British Columbia
Greenhouse Gas Offset Protocol

Carbon Capture and Sequestration

What We Heard Report

BRITISH COLUMBIA
Ministry of Environment and Climate Change Strategy

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Contents

Executive Summary

The Government of British Columbia publicly engaged on a draft Carbon Capture and Sequestration (CCS) Protocol between September 13 – December 1, 2023. The draft protocol proposed quantification methodologies, validation and verification requirements for projects wishing to generate B.C. Offset Units from the capture and permanent sequestration of greenhouse gas emissions in British Columbia.

During the engagement period, the Ministry of Environment and Climate Change Strategy made the draft protocol available on its website and held one-on-one meetings with interested parties on request. The Ministry held >10 meetings, received 36 formal submissions and 275 individual comments on the draft protocol from Indigenous nations, industry, government, non-government environmental organizations and members of the public.

A significant portion of comments received related to project eligibility, leak detection, and monitoring and quantification activities, including concern that monitoring and reporting requirements proposed were burdensome and may impact the economic viability of projects. A preference for increased flexibility for interaction between the protocol and B.C.'s new Output-Based Pricing System (OBPS), and other legislation, was also expressed.

Introduction

The Government of British Columbia is seeking to develop a B.C. Carbon Capture and Sequestration (CCS) Protocol. Engagement on a draft of the CCS Protocol took place between September 13 and December 14, 2023, with First Nations, industry, government, environmental non-government organizations and others. This feedback is critical to developing robust offset protocols. The government appreciates the time and effort taken to contribute feedback and support our transition to a low-carbon economy.

This document provides a summary of the feedback received on the draft CCS Protocol, which is expected to be finalized in 2024 following consideration of the feedback received.

Throughout this document, comments have been made in footnotes that provide clarification, legislative updates and rationale related to some of the feedback received; if a response was available at the time of writing.

B.C.'s Offset Program

The B.C. Offset Program is enabled under the provincial *Greenhouse Gas Industrial Reporting and Control Act* (GGIRCA) and governed by the *Emission Offset Project Regulation* (EOPR)[1]. GGIRCA allows the Director to establish offset protocols to specify quantification methodologies for particular types of emission offset projects, as well as prescribe eligibility requirements. In order to generate B.C. Offset

[1] Formerly known as the *Greenhouse Gas Emission Control Regulation* prior to Order in Council #24/2024.

Units, offset projects must develop project plans that adhere to a relevant protocol to demonstrate the offsets generated under the project are real, additional, measurable, permanent and verifiable.

Consistent with international approaches to emission offset protocol requirements, including the International Standards Organization (ISO) 14064-2: 2019, the World Resources Institute/World Business Council for Sustainable Development Greenhouse Gas Protocol, and others, B.C.'s offset protocols establish the following:

- General eligibility and applicability.
- Guidance and requirements for determining project start date, crediting period, and stabilization period.
- Requirements for project plans and project reports.
- Guidance on double counting and financial additionality.
- Monitoring requirements.
- Quantification methodologies.

For more information on the program or offsets generally, please visit the B.C. Offset Program webpage.

B.C.'s Carbon Capture and Sequestration Protocol

B.C.'s draft CCS Protocol specifies how greenhouse gas emission reductions and removal enhancements from projects sequestering captured carbon within British Columbia must be quantified. Greenhouse gas reduction and removal enhancements recognized by the draft protocol include:

- injecting and permanently storing captured carbon in a subsurface storage reservoir within a storage complex, or,
- chemically transforming captured carbon into a compound or form that is capable of permanently storing captured carbon, and,
- subsequently, permanently sequestering the captured carbon.

The protocol outlines requirements for developing the offset project plan and reports, and associated validation and verification requirements.

Projects approved under the draft CCS protocol are currently expected to comply, post-crediting, with a 100-year monitoring and maintenance period for projects that inject captured carbon into an oil and gas reservoir or saline formation and a 20-year monitoring and maintenance period for projects that inject into mafic rock formations. No post-crediting monitoring and maintenance is required for chemical transformation projects.

Summary of Feedback

During the engagement period on the draft CCS Offset Protocol (September 13 to December 14, 2023) the Province made the draft CCS Offset Protocol available on its website and held meetings with interested parties upon request.

In total, the Province received 36 formal submissions with 275 individual comments from First Nations, industry, government, non-governmental organizations (NGOs), and members of the public.

Table 1. Number of submissions by party

Party	Submissions	Individual Comments
Government	3	17
Industry	12	145
First Nations	14	68
NGOs	2	15
Other	5	30
Total	**36**	275

Key themes identified in the comments received were feedback on:

1. General Comments
2. Project Eligibility
3. First Nations Feedback
4. Monitoring Periods and Leak Detection
5. Crediting and Stabilization Periods
6. Quantification and Verification
7. Additionality and Double Counting

In addition to these themes, feedback was also received relating to the appropriate role of carbon capture and sequestration in meeting decarbonization goals, with concerns raised regarding safety and efficacy. Some stated that carbon capture and sequestration technologies are unproven and that open and transparent discussions are needed related to bioengineering, potential tradeoffs, and governance of these technologies, particularly with rights holders.

Feedback was also received regarding the interaction of the CCS Protocol with the B.C. Output-Based Pricing System (OBPS). A preference for greater flexibility was expressed by industry, including a request that the protocol not limit the ability for a facility to reduce its compliance obligation entirely by using CCS, or restrict the use of earned credits from CCS. It was highlighted that several proponents would be heavily reliant on the ability of their CCS project to reduce their facility's compliance obligation commensurate with the full quantity of emissions that are captured and sequestered. While this is important feedback that the Province will take into consideration in future reviews of the OBPS,

limitations on the use of offsets are a feature of the OBPS and as such is out of scope of the CCS Protocol which is concerned with how projects should be credited.

To ensure that only emissions that are permanently sequestered are credited with B.C. Offset Units, the CCS protocol only credits projects that prove the permanent sequestration of carbon dioxide emissions. An OBPS operation that uses capture technology must report all captured emissions towards its emissions total and will not be eligible for earned credits.

Theme 1: General Comments

Many comments emphasized the importance of ensuring that offset protocols are functional and realistic to what proponents can commit to and achieve so the system will not fail to generate tradable offset units. It was expressed that offset protocols must support decarbonization goals and incentivize the capital expenditures that are needed for successful projects. Overall, several comments stated that some requirements, such as materiality thresholds and monitoring requirements are too stringent and may be a limiting factor in proponents undertaking a carbon capture and sequestration project in B.C.

Many comments have expressed that CCS technologies are very expensive, and it is critical that the CCS protocol not create additional financial burdens, but instead ensure the projects are economically beneficial.

Some comments stated that the definition of "storage project" in GGECR is not appropriate for CCS projects, as they involve permanent sequestration[2].

Theme 2: Project Eligibility

A number of comments related to clarification as to what project types would qualify to generate B.C. Offset Units under the protocol. This included a proposal to establish a "positive list" of eligible chemical transformation processes, and provision of a pathway that allows additional chemical transformation processes to be added over time.

Commenters indicated that additional clarification is desired on what would qualify as a project under the CCS Protocol. Multiple comments requested additional clarification and context on what is needed on a sequestration project compared to a storage project and why they are defined differently in the Greenhouse Gas Emissions Control Regulation (GGECR)[3].

It was raised that the CCS protocol has the opportunity to ensure that only sites with secure storage capability for carbon sequestration are selected, and that requirements for site selection and certification appear to be lacking.

The draft protocol requires that captured emissions be permanently sequestered within B.C. lands or waters, however it does not require that carbon emissions be captured within B.C. It was highlighted

[2] The Ministry has amended GGECR in its new form as EOPR for the definition of "sequestration project" to include CCS projects.
[3] The Province has removed the definition of 'storage project', and amended the definition of 'sequestration project' in EOPR to include CCS projects.

that the protocol does not require that the 'carbon capture' and sequestration be carried out by the same entity.[4]

It was recommended that collaboration with the Government of Alberta would be beneficial for CCS projects due to the fossil fuel infrastructure that straddles the provincial boundaries and the significant potential for cross-jurisdictional projects.

Concerns were raised that it may be difficult for project proponents to provide the required level of confidence and that many factors (such as expenditure and operating costs) should be considered when reviewing financial additionality assertions. It was recommended that the protocol allow for flexibility to allow operators the opportunity to repurpose existing infrastructure who purposely alter existing processes to capture or increase the capture/sequestration of carbon.

Theme 3: First Nations Feedback

Several comments requested that the protocol explicitly recognize and affirm Aboriginal Rights and Title and include free, prior, and informed consent for all projects. It was suggested that project proponents should need to demonstrate that First Nations have been meaningfully consulted with and provide evidence that they have sought and included all applicable feedback from impacted First Nations into their CCS project plans. Commenters suggested that notifications to potentially impacted First Nations in the area of a project will be necessary.

It was mentioned that government should be collaborating with First Nations to assist with leak detection and monitoring of carbon capture and sequestration projects.

Several comments stated that the protocol must align with the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP) and the *Declaration on the Rights of Indigenous Peoples Act* (DRIPA).

The Province continues to strive to align legislation with Section 3 of the Declaration of Indigenous Peoples Act and uphold Aboriginal title and rights. CCS projects that require a subsurface sequestration site will undergo a permitting process with the BC Energy Regulator, which will include a consultation process with affected First Nations. CAS will also continue to work on ensuring Aboriginal title and rights are apprised with the Ministry of Energy and Low Carbon Innovation (EMLI), which is the Ministry with jurisdiction over land tenure.

It has been suggested that incentives be incorporated for Indigenous partnerships and ownership, as well as procurement policies that enable Indigenous participation in carbon capture and sequestration projects.

[4] The draft protocol does not dictate where carbon must be captured, only that it be sequestered in B.C.

Theme 4: Monitoring Periods and Leak Detection

Length of Monitoring Period

The theme most clearly stated in the feedback received from stakeholders was that the post-closure monitoring periods for CCS projects are too long. The draft protocol currently states that project proponents of a subsurface CCS project that injects captured carbon into an oil and gas reservoir or saline formation must comply with monitoring and maintenance requirements for 100 years after the end of the crediting period. Monitoring requirements for mafic rock CCS projects are reduced in comparison to sequestering carbon in oil and gas reservoirs and saline formations. The draft protocol requires projects that inject into mafic rock formations monitor for 20 years after the end of the crediting period as mafic rocks are highly reactive and can chemically transform injected carbon into mineral form relatively quickly, lowering the risk of reversal.

The draft protocol requires proponents to provide annual monitoring reports during the stabilization period to demonstrate leakage is not occurring. After the stabilization period, proponents are required to provide monitoring reports every five years for the remainder of the 20- or 100-year monitoring period. Comments mentioned that, although robust monitoring is critical to ensure no physical leakage occurs, the 100-year monitoring requirement is prohibitively long and likely to greatly impact the ability of proponents to make investment decisions in the near-term and will deter project developers due to liability concerns and administrative burden for smaller projects. It was suggested that the monitoring periods be amended so that they are proportionate to a project's operating parameters, such as project life and sequestered tonnage[5].

It was also mentioned that requiring aerial or ground-based inspections annually for leak detection is onerous, and instead monitoring requirements be risk-based and data-informed and adapted as appropriate.

Transfer of Liability to Province

Several comments proposed that the monitoring period should end after the stabilization period and that the Province should take on liability for a CCS project once the project has demonstrated that performance is consistent with expectations for permanent sequestration. Many commenters referred to Alberta's *Mines and Minerals Act* which allows the Government of Alberta to assume long-term liability for carbon sequestration sites in the event of a reversal, in return for carbon capture and sequestration operators contributing to a post-closure stewardship fund which mitigates the long-term liability risk. It has been recommended that B.C. follow suit, including issuing a closure certificate to the proponent to demonstrate that liability has been transferred to the provincial government.

Safety and Leak Detection

In contrast to the preceding section, many comments spoke to concerns related to safety and possible leaks from CCS projects. Some asked that the Province provide further information around the risk and consequences associated with leaks, and how potential leaks would be communicated. It was stated that

[5] The Emissions Offset Project Regulation has been amended to allow for monitoring periods to be set under each protocol rather than setting a default monitoring period for all projects. The Climate Action Secretariat is considering policy alternatives for monitoring post-stabilization period to ensure robust monitoring programs are maintained.

multiple verification checks and ongoing monitoring practices should be required. There was some concern that the rate of reporting may be insufficient for detecting potential leaks, and questions regarding the accuracy of leak detection technologies[6] complex underground sequestration reservoirs. It was suggested that sequestration facilities in lower-risk areas still need monitoring requirements, and that proper systems need to be in place to accurately monitor and publicly report on leaks.

Theme 5: Crediting and Stabilization Periods

Several parties requested more concrete requirements for completing the stabilization period and secure signoff from government. Some stated that the current definition makes requirements seem "open-ended and subject to BC Energy Regulator (BCER) discretion, and that additional clarity is needed to understand how BCER verifies that stabilization of stored CO_2 has occurred to an extent ensuring sequestration. It was recommended that the CCS Protocol provide an enhanced definition of Stabilization Period as the end of the stabilization period is an important milestone in the project's lifecycle and triggers a change from annual monitoring reports to reports every five years.

Section 8 of the CCS Protocol sets out a crediting period of 25 years from the project start date. Several commenters queried why a project would be restricted to 25 years and stated that the crediting period should instead be determined by the capacity and injection rate of the reservoir. It has been requested that the option to extend the 25-year crediting period be available when needed, as many projects are able to be maintained diligently beyond this point[7].

It has also been requested that the Province engage with the federal government on the ongoing development of Carbon Contracts for Difference to provide additional price and offset demand certainty, particularly for projects that would be considered early adopters.

Project Reports

The CCS Protocol currently requires that Project Reports be submitted by March 1[8] of the year immediately following the period for which the Project Report applies. Several comments expressed that this timeline is too short to complete the required reporting, quantification, quality assurance and verification activities. One commenter expressed that 6 to 8 months following the period to which the project report applies is necessary to complete requirements. As the March 1 deadline overlaps with other required reporting deadlines it was recommended that this date be changed to align with reporting deadlines under the GGIRCA and the National Pollutant Release Inventory (NPRI), or even flexibility similar to requirements used in Alberta.

[6] The draft CCS protocol specifies that monitoring reports are required every five years after stabilization; this does not mean that monitoring is done only once every five years.

[7] Section 18(2) of the *Greenhouse Gas Emission Control Regulation* (now EOPR) does allow projects to request extensions of their crediting period under the protocol applicable at that time, up to a total of 100 years of crediting and contingent upon an approved, validated project plan. Requests for extension cannot be submitted until at least 12 months prior to the end of the crediting period.

[8] This date coincides with existing BCER reporting requirements.

The OBPS establishes a restriction on the 'vintage' of offsets that are eligible for compliance purposes. It was expressed that projects should be able to report more frequently than annually to be able to take advantage of OBPS demand.

Theme 6: Quantification and Verification

Appendix A of the draft Protocol provides information on the quantification of project reductions. Equation 1 is used to determine the total emissions reductions in a project report period, Equation 2 is used to calculate the adjustment factor, Equation 3 is used to calculate the total project reductions in a project report period and Equation 4 determines the total emissions reductions that is to be credited to the contingency account. Sub-Appendices A.1 and A.2 provide additional context related to emissions quantifications for subsurface CCS projects and chemical transformation CCS projects.

CARB CCS Protocol Risk Ratings

Equation 3 uses risk-rating factors that must be calculated using equations in the California Air Resources Board (CARB) CCS Protocol. Extensive feedback was received specifically related to the use of the CARB CCS Protocol risk ratings, with many criticizing their use for risk quantification. Many have stated that the "CARB CCS Protocol the risk rating contribution factors are too high.

A number of alternative suggestions were made to the CARB approach; including Alberta's CCS protocol (2015), private insurance, Verra's Geological Carbon Storage Requirements and Geologic Carbon Storage Non-Permanence Risk Tool, and a study by Alcade et al. (2018).

Emissions Accounting

Several comments related to accounting of emissions for different activities within carbon capture and sequestration projects. Comments expressed that all CO_2e that is released during the carbon capture and sequestration process should be accounted for in the calculation for net CO_2 sequestration, and if sequestered carbon was used to allow increased emissions by fossil fuel companies, then data on increased emissions must be included to calculate net CO_2 sequestration for the project. It has been suggested that the baseline scenario should be equal to the total amount of captured CO_2 that is chemically transformed.

A few comments spoke to accounting for fuel usage and how to account for emissions associated with processing and transporting the captured carbon, suggesting that fuel usage should be prorated or adjusted to only account for the portion being used for CCS related activities. It has been expressed that additional clarity is needed on how to account for carbon emissions from transportation, densification, and chemical reactions.

The CCS Protocol references the use of emission factors and of quantification methodologies crafted by the Western Climate Initiative (WCI). WCI Methodologies are the required quantification documents for industrial greenhouse gas emissions reporting under the GGIRCA and *the Greenhouse Gas Emissions and Reporting Regulation*. Some commenters stated that these methodologies are challenging and outdated, and it has been strongly recommended that these methods be updated.

Validation and Verification

The CCS Protocol covers validation and verification requirements, including materiality thresholds, for CCS projects. Concerns were raised relating to costs of accredited verifiers and their availability, stating that "assurance providers charge above-market rates due to lack of availability." Further detail was requested on professional requirements of accredited validators and how they will assess CCS project monitoring and maintenance plans.

The Protocol sets out a materiality threshold for validation of more than 5% or one tonne of CO2, whichever is greater, and 0.1% or one tonne of CO2, whichever is greater, for verification. Concerns were raised regarding the materiality threshold for verification as too low.

Theme 7: Additionality and Double Counting

Financial Additionality

Section 20 of the CCS protocol outlines requirements for financial additionality assertions, such as an assertion that the revenue from the sale of the offset units was or will be required to implement the project and a justification for that assertion. It has been stated that the CCS protocol needs to provide additional clarification and be more explicit in defining which financial criteria are used to determine whether revenues are required, or if a specific rate of return is acceptable.

Concerns were raised that it may be difficult for project proponents to provide the required level of confidence, and that a number of factors (such as expenditure and operating costs) should be considered when reviewing financial additionality assertions.

Other questions related to whether receiving funding from the CleanBC Industry Fund would invalidate a project under the CCS Protocol, and suggested this may have implications for project development. It has been recommended that a clear pathway be established for which a project could receive government funding and still prove financial additionality.

Double Counting

Under Section 22, the CCS Protocol requires that a project proponent not count any emissions reductions or enhancements that are legally required, recognized under other offset projects, or related to the Low Carbon Fuel Standard, to avoid double counting.

Many comments were received related to double counting, with some in support and others questioning why credits cannot be claimed under other legislation. Some comments stated that the strongest measures and closure of any possible loopholes are necessary to avoid double counting, and that it should be more clearly stated that a project cannot earn B.C. Offset Units for a reduction recognized under any other crediting scheme, including the Federal Clean Fuel Regulations (CFR). Commenters requested additional guidance on double counting, and suggested that facilities that are regulated both provincially and federally should be able to recognize CCS projects under both regulations and highlighted that the federal government allows for credit stacking under the CFR with carbon pricing.

Regulatory Additionality

All B.C. Offset Protocols require a company to state within a project report that the activities are not required, directly or indirectly, by a new regulatory requirement that arose during the reporting period.

Comments expressed that this requirement is concerning given the significant financial investment, long timelines and support from crediting mechanisms that are necessary to move forward with a potential project[9]. Concerns were raised around the risk of a new policy arising following the commencement of the CCS project that could affect its ability to generate offsets will significantly impact the uptake of these types of projects. Other commenters reiterated the impacts that regulatory changes can have on new projects, such as delays, increased costs, and additional legal and administrative hurdles.

It has been suggested that more certainty be provided on expected credit generation.

Pathway to completing the CCS Protocol

The Ministry extends its sincerest appreciation for the continued engagement in the final stages of development and implementation of the CCS Protocol. The Ministry is considering all feedback received and evaluating each comment on its own merit in finalizing the CCS protocol. During this time, the Province will conduct independent analysis of the submissions to ensure the usability and rigor of the protocol. A final version of the protocol is expected to be released in late 2024.

[9] Section 25 of the draft protocol on regulatory additionality is common to all BC offset protocols and is a requirement of EOPR.