring. In addition to this, the Korea Emissions Trading Scheme (a mandatory emissions trading system launched in 2015) incentivizes industries to adopt CCS technologies by reducing compliance costs. The government has committed to providing substantial financial support for carbon offset projects, including offering 420 trillion won (approximately US$313.4 billion) in policy loans to support projects aimed at reducing carbon emissions.[44] While South Korea has established a robust policy framework and initiated significant projects, challenges remain in scaling up CCUS technologies and infrastructure. Continued investment, public–private partnerships, and international collaboration will be crucial to overcoming these challenges and achieving the nation's carbon neutrality goals.
Thailand	Thailand, as a developing nation with rising energy demands and carbon emissions, has begun incorporating CCUS into its climate policy to support its goal of achieving net zero emissions by 2065. The Royal Thai government has launched various initiatives to reduce the national carbon footprint and promote sustainable development. In March 2022, the National Committee on Climate Change Policy approved the establishment of the Greenhouse Gas Reduction Steering Committee. This committee is tasked with accelerating CCUS deployment in the energy and industrial sectors, drawing on Thailand's expertise in petroleum exploration and production. The country's first major CCS project is led by PTT Group, is expected to be operational in 2027.[45] Currently, the Department of Mineral Fuels is drafting amendments to Thailand's Petroleum Act to include a definition for "carbon business," establishing a legal framework for regulating CCUS activities.[46] Still in the draft stage, it is unclear when the amendments will be enacted. In January 2025, Thailand's cabinet approved the implementation of a carbon tax, marking a significant step in the nation's efforts to reduce greenhouse gas emissions. The tax is set at 200 baht (approximately US$6) per ton of carbon dioxide emissions and will initially apply to petroleum products such as gasoline, diesel, and jet fuel. Thailand is making concerted efforts to integrate CCUS into its climate strategy through policy development, pilot projects, and institutional coordination. However, the successful implementation of CCUS at scale will depend on finalizing regulatory frameworks, developing necessary infrastructure, and providing financial incentives to support industry participation.

Opportunities and Risks

There are several regional economic opportunities that we set out below:

Cost Competitiveness. The CCUS value chain has significant overlap with the upstream oil and gas sector, where the region holds key advantages. These include well-established local supply chains; efficiency in well development; strong operational and maintenance expertise; rigorous health, safety, and environmental standards; and a proven track record of execution by both state-owned and independent fossil fuel companies.

Strong Engineering and Construction Capabilities. The APAC region is home to some of the world's leading engineering, procurement, and construction firms. The region also dominates the shipbuilding industry, with China, South Korea, and Japan accounting for more than 80% of the global market. These companies bring extensive experience, proprietary technologies, and the ability to scale—essential strengths for CCUS projects, which require large infrastructure investments, rapid technological development, and cost efficiencies.

Potential to Drive Economic Growth. CCUS can play a key role in supporting long-term economic expansion. Beyond its environmental benefits, it can create jobs, spur innovation, boost trade, and enable the development of low-carbon products while helping existing industries decarbonize.

A Strong Culture of Collaboration. CCUS hubs and clusters are complex, large-scale projects that require close coordination between public and private stakeholders, long-term infrastructure planning, and regulatory engagement. The APAC region has extensive experience managing such ecosystems, including large industrial parks, special economic zones, and major urban developments. Success in these projects has relied on aligning strategic interests, fostering trust, and building strong partnerships—an approach that is deeply embedded in how the region operates.

State-owned enterprises, which play a significant role in APAC economies, are well-positioned to drive CCUS development. With existing ties to CO2-emitting industries, access to government support, and the ability to integrate national climate policies, these entities bring strong technical and commercial capabilities to support cross-sector and cross-border collaboration.

Regional risks include:

Limited Access to Nearby Storage Sites. In many global CCS projects, captured CO2 is injected into nearby depleted oil and gas reservoirs. For example, at Australia's Gorgon LNG plant, CO2 is stored just seven kilometers from the facility. However, many industrial hubs in APAC lack access to suitable geological formations for long-term sequestration. Countries such as Japan, South Korea, Taiwan, and Singapore, which together emit 840 million tons of CO2 annually, face particularly significant hurdles.

Regulatory and Policy Challenges. While Australia, Japan, and China have made progress, most countries still lack well-defined policies on climate targets, operational standards, and health, safety, and environmental regulations. Without a clear regulatory framework, scaling CCUS at the required pace will be difficult.

Gaps in Technical Expertise and Pilot Projects. Many CCUS processes, such as CO2 compression, transport, and injection, are well established in the oil and gas sector. However, outside of this industry, technical expertise remains limited. The region also lacks a strong track record of pilot projects to demonstrate feasibility and de-risk investments. Without proven case studies, governments and companies may adopt a cautious "wait-and-see" approach, slowing progress.

Financing Constraints. Large-scale CCUS projects require substantial investment, often in the billions of dollars. However, outside of CO2-enhanced oil recovery applications, the commercial case remains weak, making it difficult to attract funding. A lack of clear financial incentives further dampens investment appetite, creating additional barriers to deployment.

Future Outlook

Australia, Japan, Malaysia, Indonesia, and now South Korea are emerging CCUS leaders in the APAC region, driven by the CO2 storage potential in their depleted oil and gas reservoirs, stricter environmental regulations, and government support. Momentum is already building for policies in Australia, Malaysia, and Indonesia to address regulatory gaps that, in collaboration with countries with strong investment policies such as Japan and South Korea, could pave the way for them to become key CO2 storage hubs in the region. The availability of (or cross-border agreements for access to) ample storage capacity, infrastructure viability, and supportive regulations further incentivizes CCUS initiatives in these countries, and positions them favorably to attract a substantial portion of the up to US$15 billion in investment in CCUS across APAC that is anticipated over the next decade.

The IEA has identified four key areas of focus for the continued development of CCUS in the APAC region:

- **Increase regional cooperation and collaboration**, including through the Asia CCUS Network, to identify and develop opportunities for shared infrastructure development and to build CCUS capabilities throughout the region.
- **Identify and develop onshore and offshore CO2 storage resources** in parallel with the establishment of robust legal and regulatory frameworks for the safe and secure storage of CO2.
- **Encourage early investment in CCUS projects**, including pilot demonstrations and industrial hubs, through targeted policies and integrating CCUS into national energy and climate strategies. Recognizing a role for CCUS in energy and climate strategies can improve access to international finance.
- **Build international support and financing for CCUS in the region**, particularly increased access to grants and loans from international development and climate finance institutions. Encourage international capital markets to fund a broader range of clean energy investment opportunities, including CCUS, in Southeast Asia.

In summary, while policy development for CCUS across the APAC region remains uneven, momentum is building. Countries such as Australia, China, and Japan are emerging as early leaders, implementing clearer regulatory frameworks, funding support, and cross-border collaboration initiatives. Others, including Indonesia, Malaysia, New Zealand, and South Korea, are advancing through pilot programs and sector-specific policies, although many still face challenges related to legal clarity, long-term liability, and investment incentives.

As the region continues to balance decarbonization ambitions with industrial growth, robust and coherent CCUS policy frameworks will be critical to scaling deployment. The evolving regulatory landscape in APAC provides valuable insights into how emerging and developed economies alike are navigating the complexities of carbon management.

In the upcoming articles of this *White Paper* series, we will explore how jurisdictions across EMEA and the Americas are addressing similar challenges, offering a comparative lens on global policy progress in CCUS.

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ENDNOTES

1 Global CCS Institute, *The Global Status of CCS: 2024* ("Global Status of CCS 2024").

2 Global Status of CCS 2024.

3 International Energy Agency, *Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach: CCUS*, 2023.

4 Global Status of CCS 2024.

5 International Energy Agency, *CCUS in Clean Energy Transitions*, 2020.

6 "Green" hydrogen is produced using electricity from renewable resources. "Blue" hydrogen uses steam to separate hydrogen from natural gas and relies on CCUS technologies to capture and store production emissions.

7 The CCUS Hub, *CCUS Hub Playbook: Policies & Business Models,* 2023.

8 Oil and Gas Journal, *Norwegian government to continue funding Longship CCS in 2025*, Oct. 10, 2024.

9 UK Government, Department of Energy Security & Net Zero and Department for Business, Energy & Industrial Strategy, *The Carbon Capture and Storage Infrastructure Fund: an update on its design* (May 2021).

10 Association of International Energy Negotiators ("AIEN"), *White Paper—CCUS Opportunity and Implications for the AIEN*, Mar. 2024.

11 AWE International, *Voluntary carbon credit markets drive growth in carbon capture tech*, Oct. 28, 2024.

12 The CCUS Hub, *CCUS Hub Playbook: Policies & Business Models,* 2023.

13 The Inflation Reduction Act introduced improvements to the federal 45Q tax credit, including credit values of $85 per ton of carbon emissions captured and stored from industrial facilities and power plants and $180 per ton for direct air capture facilities. Clean Air Taskforce, *Carbon Capture and the Inflation Reduction Act*, Feb. 16, 2023.

14 Australian Government, Department of Climate Change, Energy, Environment and Water, *Carbon Capture, Use and Storage*, Jan. 16, 2025.

15 Upstream, *CO2CRC welcomes Western Australia's CCUS Action Plan*, Nov. 25, 2024.

16 Australian Financial Review, *Australia is throwing away a $600b carbon capture opportunity*, Feb. 10, 2025.

17 *Brunei National Climate Change Policy*, Jul. 2020.

18 Reuters, *Shell to explore carbon transport and storage options in Brunei and Singapore*, Oct. 26, 2022.

19 Global CCS Institute, *Recent Chinese policy announcements will help facilitate deployment of low carbon technologies, including CCUS*, Apr. 4, 2024.

20 Global CCS Institute, *A gap analysis of China's regulatory framework for CO2 geological storage*, Apr. 16, 2024.

21 Outlook Planet, *India Plans Ambitious Mission To Drive Carbon Capture, Utilisation And Storage*, Aug. 9, 2024.

22 Government of India, Ministry of Petroleum and Natural Gas, *Carbon Capture Utilization & Storage*, Mar. 28, 2024.

23 U.S. Department of Commerce, International Trade Administration, *India decarbonisation and carbon capture, utilization, and storage (CCUS) market*, May 8, 2024.

24 Wood Mackenzie, *India needs US$4.3 billion government support to enable CCUS adoption*, Mar. 6, 2025.

25 Carbon Herald, *Indonesia Unveils CCS Regulations To Spur Industry Growth*, Jan. 8, 2025.

26 Economic Research Institute for ASEAN and East Asia, *Is Indonesia's Ambition to Become an International CCUS Hub Attainable?*, Jan. 24, 2025.

27 Jakarta Globe, *ExxonMobil to Invest Up to $15 Billion in Indonesian Carbon Storage, Petrochemical*, Jan. 22, 2025; Reuters, *Indonesia's Pertamina, Chevron agree to share data to develop carbon storage facility*, Nov. 14, 2023; Indonesia Business Post, *PHE teams up with South Korean firms for CCS, energy transition*, Mar. 3, 2025.

28 International Energy Agency, *Carbon Capture, Utilisation and Storage in Indonesia*, Dec. 2023.

29 Government of Japan, Ministry of Economy, Trade and Industry, *Advanced Efforts for Commercialization of CCS*, Jun. 28, 2024.

30 Climate Bonds Initiative, *Japan will issue $11bn Climate Transition Bond, Certified under the Climate Bonds Standard*, 2024.

31 Ministry of Foreign Affairs of Japan, *Joint Crediting Mechanism*, Feb. 22, 2024.

32 Japan Petroleum Exploration Co., Ltd., *Commission a CCS engineering design work in Sarawak, Malaysia as the "Japanese Advanced CCS Projects" in FY2024*, Sep. 13, 2024; Argus Media, *Petronas, Japanese firms advance Sarawak CCS project*, Sep. 17, 2024.

33 The Straits Times, *Malaysia unveils CO2 storage Bill in push to be regional hub*, Mar. 4, 2025.

34 For example, the Sarawak storage project developed by Petronas and Japanese entities discussed above will be regulated by the Land (Carbon Storage) Rules 2022.

35 NZ Government, *Carbon capture framework to reduce emissions*, Jul. 9, 2024.

36 NZ Government, Ministry of Business, *Innovation & Employment, Proposed regulatory regime for Carbon Capture, Utilisation, and Storage (CCUS)*, 2024.

37 Bloomberg, *New Zealand to Allow Carbon Capture, Storage to Reduce Emissions*, Feb. 21, 2025.

38 The Spinoff, *Carbon storage has risks. How will New Zealand's new framework deal with them?*, Mar. 3, 2025.

39 Ministry of Trade and Industry, Singapore, *Singapore's National Hydrogen Strategy*, 2022.

40 Energy Market Authority of Singapore, *Low-Carbon Alternatives*, Nov. 7, 2023.

41 Singapore Economic Development Board, *Appointment of S hub to develop cross-border CCS project*, Mar. 1, 2024.

42 Ministry of Trade and Industry Singapore, *Singapore and Japan deepen collaboration opportunities on Carbon Capture and Storage*, 21 August 2024; *Singapore and Indonesia sign Letter of Intent to collaborate on carbon capture and storage (CCS)*, 15 February 2024; *Agreements and MOUs exchanged between Singapore and Malaysia at the 11th Malaysia-Singapore Leaders' Retreat*, Jan. 7, 2025.

43 Carbon Herald, *South Korea Passes New Law To Support Carbon Capture*, Feb. 11, 2025.

44 Reuters, *South Korea to provide $313 bln in loans to finance carbon offset projects*, Mar. 19, 2024.

45 PTT Exploration and Production, *Carbon Capture and Storage*.

46 Global Compliance News, *Thailand: Draft amendment to the Petroleum Act to regulate carbon storage business*, Jan. 15, 2024.