6 August, 2024

Response to MBIE's CCUS consultation document

Introduction to Captivate Technology

Captivate Technology is a carbon capture company based in New Zealand. We are commercialising our patented adsorbent for the selective removal of caron dioxide from flue gas streams and biogas. Our adsorbent prevents the release of CO_2 to the atmosphere from point sources and produces a potentially valuable stream of CO_2, enabling both environmental and economic benefits to accrue.

We have trialled our carbon capture solution on four industrial sites around the North Island in partnership with important industry players. This follows several years of research, derisking and IP development at Massey University.

We are now poised to deploy our technology on an industrial scale both in New Zealand and in an international context. Our adsorbent will be a gamechanger for CCUS by offering a lower cost and more flexible solution than existing technologies.

Ultimately, our R&D hub will create jobs here in New Zealand and our international expansion will generate export earnings.

Our position on CCUS

CCUS is an essential tool for reducing atmospheric levels of CO_2 and thus mitigating climate change. The case for the rapid and sustained roll-out of CCUS to limit global warming to <2 deg C has been made by the UN Intergovernmental Panel on Climate Change (IPCC). It can be deployed across a broad range of industries, including natural gas wells, coal- and gas-fired electricity plants, geothermal electricity plants, cement manufacturing, boilers, pulp and paper mills etc.

We fully support the development of a regulatory framework for CCUS in New Zealand. We view carbon capture as a waste management issue, but one that will only be implemented if there is a financial incentive or regulatory mandate to do so. No-one will capture and store their CO_2 for

nothing. We therefore support clear regulations, policies, mandates and incentives that facilitate and encourage investment in CCUS technologies.

CCUS technologies are available today. They are advancing rapidly thanks to R&D innovations. Some commentators falsely state that CCUS is an 'unproven' technology or will simply prolong the use of fossil fuels. However, we note that

- CCUS is applicable to non-fossil CO_2 emissions, such as cement, geothermal and biogas;
- CCUS is operational worldwide today and draws on three decades of technological development and refinements. The Clean Air Task Force has recently released a holistic review of global CCUS projects, including some that have been in action since 1996. Their report "**shows the technology is working, highlights opportunities for increased climate benefit."**
- Done properly, a CCUS framework in New Zealand can help us reduce our emissions to achieve carbon neutrality and meet our climate targets. It may also offset our need to buy carbon credits to meet the shortfall in our carbon debt.
- CCUS provides tremendous opportunities to couple innovation, employment and environmental protection. Carbon capture can help foster new clean-tech jobs and export earnings as we reduce our reliance on fossil fuels. For example, captured CO_2 can be used as a feedstock and merged with the hydrogen industry to produce sustainable aviation fuel (SAF).

General comments on the consultation document

- The plans are heavily weighted towards CCS rather than CCUS with a definite focus on capture from natural gas wells and underground storage. It would be useful for the remit to be broadened to a fuller portfolio in all aspects - CO_2 sources, CO_2 storage and CO_2 utilisation.
- No specific mention is made of **negative emissions technologies** such as bioenenergy with carbon capture and storage (BECCS) and other biogenic sources of CO_2 such as biogas form landfills and waste. Negative emissions technologies actively reduce the atmospheric concentration of CO_2 if the captured CO_2 is stored permanently. On the other hand, conventional CCUS technologies simply prevent additional CO_2 from entering the atmosphere.

  Appropriate incentives should be offered for negative emissions technologies to stimulate investment, job opportunities and high-tech industries. The government has a role to play here as it has signalled that it will buy carbon credits to meet the shortfall in New Zealand's carbon debt at a cost of $3-20 billion. Rather than obtaining these credits from international markets, some of them could be purchased from NZ-based companies who are generating negative emissions. This would represent an 'advance market commitment', as popularised by companies such as Microsoft and Stripe. Even of 5% of the projected ~$10 billion spend on carbon credits would stimulate an industry to the tune of $500m at *no net cost* to the government. Homegrown companies would benefit from upfront capital

to get their technology underway. This would subsequently be repaid in the form of captured and permanently stored carbon.

Sweden serves as an example that we could follow here: "*Sweden promotes negative carbon dioxide emissions/BECCS through its Industrial Leap program that supports the transition to net-zero emissions of greenhouse gases by 2045 and negative emissions thereafter*." - GLOBAL STATUS OF CCS 2023, GLOBAL CCS Institute.

- There may be a case for mandating CCS for any new natural gas wells drilled in New Zealand, as Australia have done for the Gorgon project in Western Australia.

Recommendations

Our primary recommendations are:

1. To ensure that the CCUS framework is broad enough to broadened encompass all CO_2 sources, all approached to long-term storage, and CO_2 utilisation.
2. To pay specific attention to negative emissions technologies and consideration given to their support, for example in the form of carbon credits purchased by the government at no net cost.
3. To provide incentives for the use of captured CO_2 in ways that reduce our reliance on fossil fuels.

Q1. Do you agree that the government should establish an enabling regime for CCUS?

Yes, for the reasons summarised in 'Our position on CCUS' above.

Q2. Do you agree with our objectives for the enabling regime for CCUS?

Yes. We suggest an additional objective around recognising *negative emissions technologies* that achieve CO_2 removal. For example, as New Zealand increases its combustion of wood waste for combined heat and power generation the opportunity for BECCS (BioEnergy with Carbon Capture and Storage) will grow, offering the chance to expedite progress towards New Zealand emission reduction targets. There are similar opportunities to generate negative emissions by capturing CO_2 from biogas or other biogenic sources.

Q3. Should the ETS be modified to account for the emissions reductions achieved using CCS? If so, how do you think it should be modified?

The ETS system needs to be modified and reformed to support more emissions reductions. As it stands, the NZ ETS treats equally removals achieved by afforestation and reductions as required by Aotearoa New Zealand's Emission Reduction Plan. Left to market forces, this is resulting in a drift to (exotic) afforestation, generally achievable at lower cost than emissions reductions, especially

as the low hanging fruit of emission reductions (lower cost) is picked off first. The Climate Change Commission (CCC) in its "2023 Draft advice to inform the strategic direction of the Government's second emissions reduction plan" has highlighted the potential impact of the status quo; that is the emissions budgets are not met and there is a long-term threat to the price stability of the NZU as the market is flooded with afforestation credits.

We need to separate the ETS for industry emission reductions including CCUS from afforestation to increase the incentive for industry emission reductions.

The NZ ETS currently rewards some industrial activities that remove emissions, including embedding carbon in products and exporting or destroying synthetic greenhouse gases. However, emerging technologies, such as carbon capture will also play an important role in the future. As technology and research and innovation develop, new techniques for GHG reductions and removals are emerging. We note that many ETS schemes globally have a process whereby these new techniques can enter the ETS as eligible activities. For example, in Alberta CCUS activities can generate offsets and credits for the regulatory carbon market.

Q4. Do you agree that all CCS activities should be eligible to receive recognition for the emissions captured and stored? If not, why not?

We believe that most CO_2 storage technologies that are both *safe* and *permanent* should be eligible. This includes injection into depleted gas reservoir and saline aquifers as well as other technologies such as mineralisation and blending into curing concrete. BECCS processes that permanently trap the carbon as biochar or bio-oil, for example, should also be recognised. Enhanced oil recovery (EOR) should not be eligible on the basis that is puts societal acceptance of CCUS at risk due to perceptions that is simply perpetuates fossil fuel use.

Q5. Do you think there should be a separate non-ETS mechanism for providing economic incentives for CCS? If so, what would this mechanism be?

Yes, an investment tax credit is a suitable economic mechanism for CCS. CCS is capital intensive and to expedite its uptake to reduce. These credits can be in place for 5-10 years to help kickstart the new technology roll out while observing cost reductions occur through time and maturity. New Zealand start-ups such as Captivate Technology have developed an emerging method of carbon capture based on a discovery at Massey University. This method provides a very low energy and low-cost technology solution for carbon capture that can very quickly have a significant impact at the million tonne per annum CO2e scale. To expedite its roll out and ensure New Zealand stays competitive with international peers a tax credit is an appropriate consideration. CO_2 is being used by our partners in the USA as a feedstock for SAF production.

Additionally, the government has signalled that it will buy carbon credits to meet the shortfall in New Zealand's carbon debt at a cost of $3-20 billion. Rather than obtaining these only from international markets, some of them could be purchased from any NZ-based companies who are generating negative emissions.

Q6. In your opinion, which overseas standards for monitoring, verification and reporting of CCUS-related information should New Zealand adopt?

Canada's (Alberta's) Monitoring Measurement and Verification (MMV) process is well established and has been in place for many years. The MMV process is used by many people working permanently on CCUS in the province. We would be happy to connect you directly to some experts in this field at companies such as Vault 44.01 and CarbonAlpha.

Q7. Is there any other information that CCS project operators should be required to verify and report? Please reference the relevant overseas standards where applicable.

We recommend following standards like those of Alberta that have been in place for many years and refined over time.

Q8. What methods should be used to quantify CO2 removal and storage in CCUS projects?

The use of permanent meters, Supervisory Control and Data Acquisition (SCADA) systems and data historians is necessary.

Q10. What level of transparency and information sharing is required?

We recommend that MMV plans and annual operations reports are required to be made public.

Q11. 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?

There should be a common standard for MMV. The government should consider a hub model to help small scale operators connect with larger operators.

Q12. Should a monitoring regime extend to CCU activity?

No, these regulations should apply to permanent CO_2 storage only.

Q13. Do you agree the proposed approach on liability for CO2 storage sites aligns with other comparable countries (like Australia)? If not, why not and how should it be changed?

Yes, it is worth reviewing the approach on liability from British Columbia and Alberta too. Captivate Technology would be happy to assist provides some connections to relevant individuals

Q14. Is the proposed allocation of liability consistent with risks and potential benefits? Are there other participants that should share liability for CCS operations?

This liability approach is consistent with international mechanisms. Liability and transfer of liability are very important considerations. The operators need to be strong reputable organisations with a demonstrated track record in compliance and safety.

Q15. 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?

Storage sites can be broadly classified as depleted gas reservoirs or saline aquifers. Liability should be the same but MMVs can be tailored to the specifics of the storage type.

Q16. Do you consider there should a minimum threshold for CCUS operators being held responsible for liability for CO2 storage sites so that small-scale pilot CCS operators would be exempt? If so, what should be the threshold?

No. Small scale operators should be exempt. The government should look to support a handful of CCUS projects (5 at most) in New Zealand and operators should be encouraged to collaborate.

Q17. 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 CO2 storage sites?

Yes, there should be a period of time, after the site is closed. A review current international best practice, for example in Alberta, is recommended.

Q18. Are additional insurance mechanisms or financial instruments required to cover potential liabilities from CO2 leakage in CCS projects?

Yes, but that is for insurer and private companies to manage. Oil and gas companies are familiar with these insurance mechanisms in their other core business (e.g. well blow out).

Q19. What measures should be implemented to monitor CCS projects for potential leakage and ensure early detection?

Companies should be applying for the right to inject CO_2. The applications should include a detailed subsurface and surface analysis of why a site is being chosen and what the shape and size of the requested area.

A range of measures should be used in the MMV plan. This can include 4 d seismic, pressure monitoring, tilt meters, results from monitoring wells etc. the Quest project in Alberta has publicly available annual reports regarding these measures.

Q20. Do you agree that trailing liability provisions are needed? How do you think they should be managed?

Yes, unfortunately there are issues in NZ and internationally with companies not being able to meet their obligations. This is worth discussing with an entity like the Alberta Energy Regulator.

Q22. 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.

There should be bespoke law and regulations covering CO_2 sequestration.

Q23. 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?

Yes. Absolutely - this is very important. A suite of data is required with geological models, petrophysical analysis, well tests. Please contact us here at Captivate Technology directly if you would like to discuss further.

Q24. Should there be separate permitting regime for CCU activity if there is no intention to store the CO2?

No, CCU activity where there is no sequestration should not be regulated and CO_2 captured from industrial processes should be freely moved downstream to utilisation. In this way, CCU technology can be supported by the government as the 'carbon capture' step can be the same as that used in CCUS.

Q25. Are there regulatory or policy barriers to investment and adoption of CCU technologies?

There is a lack of incentives currently and New Zealand is falling behind other countries in CCU. The low price of carbon in the ETS and cost of CC implementation means that only a few NZ companies are looking to spend significant sums to implement CC in this decade. NZ needs to kickstart CC technology support to help achieve our emission reduction budgets.

Q26. What potential markets for CO2 derived products do you see as most critical in New Zealand?

Use of CO_2 for e-fuels such as sustainable aviation fuel (SAF) is a future market for captured CO_2 with a high potential. This can help provide renewable fuels in NZ and the APAC region and support new jobs and growth in manufacturing of these fuels. Europe and the USA are rapidly advancing these opportunities and we are in danger of missing out.

Q27. Are there any specific barriers to transportation of CO2?

No, CO_2 is easily and safely pressurized and transported by road, rail and ship globally using widely available equipment and established protocols. It is important that now new barriers or hurdles are created with respect to the CO_2 transportation.

Thank you for the opportunity to provide feedback to this consultation document. We would be happy to engage further with MBIE regarding Captivate Technology and CCUS in general.

Your sincerely,

Shane Telfer, PhD
Chief Executive Officer

CAPTIVATE TECHNOLOGY
E: shane@captivatetechnology.com

Nigel Campbell, MEng, MA, PEng (Alberta)
Chief Commercial Officer

CAPTIVATE TECHNOLOGY
E: nigel@captivatetechnology.com

https://www.captivatetechnology.com/