MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

COVERSHEET

Minister	Hon Simon Watts	**Portfolio**	Energy
Titles of Cabinet Papers	Enabling Carbon Capture, Utilisation and Storage Policy Approach for Carbon Capture, Utilisation and Storage	**Date to be published**	27 March 2025

List of documents that have been proactively released		
Date	**Title**	**Author**
October 2024	Enabling Carbon Capture, Utilisation and Storage	Office of the Minister for Energy
16 October 2024	Enabling Carbon Capture, Utilisation and Storage ECO-24-MIN-0223 Minute	Cabinet Office
9 October 2024	Regulatory Impact Statement: Enabling Carbon Capture and Storage	MBIE
9 October 2024	Climate Implications of Policy Assessment: Enabling Carbon Capture and Storage	MBIE
December 2024	Policy Approach for Carbon Capture, Utilisation and Storage	Office of the Minister for Energy
11 December 2024	Policy Approach for Carbon Capture, Utilisation and Storage ECO-24-MIN-0305 Minute	Cabinet Office
26 November 2024	Regulatory Impact Statement: Further decisions on an enabling framework for Carbon Capture and Storage	MBIE

Information redacted **YES**

Any information redacted in this document is redacted in accordance with MBIE's policy on Proactive Release and is labelled with the reason for redaction. This may include information that would be redacted if this information was requested under Official Information Act 1982. Where this is the case, the reasons for withholding information are listed below. Where information has been withheld, no public interest has been identified that would outweigh the reasons for withholding it.

Some information has been withheld for the reasons of Confidential advice to Government, Negotiations, and National Economy.

Regulatory Impact Statement: Further decisions on an enabling framework for Carbon Capture and Storage

Coversheet

Purpose of Document	
Decision sought:	*Further decisions on an enabling framework for carbon capture and storage*
Advising agencies:	*Ministry of Business, Innovation and Employment (MBIE), Ministry for the Environment (MfE)*
Proposing Ministers:	*Minister for Energy, Minister of Climate Change, Minister for RMA Reform*
Date finalised:	*26 November 2024*

Problem Definition

Carbon capture, utilisation and storage (**CCUS**) is internationally recognised as an important part of the portfolio of options to reduce net greenhouse gas emissions. It has the potential to reduce the cost of meeting New Zealand's emissions budgets, support emissions reduction in hard to abate industries and support energy security by reducing the cost of gas production.

Carbon capture and storage (**CCS**) in suitable geologic formations is a subset of CCUS. The activities and tests required to undertake CCUS are only partially reflected in New Zealand's legislative settings. Without a comprehensive regulatory package to facilitate CCUS decision-making, potential CCS proponents have indicated they are uncertain as to how or whether to proceed. This will also impact on the ease with which regulators can assess a CCS application and to which a CCS project enjoys a good degree of social licence.

The specific policy problems addressed in this RIS are as follows:

- Existing approval processes are unlikely to provide assurance of the suitability of a storage site and associated operations, while still enabling CCS to occur, in line with other jurisdictions.
- There is the potential for inconsistency, uncertainty, and inefficiency in decision making to approve and manage CCS projects.
- There is no mechanism to reward operators that are not Emissions Trading Scheme (**ETS**) participants for undertaking CCS activities.

Executive Summary

Carbon capture and storage (**CCS**) is an important technology in the global transition away from fossil fuels. CCS involves:

- the capture of carbon dioxide (**CO_2**) from large point sources (such as upstream fossil natural gas extraction and production facilities, power generation and industrial facilities), or direct capture of CO_2 from the atmosphere, and

- the injection of CO_2 into storage sites. This involves the injection of captured CO_2 into deep underground geological formations such as depleted oil and natural gas reservoirs and deep saline aquifers.

CCS is a subset of carbon capture, utilisation and storage (**CCUS**), which also contemplates using captured CO_2 in industrial processes. Carbon utilisation activities already take place in New Zealand.

There is currently no clear enabling framework for CCS in New Zealand. In August 2024 as part of the comprehensive response to the energy security of supply situation, Cabinet agreed to the development of a clear enabling framework, including with a view to reducing the costs of gas production.

In October 2024, Cabinet took the first set of decisions on the framework. This included agreement to a high-level treatment of CCS under the New Zealand Emissions Trading Scheme (**ETS**) and noted the likely features of an enabling framework, based on key features common in regulatory regimes in other jurisdictions. These include:

- a test of the suitability of prospective CCS sites and activities to meet before a project can go ahead
- a risk-based monitoring, reporting, verification activities during and after a CCS operation
- relieving the operator of the emissions obligations associated with a storage site, if the state chooses to do so and if certain conditions are met.

There is a need to ensure the appropriate selection and management of a CCS project throughout its full lifecycle, which can be over very long timescales, including in the period after injection operations have ceased.

It is unclear how suited existing regulatory regimes in New Zealand are for CCS activities. The primary regimes at present that allow activities to occur while managing environmental effects are the *Resource Management Act 1991* (**RMA**) and *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012* (**EEZ**), depending on where a CCS project would take place. These regimes were not designed with the features of CCS activities in mind and may not provide a clear pathway to consent CCS projects while adequately managing risks. There is a need to balance a clear and efficient process to allow CCS activities to occur against risks, in order to underpin social licence for CCS, meeting our international obligations and mitigating the risk of environmental harms occurring.

There are also potential interactions with the *Crown Minerals Act 1991* (**CMA**). Some CCS activities are likely to utilise existing oil and gas infrastructure to store CO_2 in hydrocarbon reservoirs. There are obligations on existing permit holders to decommission infrastructure once extraction operations have ceased, and financial assurance requirements to mitigate the risk of decommissioning costs falling to the state.

This RIS recommends a package of options to address the above issues to support high-level decisions on the key features of an enabling framework for CCS activities. This includes requiring that a decision-maker must be satisfied of the suitability of a storage site and associated operations when approving a CCS activity, providing for the ability to adjust obligations on an CCS operator during operations, placing requirements on an operator after injection operations have ceased, and providing for a minimum 15 year period post closure before an operator could apply to the Crown to remove their surrender obligation in the ETS relating to the stored CO_2. Aligning financial assurance and decommissioning requirements with CMA obligations is also recommended.

There will be further work to determine how the proposals should be implemented, including the extent to which legislative amendments are needed and which legislative vehicle to use. There are a number of options in this space, including amending the RMA

and EEZ Act, creating subordinate legislation such as National Policy Statements and National Environmental Standards or new bespoke legislation.

Proposal on ETS Reward for non-participants

This RIS also considers the lack of a mechanism in the NZ ETS to reward parties carrying out CCS activities that are not existing participants. Under Cabinet's October decisions, participants will be able to reduce their ETS obligations by the amount of CO2 they sequester. However, there is no clear pathway for other parties undertaking CCS activities that do not have obligations under the ETS, meaning new technologies like direct air capture may not have sufficient incentives to undertake CCS.

To address this issue, this RIS proposes creating a new removal activity for CCS activities. It also notes that implementing this proposal will depend on wider changes to the ETS register, managed by the Environmental Protection Agency (**EPA**).

Limitations and Constraints on Analysis

In August 2024 as part of the comprehensive response to the energy security of supply situation, Cabinet agreed to the development of a clear enabling framework for CCS. This significantly increased the priority for establishing an enabling framework and limited the timeframes for policy design, development and further consultation and engagement.

In October 2024, Cabinet agreed to high-level decisions about how CCS activities would be treated within the NZ ETS. This included that ETS participants would be able to reduce their obligations by the amount of CO_2 they store through CCS and provide for operators to be liable under the ETS for any subsequent leakage of that CO_2, unless this liability is assumed by the Crown at a later date.

The proposals and analysis of options in this RIS assume that the October decisions to allow for ETS reward, assignment of liability and potential transfer of liability to the Crown are in place as part of the counterfactual.

The October 2024 decisions also noted the likely features of a CCS framework, including application to all forms of storage countable against international climate change commitments, an assessment and monitoring function, and a clear long-term liability framework. These are common features of CCUS regulatory regimes and frameworks in other jurisdictions. Commissioning by Ministers has included a focus on adapting features from other jurisdictions, namely Australia. Therefore, the analysis of options in this RIS focuses at a high level on each feature in a CCS regulatory framework and assesses the inclusion of these elements as a package against the counterfactual.

Except for the proposal relating to ETS reward for CCS for operators that are not already ETS participants, the preferred legislative vehicle for the proposals is not yet clear. It is likely that implementing the proposals in this RIS will require amendments to primary legislation, namely the *Resource Management Act 1991*, *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012*, *Climate Change Response Act 2002* and *Crown Minerals Act 1991*.

Confidential Advice to Government

Confidential Advice to Government

Responsible Manager(s) (completed by relevant manager)	
Sharon Corbett *Policy Director* *Energy Markets Branch* *Ministry of Business, Innovation and Employment* *25 November 2024*	*Rebecca Clements* *Manager* *Sector Policy and Finance* *Ministry for the Environment* *26 November 2024*

Quality Assurance (completed by QA panel)	
Reviewing Agency:	MBIE
Panel Assessment & Comment:	MBIE's Regulatory Impact Analysis Review Panel reviewed the RIS and considered that the information and analysis summarised in the RIS meets the criteria necessary for ministers to make informed decisions on the proposals in this paper.

Section 1: Diagnosing the policy problem

What is the context behind the policy problem and how is the status quo expected to develop?

Carbon Capture and Storage (CCS) is an important technology in the global transition away from fossil fuels

1. CCS involves:
   - the capture of carbon dioxide (**CO_2**) from large point sources (such as upstream fossil natural gas extraction and production facilities, power generation and industrial facilities), or direct capture of CO_2 from the atmosphere, and
   - the injection of CO_2 into storage sites. This involves the injection of captured CO_2 into deep underground geological formations such as depleted oil and natural gas reservoirs and deep saline aquifers.
2. There is growing international support for CCS. Both the IPCC[1] and the IEA[2] consider CCS could play an important role in reducing global emissions by preventing emissions into the atmosphere and removing existing emissions.
3. CCS is a subset of carbon capture, utilisation and storage (**CCUS**), which also contemplates using captured CO_2 in industrial processes. Carbon utilisation activities already take place in New Zealand.

[1] https://www.ipcc.ch/report/sixth-assessment-report-cycle/

[2] https://www.oecd-ilibrary.org/energy/energy-technology-perspectives-2020-special-report-on-carbon-capture-utilisation-and-storage_208b66f4-en

CCS is at an early stage of development in New Zealand, but could form an important part of meeting the next two emissions budgets

4. CCS is in its very early stages of development in New Zealand. The only operational use of CCS in New Zealand has been geothermal reinjection of CO_2, including at the Top Energy Ngāwhā geothermal power plant. Operators of most geothermal plants in the Waikato and Bay of Plenty regions are also undertaking reinjection trials. Geothermal reinjection is supported through the New Zealand Emissions Trading Scheme (**NZ ETS**) via the ability to apply for a unique emissions factor.[3]

5. Some upstream oil and natural gas producers, particularly those mining natural gas wells with high CO_2 concentration, and some midstream chemical companies have investigated CCS opportunities here. Some sites in New Zealand, including some natural gas fields in Taranaki, may be suitable for CO_2 storage. There are also companies looking at less developed capture and storage technologies, such as direct air capture, and novel storage methods.

6. A Climate Impacts of Policy Assessment (CIPA) was prepared for the previous set of decisions and set out three potential scenarios for CCS deployment in the near term, based on discussions with the sector. This assessment also informed estimates for meeting the second and third Emissions Budgets in the second Emissions Reduction Plan. The scenario selected contemplated one operator undertaking CCS activities at a high CO_2 gas field, resulting in emissions reductions of $1MtCO_2e$ in Emissions Budget Two, and $0.9MTCO_2e$ in Emissions Budget Three.

An enabling framework for CCS would support the general approach for New Zealand to meet its emissions budgets on a least cost basis

7. Under the *Climate Change Response Act 2002* (**CCRA**), New Zealand has committed to meeting a series of Emissions Budgets and has a target for net zero greenhouse gas emissions by 2050 (other than for biogenic methane).[4]

8. To achieve these targets, businesses and households will need to make behavioural changes and adopt a mix of technologies and practices to reduce the amount of greenhouse natural gases released into the atmosphere.[5]

9. Natural gas production and consumption represents a sizeable share of New Zealand's total emissions. In the long term, reducing natural gas consumption could lower carbon emissions, but the pace of decarbonisation will depend on what fuels consumers convert their energy consumption to, the emissions intensity of those fuels, and the energy efficiency of appliances. Transitioning away from natural gas before renewable alternatives are in place can be counterproductive (eg resulting in an increase of coal use for electricity generation) and cause significant economic and employment shocks.

10. An enabling framework for CCS will increase the range of options New Zealand has, alongside other emissions reduction and removals technologies, to achieve emissions budgets. It could also reduce emissions in our 'hard to abate' sectors – such as gas production, and petrochemicals and heavy industries (including the production of

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[3] CCS via geothermal reinjection is already enabled by existing regulatory settings, and differs significantly in technology and practices compared to geologic sequestration of CO_2, which is the focus of this RIS.

[4] The Paris Agreement is a legally binding international treaty on climate change. Its overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels." Since 2020, countries (including New Zealand) have been submitting their national climate action plans, known as nationally determined contributions (NDCs), to communicate actions they will take to reduce greenhouse gas emissions to reach the goals of the Paris Agreement.

[5] https://environment.govt.nz/publications/new-zealands-greenhouse-gas-inventory-19902022-snapshot/

fertiliser, methanol, cement, and steel). If deployed, it would decrease the cost of meeting emission budgets.[6] Whether operators choose to deploy CCS as a way to reduce or remove emissions will ultimately depend on commercial factors, namely the cost of using CCS compared to other technologies and options. The Government has signalled it is taking a broad-based approach to reducing net emissions, by making options available through clear enabling frameworks and regulatory settings.

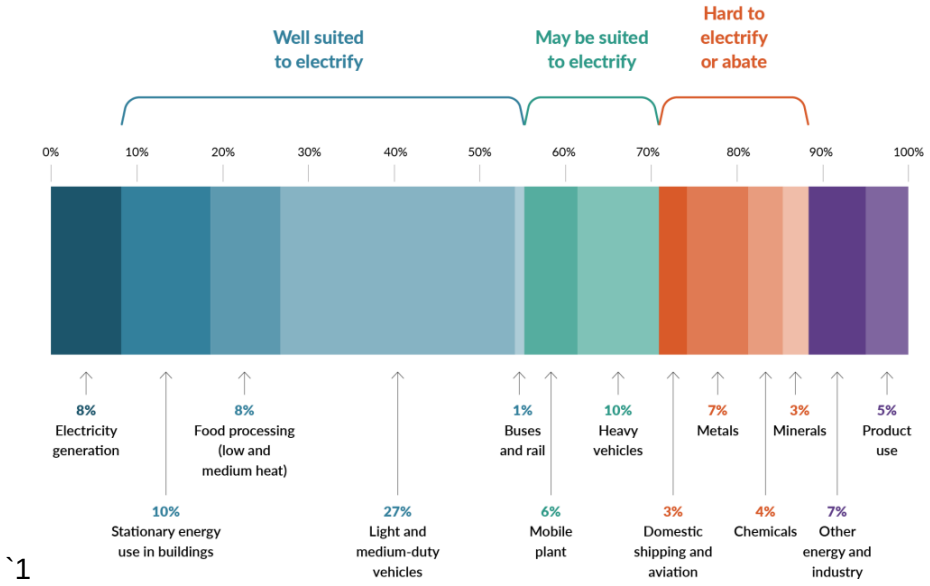

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Figure 1. *New Zealand's emissions from the energy sector and industrial processes and product use sector, 2022*

Cabinet has recently made decisions on establishing an enabling framework for CCS, and inclusion of CCS in the NZ ETS

11. In August 2024 as part of the comprehensive response to the energy security of supply situation, Cabinet agreed to the development of a clear enabling framework for CCS, including with a view to reducing the costs of gas production.

12. In October 2024, Cabinet took the first set of decisions on the framework. This included agreement to high-level treatment of CCS under the NZ ETS and noted the likely features of an enabling framework.

13. Decisions on NZ ETS treatment of CCS activities for existing participants included agreement that:

    - CCS operators will be able to reduce their obligations in the NZ ETS by the amount of carbon they sequester, including CO_2 sequestered from third party sources
    - CCS operators will remain liable under the NZ ETS for any subsequent leakage unless the Crown chooses to take on that liability at a later date.

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

https://www.mbie.govt.nz/dmsdocument/27344-energy-in-new-zealand-2023-pdf

https://www.mbie.govt.nz/dmsdocument/23550-energy-in-new-zealand-2022-pdf

14. These decisions provide the high-level incentives for CCS activities to take place in New Zealand, by providing a financial reward through the NZ ETS for stored carbon, with corresponding ETS liabilities in the event of leakage.

15. The paper noted that a CCS framework is likely to include several key features are commonly found in other jurisdictions. This includes:

    - a permitting, consenting or assessment function to enable CCUS activities to occur
    - a monitoring, reporting and verification function
    - a clear long-term liability framework that sets out who is responsible for any future migration or leakage.

16. Cabinet also agreed that application of the framework would be limited to internationally recognised forms of CCS for the purposes of New Zealand's emissions accounting commitments and agreements.

17. The paper also noted that the *Resource Management Act 1991* and *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012* contain most of the building blocks of an approval and monitoring framework for CCUS activities. Because of the interaction with petroleum and gas extraction activities, including the similar infrastructure required and potential for CCS activities to utilise end-of-life or depleted oil and gas reservoirs, the paper also noted potential interactions with permitting arrangements and obligations under the *Crown Minerals Act 1991*.

Carbon sequestered in geologic formations has a very low risk of later migrating or leaking into the atmosphere, provided that sites are appropriately selected and managed

18. International evidence suggests that CCS carried out in an appropriately selected geological storage site, and with adequate risk mitigation and management strategies in place, has a very low risk of later migrating unexpectedly, or leaking into the atmosphere.[7]

19. However, the individual characteristics of a CCS project and the associated risks of unintended migration or of leakage to the atmosphere are highly specific to the geology of the site, as well as the mitigations and measures put in place to manage and monitor for these risks.

20. There is a need to adequately and actively control for these risks through appropriate site selection, risk management and mitigation measures, and clear assignment of liability throughout the full lifecycle of a CCS project. This is needed to mitigate the potential risks of an inadequately designed and implemented CCS project on:

    - the Crown and ultimately the taxpayer, if a CCS project without clear liability attached to the operator results in leakage occurring and incurring a corresponding liability in New Zealand's national emissions accounting obligations
    - adverse effects on the local environment from unintended migration, or leakage
    - global emissions resulting from the leakage of CO_2 from a storage formation to the atmosphere.[8]

[7] Intergovernmental Panel on Climate Change (2005). Carbon Dioxide Capture and Storage. https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf

[8] Note that while leakage would have an effect on global emissions, this would be relatively small given the scale of potential CCS projects in New Zealand, that are likely to be in the hundreds of thousands to millions of tonnes.

The risk of migration and leakage from a storage site is managed throughout the full lifecycle of a CCS activity

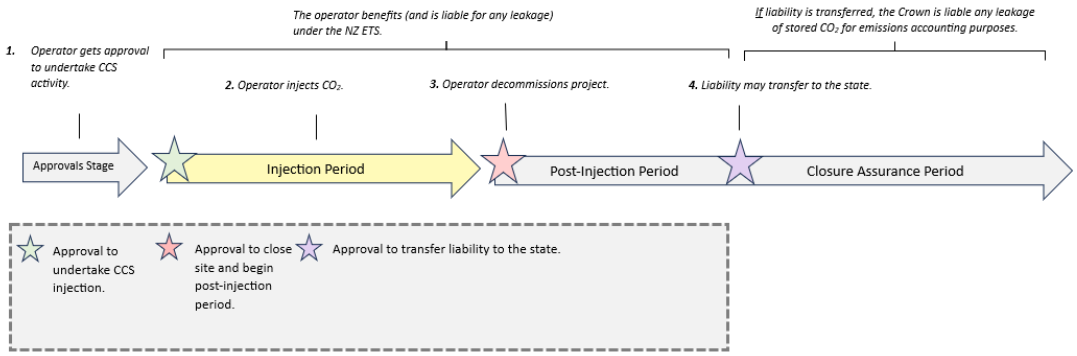
21. There are several stages typical of a geologic CCS activity that feature in regulatory regimes in other jurisdictions:

    - **Pre-injection** activities to determine the geological suitability of the proposed formation for injection and develop plans specific to that site in order to manage and mitigate risks. Monitoring of the site can start before injection to determine baselines to inform later monitoring of migration and leakage.
    - **Injection operations** where CO_2 is being injected into the storage site. This could either be injection of carbon into the formation only, or it may occur alongside active oil and/or gas extraction activities. Monitoring is typically undertaken throughout, and plans may be altered in response to changes in expected behaviour of the CO_2 within the formation.
    - **Cessation of injection** operations, where injection operations cease, and the injection well is plugged/sealed to prevent any leakage to the surrounding environment or atmosphere. There may also be requirements here for infrastructure to be removed and the site remediated to its former state. A regulator typically approves the closure of a site, subject to an operator satisfactorily meeting requirements and demonstrating that the stored CO_2 is contained.
    - **Post-injection** period, the site is monitored for an ongoing period of time, always more than ten years following site closure, to ensure there is no unexpected migration of the stored CO_2, or leakage of carbon into the atmosphere.
    - **Transfer of liability**. Where provided for in other jurisdictions, an operator can apply for indemnification of liability.
    - In a number (but not all) jurisdictions, the state **takes over liability** for the site. Some obligations and responsibilities on the operator can persist, such as obligations to continue monitoring the site for migration and leakage. Other liabilities, such as those relating to infrastructure decommissioning, environmental or property damage resulting from these activities, may persist in perpetuity.

22. These stages also include a number of decision points made by a regulator, including the initial approval to undertake a CCS operation, approval to formally close the site and begin the post-injection period, and the decision on whether to transfer liability from the operator to the state.

23. The diagram below sets out this process at a high level, including where previous decisions on financial reward and liability under the NZ ETS would apply throughout a typical CCS project lifecycle.

CCS – Condensed and Simplified Process Map



What is the policy problem or opportunity?

24. The policy problems addressed in this RIS are as follows:

- Existing approval processes are unlikely to provide assurance of the suitability of a storage site and associated operations, while still enabling CCS to occur, in line with other jurisdictions.
- There is the potential for inconsistency, uncertainty, and inefficiency in decision making to approve and manage CCS projects.
- There is no mechanism to reward operators that are not ETS participants for undertaking CCS activities.

Problem definition part 1: Existing approval processes are unlikely to provide assurance of the suitability of a storage site and associated operations, while still enabling CCS to occur, in line with other jurisdictions

The risk of CO_2 leakage is an essential consideration

25. Establishing confidence that injected CO_2 will be highly unlikely to ever leak from a storage location, before CO_2 injection at that location may be approved or before liability may possibly transfer, will be important for:

- **Achieving social licence for CCS as an emissions mitigation technology.** The degree to which risks posed by CCS projects are successfully managed and mitigated (in particular, the risk of potential CO_2 leakage into the atmosphere) is likely to influence how those projects are seen by the public. If a poorly selected or operated CCS project was approved by a decision-maker and subsequently leaked, the public could become highly critical and sceptical of:
  - individual CCS projects,
  - future CCS projects,
  - regulatory frameworks, and
  - the safety and feasibility of CCS technology itself.
- **Meeting our domestic and international obligations.** The Paris Agreement is a legally binding international treaty on climate change. Its overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels." Since 2020, countries (including New Zealand) have submitted national climate action plans, known as nationally determined contributions (NDCs), to communicate actions they will take to reduce greenhouse gas emissions to reach the goals of the Paris Agreement. New Zealand uses a system of emissions budgets to meet its 2050 target. The first three emissions budgets cover 2022–2025, 2026–2030 and 2031–2035. The Government sets out emissions reduction plans with policies and strategies for meeting emissions budgets. If New Zealand plans to meet NDCs and its emissions budgets with the aid of CCS, but CO_2 which has been injected by way of CCS is later found to have leaked, this will undo progress toward meeting NDCs and emissions budgets and make meeting future NDCs and emissions budgets more difficult.
- **Mitigating the risk of environmental harms from occurring.** As mentioned above, there are two categories of environmental harm which apply to all potential CCS projects.
  - The risk of *local environmental harms*, resulting from CO_2 migration or leakage into another area of the subsurface, or surface. For example, injected CO_2 could migrate and contaminate ground water for drinking, or

cause earthquakes. For CCS activities conducted offshore, CO_2 leakage could pose major hazards to sensitive marine organisms and make the surrounding seawater more acidic. CO_2 is denser than air and can therefore accumulate to potentially dangerous concentrations in low lying areas. Onshore, this would present a clear physiological hazard for humans (eg workers in the vicinity of any release) and animals. A concentration of CO_2 greater than 7–10 per cent in air would cause immediate dangers to human life and health. If substantial quantities of impurities, particularly hydrogen sulphide (H_2S, are included in the CO_2, this could affect the potential impacts of a leak or rupture. The exposure threshold at which H_2S is immediately dangerous to life or health, according to the National Institute for Occupational Safety and Health, is 100ppm, compared to 40,000 ppm for CO_2.

- The risk of local environmental harms, resulting from CO_2 migration or leakage into another area of the subsurface, or surface, including damage to the local environment, people and property.
- The risk of *global environmental harms*, resulting from CO_2 leakage into the atmosphere, primarily climate change.

- **Protecting the Crown from fiscal risk.** Cabinet has agreed that a CCS operator must meet relevant ETS surrender obligations for any CO_2 which has been injected but subsequently leaks. However, the Crown may agree to remove this obligation, subject to certain conditions being met, if subsequent leaks are not due to negligence. That proposal has not yet been agreed to by Cabinet and is detailed in this RIS. If leakage occurs far in the future (eg 100 years), when the CCS operator may have ceased to exist, it may not be possible to enforce its obligation to surrender NZUs for CO_2 leakage. Leaked CO_2 would be added to New Zealand's Greenhouse Gas Inventory. This could add to the fiscal cost of meeting budgets and targets depending on future decisions on how to meet these.

26. Therefore, any obligations placed upon the operator should seek to mitigate these possible harms, by ensuring that CCS injection activities may only occur at locations that are appropriate and suitable, and only if all activities pertaining to a CCS operation can and will be well managed.

Regulatory requirements should be well-balanced

27. The necessity and appropriateness of any requirement that seeks to manage and mitigate harm should be carefully considered, to ensure that requirements to be imposed on an operator are not needlessly onerous. Onerous requirements would disincentivise CCS activities from occurring.

28. Regimes for CCS established by other countries tend to carefully balance the need to ensure that CCS storage locations are appropriately selected, and CCS activities are well-managed, while still seeking to provide that regulatory settings are sufficiently enabling and incentivising. Most jurisdictions achieve this through a mix of up-front tests that must be met, ongoing monitoring requirements, specific liability arrangements in relation to any leakage of CO_2 into the atmosphere, and other obligations. These regimes ensure an operator actively controls for the risks associated with CCS activities in a proactive manner, throughout the full lifecycle of a CCS project.

It is unclear how well current regimes would provide for this balance

29. In New Zealand, the *Resource Management Act 1991* (**RMA**) and the *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012* (**EEZ Act**) provide the overarching framework to permit activities to occur, while assessing potential adverse environmental effects. Previous legal reviews have found that CCS activities would likely need a resource or marine consent for either dumping of waste, or discharge into land or water. However, it is unclear to what extent these regulatory

regimes would provide for the risk management features for CCS projects found in other jurisdictions.

30. Beyond the consenting regime under the RMA and the EEZ Act, the *Crown Minerals Act 1991* (**CMA**) may also be relevant. The CMA sets out the broad permitting regime for prospecting, exploring and mining Crown-owned minerals in New Zealand. Permits issued under the CMA for mining operations do not give their holders the right to carry out CCS operations. However, injection can be done within the existing CMA permit structure in some circumstances (for instance, when this is incidental to existing mining operations). The CMA also places requirements on permit holders to decommission infrastructure and remediate sites once permit activities have ceased and meet financial assurance requirements to underpin these requirements.

31. The CMA is mainly concerned with management of prospecting, exploration, and mining of Crown owned minerals. It is unclear whether a decision-maker deciding whether to allow 'incidental' injection activities under the CMA (which had sequestration as their purpose), would be required to consider whether injected CO_2 would ever leak into the atmosphere, or not.

Problem definition part 2: There is the potential for inconsistency, uncertainty, and inefficiency in decision making to approve and manage CCS projects

32. There have been no known applications under existing consenting processes for CCS activities in New Zealand. Previous legal reviews have found that existing regulatory frameworks are unlikely to provide sufficient clarity and certainty to project proponents, would not be ideal in their regulatory comprehensiveness for the protection of the public interest and provide little direction to decision-makers on how to consider potential benefits of CCS, alongside the potential environmental impacts.

33. CCS activities are likely to be large-scale projects, requiring careful consideration of technical data and information to assess their suitability, both in terms of the proposed geological formation for storage, and the associated infrastructure and operations. Existing settings to approve CCS projects may result in high costs and a level of uncertainty that may mean proponents are unlikely to proceed with them, resulting in a missed opportunity to utilise a key technology for emissions reductions and removals.

34. There is also an opportunity to minimise duplication of processes and compliance burden wherever possible. Under the status quo, CCS proponents would be required to obtain multiple consents and permits from different consenting authorities and regulators. Officials have also heard that one of the weaknesses of regimes in other jurisdictions is that potential proponents often have to gain approval from multiple regulators, which can discourage investment and delay projects coming online.

35. There is an opportunity to provide clear decision-making criteria and processes. An applicant to undertake CCS activities should be clear on what is required of them at each stage of the process. The criteria to be used and processes to be followed must be clear enough to make the system workable.

Problem definition part 3: There is no mechanism to reward operators that are not ETS participants

36. The October decisions established a benefit by way of reduced ETS obligations for CCS activities, which primarily covers gas producers. This is unlikely to be appropriate for other potential CCS operators who are not existing ETS participants and therefore do not have emissions to reduce their ETS obligations against. This will likely disincentivise uptake of CCS operations among new entrants that seek to inject

captured CO_2 into a geological formation without any link to oil and gas extraction, or new technologies such as direct air capture.

What objectives are sought in relation to the policy problem?

37. The policy objectives for the proposals of an enabling framework for CCS activities are similar to those considered in the previous RIS covering the first set of decisions. They are:

- **Responsible management:** putting in place the right obligations and incentives for CCS operators to appropriately mitigate and manage CCS leakage.
- **An enabling regulatory environment** for CCS activities.

Section 2: Deciding upon an option to address the policy problem

What criteria will be used to compare options to the status quo?

38. The proposals will be assessed against the criteria in the table below. The criteria have been derived from the policy objectives outlined earlier.

Objectives	Criteria
Responsible management: putting in place the right obligations and incentives for CCS operators to appropriately mitigate and manage CCS leakage.	The ability of the option to provide confidence in the **integrity of storage**. The ability of the option to support **appropriate mitigation and management of risks** specific to a given project – ie on a risk-based project-specific basis.
An enabling regulatory environment for CCS activities.	The ability of the option to provide for **obligations or criteria to be set that are not unduly onerous**. The ability of the option to provide for **certain and efficient (minimise time, cost, duplication) decision making processes.**

What scope will options be considered within?

39. In August 2024, Cabinet agreed to develop a clear, an enabling framework for CCS, including with a view to reducing the costs of gas production.

40. Subsequent decisions by Cabinet in October 2024 set the overall boundaries the regime will operate in. Namely, the ability of CCS operators that are ETS participants to reduce their obligation by the amount of carbon they sequester, and the liability under the ETS for any leakage of that carbon. These decisions also envisage the option for the Crown to assume this liability at a point in time after injection activities have ceased. These decisions also noted the likely features of a framework, including:

    - application to CCS activities that are countable under New Zealand's international climate agreements and obligations
    - an assessment/permission function
    - a monitoring function
    - a clear framework for long-term liability arrangements.

41. The October Cabinet paper also signalled the intention for the framework to be cost-neutral, meaning the costs of CCS activities are either borne directly by, or recovered from, CCS operators.

42. The scope is also guided by Ministers' commissioning us to adapt from CCUS regulatory regimes in other jurisdictions. We have identified key common features of these regimes for inclusion in a New Zealand framework. We have examined overseas

regulatory regimes to understand options for regulating CCS activities, particularly those in Australia, Canada, the EU, California, and Norway.

What options are being considered?

43. For the purposes of analysing options, we have split the options analysis into the following areas:

    - Options to provide assurance of the suitability of a storage site and associated operations, while still enabling CCS to occur in line with other jurisdictions, and to provide consistency, certainty and efficiency in decision-making for CCS projects.
    - Options to reward CCS activities, where operators are not ETS participants.

44. At the end of this section, we present the overall package of options.

Description of counterfactual option

45. Each proposal analysed below is assessed against a counterfactual option. This assumes that the previous Cabinet decisions have been implemented, meaning that:

    - an ETS benefit is established for CCS operators, where ETS participants that undertake CCS activities can reduce their ETS liabilities by the amount of CO_2 they store, and
    - there is a corresponding liability, in the event of leakage of any stored CO_2, to surrender ETS units. Ongoing ETS liability stays with operator unless the Crown opts to remove the operators ETS liability.

46. CCS Operators would rely on existing pathways to obtain resource consents under the RMA and EEZ Act for CCS injection activities. Other regulatory approvals for CCS activities remain managed through relevant regulatory regimes such as the Crown Minerals and Health and Safety regimes, where applicable.

47. The counterfactual is discussed in further detail as it relates to each proposal.

Section 2.1 – Options to establish a suitability test be met, in order for CCS projects to proceed and to be eligible for a benefit under the NZ ETS

48. There is no current mechanism to ensure that a decision-maker *must* consider the suitability of a proposed CO_2 storage site and CCS operation when deciding whether to grant approval for a proposed CCS project to occur, and whether sequestration of CO_2 achieved by that project would be recognised under the NZ ETS. The following three options have been identified to require up-front consideration of the suitability of a proposed CCS storage site and operation, by a decision-maker during the approvals stage:

    - **Option One:** Counterfactual: The decision-maker is required to consider environmental effects under the RMA, and EEZ Act, but may not be strictly required to consider the risk and global environmental impact of leakage of CO_2 into the atmosphere.
    - **Option Two**: The decision-maker must establish that injected CO_2 will be permanently contained.
    - **Option Three:** The decision-maker must be satisfied of the suitability of the proposed storage site and operations of a CCS activity.

Option One – Counterfactual

Description of option

49. As described in the problem definition section, the RMA and the EEZ Act provide the overarching framework to permit activities to occur, while assessing potential adverse environmental effects. Previous legal reviews have found that CCS activities would likely need a resource or marine consent for dumping of waste, or discharge into land or water. However, as part of these consent processes, and particularly in the case of the RMA, it is unclear whether the likelihood of possible CO_2 leakage into the atmosphere would need to be explicitly considered by a decision-maker, and there is a possibility of inconsistency between decision-makers without explicit guidance or processes in place.

Analysis of option

50. Under the counterfactual, a decision-maker could approve a CCS project that would occur at a location which was geologically unsuitable for the storage of CO_2 and would be carried out in a manner that would insufficiently manage and mitigate the risk of leakage into the atmosphere.

Option Two – The decision-maker must establish that injected CO_2 will be permanently contained.

Description of option

51. Before CCS activities may be approved, and in order for sequestration of CO_2 achieved by any approved project to be recognised under the NZ ETS, a decision-maker must determine that injected CO_2 will be permanently contained at that location and shall never leak into the atmosphere.

Analysis of option

52. This option would be better than the counterfactual for the responsible management objective, as it would create a stronger obligation for CCS operations to be appropriately managed and mitigated. However, it is highly unlikely to contribute to creating an enabling environment for CCS, as it is unlikely any CCS project could ever

be consented. This is not because all CCS projects will inevitably leak but, rather, because it is unlikely such a legal test could never be met.

53. Regarding the risk of CCS leakage, the IPCC considers that "observations from engineered and natural analogues as well as models suggest that the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99% over 1000 years."[9]

54. A more recent study published in 2018 also assessed the risk of leakage from CCS projects. Similarly, the study established that appropriately selected and well-managed CCS projects are extremely unlikely to leak over human timescales of interest, but that long-term uncertainty will always be present. [10]

Option 3 - The decision-maker must be satisfied of the suitability of the proposed storage site and operations of a CCS activity

Description of option

55. Before CCS activities may be approved, and in order for sequestration of CO_2 achieved by any approved project to be recognised under the NZ ETS, a decision-maker would need to be satisfied of the suitability of the proposed storage site and operations of a CCS activity.

56. In order to be reasonably satisfied, the decision-maker would need to determine that:

- the proposed storage formation is geologically suitable for the storage of CO_2
- the applicant is technically capable and proposes to carry out CCS activities (including site-closure) in a suitable and well-managed way.

Analysis of option

57. This option would perform better than the counterfactual for both the responsible management and enabling regulatory environment objectives. The option achieves responsible management by establishing an environmental bottom line. Further, while it may be possible for a CCS project to be consented under the counterfactual, lack of clarity and uncertainty of whether (and how) a decision-maker would consider the likely suitability of a CCS project may serve as a barrier to investment. This option removes this barrier and improves upon the counterfactual by providing clarity and certainty to CCS project proponents.

Views on regulatory approvals and storage integrity expressed during public consultation on CCUS

58. Many submitters consider that suitability of storage sites must be demonstrated by evidence (including geoscience surveys for subsurface reservoirs). This should include assessments of storage capacity, seal capacity, seal structural integrity and hazard risk (particularly seismic risk in the NZ context).

59. Submitters generally did not question the need for a permitting/consenting framework for CCS activities but noted that there are some gaps in the existing resource

[9] The IPCC defines very likely as 90–99 percent and likely as 66–90 percent.

[10] Alcalde, J., Flude, S., Wilkinson, M., Johnson, G., Edlmann, K., Bond, C. E., Scott, V., Gilfillan, S. M. V., Ogaya, X., & Haszeldine, R. S. (2018). Estimating geological CO_2 storage security to deliver on climate mitigation. *Nature Communications*, 9(1). https://doi.org/10.1038/s41467-018-04423-1

management framework (under the RMA, EEZ Act, the CMA and the CCRA), and overlaps and conflicts between existing regulations should be avoided.

60. For instance, resource and marine consents are best suited for managing activities/effects as they are occurring but are not ideal for managing the lifecycle of a project. For example, the discharge permits under the RMA are not specifically designed to address issues relating to CO_2 storage, such as leakage.

How do the options compare to the status quo/counterfactual?

	Option One – Counterfactual	**Option Two –** The decision-maker must establish with full certainty that injected CO_2 will be permanently contained	**Option Three –** The decision-maker must be satisfied of the suitability of the proposed storage site and operations of a CCS activity
The ability of the option to provide confidence in the **integrity of storage**.	0	++ This option would provide strong confidence in the integrity of storage, since it would not allow a project to proceed if there was *any* risk of leakage.	+ This option would provide strong confidence in the suitability of storage, while still allowing for an element of risk and uncertainty.
The ability of the option to support **appropriate mitigation and management of risks** specific to a given project – ie on a risk-based project-specific basis.	0	0 This option would not provide better mitigation and management of CCS project risks relative to the counterfactual, with the exception of integrity of storage, addressed above.	++ This option would establish criteria that a decision-maker must have regard to when considering the integrity of storage. This includes that a proposed storage location is geologically suitable and that proposed operations will be well-managed.
The ability of the option to provide for **obligations or criteria to be set that are not unduly onerous**.	0	-- This option establishes a requirement which is so strong that it could not be feasibly met by any potential CCS project, since risk will be a feature of all projects.	+ This option sets reasonable criteria that a decision-maker should be satisfied of the suitability of the site and operations. While this option establishes a bottom line, it still allows for some element of risk and uncertainty. Therefore, it is not considered to be an unduly onerous requirement.
The ability of the option to provide for	0	--	+

	Option One – Counterfactual	**Option Two –** The decision-maker must establish with full certainty that injected CO_2 will be permanently contained	**Option Three –** The decision-maker must be satisfied of the suitability of the proposed storage site and operations of a CCS activity
certain and efficient (minimise time, cost, duplication) decision making processes.		This option would create inefficiency since it does not allow for any uncertainty in decision-making whatsoever. This means that it is extremely unlikely that *any* CCS project could ever be approved.	This option provides strong certainty to businesses of the criteria that would be considered by a decision-maker, when considering CCS project applications. The option also establishes that one approval (and not multiple) would be needed for a CCS project to be approved and be eligible for a benefit under the NZ ETS.
Overall assessment	0	-2	5

What option is likely to best address the problem, meet the policy objectives, and deliver the highest net benefits?

61. We have assessed Option Three to be the best option. By establishing an up-front test for the suitability of a proposed CCS site and operation, the primary policy objective (responsible management) is achieved. This test ensures that a CCS project could only proceed if it was appropriately selected, and likely to be well managed by the operator. This option also meets the second policy objective, by ensuring that the requirement is not unduly onerous and provides certainty of process.

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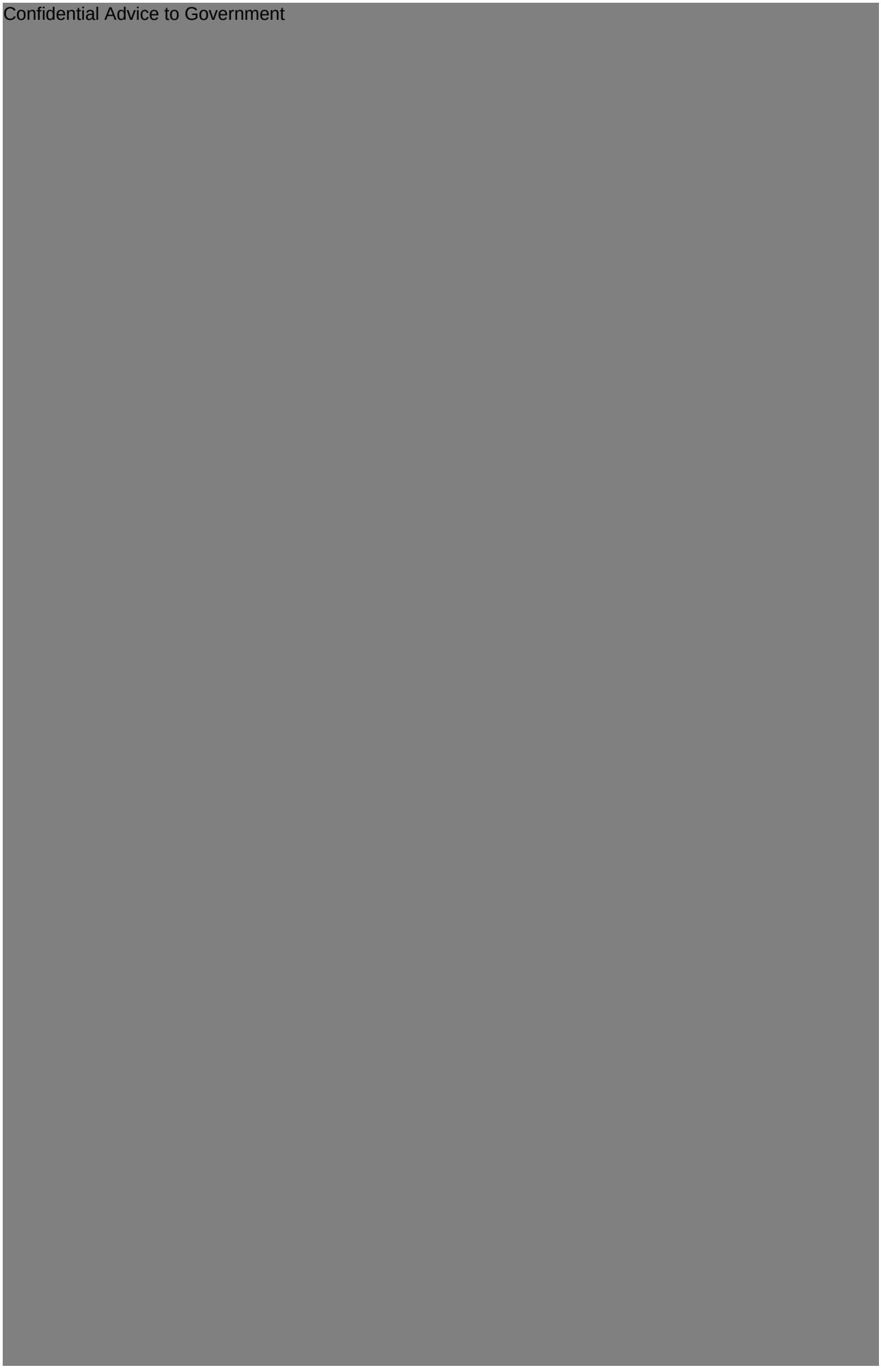

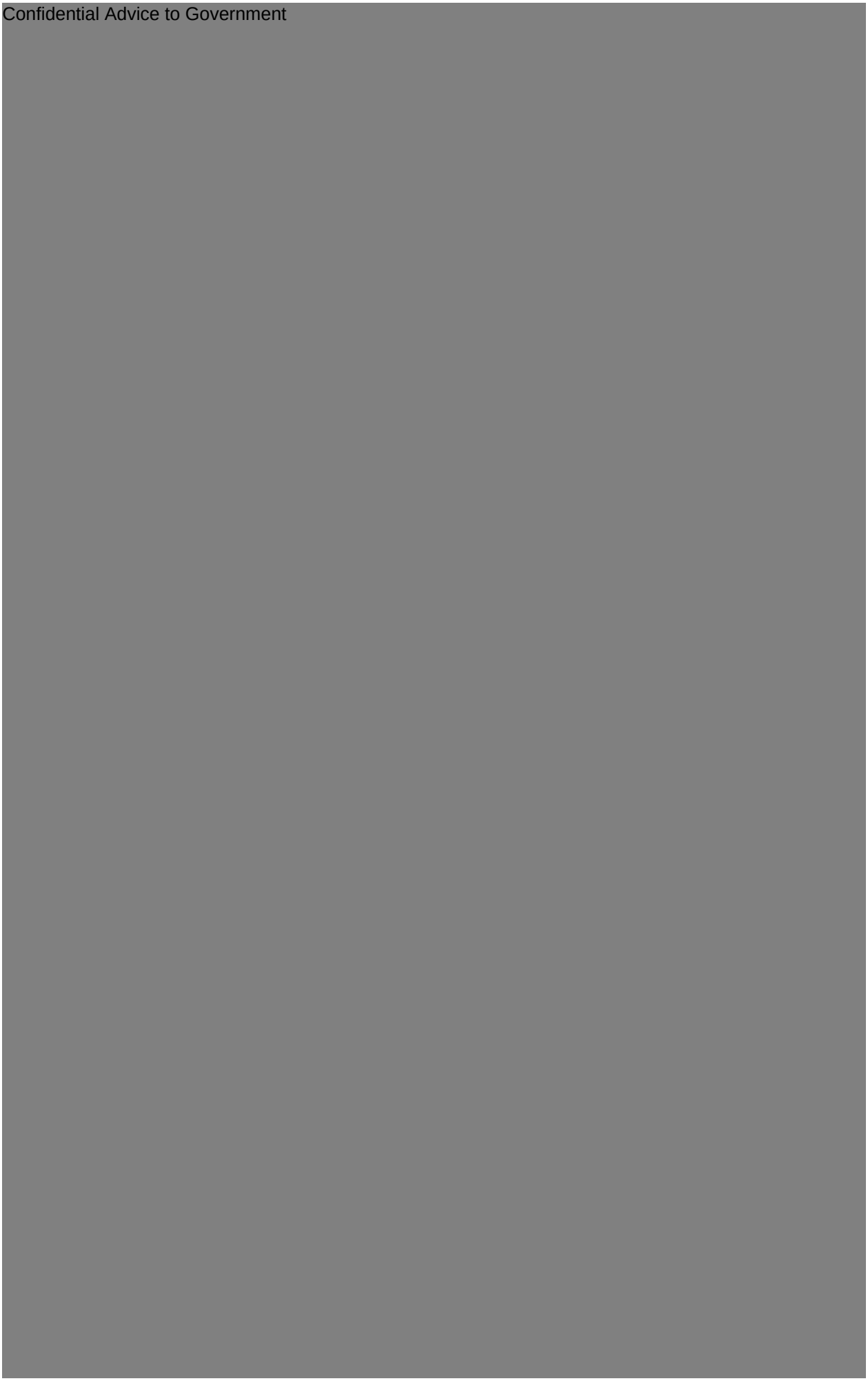
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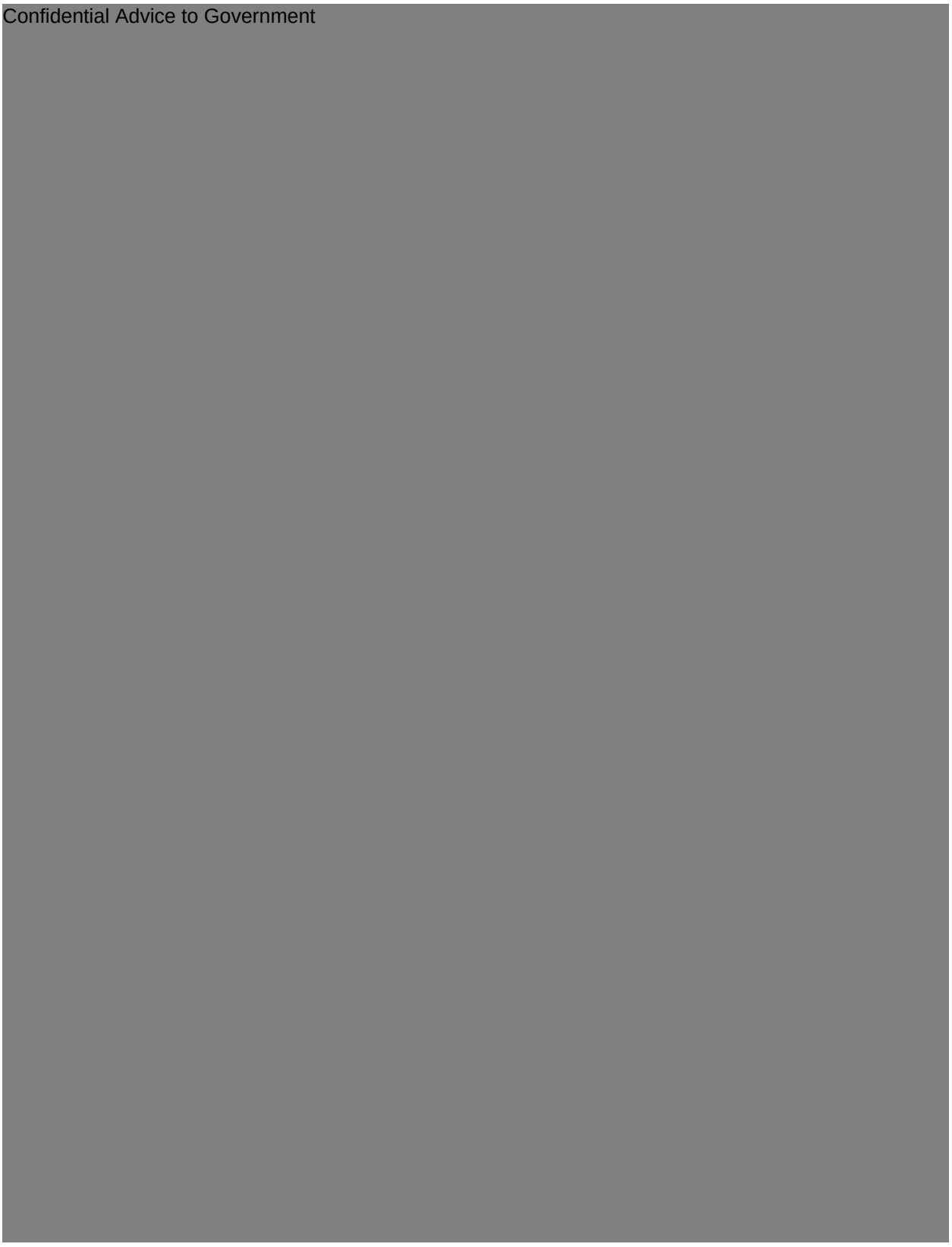
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Section 2.3 – Application of adaptive management during operation of a CCS project

Problem definition

82. CCS projects involve long timescales, require ongoing and active monitoring of the integrity and behaviour of the storage site and potential changes to operational practices in response to irregularities. Conversely, risks that are assessed to be higher during the approval phase of a CCS project may diminish over time based on information from monitoring during operation or may be better managed through changes to technology and operating practices. There is a need for flexibility in approach to ensure risks are adequately managed, while not resulting in requirements that turn out to be too onerous for operators.

83. Consenting decisions are designed to provide clarity to the applicant for the lifetime of a consent. There is some ability to account for ongoing management of environmental effects, and changes to how a consent holder must address them, through adaptive management. This approach can be applied as part of the conditions of a consent.

Option One – Counterfactual

84. Under the counterfactual, a consent authority could take an active management approach to CCS activities under the RMA, though in a limited way.

85. Once a consent has been granted, changing consent conditions in response to changes in information about the performance of a CCS project (such as, a requirement for the operator to incorporate new monitoring techniques or technology) could occur under section 127 of the RMA. However, the operator must apply to the consent authority under section 127, in order for a change or cancellation of a condition of consent to be considered, and possibly occur. The procedure that is followed is much the same as that for obtaining an initial resource consent. Practically, this means that a consent authority may not have the ability to alter the condition of consent, unless a consent holder requests this.

86. Adaptive management is contemplated for in the EEZ Act, but it is not available for a marine dumping consent or a marine discharge consent, which CCS activities are likely to fall under.

Analysis of option

87. Integrity of storage is expected to be a consideration under existing consenting arrangements, but these considerations would be front-loaded to the approval stage. The counterfactual would likely provide for some mitigation and management of risks but would be based on best-practice at the time.

88. Obligations on CCS operators may be more onerous due to the reliance on adaptive management to initial approvals and conditions. This could lead to consent authorities providing more onerous consent conditions due to a limited ability to adapt later.

89. This option may provide for more certainty for CCS operators up-front due to the design of consenting regimes to generally consider consent decisions final. However, any changes to conditions during a consent will require variation of consent conditions, which is an inflexible process that involves costs. The adaptive management approach would be up to the relevant consent authority, which could lead to uncertainty among operators about likely requirements.

Option Two – Ability to adjust obligations on a CCS operator throughout a CCS project lifecycle

90. This option would provide for the ability of the decision-maker to set a wider approach to adaptive management as part of consenting arrangements for a CCS activity. This

would allow for some of the features common in other regimes. Namely, the ability of the regulator to require:

- modifications to the monitoring programme or CCS operation,
- corrective action, and
- updates to risk assessments and plans provided as part of the approval stage.

Analysis of option

91. This option would provide for more confidence in the integrity of storage, as it would provide more flexibility for requirements on operators to be responsive to changing conditions, practices and technologies over the lifecycle of a CCS project. It would also provide for better risk management for these reasons and could support less unnecessarily onerous conditions on operators as requirements could be adjusted to the risks of a CCS project over time, compared to the counterfactual.

92. This option could provide for a more efficient process compared to the counterfactual, as ongoing requirements could be better adjusted to reflect the ongoing risks of a CCS project over time. However, it could also mean less certainty for project proponents from the outset where requirements may later change.

Views on adaptive management expressed during public consultation on CCUS

93. While this proposal was not specifically described in the public consultation documentation as it is presented in this RIS, a number of submitters commented on the limitations of existing regimes to provide a more flexible risk management approach to CCS projects as they are occurring, proportionate to the specifics of a given storage site and CCS operation.

94. This is particularly true of the monitoring, reporting and verification activities typically undertaken as part of CCS projects. One submitter and potential CCS operator noted that the policy framework for CCS should be based on ISO standard 27914:2017 – Geological storage, which includes the following adaptive practices and principles:

- project monitoring and verification (M&V) plans to be flexible and adapt to changes in storage or injection conditions, be tailored to the specific requirements of the different periods of the storage project and of the geological features
- be adaptive to relevant scientific understanding and available technology
- M&V activities should not increase unacceptable project risks (eg contamination or leakage to units not intended for storage)
- The M&V plan shall cover activities throughout the duration of the project. The project operator should plan and implement activities in stages that correspond to distinct periods in the project lifecycle, such as the pre-injection period, injection period, and closure period. Each of these periods has different M&V requirements that relate to periods in the project lifecycle and, as such, can require adaptation throughout the life of the project.

How do the options compare to the status quo/counterfactual?

	Option One – Counterfactual	**Option Two –** Ability to adjust obligations on a CCS operator throughout a CCS project lifecycle
The ability of the option to provide confidence in the **integrity of storage**.	0	+ Allows ongoing requirements to be adaptive to new monitoring practices, changes in technology and so on over time.
The ability of the option to support **appropriate mitigation and management of risks** specific to a given project – ie on a risk-based project-specific basis.	0	+ Allows for additional obligations and requirements on an operator on the basis of changes to information provided, new practices and technologies.
The ability of the option to provide for **obligations or criteria to be set that are not unduly onerous**.	0	+ Would allow for conditions to be set based on the risk of a CCS project as it changes over time
The ability of the option to provide for **certain and efficient (minimise time, cost, duplication) decision making processes.**	0	- Would provide for more efficient decision-making process to adapt conditions in response to risks over a long timeframe. May provide less certainty for CCS operators from the outset where requirements could later change.
Overall assessment	0	3

What option is likely to best address the problem, meet the policy objectives, and deliver the highest net benefits?

95. Option Two is more likely to address the problem. While there is some provision for adaptive management in existing consenting arrangements, it is only applicable to CCS projects that would be consented under the RMA, and not currently possible under the EEZ Act. Additionally, adaptive management will be driven by the initial consenting/approval process, which may make it less suitable to the long timeframes involved with CCS activities.

96. Option Two would also provide for more flexibility to adjust monitoring and other risk management approaches during a CCS activity. While this approach may be less certain for potential operators seeking to undertake CCS activities if requirements change during the injection period, the counterfactual could result in conditions disproportionate to the level of risk over time due the limitations to change requirements later.

Section 2.4 – Options for obligations on CCS operators post-injection

Problem definition

97. Effectively managing the risks of stored CO_2 from a CCS operation requires ongoing management to monitor for, and respond to, deviations from expected plume behaviour or leakage. This includes in the period after injection has ceased and can be for a number of years post-injection.

98. Other jurisdictions place ongoing requirements on operators during the post-injection period. In some cases, this can also include the period after a transfer of liability to the state for any emissions associated with the site.

99. However, a consent holder under New Zealand's resource management frameworks can only be compelled to hold a resource or marine consent while an activity is occurring. While bonds can be attached to conditions as part of a consent that can apply past the expiry of the consent, this may not provide sufficient ability to manage the risks of a CO_2 storage site.

Option One – Counterfactual

100. In the counterfactual option, a CCS operator could only be compelled to hold a consent while the activity subject to the consent, in this case CO_2 injection operations, is taking place. There would be some ability to extend conditions of a consent to the period beyond the activity occurring, for example through bond provisions.

Analysis of option

101. There would be limited ability to place obligations on a CCS operator once injection operations had ceased, which may mean less confidence in integrity of storage. There would be some ability to manage risks through existing consenting processes, such as extending conditions through bonds. Limited obligations on the operator after the injection activity has ceased would mean less onerous obligations and additional certainty provided to the operator. However, ongoing responsibilities through bond requirements would be established at the consent approval process, which could differ across projects depending on decisions by the consent authority.

Option Two – Ongoing obligations on operators after injection operations have ceased

102. There would be explicit requirements for a CCS operator to undertake activities, such as monitoring and any required remediation action in response to deviations in expected plume behaviour or leakage, after injection operations have ceased. This would also include a requirement to continue monitoring the site after a transfer of liability to the Crown.

Analysis of option

103. This option would provide better assurance in the integrity of storage as there would be ongoing obligations on the operator to continue to undertake activities to ensure integrity of containment and respond to any issues that arise. It would also provide for appropriate risk management and mitigation, as the post-injection period is the highest risk period for any unanticipated migration or leakage. While it would provide for more

onerous requirements on CCS operators, it could also provide for a clearer process compared to the counterfactual.

Option Three – Crown responsibility for ongoing obligations after injection operations have ceased

104. Alternatively, the regime could establish that once injection operations have ceased, and if the operator has satisfactorily met all obligations and conditions that have been placed upon it during the injection and closure phases, and if all available evidence suggests that stored CO_2 will be contained, the Crown would become responsible for all CCS activities and obligations, during the post-injection period. Specifically, post-injection monitoring, and a responsibility to undertake corrective action in the event of any significant irregularity (such as CO_2 leakage or migration).

105. This option would likely incentivise CCS investment, since it establishes a strong expectation that once injection operations cease, and if conditions are met, responsibility for monitoring and corrective action during the post-injection period will transfer to the Crown. However, this option would come at financial cost to the Crown (which could be cost recovered). Further, this option would not establish whether post-closure obligations could be placed on an operator, if the Crown did not or was not able to accept responsibility for (non-ETS) post-closure obligations.

Analysis of option

106. This option could provide for additional risk management over the counterfactual and a more certain process. However, it may also provide less confidence in the integrity of storage as the CCS operator would not be responsible for ongoing activities after injection had ceased, which could weaken incentives to design projects to manage long-term risks from the outset of a project. While it would provide less onerous requirements on the operator, this may not be appropriate to manage risks.

Views on obligations on CCS operators during post-injection, expressed during public consultation on CCUS

107. While this proposal was not specifically described in the public consultation documentation as it is presented in this RIS, a number of submitters commented on the limitations of existing consenting regimes to manage the full lifecycle of a CCS project, including the post-injection period.

108. Non-industry submitters argued that the cost of activities relating to the monitoring, verification and reporting requirements and oversight of CCS sites should be borne by CCS operators, not government. This included both during operation and post-injection. Some submitters referred to the approach taken in the EU, where CCS operators must monitor for an additional 30 years, after they have been indemnified.

How do the options compare to the status quo/counterfactual?

	Option One – Counterfactual	Option Two – Ongoing obligations on operators after injection operations have ceased	Option Three – Crown responsibility for ongoing obligations after injection operations have ceased
The ability of the option to provide confidence in the **integrity of storage**.	0	++ More confidence in the integrity of storage as the operator would continue to undertake activities to ensure containment.	-- Activities to monitor and account for the integrity of storage would continue after injection activities had ceased. However, transferring this obligation to the Crown immediately post-injection may provide much less confidence of storage integrity.
The ability of the option to support **appropriate mitigation and management of risks** specific to a given project – ie on a risk-based project-specific basis.	0	++ Ongoing obligations on the operator would allow for risk mitigation and management activities by the operator to continue in the post-injection period, which according to international experiences is the highest risk period for migration and/or leakage.	+ Similar to Option Two. Ongoing obligations, taken on by the state, would allow for risk mitigation and management activities to continue in the post-injection period, which according to international experiences is the highest risk period for migration and/or leakage.
The ability of the option to provide for **obligations or criteria to be set that are not unduly onerous**.	0	- Obligations on the operator would be more onerous than the counterfactual, as there would be greater ability to extend obligations beyond the injection period.	+ Obligations on the operator would be less onerous to the operator than the counterfactual, due to ongoing obligations post injection being taken over by the Crown.

	Option One – Counterfactual	Option Two – Ongoing obligations on operators after injection operations have ceased	Option Three – Crown responsibility for ongoing obligations after injection operations have ceased
The ability of the option to provide for **certain and efficient (minimise time, cost, duplication) decision-making processes.**	0	+ This option would provide more certainty to the operator than the counterfactual due to clear ongoing obligations post injection, compared to bond requirements that could differ across projects.	+ This option would provide more certainty to the operator than the counterfactual due to ongoing obligations post injection being taken over by the Crown post-injection.
Overall assessment	0	5	1

What option is likely to best address the problem, meet the policy objectives, and deliver the highest net benefits?

109. Option Two is most likely to address the problem, meet the policy objectives and deliver the highest net benefits. This would provide for ongoing obligations on an operator during the important post-injection period to provide assurance of the integrity of storage and managing risks. Although it would be more onerous for the operator than the counterfactual, it would also provide for a greater level of certainty to operators.

Section 2.5 – Options for CCS operators' ETS surrender obligation for CO_2 leakage

110. Cabinet agreed that CCS operators will remain liable under the NZ ETS for any subsequent CO_2 leakage from the storage site, unless the Crown chooses to take on that liability at a later date. However, there is uncertainty about how long CCS operators would have an ETS surrender obligation in case of leakage, and the conditions that must be met before the government would remove an operator's ETS surrender obligation.

111. We have considered the options below regarding a CCS operator's ETS surrender obligation for CO_2 leakage.

Option One – *Counterfactual*

Description of option

112. The company undertaking the CCS activity would have an ETS surrender obligation for CO_2 leakage from its storage site unless the government decides to remove this obligation. There would be no clarity about how long a CCS operator would have an ETS surrender obligation, whether the CCS operator would ever be relieved of its ETS surrender obligation, and the criteria for making decisions on removal of ETS surrender obligation.

Analysis of option

113. In the counterfactual, there would be incentives for CCS operators to minimise the leakage risk and manage the storage site responsibly. However, there would not be clear criteria for enabling a risk-based approach to making decisions on removal of CCS operators' ETS surrender obligation. There would also be uncertainty in whether and when the Crown would make such decisions. The lack of clarity about criteria and processes could result in a CCS operator bearing disproportionate compliance burden from a risk management perspective.

Option Two – Discretion to remove ETS surrender obligation 15 years after cessation of CO_2 injection and once specified conditions are met

Description of option

114. Option Two assumes that the operator would be able to claim an ETS benefit for CO_2 storage. After a minimum of 15 years after the CO_2 injection activities have ceased, the Crown may decide to remove the operator's ETS surrender obligation in relation to CO_2 leakage from that storage location. The decision would be subject to certain conditions, including:

- sufficient evidence (including an independent expert study) that the stored CO_2 is behaving in a stable and predictable manner, with no significant risk of future leakage
- fulfilment of all the conditions and obligations under consents or permits granted during the approval process (including decommissioning obligations for the site).

115. This would be similar to the design of the Australian Commonwealth CCS regime in terms of when and how government would make decisions on removal of a CCS operator's obligation to cover leakage-related emission costs.

Analysis of option

116. With regards to the responsible management objective, this option would be better than the counterfactual, as this option would provide clear criteria for guiding risk-based

decision-making when the government decides whether to remove a CCS operator's ETS surrender obligation.

117. With regards to the objective of creating an enabling regulatory environment for CCS activities, this option would also be better than the counterfactual, as it would provide more certainty about the conditions for removal of an ETS surrender obligation. CCS operators would also clearer expectations for the minimum length of time it would have an ETS surrender obligation.

Option Three – Discretion to remove ETS surrender obligation 100 years after cessation of CO_2 injection and once specified conditions are met

Description of option

118. Option Three is a variant of Option Two. The only difference is that, under Option Three, the minimum period before the Crown may decide to remove a CCS operator's ETS surrender obligation would be at least 100 years after the cessation of the CO_2 injection activities.

119. Option Three would be similar to the Californian CCUS regime in terms of the earliest time for removal of a CCS operator's obligation to cover emission costs associated with CO_2 leakage.

Analysis of option

120. With regards to the responsible management objective, this option and the counterfactual would achieve similar outcomes, as they would both incentivise CCS operators to minimise leakage risk.

121. In relation to the objective of creating an enabling regulatory environment for CCS activities, this option would provide more certainty about conditions for removal of ETS surrender obligation than the counterfactual, but the 100-year minimum period for a CCS operator's post-injection liability might be disproportionate to the leakage risk.

Views on responsibility for CO_2 leakage expressed during public consultation on CCUS

122. During public consultation, submitters commented on who should be responsible for potential impacts of CCS activities, including the emissions costs associated with CO_2 leakage from storage sites. Key themes from submissions were:

    a. *The long-term liability regime will impact the overall attractiveness of CCS investment opportunity*: Industry submitters supported indemnity after a period of time, post site-closure, with some divergence on details:
        i. Most supported long-term liability transfer after 15 years, like Australia. (See BEC and ERA submissions)
        ii. Other industry submitters, particularly Todd Energy, took a stronger view, that the liability regime for CCS in New Zealand should be less stringent than the Australian regime, due to the difference in potential CCS economics, particularly in the natural gas sector. NZ point sources are more widely distributed, and economy of scale may be harder to achieve. Gas volumes are decreasing, while up-front capital costs remain fixed. Long-run profit margins are therefore likely to be smaller for CCS applied to natural gas production. Operators could be given flexibility, with a pathway to apply for an indemnity early if it can be evidenced that CO_2 will be contained. The liability regime should also be flexible, and account for varying risk profiles of different projects (eg onshore vs offshore, developed vs greenfield).

b. *Government should not seek to promote CCS through weak regulatory settings that shift cost and risk to taxpayers*: Several non-industry submitters did not support indemnifying CCS project operators. These submitters argued that introducing considerably less onerous requirements, for the sake of improving the attractiveness of CCS investment, may not be right. Regulatory burden is a cost, but if the cost is well-considered, and fairly accounts for the assumed profile of risks and benefits, but happens to reduce the attractiveness of abatement using CCS, then that would simply suggest that CCS is uneconomic at current carbon prices, and without further incentives. Indemnification of CCS operators would be an implicit subsidy in the face of a low expected carbon price, at the potential expense of future taxpayers (who would become liable for any future CO_2 leakage).
    i. Ngā Iwi o Taranaki were opposed to the possibility of liability transfer from a potential operator to the Crown, and suggested that there should be perpetual liability for Ministers who approve the operation of storage sites, even after closure.
c. *Industry opposed to trailing liability*: Industry submitters were also generally opposed to potential trailing liability requirements, since this would decrease the attractiveness of CCS investment opportunities.

How do the options compare to the status quo/counterfactual?

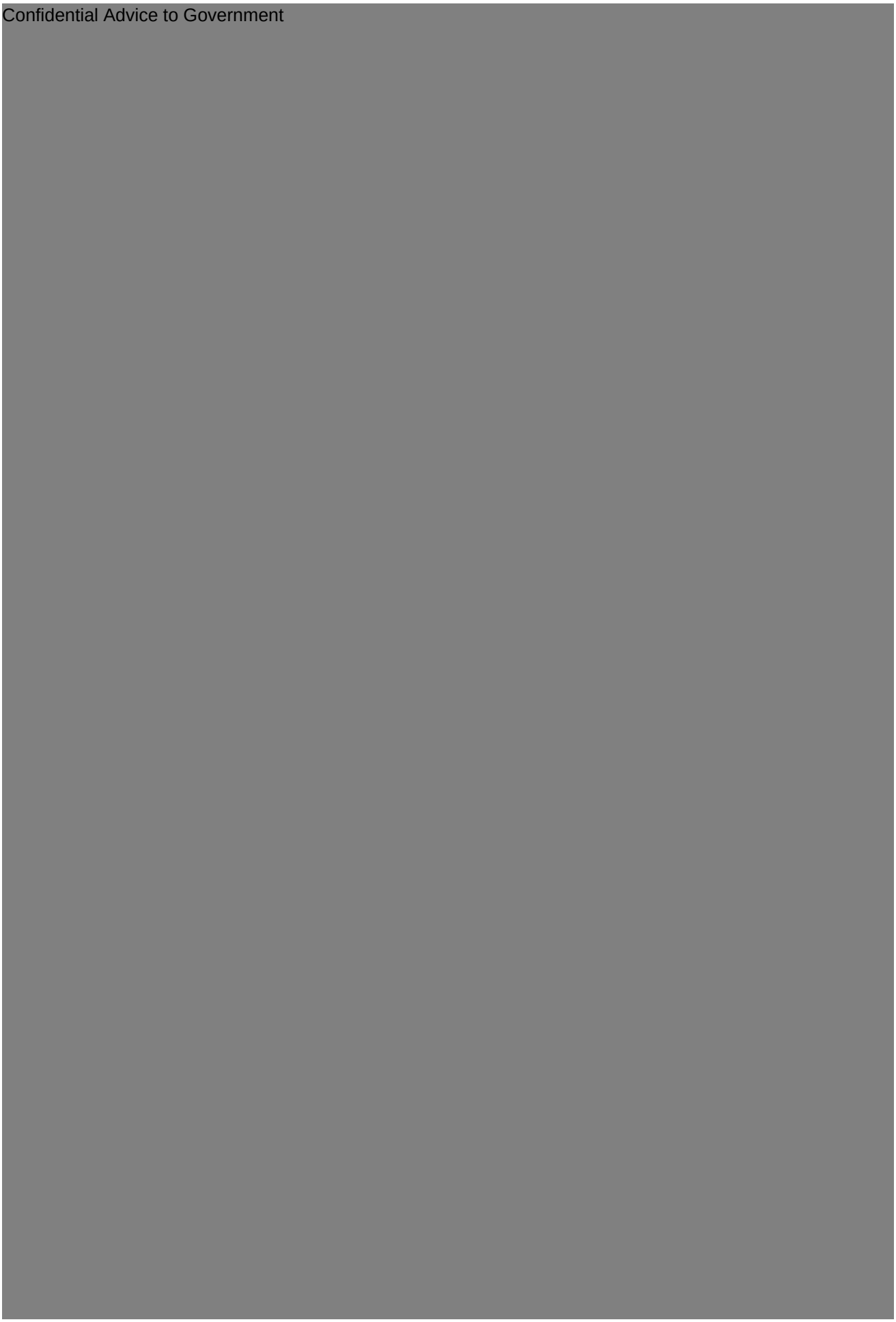
	Option One – Counterfactual (ie government may remove a CCS operator's ETS surrender obligation at some point but conditions and timeframe for the removal are not clear.)	Option Two – Discretion to remove ETS surrender obligation 15 years after CO_2 injection ceases and once specified conditions are met	Option Three – Discretion to remove ETS surrender obligation 100 years after CO_2 injection ceases and once specified conditions are met
The ability of the option to provide confidence in the **integrity of storage**.	0	0 Like the counterfactual, CCS operators would have the incentive to minimise CO_2 leakage risk. When the Minister makes decisions to remove a CCS operator's ETS surrender obligation, the available evidence (including findings of independent expert study) must give the Minister reasonable confidence that leakage from the storage site would be unlikely.	0 Like the counterfactual, CCS operators would have the incentive to minimise CO_2 leakage risk. When the Minister makes decisions to remove a CCS operator's ETS surrender obligation, the available evidence (including findings of independent expert study) must give the Minister reasonable confidence that leakage from the storage site would be unlikely.
The ability of the option to support **appropriate mitigation and management of risks** specific to a given project – ie on a risk-based project-specific basis.	0 There would be no specified criteria that could guide decision-making on removal of ETS surrender obligation, based on risk.	+ Better than the counterfactual because by setting criteria for exercising the discretion to remove a CCS operator's ETS surrender obligation, Option Two would better enable operators and regulators to make risk-based decisions. Like the counterfactual, CCS operators would have the incentive to minimise CO_2 leakage risk. During the first 15 years after the site closure, they would have strong	0 Like the counterfactual, Option Three would not enable risk-based decision-making regarding removal of a CCS operator's ETS surrender obligation in a timely manner. Even if evidence is established well before the end of the 100-year period that there is no leakage risk, the government would not be able to agree to remove a CCS operator's ETS surrender obligation

	Option One – Counterfactual (ie government may remove a CCS operator's ETS surrender obligation at some point but conditions and timeframe for the removal are not clear.)	Option Two – Discretion to remove ETS surrender obligation 15 years after CO_2 injection ceases and once specified conditions are met	Option Three – Discretion to remove ETS surrender obligation 100 years after CO_2 injection ceases and once specified conditions are met
		incentives to put in adequate measures for minimising long-term leakage risk. This would help them provide the Minister with reasonable confidence that the storage would be contained and therefore the transfer of liability to the Crown would be acceptable.	until after that period. As a result, a CCS operator's compliance burden would be larger than necessary from a risk management perspective. Like the counterfactual, CCS operators would have the incentive to minimise CO_2 leakage risk because they would bear the ETS surrender obligation for at least 100 years.
The ability of the option to provide for **obligations or criteria to be set that are not unduly onerous**.	0	0 Not materially different from the counterfactual. The minimum period during which the CCS operator has ETS surrender obligation for CO_2 leakage under Option Two (15 years) is not unduly onerous compared to overseas jurisdictions. The length of time the CCS operator has ETS surrender obligation for CO_2 leakage may or may not be different between Option Two and the counterfactual, depending on the government's decision on whether and when to remove the operator's ETS surrender obligation.	- Worse than the counterfactual because the minimum of 100 years may be unduly onerous. For example, a CCS operator would still have to carry financial risk associated with CO_2 leakage on their books, even though evidence is established well before the end of the 100-year period that there is no leakage risk. The compliance cost (such as the cost of monitoring and reporting) could also be much larger over time. This could have a chilling effect on CCS activities.

	Option One – Counterfactual (ie government may remove a CCS operator's ETS surrender obligation at some point but conditions and timeframe for the removal are not clear.)	Option Two – Discretion to remove ETS surrender obligation 15 years after CO_2 injection ceases and once specified conditions are met	Option Three – Discretion to remove ETS surrender obligation 100 years after CO_2 injection ceases and once specified conditions are met
		The evidence provided for informing decisions on removal of a CCS operator's ETS surrender obligation would likely be similar to that in the counterfactual.	
The ability of the option to provide for **certain and efficient (minimise time, cost, duplication) decision making processes.**	0	+ Better than the counterfactual, as CCS operators would have more certainty about the conditions they would have to meet to convince the government to remove their ETS surrender obligation. CCS operators would also have more certainty about the minimum period during which a CCS operator would be responsible for CO_2 leakage from the storage site.	+ Better than the counterfactual. Like Option Two, Option Three would provide more certainty about conditions for removal of a CCUS operator's ETS surrender obligation and how long the obligation would last.
Overall assessment	0	+2	0

What option is likely to best address the problem, meet the policy objectives, and deliver the highest net benefits?

123. Option Two would be the best option, as it would provide CCS operators, applicants and decision-makers with more certainty about the conditions that would have to be met before the government decides to remove an operator's ETS surrender obligation for CO_2 leakage. They would also have more certainty about the minimum period CCS operators would have ETS surrender obligation. It would not be unduly onerous for CCS operators to remain obligated for at least 15 years after the closure of the storage site, as this requirement seems reasonable based on international comparisons, and the decision on whether to remove an operator's ETS surrender obligation would be based on scientific information.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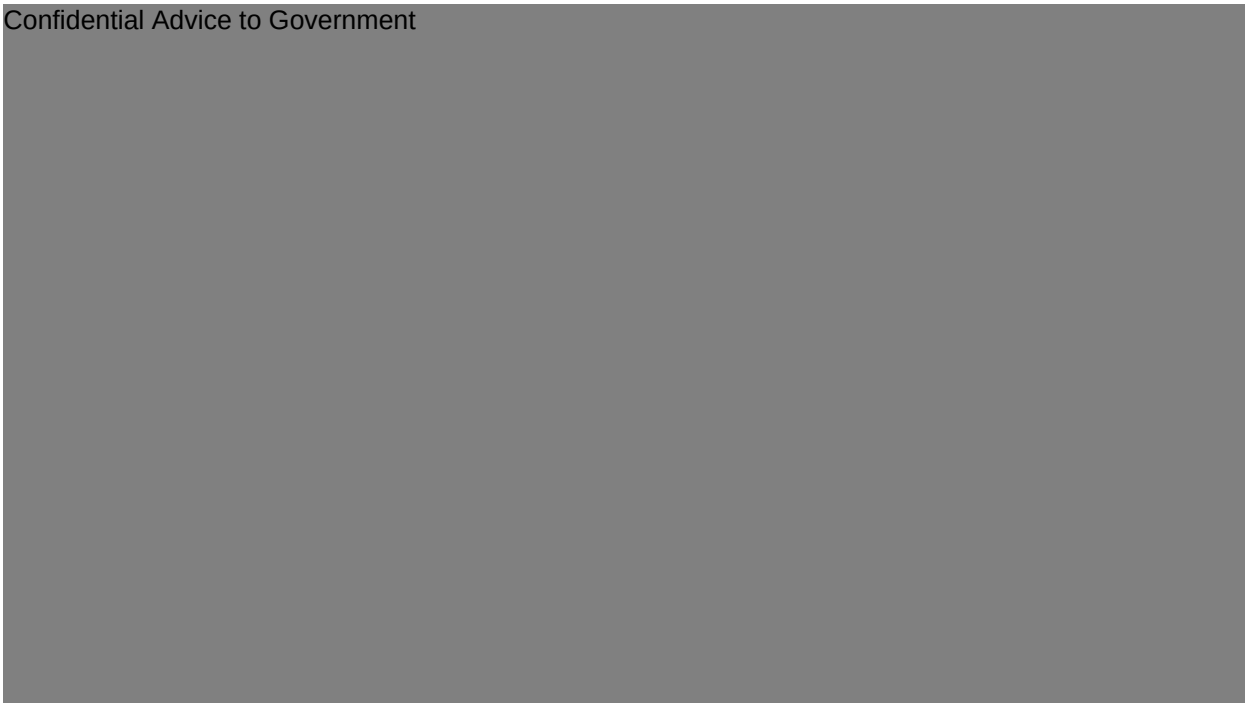
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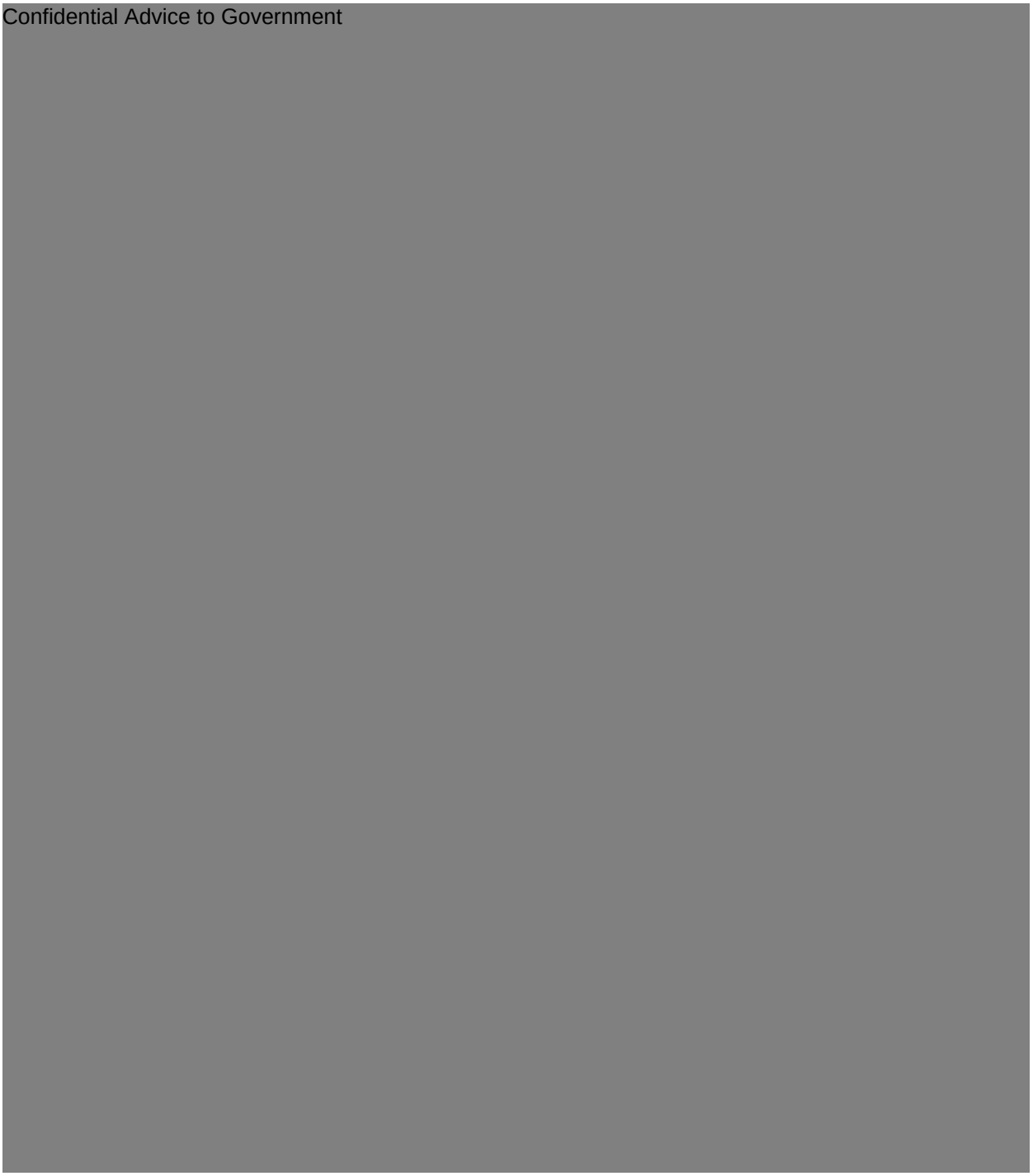
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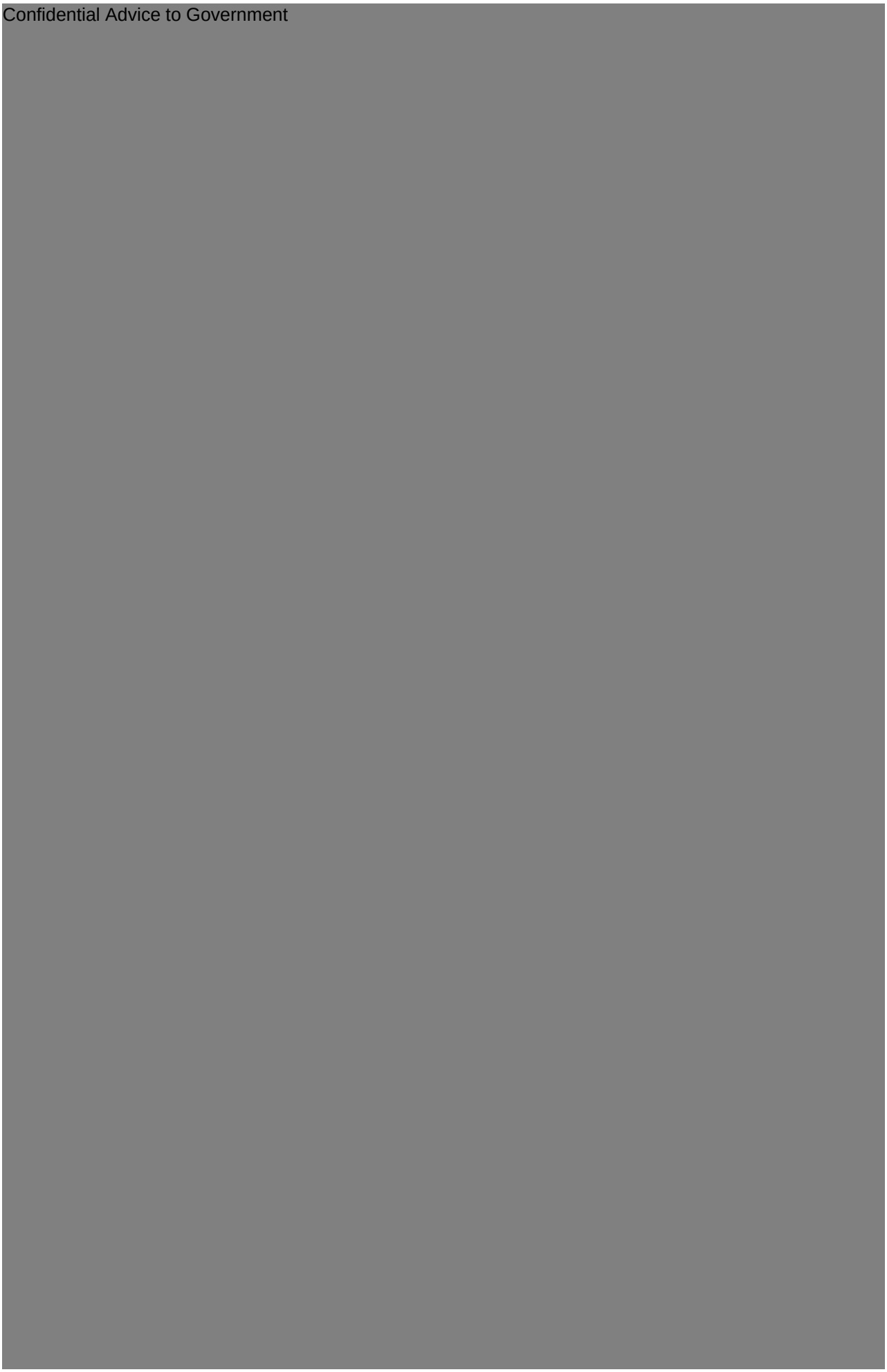
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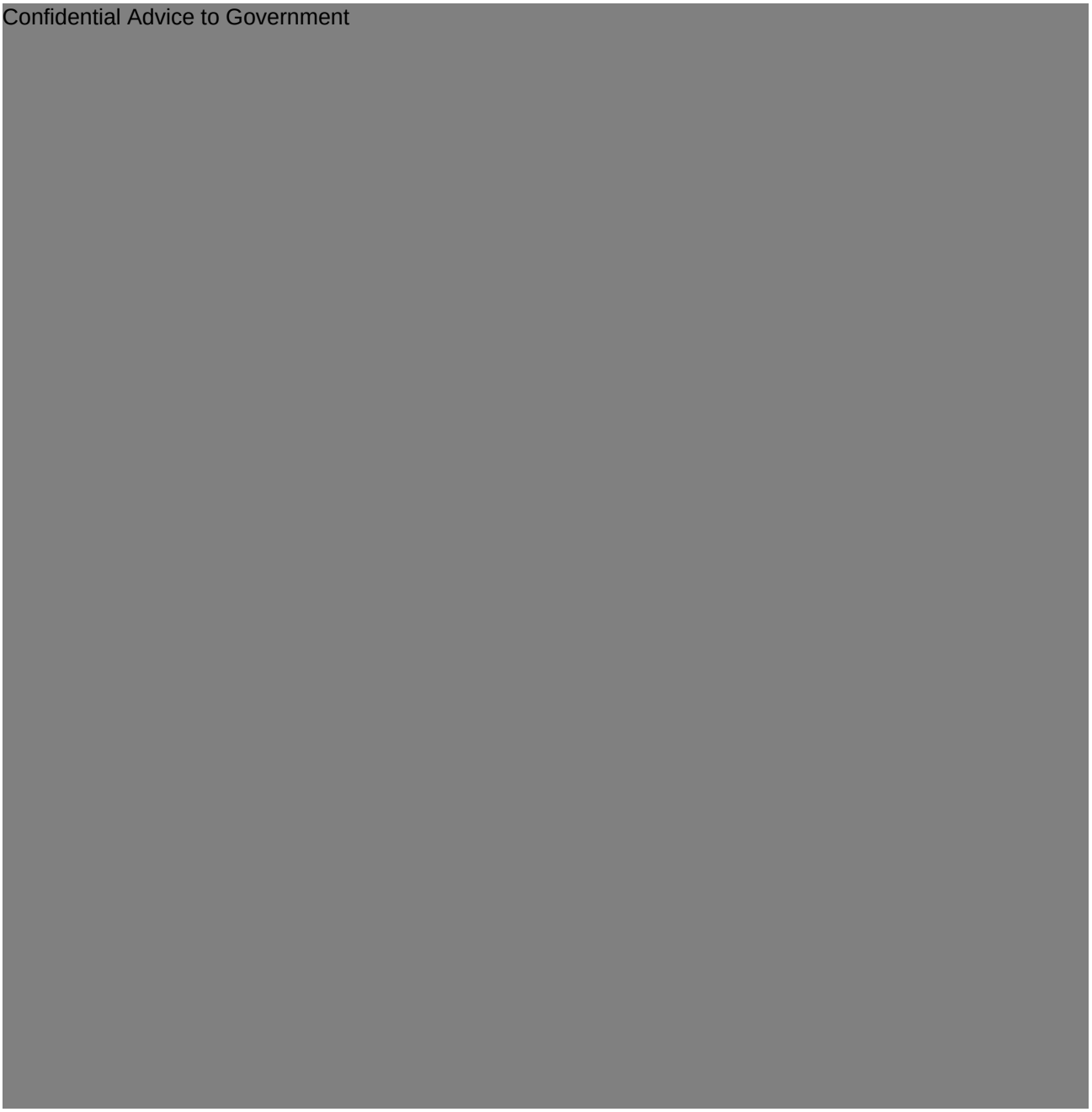
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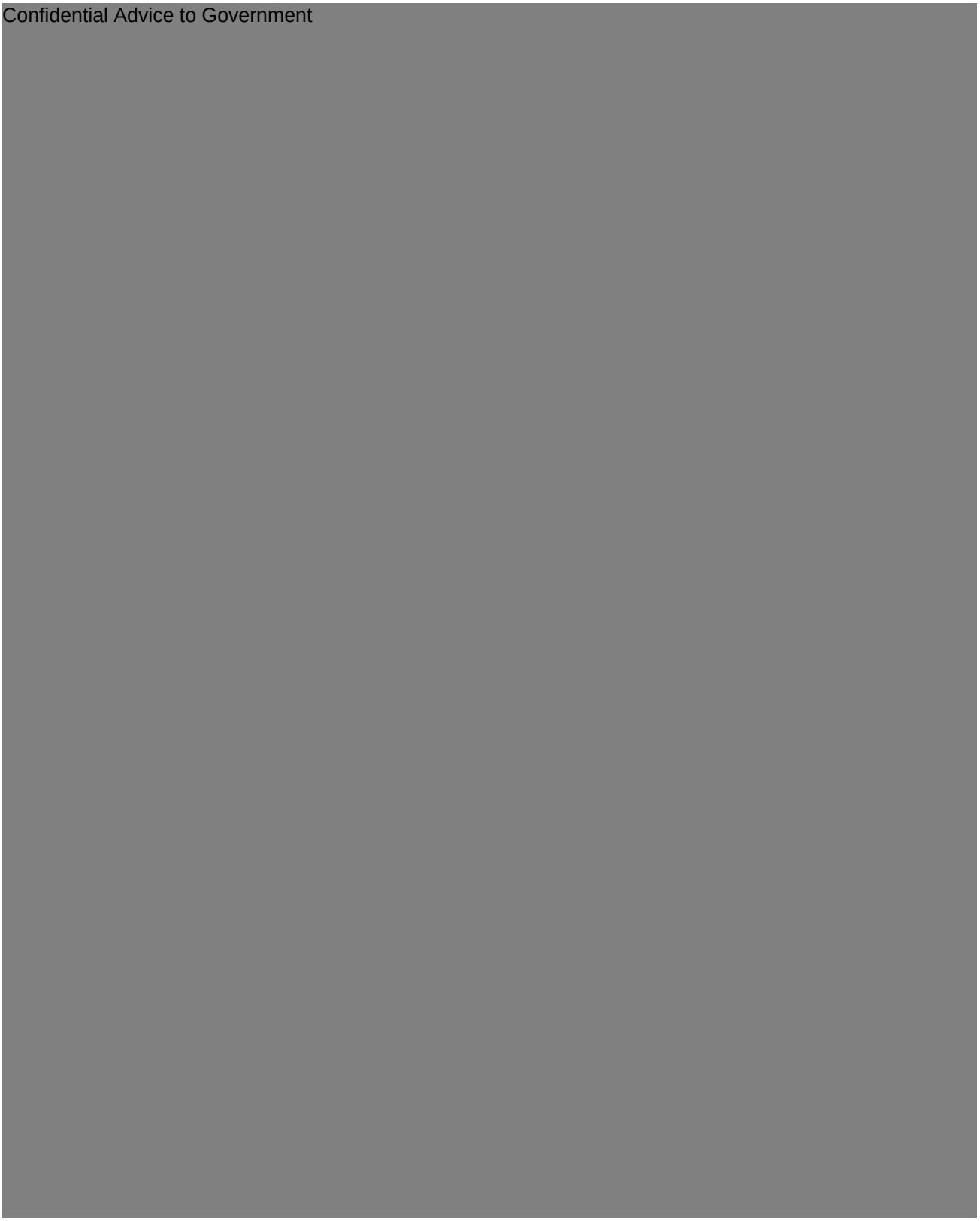
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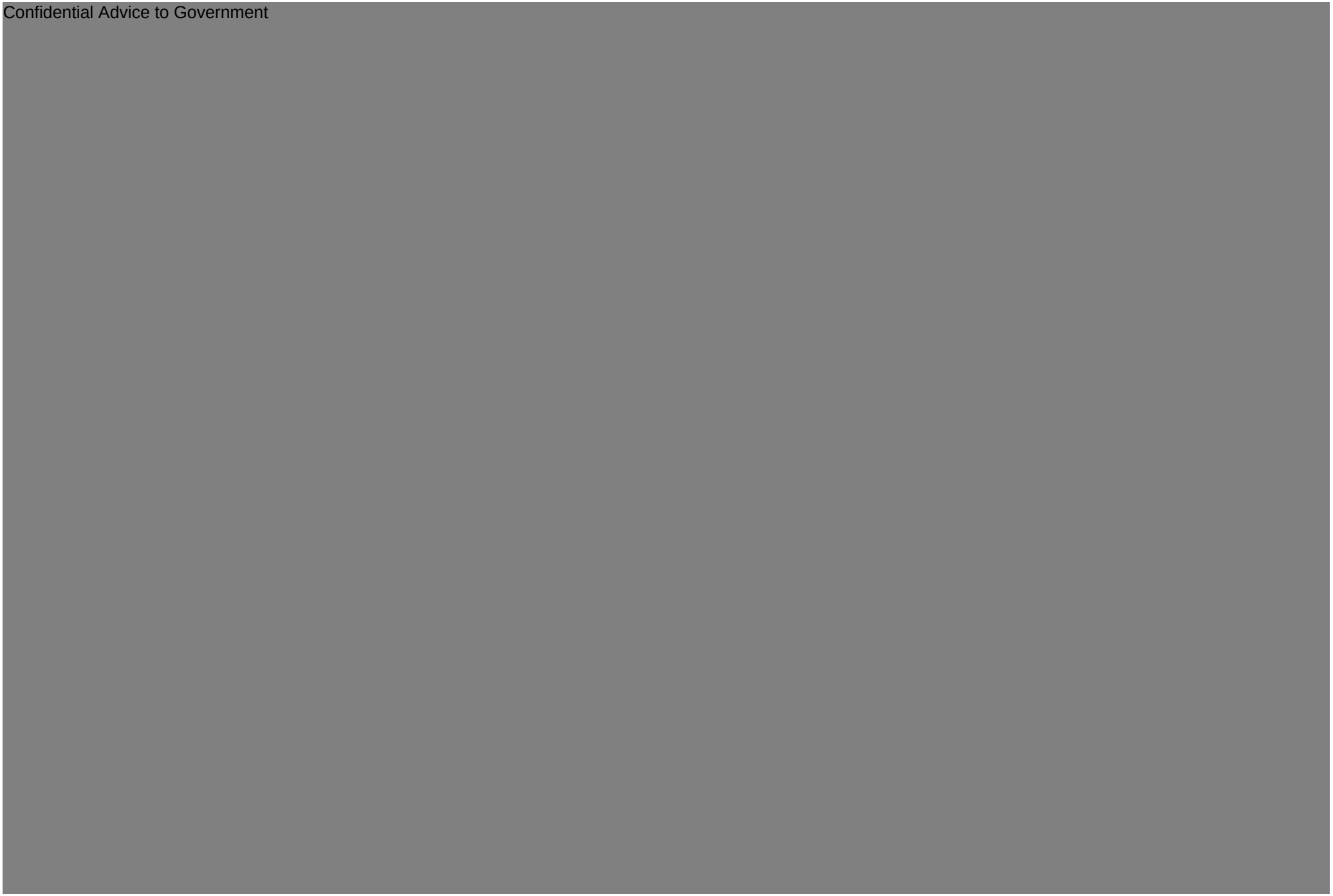
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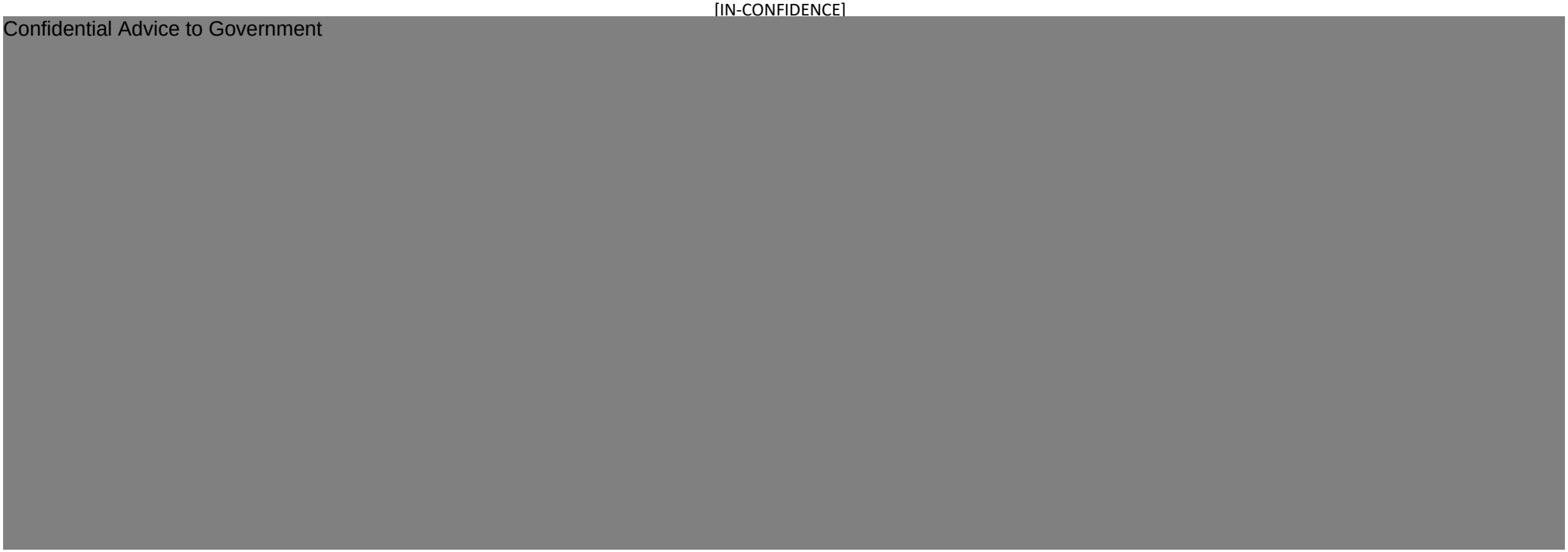

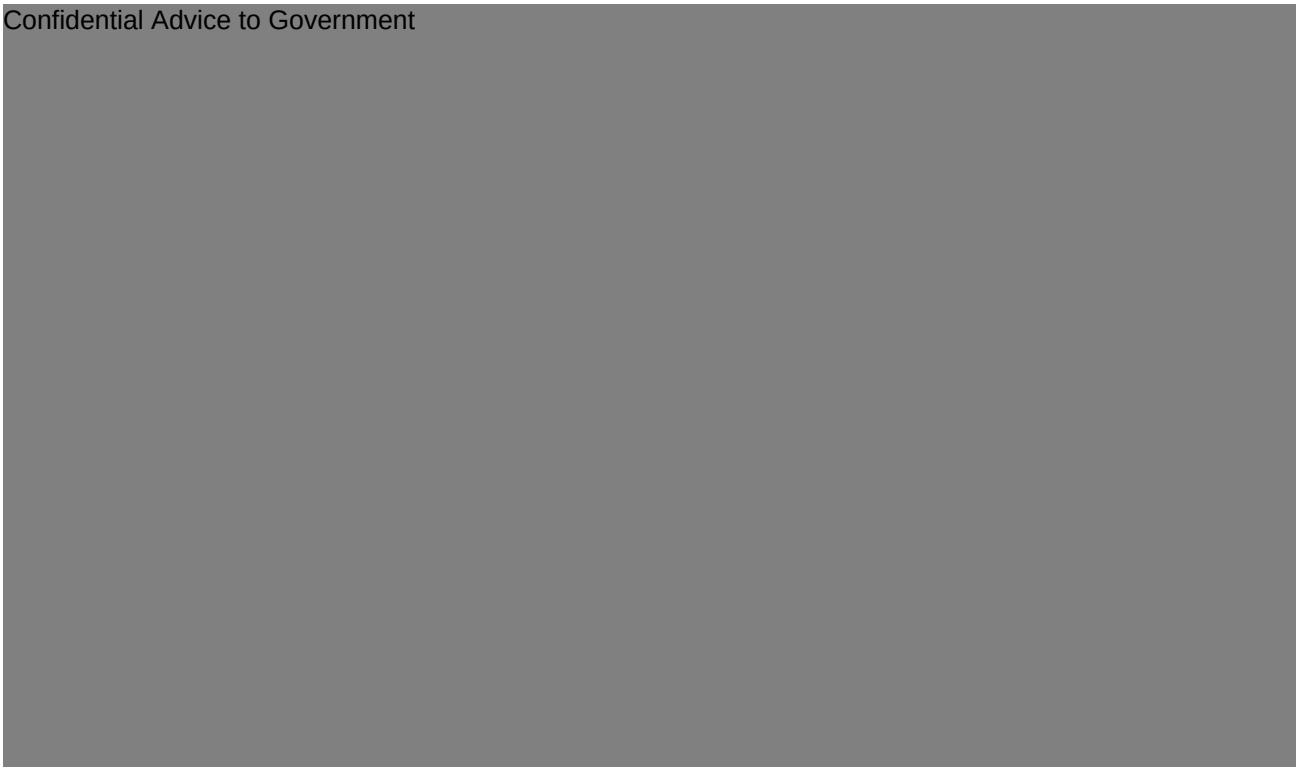
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Recommended package of options

174. We recommend a package of options including:

- Option Three relating to establishing a suitability test for CCS projects to proceed.
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- Option Two relating to application of adaptive management during operation of a CCS project.
- Confidential Advice to Government
- Option Two relating to a CCS operator's ETS surrender obligation for CO_2 leakage (including minimum period for the obligation and conditions to be met before removal of the obligation).
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What are the marginal costs and benefits of the option?

Affected groups *(identify)*	**Comment** *nature of cost or benefit (eg, ongoing, one-off), evidence and assumption (eg, compliance rates), risks.*	**Impact** *$m present value where appropriate, for monetised impacts; high, medium or low for non-monetised impacts.*	**Evidence Certainty** *High, medium, or low, and explain reasoning in comment column.*
Additional costs of the preferred option compared to taking no action			
Regulated groups	**Costs associated with information disclosure requirements** CCUS operators would have to provide information, including risk assessments, and a range of plans in relation to site operations, environmental management, health and safety, monitoring and site closure. These risk assessments and plans would also have to be updated periodically (at least once during the approval process, once every few years during CO_2 injection, and once just before the CO_2 storage site is closed). Actions as identified in the various plans, including the monitoring plan, would have to be carried out.	In the order of hundreds of thousands of dollars a year to millions of dollars a year, assuming there is at least one CCS project. These costs will be influenced by the specific detail and design of the project in question. The cost impact would be higher in the years CCS operators prepare or update their risk assessments and plans for the storage site. International literature suggests that commercial-scale CCS projects storing in the order of 1 Mt CO_2/year usually incur monitoring costs of around US$1-4 million per year.[12] The annual monitoring costs of CCS projects in New Zealand could be lower because of the relatively small size of storage sites.	Low

12 https://climit.no/app/uploads/sites/4/2020/05/2020-01-Monitoring-and-Modelling-of-CO_2-Storage.pdf

Regulators	**Cost associated with administering CCUS regulations** The regulator would have to assess applications for CCS project approval, reviewing plans submitted by CCS operators, and commissioning independent expert studies on the leakage risk of storage sites. These administrative costs could be recovered from the applicants and CCS operators, subject to further development of the cost-recovery mechanism. **Cost associated with standing up ETS reward system** Manual processing of CCS-based emissions returns would need to be resourced.	In the order of hundreds of thousands dollars a year. It depends on the number of CCS projects and how the regulator verifies information provided by CCS operators and commissions independent expert studies. The complexity and comprehensiveness of these methods would significantly influence the administration costs. A more comprehensive monitoring and verification regime, which involves independent technical reports and inspection, could cost more. The resourcing and complexity associated with processing ETS rewards manually could be significant, and the cost to replace the Register is very high. However, this cost does not fall on the CCS policy project alone, and a Register replacement will be required regardless of this project – but timeframes may not align, so CCS could be a vehicle for providing resource and bringing forward decisions on Register replacement.	Low Regarding cost to replace Register: High.
Others (eg, wider govt, consumers, etc.)	Iwi and landowners could have to respond to engagement enquiries regarding approvals for CCS projects and management of CO_2 storage sites.	Low	Medium The number of CCUS projects requiring consent could initially be low. It could increase in the future, depending on carbon

			costs and the relative costs of various technologies and methods for reducing net emissions.
Total monetised costs		In the order of hundreds of thousands to millions of dollars a year.	Low
Non-monetised costs		N/A	N/A
Additional benefits of the preferred option compared to taking no action			
Regulated groups	Increased certainty about the obligations that a CCS operator throughout the lifecycle of a CCS project. This could enable potential CCS operators estimate the compliance costs associated with seeking approvals and managing liability for CO_2 leakage and compare them with the emission cost savings that could be achieved through a CCS project. Businesses would therefore be able to make more informed business decisions on CCS investments. Increased certainty about regulatory costs of CCS projects could potentially provide more incentive for businesses to invest in CCS projects for reducing emission costs. Potential co-benefits to CCS operators that utilise existing infrastructure, such as oil and gas wells, if existing decommissioning obligations are deferred.	Low—Medium It is unclear how much impact the proposals in this RIS would have on the business case for a CCS project. In the scenario selected for the previous CIPA on the first set of proposals, where a major gas producer deploys CCS in New Zealand, approximately 1000 KT/e of CO_2 could potentially be sequestered between 2026 and 2030, and 900 KT/e between 2031 and 2035.	Low It is difficult to quantify the impact of the proposals in this RIS on incentive for businesses to invest in CCS projects. CCS investments are dependent on a range of other factors, including carbon price movements, technological developments, the economic environment, and the ability to overcome technical challenges in CO_2 injection operations. Furthermore, the impact of the proposals in this RIS on

			compliance costs would depend on how the regulator makes decisions on consent conditions and transfer of liability for CO_2 leakage.
Regulators	Gaining insights into CCS activities, the associated emissions removal/sequestration, CO_2 storage sites, and the financial capability of companies undertaking CCS activities. Better oversight of activities that could contribute to New Zealand's emissions targets.	Low	High
Others (eg, wider govt, consumers, etc.)	Creation or retention of local jobs. Development of technical expertise in CCUS. New economic opportunities for Māori groups should there be CCUS projects in their rohe (tribal area) Electricity and natural gas consumers could enjoy more stable electricity and natural gas prices.	Low It is unclear how much impact the proposals in this RIS would have on the business case for a CCS project. The number of CCS projects is expected to be low in the near future. This means that only a small number of CCS-related jobs (if any) would be created. Those jobs if created could potentially be filed by existing professionals leaving the mining industry (who would have transferrable skills). There are around 6,700 people working in the mining sector in New Zealand.[13]	Low

13 Statistics New Zealand (2024), *Labour market statistics: March 2024 quarter,* https://www.stats.govt.nz/information-releases/labour-market-statistics-march-2024-quarter/.

Total monetised benefits		N/A	N/A
Non-monetised benefits		Low—Medium	Low

Section 3: Delivering an option

How will the new arrangements be implemented?

Legislative vehicle

175. The Ministers for Energy, Climate Change, and RMA Reform are seeking delegated authority to make further decisions on the detailed design of the CCS framework. This will include confirmation of which legislation requires amending, and the specific amendments needed to give effect to the high-level proposals in this RIS.

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177. These options will be explored further as part of the next stage of this work.

178. As described in the limitations section, we are undertaking further work, including through legal advice, on the extent to which existing regulatory regimes can already accommodate some of the preferred options proposed in this RIS. If legal advice confirms that a preferred option can already be accommodated, then this would simply mean less legislative/regulatory change was needed to implement the proposals.

Timing on legislation

179. The primary legislation and regulations for the CCUS regulations are expected to come into force at the same time, potentially from 2026. Exact timing will be confirmed on introduction of the legislation to Parliament.

180. Supporting regulations to enable the regime from an ETS perspective can take place via the 'annual regulatory updates' process for the ETS in 2025, to be in force by 1 January 2026.

Implementation risks

181. The implementation risks and how they can be mitigated are as follows:

- Risk of false information provided by CCUS operators when seeking approvals. This risk can be mitigated through the RMA, EEZ Act and CCRA, which already have audit and penalty regimes that could utilised for CCUS activities.
- Risk of higher than anticipated compliance costs. There will be further engagement with potential CCUS operators, as we develop further details on the approval process, and the monitoring, reporting and verification regime as part of delegated decisions. This will provide useful feedback that could help avoid overly burdensome compliance costs.
- Technical challenges developing CO_2 storage sites. This will depend on the industry to address those technical issues. The industry is expected to seek expert engineering advice to undertake feasibility studies, develop the site, carry out CO_2 injection activities and decommission sites.
- Lack of resources for government administration of the CCUS regulatory regime. We anticipate that approvals for CCUS activities will be assessed through existing pathways, with costs to be borne by the applicant/operator. Where a need is

identified, MBIE and MfE will look to develop a cost-recovery mechanism that would ensure sufficient resources for administration.

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- Major financial and technological risk and burden on the EPA, especially in the short to medium term under the freeze to the Register. This can potentially be mitigated by utilising more manual work arounds in the near future, and accepting deferral of the full ability to reward CCS activities for new entrants for a later date.

How will the new arrangements be monitored, evaluated, and reviewed?

182. The effectiveness of the CCUS regulatory framework is expected to be reviewed by MBIE, MfE and/or the regulator(s) five years after it comes into effect. However, the review may be earlier or later, depending on any significant changes to international emission accounting and trading rules, other CCUS-related international market developments, future government priorities and government agencies' resource availability.

183. The review is expected to examine any significant changes to the level of CCUS investments, the rate of compliance with the monitoring and information disclosure requirements, the number of CO_2 leakage incidents, how well CO_2 storage sites are remediated after leakage, and stakeholders' perception of the approval framework. The regulator is expected to monitor and assess data on CO_2 storage sites and undertake a market study to inform the review.

184. The policy proposals in this RIS do not include finer details of the regulatory design, which are to be developed further. These finer details could influence the methods and performance measures that would be used for evaluating the effectiveness of the CCUS regulatory framework.