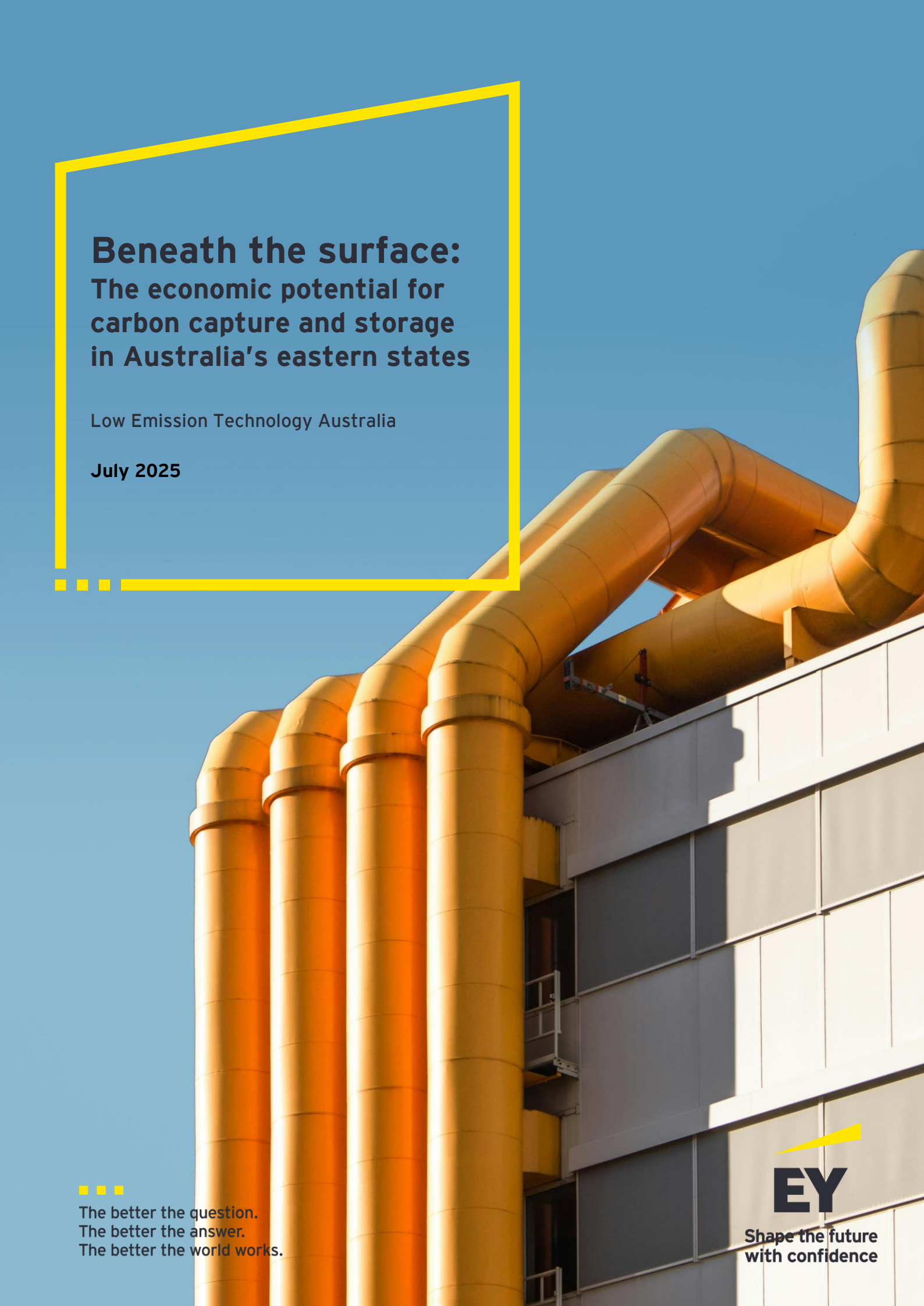
Beneath the surface:
The economic potential for carbon capture and storage in Australia's eastern states

Low Emission Technology Australia

July 2025



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Executive summary

Carbon capture and storage (CCS) is a vital technological development for mitigating the impacts of climate change, especially by removing emissions from heavy industrial activities like metal refining, mining, cement production and fertiliser manufacturing. As an engineered carbon dioxide removal method, alongside nature based solutions, CCS plays a key role in addressing climate change.

These technologies, which have been applied across the world for several decades, enable the capture, compression, and transport of carbon dioxide (CO_2) for alternative uses, or to permanently store in geological formations. Leading global and Australian organisations including the International Energy Agency (IEA), the Intergovernmental Panel on Climate Change (IPCC), Australia's Climate Change Authority (CCA) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) demonstrate a pivotal role for CCS in reducing hard-to-abate emissions and promoting energy security.

Australia has three flagship CCS operations — the Chevron operated Gorgon CCS facility on Barrow Island (offshore from Western Australia), the Santos operated Moomba CCS project (South Australia), and the CO2CRC operated Otway International Test Centre (Victoria). These facilities, and others in development, showcase the technical and economic feasibility of domestic CCS to utilise Australia's large scale geological storage resources.

However, the local industry currently lags leading countries like the US, UK and China which are actively developing integrated CCS hubs as part of their broader industrial and climate action strategies. A particular challenge for Australia is developing CCS on the east coast where progress has stalled but where much of the country's industrial and manufacturing base is located.

There is a distinct opportunity, now and over the next decade, to develop and deploy CCS to deliver cost effective industrial decarbonisation and support Australia's transition to net zero emissions by 2050.

Encouraging foundations for local CCS

Reinforcing its importance in the transition to a low-carbon economy, the foundations for a large and vibrant CCS industry in Australia appears to be encouraging.

- **High-quality geological formations** for CO_2 storage with considerable prospects for new storage resources to be discovered, including through the Australian Government's long term Resourcing Australia's Prosperity initiative which is assessing options for geological storage of hydrogen and CO_2.
- **Existing infrastructure** that is (mostly) strategically located and could be potentially repurposed for CCS.
- **Proven deployment** of local CCS projects.
- **Robust regulatory and legal frameworks** for CCS underpinned by Commonwealth legislation covering offshore CCS and various state regimes governing onshore CCS (Note: onshore storage of CO_2 is effectively banned in Queensland).
- **A skilled workforce** with strong transferability with Australia's gas and broader resources industries.

Key carbon removal technologies are expected to improve carbon management

A range of carbon removal technologies are being advanced and installed by industry to reduce industrial emissions at their source and remove CO_2 directly from the atmosphere at meaningful volumes.

- Engineered CCS solutions involve capturing the exhaust gases of industrial facilities and power plants using techniques such as post combustion, oxy-fuel combustion and direct air capture, transporting, and injecting the gases into underground formations like depleted gas fields and saline aquifers. Close to 100 CCS projects are now operating or being built around the world.

- Nature based solutions are a complementary form of carbon removal and involve techniques like afforestation, soil carbon sequestration, and ocean-based carbon removal. These approaches can provide an effective method of removing carbon from the atmosphere and can often deliver other environmental benefits.

While many forms of carbon removal are proven and deployable now, the large-scale rollout of these technologies faces challenges in terms of cost, technical development, and integration. Not all forms of carbon removal may be commercially viable and suitable for Australia. In broad terms, engineered solutions, predominantly due to their ability to be retrofitted to existing industrial and power plants, offer the greatest carbon abatement potential for Australia out to 2050.

Engineered solutions also provide permanent carbon storage. In contrast, nature based solutions can 're-emit' carbon during natural lifecycle processes, particularly during hotter and more dry periods of El Niño when growth is limited, and bushfires are more frequent.

Potential development pathways for CCS on the east coast

Given the volume of emissions reductions required to meet Australia's climate change commitments by 2050, the deployment of industrial CCS technologies at scale is likely to be crucial. Indeed, for many industries like cement, steel, and chemicals manufacturing — which are covered under the Safeguard Mechanism — CCS is likely to represent an important prospective pathway to decarbonise.

These hard-to-abate industries are major economic hubs, supporting approximately 130,000 jobs along Australia's eastern coast and generating over $130 billion in export value[1] in the past year, while also supporting a range of sectors, supply chains, and sovereign manufacturing capabilities. Indeed, the economic and environmental sustainability of these sectors is crucial to Australia's economic and strategic interests in the renewable energy transition, housing and infrastructure, and defence manufacturing.

This report sets out three scenarios (outlined below) for the potential development of CCS on the east coast as Australia transitions to net zero emissions by 2050. The scenarios showcase how CCS could develop over the next few decades based on the current volumes and location of industrial emissions, where storage basins are being developed (say in Victoria's Otway basin) and how, ultimately, a fully integrated industrial CO_2 transport network linking large scale storage facilities could emerge.

Importantly, the scenarios shown are not additive but represent discrete pathways (see Table 1) and are deviations from the base case. Due to investment lead times, achieving network and scale efficiencies, and the need for supportive regulatory conditions to be in place, the pathways diverge from around 2030. They are all consistent with achieving net zero target by 2050.

[1] EY analysis of DFAT trade statistics and ABS Labour Force Detailed data (EQ06)

Table 1: Overview of the east coast CCS development scenarios

Conditions	Moderate growth	Accelerated deployment	Sequestration nation
How CCS might develop on the east coast	Gradual expansion of CCS in industrial clusters	Coordinated efforts and investments enable widespread CCS adoption across industries and regions, lowering barriers for smaller-scale facilities	CCS becomes a cornerstone of Australia's decarbonisation strategy, supported by strong policy alignment, advanced technologies, and significant investment, positioning Australia as a global leader in CCS
How CCS could support industries on the east coast	Steady adoption in select industrial clusters in Victoria, with minimal expansion into other regions or industries	CCS technologies deployed at scale across states, with an emerging storage as a service and H_2-CCS industry	Industrial onshoring, decarbonisation of metallurgical coal mining through VAM CCS, and development of a domestic hydrogen sector increases the demand for CCS
Minimal scale thresholds for facilities which can afford to access CCS	Very large facilities producing around 1 $MtCO_2$ per year	Large facilities producing around 0.5 $MtCO_2$ per year	Medium-large facilities producing around 0.25 $MtCO_2$ per year
Regulatory conditions	Few changes from current settings	Supportive – Carbon storage permitted in Queensland from 2035	Supportive – Carbon storage permitted in Queensland from 2030

Source: EY analysis

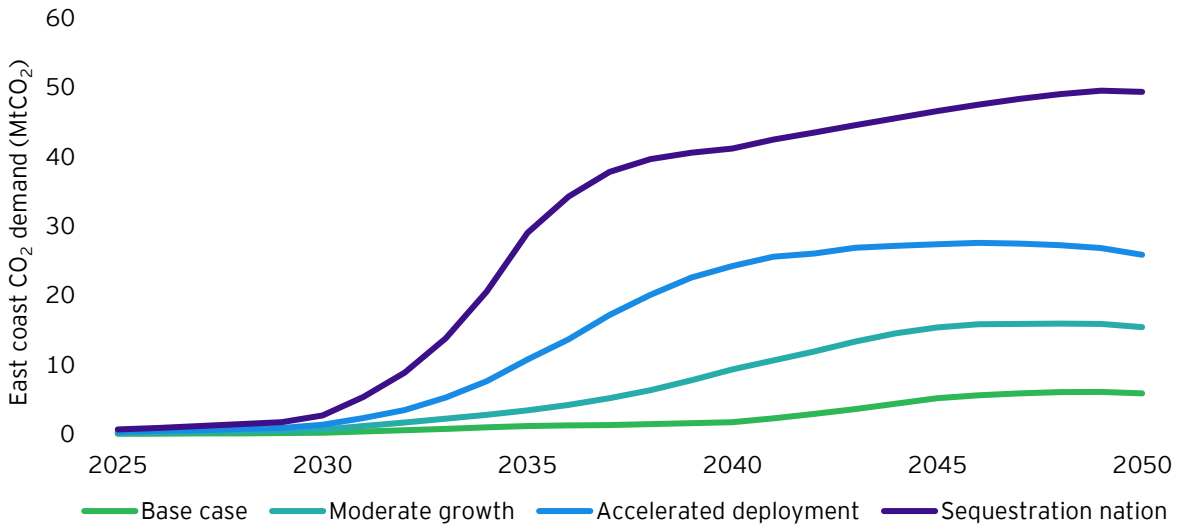
Note: These scenarios aim to explore the potential of CCS on Australia's east coast and were developed for the purpose of this study only.

Under the high growth 'Sequestration Nation' scenario where the right mix of regulatory, technology, and commercial settings are introduced, CCS deployment along the east coast could rapidly accelerate to 50 $MtCO_2$ in 2050.

A fully networked CCS industry along the east coast could increase economic activity by around $66 billion and support an additional 15,250 jobs over the coming decades.

Such a scenario would require a significant but achievable scale up in common-use infrastructure, reductions in upfront capital and ongoing costs, particularly for emerging technologies such as direct air capture, and effective coordination across government and industry.

Figure 1: Potential east coast demand for CCS under each scenario



Source: EY analysis

The potential economic dividends of capturing growth in CCS could be meaningful. Many hard-to-abate sectors such as cement manufacturing and steelmaking have limited decarbonisation technologies and are likely to be heavily reliant on CCS solutions to meet their emissions reduction targets. Accelerating the deployment of CCS could reduce the costs of decarbonisation for these important industries, improving their overall commerciality and sustainability, mitigating risks of deindustrialisation.

Industry expansion under each of the CCS development scenarios is projected to lift economic output (see Table 2). The lower trajectory CCS scenarios (Moderate growth and Accelerated deployment) also show meaningful economic gains but do not reflect the dividends for widespread adoption of CCS across Australia's east coast industrial landscape.

Table 2: Economic impact summary of results, deviation from base case, 2024 - 2050

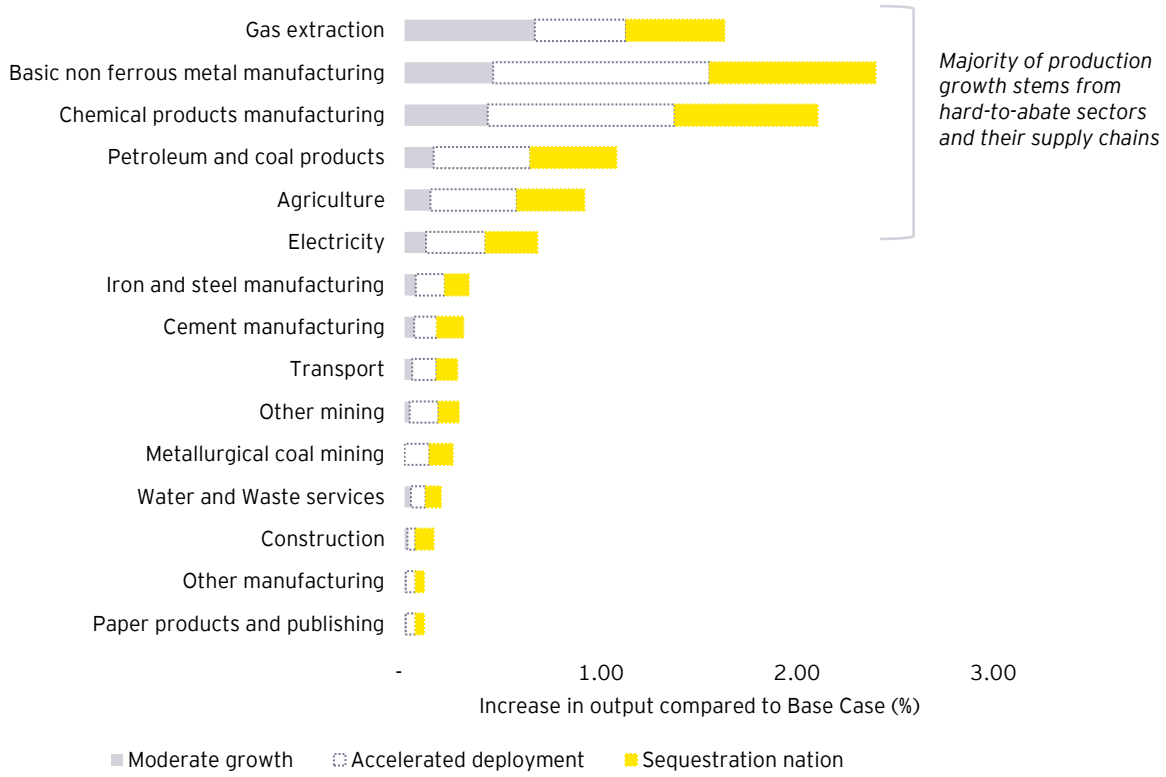
Economic outcome	Moderate growth	Accelerated deployment	Sequestration nation
GDP (NPV, $m)	13,777	39,822	66,231
Employment (average FTE)	3,800	10,200	15,261

Source: EY analysis

With increased deployment of CCS and lower economy-wide carbon abatement costs, economic output across a series of major industries could grow significantly (see figure below). This directly benefits heavy industries using CCS and their upstream and downstream supply chains, particularly construction and electricity generation — where economic output is projected to grow by up to $14.7 billion and $5.6 billion respectively under the Sequestration Nation scenario by 2050.

These industrial spillover benefits are crucial for advancing Australia's sovereign industry development agenda which will be heavily reliant on securing cost-effective decarbonisation, including for major industrial feedstocks.

Figure 2: Potential uplift in economic output across key sectors (deviation from base case)



Source: EY analysis

A foundation for industry in a net zero economy

CCS, especially its engineered forms, require long-term and capital-intensive investments. As such, there are a myriad of timing and coordination challenges to be managed if the technology is to be networked, derisked and made commercially accessible for smaller scale industrial facilities.

In realising these potential gains, there remain important barriers related to the technical and regulatory aspects of individual components of CCS:

- Some aspects of CCS are highly location-specific and will benefit less from international developments. This is especially the case for carbon storage, in which there are typically unique geological and spatial factors. Importantly, proving up storage resources is likely to involve larger development hurdles and longer lead times than commercialising capture and transport components. This places an increased emphasis on Australia making meaningful domestic contributions to demonstrate and prove up storage resources to accelerate the process of CCS commercialisation.

- Technical progress is needed to promote confidence in the performance of capture and storage technologies at industrial scale in Australian conditions. This would also bring down costs - with volume-weighted abatements costs projected to fall by almost $40 per ton of CO_2 in 2050 if CCS technologies are further developed. There is less technical risk on the network aspects of CCS and, accordingly, it appears there is greater confidence that the transport of CO_2 can be delivered at scale.

- Similar to much of the early development of Australia's gas pipeline infrastructure, it is feasible that government may derisk project economics or take an ownership stake in the 'backbone' of the CO_2 transport network.

- In addition to the barriers associated with individual components of CCS, there are substantial challenges for CCS from a whole-of-system perspective, especially on the east coast. For instance, delays on the availability of any single CCS component — capture, transport or storage — are likely to hold back deployment of the overall technology. Similarly, deployment of the technology may be impeded if there are delays on any of the separate technical, regulatory and market-related facets of commercialisation. The benefits in overcoming these issues, supported by the right policy settings, was a feature of the scenario analysis.

Ultimately, the existence of major economic spillover benefits and its contribution to Australia's climate change commitments provides a strong rationale for policy actions to encourage greater deployment of CCS — in both its engineered and nature based forms.

CCS deployment is integral in sustaining the growth and global competitiveness of Australia's hard-to-abate sectors, while still ensuring industry alignment with national climate goals under the Safeguard Mechanism. Indeed, the IEA projects that nearly half of the emissions reductions required to achieve net zero by 2050 will depend on technologies still in development—highlighting the urgency of accelerating innovation and large-scale deployment.

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