Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

Submission on the proposed regulatory regime for Carbon Capture, Utilisation, and Storage (CCUS)

To the Ministry of Business, Innovation and Employment

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Submitter details

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The Parliamentary Commissioner for the Environment

The Parliamentary Commissioner for the Environment was established under the Environment Act 1986. As an independent Officer of Parliament, the Commissioner has broad powers to investigate environmental concerns and is wholly independent of the government of the day. The current Parliamentary Commissioner for the Environment is Simon Upton.

Introduction

Thank you for the opportunity to provide feedback on the Government's proposed regulatory regime for Carbon Capture, Utilisation, and Storage (CCUS).

This submission's format follows the consultation document's structure and provides feedback on the questions raised.

Treatment under New Zealand's emissions trading Scheme

The consultation document expresses benefits for New Zealand from establishing a clear regulatory environment for Carbon Capture Utilisation and Storage (CCUS). One of which is the creation of a level playing field between emissions reduction and removal mechanisms to enable a least cost transition.

An objective of evening the playing field seems reasonable given at present New Zealand's Emissions Trading Scheme (ETS) recognises Carbon Capture and Storage (CCS) in the form of forestry removals and some geothermal energy but does not recognize emissions reductions or removals from CCS activities more broadly. It therefore makes sense to include CCS to be consistent with the net-approach to emissions reductions currently operating within the ETS.

However, the net-approach itself has problems the Government should be aware of. At present forestry is the dominant mechanism for offsetting carbon dioxide (CO_2) emissions in the ETS. I have argued extensively on the *in*commensurability between carbon sequestration in forestry and gross emission reductions[1]. Simply, if emissions are prevented there is a 100% probability they are not released into the atmosphere. This is not the case if carbon is instead captured and stored - presently through forestry, or through alternative CCS technologies in the future. Forestry is a particularly risky storage option because it is relatively impermanent. It is vulnerable to being deforested either through deliberate harvesting or from natural events such as pest, disease and fire. While the permanence risks of CCS may be much lower than forestry, they are not zero, and are poorly understood in New Zealand's tectonically active setting. Potential for leakage needs to be factored into any regulatory regime, with any 'benefit' to the storage being discounted accordingly.

Currently the Crown effectively underwrites the risk of the carbon stored in our forests via the ETS. We should learn from this and build some protection into any new systems. This could be done in the form of a well-calibrated discount on carbon sequestered, to ensure this is less valuable than prevented emissions. For example, the ETS could recognise 80% of the carbon stored to build in a buffer should some carbon be released. The actual percentage for each site should be determined by a site-specific risk assessment of carbon leakage. Alternatively, some sort of bond scheme could be introduced.

When considering the treatment of CCS in the ETS it is also important to make a distinction between ETS participants carrying out their own capture and storage activities, akin to current geothermal reinjection operations, and businesses which could choose to capture other companies' emissions and deploy storage technologies to earn New Zealand Units (NZU).

The former should be able to apply for a unique emissions factor which would recognise their efforts in capturing carbon. This would be in keeping with the existing treatment of CCS technologies for geothermal power plants. I consider that the best regulatory mechanism would be to modify or expand upon the Climate Change (Unique Emissions Factors) Regulations 2009. These regulations currently enable geothermal power stations that engage in CCS to obtain unique emissions factors which reflect their lower CO_2 emissions. This could be expanded to other emitters, such as oil and gas companies, who can similarly store their emissions.

Stricter regulations would be required for businesses deploying storage technologies to earn NZUs. It is considerably more complex and would require well considered measures to ensure the chain from CO_2 capture to its eventual storage was unexploitable. Issues surrounding double counting would need to be carefully monitored. The regulation for earning NZUs from this type of CCUS would fit best in the Climate Change Response Act 2002 (CCRA). As well as amendments to the legislation, this is likely to also require the making of appropriate regulations, similar to the way in which forestry is currently regulated under the CCRA.

There is no need to create a separate regime for *enabling* CCUS because, as acknowledged in the consultation document, the existing legislation does not preclude the deployment of these technologies. The Government has stressed the need for industry to support itself, without subsidies or the creation of preferential conditions for certain technologies. An enabling regime could be construed as 'picking winners' and would be out of alignment with the market-led approach to emission reductions the Government is pursuing.

Monitoring regime for CCS activities

In the background to the consultation document the IPCC is quoted as having high confidence in the ability to achieve permanent underground storage of CO_2 using CCS technologies. This is true for the first 100 years carbon is sequestered in a geological reservoir, however when a time

[1] https://pce.parliament.nz/media/humpby5q/report-farms-forests-and-fossil-fuels.pdf; https://pce.parliament.nz/media/qfxluadl/going-with-the-grain-changing-land-uses-to-fit-a-changing-landscape.pdf

scale of thousands of years (the lifespan of CO_2 in the atmosphere) is considered the IPCC revises its probability from very likely, to likely (66-90%), that all the stored carbon will remain locked-away[2]. Whilst the reinjection of CO_2 in geological reservoirs likely provides more durable storage than current afforestation offsets, it is noteworthy that the confidence expressed by the IPCC is contingent on appropriate storage site selection and management. This risk of carbon leakage for New Zealand's geological reservoirs might be even higher given its tectonically active setting, fractured geology and diverse sedimentary systems – which is fundamentally different to the old Australia/Canadian cratons.

The consultation document includes the question "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?"

It is little short of astonishing that this question is even being asked. The answer is an obvious yes, given the importance of site selection and management for the long-term sequestration of CO_2. However, obtaining a clear picture of geological suitability may be uniquely challenging in New Zealand given its position across an active plate boundary, resulting in a highly fractured upper crust where geological faults would potentially act as leakage pathways, as well as high volcanic and seismic activities which will invariably result in massive disturbances at great depths. This will necessitate very careful site assessment for multiple geological risks in most areas.

Research published in 2016 in collaboration with scientists from GNS Science concluded that although several gigatonnes of CO_2 storage capacity might be available, it is likely most theoretical storage capacity will be discounted once detailed assessments are made[3]. Any regulation must contain strict requirements that CCUS operators prove the efficacy of their storage site(s) that include thorough risk assessments around storage and leakage.

Regulations must also contain obligations that the CCUS operator would have to adhere to following any carbon leakage. If leakage were detected, timeframes should be established by which the operator would have to surrender units or recapture an equivalent quantity of carbon. These would need to be commensurate with the risk from such incidents, which could adversely affect the ability of New Zealand to meet its emission budgets or international targets.

Finally, there should be a bond requirement to protect the Government from incurring the expenditure required for remediation should leakage occur, especially if no discount was applied to sequestered carbon.

At present there are a lot of uncertainties in the proposal, and I note that there will be further consultation on the design of any monitoring, verification and permitting regimes. This will be of considerable importance given issues that have previously arisen at large scale CCS projects - which have struggled to accurately model the CO_2 stored[4].

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[2] https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf - ocean storage would have a higher probability of leakage. Depending on the depth of injection and the location, the IPCC anticipate the fraction retained to be 65–100% after 100 years and 30–85% after 500 years.

[3] https://researchcommons.waikato.ac.nz/server/api/core/bitstreams/eb2a8ec7-1f65-4e79-897a-e344e6f5cd88/content

[4] https://www.desmog.com/2023/09/25/fossil-fuel-companies-made-bold-promises-to-capture-carbon-heres-what-actually-happened/; https://ieefa.org/articles/norways-carbon-capture-and-storage-projects-augur-geological-risks-global-aspirations-bury

Liability for CO_2 storage sites

When considering liability, the preferred option in the consultation document mirrors regimes in Australia and the EU in which project managers remain liable for a minimum period following site closure, and the liability is then transferred to the Government if it is satisfied the risk of leakage is minimal. In New Zealand it is important to consider after what period following site closure it would be appropriate to indemnify the operator against any liability. As CO_2 is a long-lived greenhouse gas, periods of 15 and 20 years used abroad are dwarfed by the duration of CO_2 in the atmosphere (thousands of years).

The ability of the project manager to finance remediation activities following leakage should be assessed prior to permit issuance. It would also be sensible to require some form of financial security from project managers to insure against any risk from CO_2 leakage following site closure.

To maintain consistency with current practice in the ETS, liability should be located high-up within the supply chain. Thus, it is the initial emitter of the CO_2 that should remain liable and not any downstream user of CO_2 that has been captured and transferred.

Consenting and permitting for CCUS

Any consenting or permitting regime should still require RMA or EEZ consents, potentially with additional requirements built in. For example, to account for processes required prior to site development (proof of site suitability) and following the closure of a site (site closure plans), and to provide for fiscal requirements such as bonds.

Carbon capture and utilisation

Whilst beneficial to the economy, the ability of captured CO_2 to be used in various industrial and commercial operations should not be viewed as a way of mitigating New Zealand's GHG emissions. This is because for most uses of any CO_2 captured the CO_2 would be re-emitted into the atmosphere within relatively short timeframes. Therefore, carbon *utilization* should not be eligible for ETS credits.

A distinction must also be made between CO_2 injected and captured into geological reservoirs for the purpose of its permanent sequestration, and the *use* of captured CO_2 for enhanced oil recovery (EOR) or enhanced gas recovery (EGR). It has been estimated that 79% of carbon capture capacity currently in operation sends CO_2 to extract more fossil fuels via EOR[5].

In the Interim Climate Implications of Policy Assessment accompanying the consultation document, it is acknowledged that CCUS could result in additional emissions from further gas supply being unlocked through EGR. The cumulative impact of this on the New Zealand gas sector could be a net increase in GHG emissions. That risk reinforces the argument that CO_2 reinjection by the oil and gas sector is best regulated through setting unique emissions factors, rather than allowing NZUs to be earned.

Cost Competitiveness

The creation of a clear regulatory environment for CCUS is intended to allow participants in the ETS to access the most cost-effective carbon storage technology for their situation. In the Regulatory Impact Statement (RIS) associated with the consultation document it is suggested

[5] https://priceofoil.org/2023/11/30/ccs-data/

that if CO_2 emissions were valued at more than $30 per tonne, the natural gas industry would have a commercial incentive to invest in CCS.

This figure was based on rough order of magnitude estimates of cost that did not include consenting, decommissioning, and made no mention of monitoring, verification and reporting costs[6]. In a document cited in the RIS, commercial scale projects abroad were found to typically incur monitoring costs alone of around US $1-4 million (per year)[7].

The IEA has valued just the *capture* of CO_2 from a natural gas processing facility at US $15-25 per tonne in 2019 (around NZ $30-$50 today), and for other industries cited in the consultation document, such as cement and steel, the IEA estimated costs ranged from US $40-120 per tonne for the capture of CO_2[8].

It is therefore unclear whether the creation of a regulatory environment for CCUS would be sufficient to encourage uptake of this technology. The current price of carbon in the ETS is around NZ $52, and in the Government's latest modelling for the second emission reduction plan consultation a long-run price of NZ $50 (in 2023 dollar values) is anticipated from 2035 onwards. It therefore seems unlikely that CCS technologies would be cost competitive, regardless of whether the regulatory environment is amenable.

The Ngāwhā geothermal field - cited in the consultation document as a success story for the reinjection of CO_2 into the ground - is a cautionary tale. The decision by Ngāwhā to invest in CO_2 injection was based on a high and *rising* price of carbon. Recently, the assistant operations manager at Ngāwhā told a panel discussion "had we known what the forward price path was for CO_2, we would not have hit it as fast, if it all, as we did"[9].

Consequently, unless the carbon price is significantly higher, for example through the exclusion of forestry from the ETS, any regulatory environment for CCUS is likely to be moot.

Conclusion

In short, in my view any CCUS regime that is developed is unlikely to be used in the short to medium term due to low carbon prices (as a result of unlimited use of forestry offsets in the ETS). Given we have time, it is hard to see why policy work in this space should command any priority. The time of officials would be better spent tackling New Zealand's gross emissions and the policy interventions needed to manage the real risk of the ETS collapsing in the mid-2030s.

However, once we have focused on tackling gross emissions for most sectors, it could well be worth developing the regime for future use in hard to abate sectors to allow further development of the technology for reducing emissions from industries like cement and steel production. Currently, CCUS for cement and steel production is expensive due to the processes involved resulting in low CO_2 concentration gas streams but the lack of a regulatory system should not be allowed to become a disincentive to explore these possibilities.

CCUS capability may also be important in the future to enable New Zealand to go net negative. There exists a lack of direction on what net-negative would look like post-2050. Establishing a clear regulatory environment may help CCUS technologies mature and become viable for

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[6] https://www.mbie.govt.nz/dmsdocument/27264-review-of-ccus-ccs-potential-in-new-zealand-march-2023-pdf

[7] Storing on the order of 1 Mt CO_2/year - https://climit.no/app/uploads/sites/4/2020/05/2020-01-Monitoring-and-Modelling-of-CO2-Storage.pdf

[8] https://www.iea.org/commentaries/is-carbon-capture-too-expensive

[9] https://www.energynews.co.nz/news/emissions-trading-scheme/162564/ets-shakeup-would-drive-decarbonisation-geothermal-generators?utm_source=newsletter&utm_medium=email&utm_campaign=energy-news-newsletter

difficult to eliminate emissions in the future. It would also maintain commensurability between different emissions reduction and removal mechanisms in the ETS.

I recommend that:

- The regulatory environment for CCUS should acknowledge the difference between emissions stored (which can potentially be re-released), and emissions prevented.
- Carbon capture for use should not receive emissions reduction or storage credits.
- Carbon capture and storage through reinjection for the same activity (eg capturing CO_2 from and oil and gas well and reinjecting it into the same reservoir) should be regulated by use of unique emissions factors.
- Businesses deploying storage technologies to earn NZUs should be regulated under the CCRA, and specific regulations made under the CCRA for that purpose.
- Careful attention should be paid to the need for a monitoring, verification and permitting regime, and the issue of assigning long-term liability. I recommend that the system build in the risk of carbon being lost, for example by discounting the value of the units given for a certain amount of carbon stored and the implementation of a bond system to help cover potential future liabilities.
- The regulatory regime should require site specific risk assessments for all proposed storage sites and more research into the geological suitability of New Zealand for CCUS should be undertaken.

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