Proposals for a Regulatory Regime for Carbon Capture, Utilisation and Storage

Consultation document
June 2024

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Te Kāwanatanga o Aotearoa
New Zealand Government

Ministry of Business, Innovation and Employment (MBIE)
Hīkina Whakatutuki – Lifting to make successful

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Minister's foreword

The Government is committed to ensuring New Zealand has a resilient energy system that meets our needs as we move towards a lower emissions economy. The proposed regulatory regime for Carbon Capture, Utilisation and Storage (**CCUS**) will help achieve this.

There is growing international momentum for CCUS. CCUS is an important technology for reducing global emissions, and around the world, successful CCUS projects have been supported by clear and enabling regulation. It is important that New Zealand also seizes this opportunity.

A regulatory regime for CCUS would allow New Zealand's industries to access CCUS technology on a level playing field with other emissions reduction and removal tools to support a least cost transition towards net zero emissions.

Enabling industries to access CCUS will also support security of gas supply. CCUS will attract investment, helping to reverse the current sharp decline in gas production and make sure that gas is available as we transition to a low emissions economy.

It is important that we design a CCUS regulatory regime that works for New Zealand, particularly making sure the CO2 stored underground stays there. We seek your feedback on proposals to:

- recognise emission reductions or removals resulting from CCUS activities through the Emissions Trading Scheme
- ensure emission reductions are monitored and accurately reported
- mitigate the risk of CO_2 leakage from sites storing CO_2
- appropriately assign the liability for the storage sites.

The Government also wants to reduce barriers to the use of CCUS, so the document also seeks feedback on whether there are:

- any barriers to obtaining consents or permits for CCUS activities in New Zealand
- any other barriers to capturing CO_2 to use it for the benefit of our economy.

I welcome your feedback on these proposals and issues, which is essential to help our Government create an effective CCUS regulatory regime.

Please provide feedback on the proposals to gasfuelpolicy@mbie.govt.nz by 5pm on 6 August 2024.

Hon Simeon Brown

Minister for Energy

Background

Carbon capture, utilisation and storage (**CCUS**) is regarded by the Intergovernmental Panel on Climate Change (**IPCC**)[1] and the International Energy Agency[2] (**IEA**) as an important way to reduce emissions from industries such as natural gas production and petrochemical manufacture. The consultation document discusses proposals for enabling carbon capture and storage and asks about barriers to the economic utilisation of CO_2.

Carbon capture and storage (**CCS**) is the process of capturing and storing CO_2 to prevent it from entering the atmosphere. The IPCC has expressed high confidence that permanent underground storage of CO_2 using these technologies can be achieved. It has stated that "…the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years."[3] It has also expressed the need for effectiveness and robustness of regulatory systems to ensure the safe and reliable deployment of CCUS technologies.

Carbon capture and utilisation (**CCU**) refers to the process of capturing CO_2 and using it either directly or indirectly to create valuable products and materials. In New Zealand these uses range from dry ice to chill meat and sea food exports to a welding gas for heavy steel construction. Internationally, new utilisation pathways in the production of CO_2-based synthetic fuels, chemicals and building aggregates are also gaining momentum. The IEA estimates that just under 15 Mt of CO_2 per year could be captured globally for these new uses by 2030, including around 8 Mt CO_2 in synthetic fuel production.

CCUS has been deployed at scale in countries around the world. Further background information can be found in the accompanying 'A Background to CCUS' document.

CCUS has the potential to deliver three significant benefits for New Zealand:

1. Allowing industries to access CCUS technology on a level playing field with other emissions reduction and removal mechanisms will better enable a least cost transition. Businesses will be able to choose the technology that is right for them and that provides the best 'bang for buck' emissions reduction approach that suits their needs.
2. CCUS technology can reduce the cost of gas production, especially for higher CO_2 content gas fields. This could promote investment, leading to a reversal in the current sharp decline in gas production.[4] The natural gas sector plays a critical role in the New Zealand economy and natural gas will be a key energy source during our transition to a low emissions economy. This includes it as a source of electricity generation when renewable generation is not able to meet demand.
3. Allowing CCUS has the potential to decrease New Zealand's cost of reducing emissions and assist with ensuring the international competitiveness of our businesses and our energy system.

Enabling carbon capture and utilisation will have the additional benefit of improving the resilience of New Zealand's CO_2 supply chain.

Globally, Governments are developing enabling regulatory environments for CCUS

Around the world, successful CCUS projects have been supported by clear and enabling regulation. In Australia, regulatory frameworks are being developed to streamline the approval and operation of CCUS projects. The European Union (**EU**) has incorporated CCUS into its comprehensive regulatory strategy

[1] The IPCC is a United Nations body responsible for assessing the science related to climate change.
[2] The IEA is an intergovernmental organisation that provides data, analysis, and policy recommendations on global energy issues.
[3] https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf
[4] Natural gas production in New Zealand is currently declining more quickly than expected leading to concerns about security of energy supply.

including the EU Emissions Trading System which enables parties to achieve a financial benefit for carbon capture and storage. Norway has established clear regulations for CO_2 storage and transport, supporting projects like Northern Lights[5] by providing a stable legal framework. Canada has implemented legislation to support CCUS, including tax incentives and regulatory measures to ensure safe and effective CO_2 storage and utilisation. Further international comparison can be found in the Annex and the accompanying 'A Background to CCUS' document.

New Zealand Government's position on CCUS

The Government's position on CCUS in New Zealand, subject to consultation, is that it should be available to industry as a means of reducing and removing emissions. The Government's role is not to provide financial incentives but to create a clear regulatory landscape for CCUS that provides a level playing field for reduction and removal activities. The decision to deploy CCUS will rest with individual businesses.

The Government's overall approach is to ensure the right incentives are in place across the economy to reduce net emissions where it is most cost-effective to do so. To grow and increase productivity, New Zealand needs to follow the most efficient, flexible, and cost-effective pathway to net zero 2050. This means taking a net-based approach that treats emissions reductions and removals the same.

This document describes the Government's proposed approach to enabling CCUS. This consists of proposals for:

1. Treatment of CCS activities under the Emissions Trading Scheme (**ETS**)
2. A CCS monitoring regime
3. Liability for CO_2 storage sites
4. Consenting and permitting for CCUS
5. Understanding any barriers to carbon capture and utilisation.

The objectives for this proposed approach are:

1. Efficient emissions abatement — creating a level playing field for emissions reduction/removal technologies to enable businesses to reduce/remove emissions at least cost.
2. Environmental integrity — ensuring that the CO_2 storage sites and the emissions sequestered in those sites are monitored and accurately reported, the risk of CO_2 leakage from these sites is mitigated, and the liability for the storage sites is appropriately assigned.
3. Energy security — supporting security of energy supplies as we transition to a low-emissions economy.

We invite you to provide feedback on the Government's proposals. Following public consultation, the Government will make in-principal decisions on whether to include CCUS policies as part of the government's second emissions reduction plan.

Questions for consultation

1. **Do you agree that the government should establish an enabling regime for CCUS? Please provide any further information to support your answer.**

[5] The Norway Northern Lights Project is a collaborative initiative in Norway to capture CO_2 emissions from industrial sources and store them permanently underground in the North Sea.

2. **Do you agree with our objectives for the enabling regime for CCUS? Please provide any further information to support your answer.**

Treatment under the Emissions Trading Scheme

How CCS activities are currently treated under the Emissions Trading Scheme

The Emissions Trading Scheme (**ETS**) incentivises net emissions reductions by putting a price on emissions from the production or consumption of energy sources such as electricity, gas, diesel, petrol and coal. For the energy sector, the emissions price flows through into the price of energy sources that create emissions when they are produced or consumed.

However, the ETS does not currently include mechanisms to recognise (and therefore reward) emission reductions or removals resulting from CCS activities, apart from forestry removals[6] and geothermal reductions[7].

CASE STUDY: GEOTHERMAL REINJECTION OF CO_2 AT NGĀWHĀ

The Ngāwhā geothermal field, owned by Top Energy, is a geothermal area in the North Island. It is the only high-temperature geothermal field in New Zealand located outside the Taupo Volcanic Zone. The geothermal power station in Ngāwhā has been operating since 1998, generating power for the Far North.

The CO_2 and other gases in geothermal systems are naturally occurring. Underground the CO_2 is dissolved in liquid (geothermal fluid). This liquid boils when it moves up production wells, and the CO_2 is released into the steam. The steam is then utilised for power generation.

For many years it has been standard practice in the geothermal industry to reinject the cooled geothermal fluid back underground (after it has travelled through the surface plant/power station) while any CO_2 gas is vented into the atmosphere).

Unlike other geothermal power stations, where some CO_2 is naturally released through cracks in the ground, Ngāwhā has an impermeable cap rock which stops this from happening. Consequently, the geothermal field at Ngāwhā has a relatively high concentration of CO_2 compared to other geothermal sites, and a large ETS surrender obligation (previously accounting for roughly 30 per cent of the project's revenue).

Under the *Climate Change (Unique Emissions Factors) Regulations 2009*, a geothermal fluid user may apply for approval to use a unique emissions factor (**UEF**) for a particular geothermal plant. Using the UEF, a geothermal ETS participant can subtract CO_2 reinjected into geothermal fields from its ETS liability.

To reduce its ETS obligation, Ngāwhā has been trialling the reinjection of CO_2 into the ground. CO_2 is dissolved into the geothermal reinjection liquid and pumped back underground instead of being vented. The reinjected CO_2 then becomes part of the existing geothermal reservoir.

[6] Forestry removals are rewarded because trees absorb CO_2 from the atmosphere, helping offset emissions from other sectors.

[7] Geothermal CCS activities can apply for a unique emissions factor, acknowledging CCS can further reduce emissions from geothermal energy.

Top Energy had budgeted six million dollars for the project, but the project team delivered it at only "a couple of hundred thousand dollars."[8] As the geothermal fluid was already returned underground, any extra infrastructure needed to reinject the CO_2 was minimal.

In the first half of 2023, about 35,000 tonnes of CO_2 equivalent (tCO_2-e) was re-injected back underground at Ngāwhā. This represents a saving about 2.5 million dollars' worth of emission units at a carbon price of $70 per tCO_2-e. Once all the power plants at Ngāwhā reinject their GHG emissions, the annual carbon credit savings could reach $10m a year at that carbon price.[9] The company has set a goal of becoming fully net zero by the end of 2025.

The inability of (non-geothermal) businesses investigating storage activities to either receive emissions units or reduce their ETS liability is affecting commercial interest in CCS. Further information on this problem can be found in the supporting Regulatory Impact Statement (**RIS**).

How CCS is treated in other jurisdictions with carbon-pricing schemes

In jurisdictions with enabling regulatory frameworks and clear incentives for CCS activities (such as ETS recognition of the associated emission reduction/removal), CCUS deployment and planned deployment has increased.[10] Australia's Carbon Credit Unit Scheme allows storage projects to be awarded carbon credit units if project activities capture greenhouse gases and inject them for permanent underground storage. Capture, transport and storage installations are also explicitly included in the European Union ETS. For more information on the treatment of CCUS in overseas carbon-pricing schemes, please refer to the Annex.

Our proposed approach for how CCS activities are treated under the ETS

We propose that the ETS include mechanisms to recognise (and therefore reward) emission reductions or removals resulting from storage activities. One tonne of CO_2 captured and stored would be equivalent to one tonne of emissions reduction under the ETS. These reductions or removals would also count towards our emission targets in international emissions accounting. We propose:

1. That ETS participants carrying out storage activities be able to subtract emissions captured and stored from its own activity through CCS projects, for the purpose of estimating its ETS liability.
2. Alternatively, businesses deploying storage technologies could choose to capture CO_2 to receive New Zealand emissions units (**NZU**) for their removals (similar to how owners of forestry land receive NZUs for their removals). These businesses would need to have a clear mechanism for sequestering the CO_2. This could enable the development of direct air capture technologies or could enable a market for storage of CO_2 from third-party emitters.

To avoid double-counting, ETS participants subtracting emissions captured and stored from ETS liability would not be allowed to receive NZUs for those stored emissions.

Questions for consultation

3. **Should the ETS be modified to account for the emissions reductions achieved using CCS? If so, how do you think it should be modified?**

8 https://www.youtube.com/watch?v=4a91R1sK5ck

9 https://topenergy.co.nz/assets/16.0-Top-Energy-Sustainability-Report-23-Online01.jr.pdf

10 https://www.globalccsinstitute.com/resources/publications-reports-research/global-status-of-ccs-2023-executive-summary/

4. **Do you agree that all CCS activities should be eligible to receive recognition for the emissions captured and stored? If not, why not?**

5. **Do you think there should be a separate non-ETS mechanism for providing economic incentives for CCS? If so, what would this mechanism be?**

Monitoring regime for CCS activities

How CCS activities are currently monitored in New Zealand

Businesses carrying out CCS activities (outside of the geothermal and forestry sectors) are currently not subject to regulations for monitoring and reporting emissions removal/storage associated with CCS activities.

Under the *Resource Management Act 1991* (**RMA**) geothermal CCS projects are subject to monitoring requirements to ensure environmental protection. Geothermal projects are required to develop and implement environmental monitoring plans as part of their resource consent conditions.

How CCUS is monitored in other jurisdictions

Australia requires CCUS projects to provide plans outlining how the project will be undertaken, including operations of the storage site and monitoring, verification and reporting activities. To sequester emissions through CCUS the project operator must obtain a licence under the applicable regulations. Following the cessation of injection activities, the licence holder must apply for a site closing certificate (**SCC**). If this application is accepted, a pre-SCC may be issued. The pre-SCC sets out a monitoring and verification program, as well as a required level of financial security to cover the costs of that program.

The EU also has a monitoring regime and extensive requirements for selecting storage sites for CO_2. This includes continuous monitoring of CO_2 injection rates and storage pressure, environmental monitoring and post-closure monitoring to ensure long-term storage integrity and safety. The Annex contains more information on overseas monitoring regimes.

Our proposed approach for a CCS monitoring regime

Our proposed approach is to create regulations similar to those in Australia[11] and the EU, to require a CCUS operator to monitor CO_2 storage sites, and collect the following information:

1. CO_2 captured
2. CO_2 leakage during transportation and injection
3. CO_2 sequestered in a storage site
4. migration and leakage of CO_2 from a storage site.

Collecting this information would enable the regulator to monitor how much CO_2 is captured, who captures it, who sequesters it, how much (if any) is leaked during transfer to the storage site, and how much (if any) is leaked after the storage site is closed. This would enable tracking the source of the CO_2 captured and where it ends up being stored, minimising the risk of double-counting emissions reduction.

In these regulations we propose setting out the relevant accounting and reporting rules, as well as the regime for inspection of CO_2 storage sites for verification purposes.

[11] Australian Government, Regulation 4.12, *National Greenhouse and Energy Reporting Regulations 2008*, https://www.legislation.gov.au/F2008L02230/latest/downloads

The regulations would also include an audit and compliance regime. They would set out the powers needed, such as right of entry, to ensure the site could be effectively monitored. The compliance regime would also set out penalties associated with non-compliance. The audit and compliance regime would be consistent with comparable existing regimes in the ETS[12] and the *Crown Minerals Act 1991* (**CMA**).

The CCUS operator would be obliged to be a participant in the ETS until it was no longer deemed to be responsible for a CO_2 storage site. In the case of CO_2 leakage from a storage site, the CCS operator would either have to:

- surrender emissions units, or
- store an equal amount of CO_2 without receiving emissions units.

Questions for consultation

6. **In your opinion, which overseas standards for monitoring, verification and reporting of CCUS-related information should New Zealand adopt?**
7. **Is there any other information that CCS project operators should be required to verify and report? Please reference the relevant overseas standards where applicable.**
8. **What methods should be used to quantify CO_2 removal and storage in CCUS projects?**
9. **Are additional mechanisms required to ensure compliance with monitoring requirements?**
10. **What level of transparency and information sharing is required?**
11. **Do you consider there should a minimum threshold for monitoring requirements so that small-scale pilot CCS operators would not have to comply with them? If so, what should be the threshold?**
12. **Should a monitoring regime extend to CCU activity?**

Liability for CO_2 storage sites

Existing mechanisms for long-term liability of CO_2 storage sites

Currently, unlike Australia and the EU, New Zealand does not have any regulatory regime designed specifically for establishing liability for CO_2 storage sites. Consent conditions (such as those requiring a bond) could be used for managing long-term liability for maintenance and remediation of CO_2 storage sites. However, it is not clear how this would work in practice (see supporting RIS for more information).

How CCUS liability is managed in other jurisdictions

In Australia, if a CO_2 storage facility is decommissioned, liability for CO_2 leakage still exists. The liability for CCS projects is typically specified in regulatory approvals granted by relevant authorities. The project operators may be required to provide financial assurance or secure funds to cover post-closure activities, including long-term liability management. When a site closing certificate is issued, project operators remain liable for a minimum of 15 years. Following this period if the Minister is satisfied there are no significant risks of leakage, the liability may be transferred to the Government.

[12] https://www.epa.govt.nz/industry-areas/emissions-trading-scheme/participating-in-the-ets/compliance-in-the-ets/

The EU framework is similar to the Australian regime, except it provides for a minimum 20-year closure assurance period. More information on the overseas regimes for CCUS liability is available in the Annex.

Our proposed approach on liability for CO_2 storage sites

We are proposing an approach similar to the model used in Australia. It would require a clear and thorough permitting framework for keeping records of CCS operations and CO_2 storage sites.

Operators who are responsible for CO_2 storage sites would be required to:

1. apply for permits for activities relating to exploring and injecting CO_2 into storage sites
2. submit and gain approval for their plans to monitor stored carbon
3. monitor leakage and migration of CO_2, environmental impacts, and the safety and integrity of the storage site
4. in the event of leakages of CO_2 or significant irregularities, notify the government and pay appropriate compensation
5. before the closure of a CO_2 storage site, record and report information on the site closure plans, closure cost estimates, a closure completion report, and evidence demonstrating that the sites can technically be used for CO_2 storage and will have no or negligible risk of leakage
6. complete a financial capability assessment if requested, to determine the operator's ability to meet the costs of maintaining or remediating the site.

If a CCUS operator is an owner of an underground oil or gas reservoir which has been repurposed from oil or natural gas production to CO_2 storage, it will still be subject to the requirements under the CMA or *Exclusive Economic Zone and Continental Zone (Environmental Effects) Act 2012* (**EEZ Act**) applicable to decommissioning of petroleum infrastructure on the site, unless the Minister grants an exemption.

A CCUS operator would be responsible for any issues at its CO_2 storage site for a set period after the site's closure. The government could then opt to indemnify the operator against any liability after that period if the responsible Minister were satisfied that there is no significant risk of leakage and adverse environmental impacts.

The proposed approach will also make provisions for trailing liability — if a storage site is sold and the new owner is not able to meet the liability obligations, the previous owner would be liable for the CO_2. The trailing liability approach would be based on the provisions in the CMA.

Civil pecuniary penalties would apply to failure to comply with the monitoring and information disclosure requirements, while it would be a criminal offence not to close or remediate the CO_2 storage site in line with the closure plan submitted to the regulator.

Questions for consultation

13. **Do you agree the proposed approach on liability for CO_2 storage sites aligns with other comparable countries (like Australia)? If not, why not and how should it be changed?**
14. **Is the proposed allocation of liability consistent with risks and potential benefits? Are there other participants that should share liability for CCS operations?**
15. **Should liability be the same for all storage sites if projects are approved? Or should liability differ, depending on the geological features and characteristics of an individual storage formation?**

16. **Do you consider there should a minimum threshold for CCUS operators being held responsible for liability for CO_2 storage sites so that small-scale pilot CCS operators would be exempt? If so, what should be the threshold?**

17. **Should the government indemnify the operator of a storage site once it has closed? If so, what should be the minimum time before the government chooses to indemnify the operator against liabilities for the CO_2 storage sites?**

18. **Are additional insurance mechanisms or financial instruments required to cover potential liabilities from CO_2 leakage in CCS projects?**

19. **What measures should be implemented to monitor CCS projects for potential leakage and ensure early detection?**

20. **Do you agree that trailing liability provisions are needed? How do you think they should be managed?**

Consenting and permitting for CCUS

Current consenting and permitting for CCUS in New Zealand

The current regulatory settings for consenting CCUS are broadly neutral - neither enabling nor disabling.[13] Consenting for CCUS onshore and within 12 nautical miles offshore is covered under the *Resource Management Act 1991* (**RMA**). The *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012* (**EEZ Act**) covers CCUS consenting for operations in the exclusive economic zone and extended continental shelf.

Beyond the consenting regime under the RMA and the EEZ Act, the CMA and property rights may also be relevant. The CMA does not authorise nor prevent CCUS operations that would otherwise require consents under the RMA or the EEZ Act. In addition to consents under the RMA or EEZ Act, first-party CO_2 re-injection that is part of petroleum mining may need approval under the CMA but not for private land. Other types of CO_2 injection may require the consent of landowners.

We are seeking feedback on the existing consenting and permitting pathways for CCUS

New Zealand currently has a neutral policy environment for consenting so we are not proposing any changes in this document. We are aware of some inconsistencies across the consenting legislation, but it is not clear this is an impediment to investment. Geothermal plants are already piloting CCUS activities, but other larger emitters may face more impacts of inconsistencies in consenting pathways and other regulations.

Questions for consultation

21. **Are inconsistencies in existing legislation for consenting and permitting impacting investment?**

22. **Should the permit regime for CCUS operations be set out in bespoke legislation or be part of an existing regulatory regime (such as the RMA, EEZ Act, the CMA or the Climate Change Response Act 2002)? Please give reasons for your answer.**

[13] https://www.mbie.govt.nz/dmsdocument/27265-carbon-capture-and-storage-taking-action-under-the-present-law-pdf

23. **Should CCS project proponents be required to submit evidence that proposed reinjection sites are geologically suitable for permanent storage, in order for projects to be approved? If so, what evidence should be provided to establish their suitability?**

24. **Should there be separate permitting regime for CCU activity if there is no intention to store the CO_2?**

Carbon capture and utilisation

Existing carbon capture and utilisation in New Zealand

CCU provides an opportunity to use captured CO_2 for various industrial and commercial uses. Currently CO_2 is used to:

a) Produce dry ice including for primary sector exports of meat and seafood (around 7% of seafood and 2% of meat exports) – this accounts for around 20 per cent of CO_2 use.

b) Produce beer – this accounts for around 15 per cent of our CO_2 use.

c) Serve beverages – around 11,000 hospitality venues rely on CO_2.

d) Package dairy exports such as milk powder – around $450m per annum of exports.

e) Improve the growth of greenhouse crops – such as tomatoes and capsicum.

f) Help weld heavy steel construction – such as bridges – as part of the welding gas mix.

g) Increase the shelf life of packaged products – especially meat, which reduces waste.

h) Help treat our drinking water to make it safe.

i) Supply the active gas for fire suppression systems.

There are also emerging uses for CO_2 in the production of synthetic fuels, chemicals and building aggregates. While these novel uses are still in the early stages of development, we want to make sure New Zealand can take advantage of international developments.

Todd Energy's Kapuni plant is New Zealand's single domestic supplier of CO_2 – the rest of our CO_2 is imported. Having a single domestic producer means there is limited resilience in the supply chain (case study below).

CASE STUDY: New Zealand's 2022/23 CO_2 shortage

In 2023, New Zealand experienced a significant CO_2 shortage. This had considerable impact on various industries, particularly for food and beverage production.

The closure of the Marsden Point oil refinery in April 2022 caused a reduction in the domestic supply of CO_2. In response, Todd Energy's Kapuni plant, the remaining domestic supply source, increased supply and the two main CO_2 suppliers, BOC and Air Liquide, increased imports.

Kapuni faced a temporary shutdown at the end of 2022 due to a safety concern. This resulted in an acute shortage of CO_2, that saw significant price increases for CO_2. The shortage was managed in a matter of months and the Kapuni plant resumed production alleviating supply pressures. However, the price of CO_2 remains higher than pre-shortage levels.

MBIE undertook analysis of a potential extended shortage which indicated there could be an adverse impact on core primary sector activity, including dry ice enabled meat and seafood exports and packaging for dairy exports. In both cases, there is a risk to New Zealand's reputation as an exporter of high-quality primary produce.

The shortage highlighted the need for New Zealand to explore alternative CO_2 sources and technologies, such as CCU to mitigate future supply disruptions.

We are seeking feedback on whether there are barriers to CCU

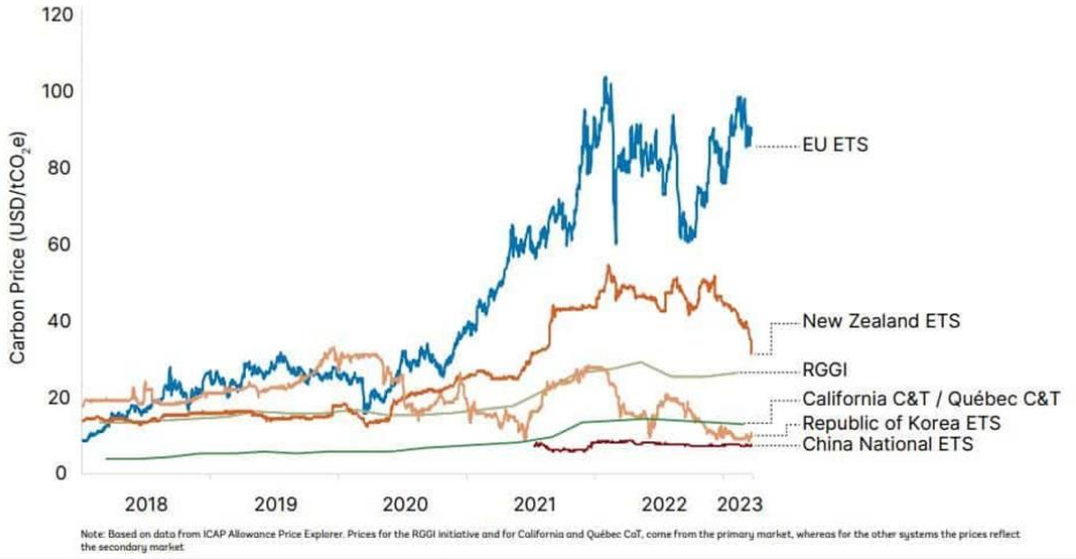
There are existing utilisation projects in New Zealand, the largest being CO_2 capture at Todd Energy's Kapuni plant. As CO_2 is a valuable input for various supply chains in New Zealand, we want to ensure an enabling environment for potential proponents to capture and utilise CO_2. We are seeking feedback on whether there are any regulatory or policy barriers to investment and adoption of utilisation technologies.

Questions for consultation

25. **Are there regulatory or policy barriers to investment and adoption of CCU technologies?**
26. **What potential markets for CO_2 derived products do you see as most critical in New Zealand?**
27. **Are there any specific barriers to transportation of CO_2?**

Annex: international approaches to CCUS

Treatment of CCUS in overseas carbon pricing schemes

Australia	Australia's Carbon Credit Unit Scheme lets companies earn Australian carbon credit units (**ACCUs**) for each tonne of carbon stored or avoided. The units may then be sold to the federal government, or on the secondary market to provide revenue. In the secondary market, private buyers purchase ACCUs to voluntarily offset their emissions or meet compliance requirements. CCS projects are included in the scheme, and can be awarded ACCUs if project activities capture greenhouse gases and inject them for permanent underground storage.[14]
EU	The EU's Directive 2009/31/EC on the geological storage of CO_2 (**CCUS Directive**) establishes the overall legal framework for the environmentally safe geological storage of CO_2.[15] Since the 2015 amendment to the EU Emissions Trading System Directive (**EU ETS**), capture, transport and storage installations are explicitly included in the EU ETS – CO_2 that is captured and safely stored (ie CCS projects) are considered as 'not emitted'. Currently, the EU ETS does not reward CCUS due to lack of evidence and methodologies. The EU quota system establishes a maximum level of total emissions. This ceiling is reduced on an annual basis to ensure that contributions are made toward the system's set emission target when the relevant quota period expires. Quotas are either auctioned or allocated free. In recent years, the CO_2 price in the EU quota system has been increasing. FIGURE 1 PRICE EVOLUTION IN SELECTED ETSs FROM 2018 TO 2022  Note: Based on data from ICAP Allowance Price Explorer. Prices for the RGGI initiative and for California and Québec CaT, come from the primary market, whereas for the other systems the prices reflect the secondary market.
Norway	Norway joined the EU ETS in 2008. Norwegian companies are subject to the same quota obligations as those in the EU. In addition, Norway has a carbon tax on all combustion of

14 https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/accu-scheme-methods/carbon-capture-and-storage-method

15 https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0114:0135:EN:PDF

	gas, oil and diesel in petroleum operations on the continental shelf and on releases of CO_2 and natural gas. The combination of the CO_2 tax and a quota obligation (under the EU ETS) means that companies operating on the Norwegian continental shelf face an extremely high price per tonne for CO_2 they emit. Emissions pricing measures in Norway have incentivised two world leading CCUS projects, (Sleipner in 1996, and Snøhvit in 2008). Both facilities separate CO_2 from their respective produced gas, then compress, pipe and reinject it underground. More recently, the Norwegian government is supporting the Longship CCUS project, which is the first industrial CCUS chain in construction under the current European legal framework. This includes: 4. a CO_2 capture project at the Heidelberg Materials cement factory in Brevik 5. a CO_2 capture project at the Hafslund Celsios' Waste to Energy facility in Oslo 6. the 'Northern Lights' transport and storage infrastructure (the final part of the Longship CCUS chain). CO_2 captured from across Europe can be transported and stored at the Northern Lights offshore storage facility in the North Sea.
Canada	Canada has a Federal Carbon Pricing System, which is set out under the Canadian *Greenhouse Gas Pollution Pricing Act*.[16] The system includes a 'fuel charge' (a regulatory charge on fossil fuels like petrol and natural gas) and a separate performance-based regulatory emissions trading system designed to ensure that there is a price incentive for industrial emitters to reduce GHG emissions (including by use of CCUS). Projects that enable permanent CO_2 storage are also eligible for a refundable CCUS investment tax credit.[17] The credit is valued at $3.1 billion over the first five years, and around $7.6 billion up to 2030.

16 https://laws-lois.justice.gc.ca/PDF/G-11.55.pdf

17 https://www.canada.ca/en/department-finance/news/2022/08/additional-design-features-of-the-investment-tax-credit-for-carbon-capture-utilization-and-storage-recovery-mechanism-climate-risk-disclosure-and-k.html

Overseas monitoring regimes for CCUS

Australia	To participate in the Australian Carbon Credit Union Scheme, CCUS project operators must develop, and implement a CCUS project plan. This plan must outline how the project will be undertaken, including characteristics and operation of the storage site, and monitoring, verification and reporting activities. Project operators must demonstrate to regulators that storage reservoirs will not leak, and must monitor and verify that underground storage of project emissions remains secure. This includes monitoring wells and undertaking seismic surveys. If all injection activities have ceased, the licence holder for a storage operation must apply for a site closing certificate. If this application is accepted by the responsible minister, a pre-site closing certificate may be issued setting out a monitoring and verification program, as well as a required level of security to cover the costs of that program. Australia's National Greenhouse and Energy Reporting Scheme[18] provides the framework for counting emissions. The framework requires industry to share information about captured emissions, emissions stored underground, leaked emissions, and emissions sent to, or imported from, another country.
EU	The EU has extensive requirements for selecting storage sites for CO_2.[19] A site can only be selected if prior analysis shows that, under the proposed conditions of use, there is no significant risk of leakage or damage to human health or the environment. If leakage does occur, operators must surrender emission allowances for any resulting emissions under the EU ETS. The monitoring regime in the EU includes: • monitoring and reporting CO_2 emissions • tracking capture efficiency • monitoring to ensure safe and efficient transport of CO_2 • continuous monitoring of CO_2 storage sites to verify integrity • utilisation monitoring systems.
Canada	Canadian provinces (such as Alberta, Saskatchewan, and British Columbia) hold much of the responsibility for regulating requirements for measurement, monitoring, verification and oversight of geological storage. However, there are federal responsibilities for certain aspects. As of 2017, all facilities engaged in CCUS activities are required to report the amounts of CO_2 captured, transported, injected (or used for enhanced oil recovery), and geologically stored to the Government of Canada. Facilities must also report CO_2 emissions (leakages) from equipment or infrastructure used in CCUS activities and from geological storage sites.

18 https://www.dcceew.gov.au/climate-change/emissions-reporting/national-greenhouse-energy-reporting-scheme

19 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0031

Overseas regime for liability for CO_2 storage sites

Australia	The liability for CCUS projects is typically specified in regulatory approvals granted by relevant Australian authorities. The project operators may be required to provide financial assurance or secure funds to cover post-closure activities, including long-term liability management. If all injection activities have ceased the licence holder must apply to the responsible minister for a site closing certificate, who must decide on the application within 5 years of the application date. Once a site closing certificate is issued, at least 15 years must elapse before the responsible minister may declare a closure assurance period. The responsible minister must be satisfied that there are no significant risks of leakage. If the minister is not satisfied, the closure assurance period is not declared. After the closure assurance period is declared, the government must indemnify against liability if the storage formation was specified under the GHG licence, and a site closing certificate is in force. This means that the state becomes liable for the risk of future damages.
EU	Directive 2009/31/EC[20] of the EU establishes that long-term liability for CCUS activities is eventually transferred to Member States. The EU framework functions similarly to Australia's, in that it provides for a minimum 20-year closure assurance-like period. Several conditions must be met prior to transfer of liability, including that "the CO_2 [must] be completely and permanently contained". A report must be published by the operator before liability can be transferred, demonstrating that the storage site is evolving towards a situation of long-term stability. A security must be paid by the operator to cover at least the cost of monitoring and post-transfer obligations of a Member State for a period of 30 years.

20 Directive 2009/31/EC of the European Parliament and of the Council [2009] OJ L 140/114.