Submission Regarding Greenhouse Gas Storage Acreage Release

30 June 2023

About Australian Marine Conservation Society

The Australian Marine Conservation Society (**AMCS**) is Australia's peak marine conservation organisation and Australia's leading national charity dedicated solely to protecting our precious ocean wildlife – a community of ocean lovers across the nation working for healthy seas. Representing over 300,000 people from all around the country, we are the guardians and voice for marine life. We work to protect our oceans and coastal environments for the benefit of all marine life, and current and future generations.
marineconservation.org.au

About Environmental Defenders Office

The Environmental Defenders Office (**EDO**) is a community legal centre specialising in public interest environmental law. We help people who want to protect the environment through law.
www.edo.org.au

Acknowledgment of Country
The Australian Marine Conservation Society and Environmental Defenders Office recognises the Traditional Owners and Custodians of the land, seas and rivers of Australia. We pay our respects to Aboriginal and Torres Strait Islander Elders past, present and emerging, and aspire to learn from traditional knowledges and customs so that, together, we can protect our environment and cultural heritage through law.

Submitted to:
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1 Introduction

AMCS and EDO welcomes the opportunity to provide feedback to the Commonwealth government on potential release areas for greenhouse gas storage in our oceans.

The release of greenhouse gas storage acreage for bidding and any subsequent exploration titles granted have the potential to cause significant negative impacts on the offshore environment and marine life in Australia, through exploration processes such as seismic blasting and test drilling. The release of greenhouse gas storage acreage for bidding and any subsequent exploration titles granted also pose a significant risk in relation to climate change, as they may provide perverse incentives to engage expired well enhancement efforts in depleted fields and prolong the use of oil and gas fields through the unproven and unsafe technology of carbon capture and storage (CCS), which will inevitably lead the release of further greenhouse gas emissions.

This Submission sets out issues for the government to consider in the decision to release greenhouse gas storage acreage for bidding, including matters related to specific listed title areas.

This Submission also sets out matters the government and companies need to be aware of in terms of climate change impacts and other environmental impacts, when considering or preparing bids for any subsequent release of greenhouse gas storage titles for exploration.

This submission has been prepared in conjunction with the Environmental Defenders Office.

2. Greenhouse gas storage acreage release principles for consideration

Administrative decisions regarding greenhouse gas (GHG) emissions must proceed from a science-based position, being that petroleum activities are to be phased out, and no new petroleum fields should be developed.

The release of greenhouse gas storage acreage will continue to sustain the fossil fuel industry. The proposed development of CCS activities in relation to the released titles is likely to be used to justify ongoing fossil fuel extraction within Australia and internationally. Globally, CCS has not been demonstrated to be a viable technology to abate GHG emissions on the scale necessary to avoid dangerous levels of climate change. The proposed acreage release therefore poses a risk of indirectly contributing to the further release of significant GHG emissions in Australia and undermines efforts to meet Paris Agreement commitments.

Greenhouse gas storage acreage releases should not proceed while the potential environmental impacts of GHG storage are not fully understood. In particular, greenhouse gas storage acreage release should not proceed while the efficacy of CCS technology in permanently, safely and efficiently storing GHG emissions remains unproven.

3. New fossil fuel infrastructure is inconsistent with the Paris Agreement

The IPCC has recently made clear that emissions from existing fossil fuel infrastructure will push the world beyond 1.5°C of warming, and that "[g]lobal warming is more likely than not to reach 1.5°C between 2021 and 2040 even under the very low GHG emission scenarios."[1] It goes on to say, "Pathways consistent with 1.5°C and 2°C carbon budgets imply rapid, deep, and in most cases immediate GHG emission reductions in all sectors (high confidence)."[2]

The United Nations Secretary-General has warned that "[i]nvesting in new fossil fuel infrastructure is moral and economic madness."[3]

The International Energy Agency has concluded that the scientifically credible pathway to limiting warming to 1.5°C – the goal of the Paris Agreement – requires that no new gas and oilfields be approved for development after 2021.[4]

Australia is a signatory to the Paris Agreement, which entered into force on 4 November 2016. The Paris Agreement aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty. This is by "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change".[5]

Section 4 below outlines the risks of CCS contributing further to climate change, rather than mitigating it. The impact of potential GHG emissions from CCS projects should also be considered, in terms of direct emissions and potential for leaks of injected carbon dioxide (CO_2).

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[1] Hoesung Lee et al., 'Synthesis Report of the IPCC Sixth Assessment Report (AR6)' (2023) IPCC, Figure 3.5, 56, Available at:https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_LongerReport.pdf.
[2] Ibid, 46.
[3] UN Secretary-General Antonio Guterres, 'Secretary-General Warns of Climate Emergency, Calling Intergovernmental Panel's Report 'a File of Shame', While Saying Leaders 'Are Lying', Fuelling Flames' (Media Release SG/SM/21228, 4 April 2022)' (2022) UN, available at: https://press.un.org/en/2022/sgsm21228.doc.htm.
[4] International Energy Agency, 'Net Zero by 2050: A Roadmap for the Global Energy Sector – Summary for Policymakers' (May 2021), 11, Available at: https://iea.blob.core.windows.net/assets/7ebafc81-74ed-412b-9c60- 5cc32c8396e4/NetZeroby2050-ARoadmapfortheGlobalEnergySector-SummaryforPolicyMakers_CORR.pdf.
[5] Paris Agreement 2015, article 2.

4. The Commonwealth must consider whether CCS presents a viable mechanism for the meaningful reduction of emissions before deciding whether to release acreage

The Commonwealth must consider whether CCS presents a viable mechanism for the meaningful reduction of emissions before deciding whether to release acreage. As it stands, and for the foreseeable future, CCS does not offer an effective abatement solution to the enormous quantities of GHG emissions released by the fossil fuel industry in Australia and internationally. This is for two reasons:

a. Pre- or post-combustion capture of CO2 requires significant energy use.[6] Unless sourced from renewable sources, this energy use can reasonably be expected to increase GHG emissions. Post-combustion capture associated with energy production presents particular difficulties with efficiency and contaminants.[7]

b. b. CCS is not currently effective in reducing greenhouse gas emissions. It is unclear whether it will ever be effective, at least in the timescales required to avoid dangerous climate change. CCS is also unscalable at the rate and extent needed to rapidly reduce global emissions.[8]

Based on previous real-world experience, CCS does not present a realistic option for meaningfully reducing CO_2 emissions. According to a report by the Center for International Environmental Law, the "28 CCS facilities currently operating globally have a capacity to capture only 0.1 percent of fossil fuel emissions, or 37 megatons of CO_2 annually."[9]

The Gorgon LNG project operated by Chevron on Barrow Island in Western Australia demonstrates valid reasons to be concerned about the efficacy of CCS in an Australian context. For that project, the amount expected to be sequestered will be less than 6% of the total emissions from the

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[6] Leigh Collins, 'The amount of energy required by direct air carbon capture proves it is an exercise in futility', *Recharge* (online, 14 September 2021) (2021, Available at: https://www.rechargenews.com/energy-transition/the-amount-of-energy-required-by-direct-air-carbon-capture-proves-it-is-an-exercise-in-futility/2-1-1067588; see also IPCC, 'Climate Change 2022: Mitigation of Climate Change, Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change' (2022) IPCC, 642, Available at: https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_FullReport.pdf.

[7] Leigh Collins, 'The amount of energy required by direct air carbon capture proves it is an exercise in futility', *Recharge* (online, 14 September 2021) (2021, Available at: https://www.rechargenews.com/energy-transition/the-amount-of-energy-required-by-direct-air-carbon-capture-proves-it-is-an-exercise-in-futility/2-1-1067588; see also Roger Sathre et al., 'The role of Life Cycle Assessment in identifying and reducing environmental impacts of CCS' (April 2011), Available at: https://escholarship.org/uc/item/2bv98328.

[8] N. Mac Dowell et al., 'The role of CO2 capture and utilization in mitigating climate change' (2017), 7 *Nature Climate Change*, 243, Available at: https://www.nature.com/articles/nclimate3231. ("Given that CCS is expected to account for the mitigation of approximately 14–20% of total anthropogenic CO_2 emissions, in 2050 the CCS industry will need to be larger by a factor of 2–4 in volume terms than the current global oil industry. In other words, we have 35 years to deploy an industry that is substantially larger than one which has been developed over approximately the last century . . .").

[9] Ibid, 243.

project (including scope 3 emissions).[10] Such low sequestration rates demonstrate the inability of CCS technology to reduce emissions in-line with the commitments of the Paris Agreement.

Furthermore, CCS technologies are not designed to capture and store methane, a much more potent greenhouse gas emitted from oil and gas operations – including offshore CCS projects developed over depleted oil and gas fields. Methane removal from the air presents technical challenges because "methane is 200 times less abundant in the atmosphere than CO_2," and "[c]apturing methane would require processing a lot of air, which would require an unfeasibly large amount of energy."[11]

Release of CCS acreage may also lead to direct GHG emissions. The acreage proposed for release at Bonaparte Basin, Browse Basin, Northern Carnarvon Basin, Perth Basin, Otway Basin, Bass Basin and Gippsland Basin may contain geological formations with the potential to release greenhouse gases during CCS exploration. Whether exploration of any of the titles would involve additional extraction or release of methane or other greenhouse gases is an important issue that must be evaluated in any decision to release CCS acreage.

The proposal to open up large tracts of Australia's oceans to CCS projects in basins where there are existing offshore oil and gas operations, many of them depleting, may represent an attempt by industry to enhance those fields. The process involves pumping CO2 into partially depleted gas and oilfields to extract additional fossil fuels for sale that would otherwise be commercially unviable to extract.[12] Enhanced oil and gas recovery is often coupled with CCS to make the latter technology commercially viable. However, this results in the extraction of additional fossil fuels and GHG emissions, rather than the reduction of GHG emissions, which is the purported purpose of CCS.

5. The Commonwealth should consider the risk of GHG leaks from CCS exploration and storage facilities before deciding whether to release acreage

There are significant concerns around the efficacy of CCS to offset GHG emissions. CCS is an unproven technology that carries the significant risk of leaks and fugitive emissions. Any leaks of stored greenhouse gas from CCS projects would represent a failure to offset emissions and may in fact result in an increase to Australia's total GHG emissions.

Recent analysis of the operations of two CCS facilities in Norway shows one site to have been

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[10] Chevron, *Gorgon Gas Treatment Plant Greenhouse Gas Management Plan* (17 Aug. 2022), Available at: https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-gas-treatment-plant-greenhouse-gas-management-plan.pdf. Chevron estimates emissions as follows: Scope 1 (the project): 9.4 MTCO2e per year (page 14); Scope 2: none (page 8); Scope 3: 49.8MTCO2e per year (page 45). With 3.4 MTCO2e per year sequestered as projected (page 14), less than 6% of total (Scope 1, 2 and 3) emissions (49.8+9.4= 59.2 MTCO2e) from the project would be sequestered, even with perfect implementation.

[11] Camille Bond, 'Why Capturing Methane Is So Difficult', *E&E News* (17 Jan. 2023), Available at: https://www.scientificamerican.com/article/why-capturing-methane-is-so-difficult/#:~:text=But%20methane%20is%20200%20times,unfeasibly%20large%20amount%20of%20energy.

[12] See for example, Simon Evans, 'Around the world in 22 carbon capture projects' (2014), Carbon Briefing <https://www.carbonbrief.org/around-the-world-in-22-carbon-capture-projects/>. "Captured gas will be injected into a nearby oil field in order to squeeze more oil out of the ground, a technique called enhanced oil recovery."

leaking CO_2 for a significant period of time with the other storing CO_2 greatly below expected storage capacity.[13] The facilities Sleipner and Snøhvit are run by a Norwegian state-owned energy company and have been operating since 1996 and 2008 respectively. The scale of these projects is significant for CCS and they report "an average of 1.8 million metric tonnes per year of CO_2 are disposed of … accumulating 22 million tonnes in storage so far" for the two sites.[14]

In recent analysis the Sleipner site is reported to have had CO_2 "unpredictably migrating upwards by 220 m" from the original underground storage site (while still remaining buried). The movement of CO_2 upwards 220 meters was over three years.[15] Reporting suggests "this implied that the eight layers were potentially far more fractured and/or thinner than previously thought… The ability of the CO_2 to travel so quickly and easily from its initial deposition point to Layer 9 raised questions".[16]

The Snøhvit site faced different challenges. Its storage capacity was revised down from an estimated 18 years of CO_2 sequestration to less than 2 years once the operation was underway. A geological structure thought to have 18 years' worth of CO_2 storage capacity was indicating less than six months of further usage potential."[17]

GHG leaks can also lead to contamination of important aquifers as CO_2 migrates through fractured or ineffective caprock, along fault lines, or through porous geological strata.[18] Leakage of CO_2 emissions has significant climate impacts and can result in vast shortfalls in storage.
The significant concerns raised about the efficacy of existing CCS operations in Australia and internationally (including those that have been operational for more than a decade), should be considered in any determination to release greenhouse gas storage titles.

6. The Commonwealth should consider the significant environmental risks and impacts of releasing greenhouse gas storage acreage

The release of greenhouse gas storage titles for exploration in our oceans risks causing potential significant impacts on the marine environment. Many of the basins listed for acreage release are Biologically Important Areas (BIA) for federally listed species including the blue whale, humpback whale, whale shark and fragile ecosystems including the great southern reef.

One of the most significant threats to marine life in the CCS exploration process is posed by seismic exploration, which has been proven to damage the hearing of whales and keep them

[13] Hauber, G, 'Norway's Sleipner and Snøhvit CCS: Industry models or cautionary tales?', (2023), Institute for Energy Economics and Financial Analysis, available at: Norway's Sleipner and Snøhvit CCS: Industry models or cautionary tales? | IEEFA.
[14] Ibid.
[15] Ibid.
[16] Ibid.
[17] Ibid.
[18] Jinfeng Ma et al., 'Carbon Capture and Storage: History and the Road Ahead' (2022) *Engineering* 14, 33-43, 39; see also IPCC, CO2 Capture and Storage (2005), Available at: https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf.

away from key feeding and breeding grounds.[19] Other large animals like dolphins, sea turtles, and sea lions could suffer similar effects. Seismic blasts cause significant distress for marine animals, like whales and dolphins, that rely on sound to navigate and for communicating over vast distances. Seismic blasting is also likely to have significant impacts on those species that cannot escape the blast area quickly, like zooplankton and shellfish.
Drilling and laying pipelines in offshore locations may pose significant threats to offshore ecosystems.[20] In the event of leaking CO_2 from CCS sites, the environmental impact on marine environments and wildlife could be significant. This would be compounded if prolonged leaks occurred or were inadequately monitored and managed.

Leaking CO_2 risks causing acidification of the water around the CCS site. CO_2 leakages lead to CO_2 dissolving into seawater and decreasing seawater pH, with the effect of acidifying the marine environment.[21] Acidification can "produce chemical changes in the sediment seawater interface, leading to biogeochemical alteration in marine ecosystems".[19]

In experiments mimicking CO_2 leakage in a marine environment, scientists found the CO_2 leakage impacted on species mortality. For example, research has observed significant increases in mortality of peppery furrow shell clams (*Scrobicularia plana*) at simulated decreases in pH values down to 7, 6.5 and 6,[22] significant increase in mortality of South American amphipod (*Hyale youngi*) at decreases in pH values down 6.5 and 6.0, [23]significant increase in mortality of Gilt-head Bream fish (*Sparus aurata*) larvae at decreases in pH values down to 6.0 and 5.5,[24] significant increase in mortality of Manila Clams (*Ruditapes philippinarum*) at decreases in pH values down to 6.0 and 5.5,[25] and significant increase in mortality of early juveniles of the European lobster (*Homarus gammarus*) at elevated partial pressure of carbon dioxide (pCO_2) levels of 9,000 µatm.[26]

In other experiments mimicking CO_2 leakage in a marine environment, scientists also found impacts on species reproduction. For example, research has observed a significant reduction in reproduction rates of one crustacean (*Moina mongolica*) at decreases in pH values down to 7.8,

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[19]Pelagos Institute, available at: http://www.pelagosinstitute.gr/gr/pelagos/pdfs/Gordon%20et%20al.%202004,%20Review%20of%20Seismic%20Surveys%20Effects.pdf

[20] MD Basallote et al, 'Lethal Effects on Different Marine Organisms, Associated with Sediment-Seawater Acidification Deriving from CO2 Leakage' (2012) 19(7) *Environmental Science and Pollution Research* 2550, 2551.

[21] MD Basallote et al, 'Lethal Effects on Different Marine Organisms, Associated with Sediment-Seawater Acidification Deriving from CO2 Leakage' (2012) 19(7) *Environmental Science and Pollution Research* 2550, 2551; M Dolores Basallote et al, 'CO2 Leakage Simulation: Effects of the PH Decrease on Fertilisation and Larval Development of Paracentrotus Lividus and Sediment Metals Toxicity' (2018) 34(1) *Chemistry and Ecology* 1, 2.

[22] M Conradi et al, 'Lethal and Sublethal Responses in the Clam Scrobicularia Plana Exposed to Different CO2-Acidic Sediments' (2016) 151 *Environmental Research* 642, 645.

[23] TA Goulding et al, 'Assessment of the Environmental Impacts of Ocean Acidification (OA) and Carbon Capture and Storage (CCS) Leaks Using the Amphipod Hyale Youngi' (2017) 26(4) *Ecotoxicology* 521, 525, 530–531.

[24] Basallote et al, 'Lethal Effects on Different Marine Organisms, Associated with Sediment-Seawater Acidification Deriving from CO2 Leakage' (2012) 19(7) *Environmental Science and Pollution Research* (n 1) 2554–2555.

[25] Ibid 2555–2556.

[26] Daniel P Small et al, 'The Sensitivity of the Early Benthic Juvenile Stage of the European Lobster Homarus Gammarus (L.) to Elevated PCO(2) and Temperature' (2016) 163(3) *Marine Biology* 53, 52, 53.

7.6 and 7.3,[27] significant reduction in neonates production of water fleas (*Daphnia magnia*) at pH 7.0,[28] and significant reduction in the embryo-larval development success and fertilisation rate of Atlantic Purple Sea Urchins (*Paracentrotus lividus*) at pH 6.5.[29]

We also note that the impacts of CCS leaks may cause a cascade effect within a marine ecosystem. For instance, one study observes "since the burrowing activity of [clams] has a strong influence on the biogeochemistry of sediments and the composition of meiofauna communities, it seems likely that changes in macrofauna abundance in response to elevated seawater pCO_2 [i.e. increased mortality] can have strong repercussions on infaunal ecosystem processes."[30]

Separately, research shows that acidic conditions enhance the mobility of trace metals or other contaminants that could be present in marine sediment. .[31] This makes trace metals or contaminants more available in the overlaying water column.[32] This may increase the risk of environmental harm in marine environments where exploration activities for CCS are proposed, and should be taken into account in any decision to release acreage.

The impact of CO_2 leakage on marine wildlife species is an important issue that should be considered as part of the release of greenhouse gas storage titles for exploration. The precautionary principle, as set out in section 3A(b) of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) should be applied to any decision to release acreage.[33] Potential serious or irreversible damage caused to marine environments in the event of CO_2 leakage is not yet fully understood in the Australian offshore context. However, the research outlined suggests that CCS projects are also likely to pose a significant impact to Australian marine species.

The principles of ecologically sustainable development, including the integration of long-term economic, environmental, social and equitable considerations, as set out in section 3A(a) of the EPBC Act should be considered as relevant policy guidance for the proposed acreage release.[34] CO_2 leakage from CCS projects poses a serious and potentially irreversible risk to marine environments that Australians rely on for long-term economic and environmental benefit. This risk should be fully understood before any determination is made to release acreage for potential CCS projects.

Further research into the impact of CO_2 leakage resulting from CCS in Australia is necessary before further exploration is undertaken offshore in relation to these projects.

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[27] Zaosheng Wang, Youshao Wang and Changzhou Yan, 'Simulating Ocean Acidification and CO2 Leakages from Carbon Capture and Storage to Assess the Effects of PH Reduction on Cladoceran Moina Mongolica Daday and Its Progeny' (2016) 155 *Chemosphere* 621, 625.

[28] Gema Parra et al, 'Effects of Experimental Long-Term CO2 Exposure on Daphnia Magna (Straus 1820): From Physiological Effects to Ecological Consequences' (2016) 156 *Chemosphere* 272, 275.

[29] Basallote et al, 'CO2 Leakage Simulation' (n 1), 8.

[30] Hanna Schade et al, 'Simulated Leakage of High PCO(2) Water Negatively Impacts Bivalve Dominated Infaunal Communities from the Western Baltic Sea' (2016) 6 *Scientific Reports* 31447, 2.

[31] MD Basallote et al, 'Lethal Effects on Different Marine Organisms, Associated with Sediment-Seawater Acidification Deriving from CO2 Leakage' (2012) 19(7) *Environmental Science and Pollution Research* 2550, 2551.

[32] Ibid, 2551.

[33] *Environment Protection and Biodiversity Conservation Act 1999* (Cth), section 3A.

[34] *Environment Protection and Biodiversity Conservation Act 1999* (Cth), section 3A.

CCS systems are also water-intensive operations because water is needed during the cooling process at the power-plant level and as part of the carbon capture process.[35] Consequently, broad adoption of CCS "could strongly affect local and global water resources" where they compete with municipal and industrial uses, irrigated agriculture, and agro-ecosystems.[36]

Having regard to the on-shore locations proximate to the titles in the Bonaparte Basin, Browse Basin, Northern Carnarvon Basin, Perth Basin, Otway Basin, Bass Basin and Gippsland Basin there may be areas of potential water use sensitivity that could be impacted by CCS activities if pursued for each title. Accordingly, the water use required for CCS should be considered in terms of the location of the proposed acreage release in any determination to release acreage.

Transport of captured CO_2 presents significant risks associated with pipeline failure which increase with the distance of travel required.[37] Large-scale implementation of CCS would require "a massive buildout of pipelines and associated infrastructure" on top of the existing oil and gas pipeline network, which would have significant environmental impacts and endanger communities through which the pipelines would run.[38]

The technical information and understanding necessary to ensure these environmental impacts are properly mitigated, may not be held by companies preparing bids for the acreage release. However, the environmental impacts and risks posed by CCS should be fully considered in any determination to release acreage. A failure to do so may mean that appropriate mitigating conditions are not properly identified or proposed as CCS projects progress.[39]

Further, given the environmental impacts and risks discussed above, ongoing monitoring and compliance measures in relation to CCS projects will pose a significant administrative and financial burden on proponents and government. Given that a CCS project is only effective if it

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[35] Lorenzo Rosa et al., 'The Water Footprint of Carbon Capture and Storage Technologies' (2021) *Renewable and Sustainable Energy Reviews* 3; see also IPCC AR6 WGIII Report 643 ("CCS requires considerable increases in some resources and chemicals, most notably water. Power plants with CCS could shut down periodically due to water scarcity. In several cases, water withdrawals for CCS are 25–200% higher than plants without CCS (Rosa et al. 2020b; Yang et al. 2020) due to energy penalty and cooling duty. The increase is slightly lower for non-absorption technologies. In regions prone to water scarcity such as the Southwestern USA or Southeast Asia, this may limit deployment and result in power plant shutdowns during the summer months (Liu et al. 2019b; Wang et al. 2019c).").

[36] Lorenzo Rosa et al., 'The Water Footprint of Carbon Capture and Storage Technologies' (2021) *Renewable and Sustainable Energy Reviews* 3, 17.

[37] A. Brown et al, 'IMPACTS: Framework for Risk Assessment of CO2 Transport and Storage Infrastructure' (2017) 114 Energy Procedia 6501, 6503. See also, Dr. S Jansto, *Risks and Potential Impacts from Carbon Steel Pipelines in Louisiana Transporting and Processing Variable Produced Gases such as CO2 (CO_2), Hydrogen (H_2), Methane (CH_4)* (Oct. 9, 2022), Available at: https://healthygulf.org/wp-content/uploads/2022/10/CCS-and-Pipeline-Final-Report_Jansto_October-9th-1.pdf.

[38] Center for International Environmental Law, 'Carbon Capture and Storage (CCS): Frequently Asked Questions' (Blog Post), Available at: https://www.ciel.org/carbon-capture-and-storage-ccs-frequently-asked-questions/. ("CO2 in high concentrations can be hazardous to human health, building out a national CO2 pipeline network raises safety issues which may affect nearby communities and may hinder CCS deployment."); see also Congressional Research Service, *CO2 Pipelines: Safety Issues* (2022), Available at: https://crsreports.congress.gov/product/pdf/IN/IN11944.

[39] Joris Koornneef et al., 'The environmental impact and risk assessment of CO2 capture, transport and storage: An evaluation of the knowledge base' (2012) *Progress in Energy and Combustion Science* (abstract), Available at: https://www.sciencedirect.com/science/article/abs/pii/S0360128511000402.

can permanently store GHG emissions, these projects will pose an enduring regulatory burden for the government. The capacity of government regulators to enforce conditions on CCS projects to effectively monitor and mitigate environmental impacts in perpetuity is an important issue to be considered in any determination to release acreage for bidding, and any subsequent project specific approvals.

7. Conclusion

AMCS and EDO are strongly opposed to any acreage release for the proposed storage of greenhouse gases. For decades, CCS has been held up by the fossil fuel industry as a viable technology to capture carbon pollution from current and future coal, oil and gas projects. However, the technology is, and will continue to be, a failure. CCS has proven to be expensive, unreliable, unsafe and unviable at the scale Australia needs to take meaningful action on climate change.

Our oceans, marine life, climate and Australian communities should not be forced to bear the burden of this unproven, unviable, uneconomical and unsafe technology designed to prolong the fossil fuel industry.