British Columbia Greenhouse Gas Offset Protocol: Carbon Capture and Sequestration

Version 1.0

Effective Date: [Date Protocol will be Approved by the Director and publicly released]

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Equations

GUIDANCE

*This document contains both a protocol for the carrying out of certain emission offset projects that capture or remove and sequester (permanently store) greenhouse gas emissions, and guidance associated with such projects. The Protocol is established under section 10 of the Greenhouse Gas Industrial Reporting and Control Act ("**GGIRCA**"). It creates legal requirements that Project Proponents, Validation Bodies and Verification Bodies must follow for the proponent to obtain Offset Units under GGIRCA. This document also contains guidance which is intended to assist Project Proponents, Verification Bodies and Validation Bodies. Such guidance is not a legal requirement imposed, although it may refer to binding legal requirements. For example, explaining implications of a Protocol requirement or reminding Project Proponents that they may be subject to other legislation or regulations, and that nothing in this Protocol affects those obligations.*

*Text in this document which is italicized is guidance and is not part of this Protocol. Text in this document which is not italicized is part of this Protocol. Terms that are capitalized, other than for grammatic purposes, have the definitions ascribed to them in this Protocol, GGIRCA, or the Greenhouse Gas Emission Control Regulation ("**GGECR**"), or the Greenhouse Gas Emission Reporting Regulation ("**GGERR**"), or the Petroleum and Natural Gas Act ("**PNGA**"), or the Oil and Gas Activities Act ("**OGAA**").*

The guidance included within this Protocol is for the purpose of providing additional information only and may not be applicable to specific Projects. Project Proponents are responsible for ensuring compliance with all applicable laws, including, but not limited to, this Protocol, GGECR, GGIRCA, OGAA[1], PNGA, and associated British Columbia Energy Regulator (BCER) requirements or other regulations as applicable.

The Protocol expands on GGECR requirements for Eligible Projects and provides detailed rules for quantification of Project Reductions from Eligible Projects. The Protocol must be read in conjunction with GGECR, as most of the requirements of GGECR apply fully to Eligible Projects.

Simply meeting the eligibility requirements in this Protocol does not guarantee a Project will be able to generate offset units. Project Proponents are advised to confirm that the rules for calculating Baseline Emissions under this Protocol will allow for generation of offset units. Project Proponents are also advised to confirm that the required assertions related to additionality of the Project can be made.

Project Proponents are further responsible for understanding the interaction of Projects under this Protocol with other regulatory and funding programs. This will vary according to the rules of GGECR, this Protocol and the rules applicable to other programs. For example, obtaining funding for a project under the CleanBC Industry Fund may affect the ability to obtain

[1] When certain sections of the Energy Statutes Amendment Act 2022 (Bill 37) come into force by regulation, references in this document to OGAA must be read as references to the Energy Resource Activities Act.

validation of a Project Plan, and attempting to obtain Offset Units from a Project may be a breach of funding agreements.

Project Proponents are also responsible to ensure that the Validation Body or Verification Body used is accredited in relation to projects in the sector covered under this Protocol (i.e. accreditation by the Standards Council of Canada to Technical Sector D: Carbon Capture and Storage or by the American National Standards Institute (ANSI) to Sector Group 4: Carbon Capture and Storage).

Project Proponents are strongly encouraged to test the feasibility of potential projects prior to developing a Project Plan under this Protocol. Project Proponents assume all risk if the emission reductions estimated during a feasibility study or any other means of estimation are different from those calculated using the quantification methodology contained in the Protocol.

PART 1: DEFINITIONS AND INTERPRETATION

Definitions and Interpretation

1 (1) In this Protocol, a word or expression that is capitalized other than for grammatic purposes has the same meaning as in GGIRCA, GGECR, GGERR or PNGA, or as set out below:

"BCER" means the BC Energy Regulator;

"Calendar Year" means a period of twelve consecutive months, beginning on January 1 and ending on December 31.

"CARB CCS Protocol" means California Air Resources Board's "Carbon Capture and Sequestration Protocol under the Low Carbon Fuel Standard", 2018, available from here.

"Captured Carbon" means

(a) CO_2 that is captured from an emission source by a Capture Facility before it is released into ambient air, or

(b) CO_2 that is already present in ambient air and captured by a Capture Facility;

"Capture Facility" means a facility capable of capturing CO_2 directly from an emission source before it enters the atmosphere, or capturing CO_2 already present in ambient air, via a technology that includes a mechanical system;

"Carbon Capture and Sequestration Project" or "CCS Project" means a Project that has the Sequestration of Captured Carbon as its Primary Project Activities;

"Chemical Transformation CCS Project" means an above-ground CCS Project for which Sequestration is achieved

(a) by chemically transforming Captured Carbon into a compound or form capable of permanently storing Captured Carbon, and

(b) by permanently storing the Captured Carbon;

"CO_2e" or **"Carbon Dioxide Equivalent"** means carbon dioxide equivalent as determined in accordance subsection (6) of this section;

"Effective Date" means the date on which public notice of this Protocol was provided under section 10 (3) of GGIRCA *[as shown for guidance purposes on the cover page of this protocol]*;

"Eligible Project" means a Project that is eligible under section 4;

"GGECR" means the Greenhouse Gas Emission Control Regulation, B.C. Reg 250/2015;

"GGERR" means the Greenhouse Gas Emission Reporting Regulation, B.C. Reg 76/2022;

"GGIRCA" means the *Greenhouse Gas Industrial Reporting and Control Act*;

"GHG" means Greenhouse Gas;

"GWP" or **"Global Warming Potential"** means the global warming potential referred to in subsection (6) of this section;

"Low Carbon Fuel Requirements Program" means the regulatory scheme under Part 3 of the *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act*, the low carbon fuel requirements program under the *Low Carbon Fuel Act*, S.B.C. 2022, c. 21, or any regulatory scheme for reducing carbon intensity of fuels that replaces either Act;

"Monitoring Report Period" means the period referred to in section 26 (1) of GGECR for which monitoring reports under GGECR must be submitted;

"New Regulatory Requirement", in relation to a Project, means a Regulatory Requirement that arises during a Project Report Period;

"OGAA" means the *Oil and Gas Activities Act*;

"PNGA" means the *Petroleum and Natural Gas Act*;

"Project" means an offset project that results in reductions in GHG emissions or increases in GHG removals that are quantified and applied toward a Regulatory Requirement, or are recognized under a voluntary or regulatory program, for the purposes of offsetting GHG emissions;

"Primary Project Activities" means the Sequestration of Captured Carbon;

"Program of Activities" means a Project made up of activities occurring at multiple facilities or operations that each would individually constitute an Eligible Project;

"Project Instance" means an individual Eligible Project within a Program of Activities;

"Regulatory Requirement" means a requirement related to the regulating of Sequestration management practices or facilities, whether directly or indirectly, in a regulation, order, or other instrument that

(a) is issued by, or entered into with, the government, BCER or federal government, and

(b) requires a Project Proponent to take action to bring the Project Proponent's Sequestration practices or facilities into compliance with a law that relates to the Sequestration of CO_2;

"**Sequester**" or **"Sequestration"**, means doing one of the following in British Columbia:

(a) injecting and permanently storing Captured Carbon in a Storage Reservoir within a Storage Complex, or

(b) chemically transforming Captured Carbon into a compound or form capable of permanently storing Captured Carbon and, subsequently, permanently storing the Captured Carbon;

"Stabilization Period", in relation to a Subsurface CCS Project, means the period referred to in section 9;

"**Stand-Alone Project"** means an Eligible Project in which the Primary Project Activities are limited to a single facility or operation;

"Storage Complex" means the three-dimensional subsurface volume, of which the Storage Reservoir is a part, that is characterized, modified by corrective actions, and

monitored so that the CCS Project is able to meet the requirements for carbon Sequestration;

"Storage Reservoir" means a Storage Reservoir (as defined in the PNGA) where, in relation to a greenhouse gas, trapping mechanisms suitable for permanent storage exist;

"Subsurface CCS Project" means a Project for which Sequestration is achieved by injecting and permanently storing Captured Carbon in a Storage Reservoir within a Storage Complex;

"WCI Methodologies" means the Western Climate Initiative emission quantification methodologies incorporated by reference in the GGERR, consisting of the core 2011 WCI quantification methods in combination with the 2012 and 2013 amendments, as applicable per activity and emission source type, available from here.

(2) Text in this Protocol that is italicized, other than a reference to an Act, is for guidance only and is not part of this Protocol.

(3) The *Interpretation Act* applies to this Protocol.

(4) A definition or requirement that is expressed as including items in a list is not limited to those listed items.

(5) For the purposes of GGECR, a CCS Project is a "storage project" and not a "sequestration project".

(6) Section 1 (3) and (4) of the Greenhouse Gas Emission Reporting Regulation, B.C. Reg. 249/2015, applies to the calculation of carbon dioxide equivalent and, for that purpose,

(a) the global warming potential that applies to a calculation contained in a Project Plan is the global warming potential in effect as of the date of the Project Plan, and

(b) the global warming potential that applies to a calculation contained in a Project Report is the global warming potential in effect as of the date of the Project Report.

(7) For certainty, unless a contrary intention appears, a requirement imposed by this Protocol applies to Eligible Projects.

(8) For certainty, an assertion required by this Protocol to be included in a Project Plan, Project Report or Monitoring Report is

(a) an assertion of the Project Proponent,

(b) in the case of a Project Plan, an assertion for the purposes of section 15 (1) (a) of GGECR, and

(c) in the case of a Project Report or Monitoring Report, an assertion for the purposes of section 21 (1) (a) of GGECR.

(9) The Appendices to this Protocol form part of this Protocol.

PART 2. APPLICABILITY AND ELIGIBILITY

Applicability of Protocol

2 (1) This Protocol applies to Carbon Capture and Sequestration Projects.

(2) For certainty, in accordance with section 10 (4) of GGIRCA, this Protocol does not apply to a Project if the Project Plan was validated before the Effective Date.

Eligibility Assertion

3 A Project Plan must contain an assertion that the Project is an Eligible Project under this Protocol.

Eligible CCS Projects

4 A CCS Project is eligible under this Protocol if

(a) the Project involves the Sequestration of Captured Carbon in British Columbia, and

(b) the Project is not excluded under section 5.

Excluded Projects

5 A Project is not eligible under this Protocol if

(a) the Project Start Date was before January 1, 2022, or

(b) the Project is not likely to result in Project Removals, as determined in the Project Plan in accordance with this Protocol.

PART 3. GENERAL RULES

GGECR applies unless expressly disallowed or varied

6 Unless this Protocol specifically states that a requirement under GGECR is inapplicable, all Project Plans, Validation Statements, Project Reports, Verification Statements and Monitoring Reports, must meet the requirements of both this Protocol and GGECR.

Note re: consequences of failure to comply with GGIRCA or GGECR. Failure to meet such requirements may cause a project plan not being accepted under GGIRCA or offset units not being issued.

Determination of Project Start Date

7 A Project Start Date is the earliest date on which the Primary Project Activities cause an increase in the Sequestration of CO_2 relative to the baseline.

Crediting Period

8 The Crediting Period for a Project begins on the Project Start Date and ends on the earlier of the following:

(a) the date that is 25 years after the Project Start Date;

(b) in the case of a Stand-Alone Project, the date on which injection is completed for the Project;

(c) in the case of a Program of Activities, the date on which injection is completed for all Project Instances.

Notes re: Crediting Periods: while the crediting period is twenty-five years from the Project start date, the Baseline Emissions of the Project will be adjusted to reflect increased Regulatory Requirements over time, if any.

While there is a possibility that a Project may receive a revalidation based on any applicable protocol in effect at the end of the Crediting Period, this will be based on the continuation of the project meeting all GGECR and protocol requirements in place at that time, e.g. that the continuation of the Project exceeds regulatory requirements and requires the financial incentives of credits.

Stabilization Period (if applicable)

9 (1) A Stabilization Period applies to a Subsurface CCS Project and, if the Subsurface CCS Project is a Program of Activities, to each Project Instance.

(2) The start date of the Stabilization Period of a Stand-Alone Project is the date on which injection is completed for the Project.

(3) The start date of the Stabilization Period of a Project Instance is the date on which injection is completed for the Project Instance.

(4) The Stabilization Period ends when the BCER verifies that stored CO_2 stabilization has occurred to an extent ensuring Sequestration.

Quantification of Project Reductions

10 Project Reductions must be quantified in accordance with the Appendices.

PART 4: GENERAL PROJECT PLAN REQUIREMENTS

Additional Project Plan Requirements

11 (1) A Project Plan for a Subsurface CCS Project must include the following assertions:

(a) the Project Proponent

(i) holds a storage reservoir license in accordance with Part 14 of the PNGA, or holds a PNG lease for the spacing area where the CO_2 originates from oil and gas activity, and

(ii) has complied with financial security requirements under Section 30 of OGAA, and provided security to the BCER sufficient to cover the costs of

A. operation, monitoring, and reporting during the Project Crediting Period,

B. Storage Complex monitoring, corrective actions, and reporting during the Stabilization Period,

C. Storage Complex monitoring, maintenance, and reporting after the Stabilization Period for the period set out in section 29 (1) (a) or (b) of this Protocol, as applicable;

(b) the development or use of the storage reservoir has been designated as a special project under s. 75 (1) (c.1) of OGAA,

(2) A Project Plan for a Chemical Transformation CCS Project must include an assertion that the Project Proponent has provided sufficient evidence to demonstrate a reasonable likelihood for CO_2 Sequestration.

Technical Descriptions in Project Plan

12 The technical description referred to in section 14 (3) (c) of GGECR must include a detailed description of the Primary Project Activities.

Project Identification Information

13 The Project identification information referred to in section 14 (3) (d) of GGECR must include one of the following:

(a) in the case of a Stand-Alone Project, the street address, GPS coordinates, and latitude and longitude of the Project's Facilities as of the date of the Project Plan;

(b) in the case of a Program of Activities, the street address, GPS coordinates, and latitude and longitude of all Project's Facilities for known Project Instances as of the date of the Project Plan.

Chronological plan for the Project

14 A chronological plan referred to in section 14 (3) (e) of GGECR must set out:

(a) the key events in the development of the Project that occurred before the Start Date, and

(b) the dates on which those events occurred.

PART 5: GENERAL PROJECT REPORT REQUIREMENTS

Assertions in Project Reports apply to the Project Report Period

15 An assertion that this Protocol requires in a Project Report is an assertion for the Project Report Period.

Project Report Period

16 (1) The first Project Report Period

(a) begins on the Project Start Date, and

(b) ends on December 31 of the Calendar Year immediately after the Calendar Year that includes the Project Start Date.

(2) Each subsequent Project Report Period is one Calendar Year.

Project Report Submission Timing and Form

17 Project Reports must be submitted by March 1 of the year immediately following the Project Report Period for which the Project Report applies.

Project Reports for Programs of Activities

18 If a Project is a Program of Activities, the Project Report must include

(a) a list of all Project Instances not described in the Project Plan, and

(b) a list of all Project Instances described in the Project Plan that have not proceeded.

Additional Project Report Requirements

19 A Project Report for a Subsurface CCS Project must include an assertion that carbon dioxide storage progress reports have been submitted to the BCER in accordance with the requirements that apply to the carbon dioxide storage project reports.

PART 6: ADDITIONALITY AND DOUBLE COUNTING

Financial Additionality Assertion

20 A Project Plan

(a) is not required to include the assertion in section 14 (3) (n) (xi) of GGECR, but

(b) must include an assertion that the revenue from the sale of Offset Units was or will be required to implement the Project and a justification for that assertion.

Historic Practice Assertion

21 A Project Plan must include an assertion that the Project involves the installation and operation of new or additional infrastructure for the Sequestration of CO_2 relative to the Baseline Scenario.

Double Counting

22 A Project Proponent must ensure, and the Project Plan and every Project Report must include assertions, that the Emissions Reductions and Removal Enhancements included in the determination of Project Reductions have not been, and will not be, counted

(a) towards any legal obligation of the facility, which was the source of the emissions, to reduce or limit GHG emissions from industrial processes or from the combustion of fuels, or to reduce the emissions intensity of their product suite,

(b) as an emission reduction from other Offset Projects, including being considered in determining carbon intensity of a fuel for the purpose of other Offset Projects,

(c) for the purpose of determining carbon intensity of a fuel under the Low Carbon Fuel Requirements Program, or

(d) towards any legal obligation of a utility to capture CO_2.

Captured and transported CO_2 contracts [data sharing agreements]

23 (1) In each Project Report, the Project Proponent must identify all of the following:

(a) all Capture Facilities from which all of the Captured Carbon was sourced and all transportation service providers that transported the Captured Carbon;

(b) for each Capture Facility and each transportation service provider referred to in paragraph (a), location, ownership, quantity of gas received or transported, CO_2 concentration, quantity of CO_2;

(c) a breakdown by amount of gas supplied from each Capture Facility as a portion of the whole;

(d) a breakdown by amount of gas transported by each transportation service provider as a portion of the whole.

(2) A Project Plan must include an assertion that, as of the date of the Project Plan, the Project Proponent has an agreement with respect to each Capture Facility referred to in subsection (1) from which Captured Carbon is supplied for the purposes of obtaining

(a) the data described in subsection (1), and

(b) all data necessary to quantify the Project Emissions according to Sub-Appendix A.1 or A.2.

(3) A Project Plan must include an assertion that, as of the date of the Project Plan, the Project Proponent has an agreement with respect to each transportation service provider

referred to in subsection (1) from whom Captured Carbon is transported for the purposes of obtaining

(a) the data described in subsection (1), and

(b) all data necessary to quantify the Project Emissions according to Sub-Appendix A.1 or A.2.

Regulatory Additionality – Project Plans

24 (1) A Project Plan must include either

(a) an assertion that the Primary Project Activities are not required, directly or indirectly, by a Regulatory Requirement, or

(b) an assertion that the Primary Project Activities are required, directly or indirectly, by a Regulatory Requirement, but the Primary Project Activities exceed the standards required by the Regulatory Requirement.

(2) For the purposes of validation of a Project Plan, if a Project Plan includes an assertion referred to in subsection (1) (b), the Project Proponent must demonstrate in the Project Plan that the Primary Project Activities exceed the standards required by the Regulatory Requirement.

Regulatory Additionality – Project Reports

25 (1) A Project Report for a Project Report Period must include either

(a) an assertion that the Primary Project Activities are not required, directly or indirectly, by a New Regulatory Requirement that arose during the Project Report Period, or

(b) an assertion that the Primary Project Activities are required, directly or indirectly, by a New Regulatory Requirement that arose during the Project Report Period but the Primary Project Activities exceed the standards required by the New Regulatory Requirement.

(2) If a Project Report includes an assertion referred to subsection (1) (b), the Project Proponent must demonstrate, in the Project Report, that the Primary Project Activities exceed the standards referred to in that subsection.

PART 7: HISTORICAL PRACTICES

26 For a CCS Project that involves the expansion of existing storage capacity, the technical description required by section 12 of this Protocol must clearly distinguish between the

elements of the Sequestration system in place prior to the Start Date and those established on, or started after, the Start Date.

PART 8: MATERIALITY THRESHOLDS

Materiality Threshold for Validation

27 For the purposes of sections 15 (3) (c) of GGECR, errors, omissions or misrepresentations are considered material if the aggregate effects of all errors, omissions and misrepresentations result in an overestimation of the Project Reductions of more than 5% or one tonne CO_2, whichever is greater.

Materiality Threshold for Verification

28 For the purposes of sections 21 (4) (c) of GGECR, errors, omissions or misrepresentations are considered material if the aggregate effects of all errors, omissions and misrepresentations result in an overestimation of the Project Reductions in a Project Report Period of more than 0.1% or one tonne CO_2, whichever is greater.

PART 9: MONITORING

Monitoring Period

29 (1) For the purposes of monitoring and maintenance requirements under section 25 of GGECR,

(a) a Project Proponent of a Subsurface CCS Project that injects Captured Carbon into an oil and gas reservoir or saline formation must comply with the obligations under that section for 100 years after the Crediting Period of the Project ends, and

(b) a Project Proponent of a Subsurface CCS Project that injects Captured Carbon into a mafic rock formation must comply with the obligations under that section for 20 years after the Crediting Period of the Project ends instead of 100 years.

(2) A Project Proponent of a Chemical Transformation CCS Project is not required to comply with section 25 of GGECR.

Monitoring Report Period for Subsurface CCS Projects

30 (1) The first Monitoring Report Period for a Subsurface CCS Project

(a) begins on the day after the end of the Crediting Period, and

(b) ends on December 31 of the Calendar Year immediately after the Calendar Year in which the Crediting Period ends.

(2) Subject to subsection (3), each subsequent Monitoring Report Period for the Project is one Calendar Year.

(3) Following the Calendar Year in which the Stabilization Period ends, each subsequent Monitoring Report Period for the Project is five Calendar Years.

Requirements for Monitoring Reports

31 For the purposes of section 26 (3) (i) of GGECR, a Monitoring Report must include

(a) an assertion that the Project Proponent has complied with any monitoring and maintenance requirements under OGAA, including any requirements under a permit under section 75 (1) of OGAA or requirements imposed by the BCER, that apply in relation to the Project,

(b) if applicable, an assertion that the leak detection strategies under section 33 of this Protocol have been carried out, and

(c) evidence to support the assertion in paragraphs (a) and (b).

Additional Requirements for Subsurface CCS Projects that are Programs of Activities

32 (1) This section applies to Subsurface CCS Projects that are Programs of Activities.

(2) For the purposes of section 14 (3) (p) of GGECR, if injection is completed for a Project Instance before the end of the Crediting Period, a Project Report must include

(a) an assertion that the Project Proponent has complied with any monitoring and maintenance requirements under OGAA, including any requirements under a permit under section 75 (1) of OGAA and requirements imposed by the BCER, that apply in relation to the Project Instance following the completion of injection,

(b) if applicable, an assertion that the leak detection strategies under section 33 of this Protocol have been carried out in relation to the Project Instance, and

(c) evidence to support the assertions in paragraphs (a) and (b) of this subsection.

Leak Detection Monitoring After Stabilization Period

33 (1) For the remainder of the period referred to in section 29 (1) (a) or (b) of this Protocol, as applicable, following the end of the Stabilization Period, the Project Proponent of a Subsurface CCS Project must implement a leak detection strategy, as follows:

(a) using ground-based methods in the near-surface strategically located near plugged and abandoned wells. Aerial technologies with a likelihood of detecting leakage from wells in the near-surface equivalent to that of ground-based methods may be used, with approval of the BCER;

(b) at areas of concern determined by modelling to be potential pathways for the preferential migration of CO_2 to the surface, at a frequency based on monitoring and verification data collected during injection and using methods approved by the BCER, at minimum once every Monitoring Report Period;

(c) using methods that can be verified and provide the following data, at a minimum:

(i) date and time of site visit or visual inspection;

(ii) GPS coordinates for any samples collected, measurements recorded, and locations of pertinent areas/points of concern (e.g., plugged and abandoned wells);

(iii) photographs documenting site conditions on date of inspection;

(iv) appropriate baseline and background measurements collected prior to the end of the Stabilization Period;

(d) if the inspection checks suggest a potential leak may have occurred, the Project Proponent must perform continuous and intermittent geochemical monitoring of the relevant area, including sampling of CO_2, ratios of CO_2 to other gasses, natural chemical tracers, and introduced tracers;

(e) if leakage is detected, it must be attributed, quantified, and assessed for potential corrective action, and the Project Proponent must appropriately manage, stop, and mitigate leakage.

(2) If a Subsurface CCS Project is a Program of Activities, the Project Proponent must implement the leak detection strategies described in subsection (1) for each Project Instance following the end of the Stabilization Period for the Project Instance, including if the Stabilization Period ends during the Crediting Period.

APPENDIX A: QUANTIFICATION

Section A.1 Applicability

(1) For the purposes of section 20 (3) (f) (vi) of GGECR, the measurements and calculations that result in the amounts asserted under section 20 (3) (f) (v) must be carried out in accordance with this Appendix.

Section A.2 Quantification of Emissions Reductions plus Removal Enhancements (ERRE) and of Project Reductions

(1) For each Project Instance, ERRE for a Project Report Period must be calculated by using Equation 1.

Equation 1 - Total Emissions Reductions in a Project Report Period

$$ERRE = (CO2_{Sequestered} - PE) \times (Adjustment) \quad (1)$$

Where,

Variable		Description	Units
ERRE	=	means the sum of Emissions Reductions and Removal Enhancements in the Project Report Period and is the value being calculated	t CO2e
$CO2_{Sequestered}$	=	means the total injected or chemically transformed CO_2 in the Project Report Period as calculated in accordance with the methodology referred to in Sub-Appendix A.1 or A.2, as applicable.	t CO2e
PE	=	means the total of all Project Emissions in the Project Report Period as calculated in accordance with the methodology referred to in Sub-Appendix A.1 or A.2, as applicable.	t CO2e
Adjustment	=	means the Adjustment determined under subsection (2)	Unitless

(2) The Adjustment in Equation 1 must be calculated by using Equation 2.

Equation 2 - Adjustment Factor

$$Adjustment = (1 - Supplied_{Credited}) \quad (2)$$

Where,

Variable		Description	Units
$Supplied_{Credited}$	=	the fraction of the total CO_2 under another regulatory regime that may reasonably be expected to be, or have been a. recognized or claimed in relation to a regulatory requirement related to greenhouse gas reductions under another enactment, or	Unitless

		b. submitted for recognition under a voluntary or mandatory emission offset scheme and includes, without limitation, any CO_2 referred to in section 22 (a) of this Protocol *[Double Counting]*.	
Adjustment	=	the value being calculated	Unitless

(3) For each Project Instance, Project Reductions for a Project Report Period must be calculated by using Equation 3.

Equation 3 - Total Project Reductions in a Project Report Period

$$PR = ERRE \times (1 - RiskRating) \quad (3)$$

Where,

Variable		Description	Units
PR	=	means Project Reductions in the Project Report Period and is the value being calculated	t CO2e
ERRE	=	means the sum of Emissions Reductions and Removal Enhancements in the Project Report Period calculated using Equation 1	t CO2e
RiskRating	=	means the overall Project risk rating factor determined under subsection (4)	Unitless

(4) The RiskRating factor in Equation 3 must be calculated using CARB Equation G.1 in the CARB CCS Protocol.

(5) After determining the RiskRating factor, the Project Proponent must calculate the total emissions reductions to be credited to the government's Contingency Account by using Equation 4.

Equation 4 - Total Emissions Reductions to be credited to the Contingency Account

$$CA = ERRE \times RiskRating \quad (4)$$

Where,

Variable		Description	Units
CA	=	means ERRE in the Project Report Period to be credited to the Contingency Account by the Director and is the value being calculated	t CO2e
ERRE	=	means the sum of Emissions Reductions and Removal Enhancements in the Project Report Period calculated using Equation 1	t CO2e
RiskRating	=	means the overall Project risk rating factor determined under subsection (4)	Unitless

(6) Baseline Emissions and Project Emissions must be calculated in accordance with the applicable Sub-Appendix in this Appendix.

(7) Project Reports must show each equation applicable to the quantification of Project Reductions and, for the relevant Project Report Period, how the inputs into those equations were derived, and the outputs from those equations.

(8) For a Project which is a Program of Activities, the Project Reductions must be calculated by applying subsections (1) to (7) to each Project Instance as if each instance was a Stand-Alone Project and totaling the result.

SUB-APPENDIX A.1: SUBSURFACE CCS PROJECTS

Section A1.1 Application of Sub-Appendix

This Sub-Appendix applies only to Subsurface CCS Projects.

Section A1.2 Emission sources and sinks

Section B.1 of the CARB CCS Protocol *[System Boundary]* sets out the emission sources and sinks that must be used, as applicable, in relation to the assessment of reductions in emissions associated with Subsurface CCS Projects.

Section A1.3 When sharing a CO_2 Pipeline

If a Project Proponent is one of several utilizing a shared pipeline for transporting CO_2 for injection into Storage Reservoirs, then

(a) upstream of the tie-in point, emissions from all applicable sources and sinks are allocated to each Project Proponent in proportion to the fraction of pipeline CO_2 injected by each out of the total, and

(b) downstream of the tie-in point, each Project Proponent is allocated 100% of the respective emissions, and

(c) for each Project Proponent, the total Project Emissions are the sum of emissions in (a) and (b).

Section A1.4 Project Emissions Quantification Methodology

The quantification of Project Emissions (PE) for Subsurface CCS Projects must follow the method outlined in Section B.2.2 of the CARB CCS Protocol *[Greenhouse Emissions Reductions Calculation]* as described and modified below.

References to specific equations from the CARB CCS Protocol will include the prefix "CARB".

Section A1.5 Emission factors and default values, when applicable

(1) Global Warming Potentials for GHGs must be taken from column 4 of the Schedule in the Carbon Neutral Government Regulation

(2) Emission Factors for fuels and grid electricity must be taken from the following:

- Grid Electricity – B.C. Grid Factors are available here.
- Fuels – Tables in part WCI.20 of the WCI Methodologies, available here.

Section A1.6 Baseline Scenario Emissions

The Baseline Emissions (BE) are equal to the total amount of injected CO_2 as measured directly at the point of injection.

Section A1.7 Project Scenario Emissions

Project Emissions (PE) are the sum of the individual terms on the right-hand-side of CARB Equation 2 as the terms are defined therein.

The $GHG_{capture}$ emissions are the sum of the individual terms on the right-hand-side of CARB Equation 3 as the terms are defined therein. However, the quantification of the individual terms must follow the WCI Methodologies as applicable to specific activities and emission source types.

The $GHG_{transport}$ emissions are the sum of the individual terms on the right-hand-side of CARB Equation 4 as the terms are defined therein. However, the quantification of the individual terms must follow the WCI Methodologies as applicable to specific activities and emission source types.

The $GHG_{injection}$ emissions are the sum of the individual terms on the right-hand-side of CARB Equation 6 as the terms are defined therein. However, the quantification of the individual terms must follow the WCI Methodologies as applicable to specific activities and emission source types.

To be conservative, the term $CO2_{leakage}$ in CARB Equation 6 must equal half the detection limit of the method used to detect leaks deployed in the Project's monitoring and testing plan, or the volume of leakage detected, whichever is larger. The Project Proponent must provide a description and justification for the method used to calculate the detection limit.

Section A1.8 Measurement and Data

Project Proponents must follow the data sampling, analysis, and measurement requirements of the WCI Methodologies as applicable to the specific activities and emission source types they are quantifying.

Section A1.9 Missing Data

Project Proponents must follow the procedures for estimating missing data of the WCI Methodologies as applicable to the specific activities and emission source types they are quantifying.

SUB-APPENDIX A.2: CHEMICAL TRANSFORMATION CCS PROJECTS

Section A2.1 Application of Sub-Appendix

This Sub-Appendix applies only to Chemical Transformation CCS Projects.

Section A2.2 Emission sources and sinks

The relevant parts of section B.1 of the CARB CCS Protocol *[System Boundary]* set out the emission sources and sinks that must be used in relation to the assessment of reductions in emissions associated with CO_2 capture, transportation, and transformation, where references to "injection" are to be read as references to "chemical transformation", references to "oil and gas reservoirs" or to "saline formations" are to be read as references to "chemical compound or form", and references to "leakage" are to be read as references to "chemical reversal".

Section A2.3 Project Emissions Quantification Methodology

The quantification of Project Emissions must follow the WCI Methodologies as applicable to specific activities and emission source types.

Section A2.4 Emission factors and default values, when applicable

(1) Global Warming Potentials for GHGs must be taken from column 4 of the Schedule in the Carbon Neutral Government Regulation from here.

(2) Emission Factors for fuels and grid electricity must be taken from the following:
- Grid Electricity – B.C. Grid Factors are available here.
- Fuels – Tables in part WCI.20 of the WCI Methodologies, available here.

Section A2.5 Baseline Scenario Emissions

The Baseline Emissions (BE) and Baseline Removals (BR) are zero.

Section A2.6 Project Scenario Emissions

Projects Removals (PR) are equal to the total amount of captured CO_2 that is chemically transformed into a compound or form capable of permanently storing the captured CO_2.

Project Emissions (PE) are the sum of the individual terms on the right-hand-side of CARB Equation 2 as the terms are defined therein except as modified above.

The $GHG_{capture}$ emissions are the sum of the individual terms on the right-hand-side of CARB Equation 3 as the terms are defined therein. However, the quantification of the individual terms must follow the WCI Methodologies as applicable to specific activities and emission source types.

The $GHG_{transport}$ emissions are the sum of the individual terms on the right-hand-side of CARB Equation 4 as the terms are defined therein. However, the quantification of the individual terms must follow the WCI Methodologies as applicable to specific activities and emission source types.

The $GHG_{transformation}$ emissions are the sum of the relevant individual terms on the right-hand-side of CARB Equation 6 as the terms are defined therein except as modified above. However, the quantification of the individual terms must follow the WCI Methodologies as applicable to specific activities and emission source types.

Section A2.7 Measurement and Data

Project Proponents must follow the data sampling, analysis, and measurement requirements of the WCI Methodologies as applicable to the specific activities and emission source types they are quantifying.

Section A2.8 Missing Data

Project Proponents must follow the procedures for estimating missing data of the WCI Methodologies as applicable to the specific activities and emission source types they are quantifying.