

## Draft Quantification Protocol for CO<sub>2</sub> Capture and Permanent Geologic Sequestration v2.0

You are invited to review the *Draft Quantification Protocol for CO<sub>2</sub> Capture and Permanent Geologic Sequestration v2.0* and to provide written comments using the table below (or the same format in an email). This will ensure a complete and accurate consolidation. Please send comments to: [EPA.GHG@gov.ab.ca](mailto:EPA.GHG@gov.ab.ca)

Page # & Paragraph #	Clause/Section/Number/Table/Figure (Specify # where applicable)	Nature of the Comment (Editorial, Overarching, Technical)	Comment/Question (Please provide rationale and a proposed solution or revision)
Throughout draft protocol	Section 1.1, 4.1, 4.3, 4.3.1	Editorial	The draft adds clarity around double crediting/stacking with other regulations and programs. However, <b>IETA encourages increased clarity around references to carbon price and “stacking” be added</b> to limit ambiguity in the listed sections. Examples could be added where appropriate.
Page 5	Section 1.0	Overarching	<p><b>Requirement for CO<sub>2</sub> source to be a Large Final Emitter (LFE):</b> First, section 1 states “<i>unless approved by the Director</i>” but realistically this may be more difficult to get approval if non-LFE (e.g. this is reserved for unforeseen circumstances rather than one of the standard/default options). Second, many CCS projects will source CO<sub>2</sub> from LFEs, but many (e.g. DAC, BECCS, etc.) may not; EPA should ensure that additional barriers to these more novel engineered removal project types are not created.</p> <p><b>The Director’s Approval on every project back-end loads a binary risk to post-FID.</b> There should be things that proponents could do earlier on to mitigate or eliminate this risk. For example, 3<sup>rd</sup> party validation pre-FID might be possible if they were explicit about at least some of the things that the Director will be looking for / checking in that approval.</p> <p><b>We wish to see additional clarity on this topic.</b> For example, maybe allowing something like a 3<sup>rd</sup> party validation early on that the Director can approve, with conditions such as the project needs to operate similar to the plan that was 3<sup>rd</sup> party validated.</p> <p><b>Misalignment between an LFE exporting electricity at the High-Performance Benchmark (HPB) vs. an offset project importing the same electricity at the electricity grid displacement factor (EGDF) creates some bizarre unintended consequences</b> (at least in the short term, AEPA has pointed out that this goes away when EGDF and HPB converge, which is true could be addressed now).</p>

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Page 5	Section 1.0	Overarching	<b>IETA supports and applauds the expansion of protocol coverage</b> to include novel industrial and engineered carbon removal technologies including DAC, BioCCS etc.
Page 5	Section 1.0	Overarching	The draft allows any entity (capture entity, transportation entity, sequestration entity) to be project developer. Appendix A contemplates several scenarios with multiple capture and injection sites. <b>Please clarify that multiple emission offset projects can be created for a single injection point?</b>
Page 5	Section 1.1, first paragraph	Editorial	There's a typo in the first paragraph "...section 19(2) of the Technology, Innovation..."
Page 5	Section 1.1, first paragraph	Editorial	We believe the reference to " <i>The sequestration must not be subject to a carbon price outside of the Federal Clean Fuel Regulation</i> " is an attempt to require additionality and avoid double counting. However, we <b>are concerned that this may cause confusion or uncertainty</b> . This paragraph could be improved with a general discussion of additionality requirements that apply to offsets to place the carbon price reference in context.
Page 5	Section 1.1, first paragraph under "Baseline Condition"	Overarching	The reference to the figure in the last sentence is not visible. There is a link to the figure if you hover and click on it. This happens in multiple references throughout the document. It seems all "caption" text styles within the document are in white font.
Page 5	Section 1.1, "Protocol Approach"	Technical	<i>"This protocol applies to CCS emission offset projects where captured CO<sub>2</sub> is received from a large emitter or opted-in facility..."</i> <b>IETA believes that because aggregate facilities are regulated under TIER, they should be included.</b>
Page 5 & Page 32	Section 1.1 & Section 4.2/ CO <sub>2</sub> injected originating from within project boundary	Technical	The draft Protocol has injected CO <sub>2</sub> originating from a project being subtracted from both the Project and Baseline emissions. <b>IETA recommends these emissions count both as Project and Baseline emissions and not be required to be subtracted.</b> The resulting offset credit generation would remain unaltered, but unnecessary metering requirements would be avoided, and the implementation of this change simpler. This also maintains accurate, complete, and transparent categorization of Project and Baseline emissions.
Page 5 & 6, throughout	Section 1.1	Editorial	References to "TIER", "provincial greenhouse gas regulation (GHG) Regulations" throughout. <b>IETA suggests using a consistent reference.</b>
Page 6	Section 1.1, paragraph 1 under "Project Condition"	Editorial	As seen in " <i>the emission offset project developer as described in the Regulation...</i> " the "Regulation" is not defined.
Page 6	Section 1.1, paragraph 1 under "Project Condition"	Editorial	<b>It would be useful to reference or port some of the language and the diagrams from the TIER CCUS Fact Sheet into this protocol.</b> Particularly with the various descriptions of the different facility boundary configurations, it is relevant to the project condition and has implications for how emissions are reported (e.g., by the regulated facility, whether emissions are part of the TRE, or are exported, etc.) and the point of offset creation.

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Page 7	Section 1.2	Overarching	The offset crediting period duration of 20 years is misaligned with the 15-year Carbon Sequestration Agreement term. <b>Suggest aligning both to 20 years with 5-year extensions.</b>
Page 7	Section 1.3, paragraph 2	Overarching	What is the timeframe to receive Director approval to have a project created in the Registry? <b>We seek clarity and suggests an expected timeframe be provided for planning purposes.</b>
Page 7	Section 1.3, Requirement #4	Technical	<b>Clarification needed:</b> Noting Sec 5.1, will multiple project boundaries need to be established as additional source emissions are added? Or can one project boundary include multiple sources and be amended from time to time? Can you have overlapping project boundaries (e.g., two different offset projects with a shared single injection point. )
Page 8	Section 1.3, Protocol Applicability	Technical	<i>“Projects that employ alternate technologies for CO<sub>2</sub> capture, transport, injection, or use technologies and processes other than those commercially available and outlined in this protocol.”</i> This restricts ability to successfully test emerging technologies and to develop commercial pathways. <b>For technologies not explicitly defined within the protocol, please provide confirmation at what stage in the project development the Director would be able to provide confirmation that a “non-ready” technology could be deployed.</b> Could this occur during the project development planning stages so that the developer can gain confirmation from the Director that their project will be approved?
Page 8	Section 1.4, Flexibility Mechanism 1	Technical	Flexibility Mechanism 1 states that <i>“all vented, flared and fugitive emissions upstream of the injection meters except for emissions of the captured CO<sub>2</sub>”</i> must be quantified. <b>We request further clarity as to what “except for emissions of the captured CO<sub>2</sub>” is referring to in the context of DAC.</b>
Page 8	Section 1.4, Flexibility Mechanism 1	Technical	<b>Flexibility Mechanism 1 appears to not include stationary fuel combustion emissions</b> (e.g. P8/P9 Off-Site Electricity/Heat Generation; P10 On-Site Heat and Electricity Generation) <b>as required for the quantification of DAC upstream emissions</b> - is this perhaps an error?
Page 8	Section 1.4, Flexibility Mechanism 1	Technical	IETA agrees with offering eligibility for CCS projects that source CO <sub>2</sub> from DAC, however this would not meet the Protocol requirement that captured CO <sub>2</sub> be received from a large emitter or opted-in facility under the Regulation. <b>We request clarification that projects exercising flexibility mechanism #1 are not required to meet these criteria.</b> For example, please clarify whether DAC plants are expected to opt-in.
Page 8	Section 1.4, Flexibility Mechanism 3	Editorial	IETA supports the improved proposal to limit the liability impact of a reversal to 3 years without the complexity and cost of applying an additional holdback factor. <b>However, we believe that the proposed discount factor of 0.01 in the flexible measure coupled with the 0.005 discount factor for post-closure is still too high, especially in light of additional sequestration fees that the Alberta Energy department is proposing.</b> It is important that proponents can assess their overall cost position and that it is transparent.

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			<p><b>We encourage the various Alberta departments to work together to ensure timely transparency.</b> Also note that there will be insurance costs to be incurred as well. Overall, it is possible that the sum of all such costs becomes a competitiveness problem for Alberta. It is well understood that the leakage risk is low, and excessive layers of discount factors and fees ignore this low risk and only serve to hurt project competitiveness for what is a priority decarbonization strategy in the province.</p>
Page 8	Section 1.4, Flexibility Mechanism 3	Editorial	<p>Flexibility Mechanism 3 states that “<i>maximum liability will be calculated as the annual average of CO<sub>2</sub> injected over the life of the crediting period, multiplied by three years</i>”. <b>Is this based on average expected CO<sub>2</sub> sequestration or average actual sequestration?</b> If actual, how can it be determined if a true-up exceeds this amount if a reversal occurs during the crediting period? How is this impacted if the project crediting period is extended?</p>
Page 8	Section 1.4, Flexibility Mechanism 3	Editorial	<p>We agree with offering a mechanism for Project Developers to limit liability, <b>however limiting liability to the “<i>maximum total of three-year injected volume based on the average annual injection</i>” will still prohibit many Project Developers from proceeding with their projects.</b> IETA believes this would be an excessive liability to maintain throughout the life of the project and would make many potential projects economically unfeasible. <b>We recommend that alternative mechanisms for post-crediting/pre-closure certificate release event liability be considered, such as a buffer pool mechanism.</b></p>
Page 9	Section 1.5	Overarching	<p><b>The definition of <u>Reversals</u> is unclear in the draft Protocol.</b> Section 1.5 describes a reversal as a release or removal of CO<sub>2</sub> from the targeted geologic zone, indicating that ANY loss of containment from the targeted geologic zone is considered a reversal, but references to Reversals elsewhere in the Protocol seem to refer exclusively to releases to atmosphere (e.g. definition of SSR P20). <b>IETA requests clarification on the definition of reversals.</b> In particular, we note the requirements under D065 outlined on page 57 and encourage AEPA to ensure that the reversal described in this Protocol update is consistent with assurance reporting requirements under D065. Attention should be given to the term migration in respect of the targeted storage zone, and assurance over CO<sub>2</sub> containment as required under D065. Primarily, where migration outside the targeted geologic zone occurs but assurance over CO<sub>2</sub> containment remains, we would need to understand if, whether and why this is considered a reversal or not.</p>
Page 9	Section 1.5	Overarching	<p>Revisions to the offset project verification report template will need to be made and well communicated to encompass reversals.</p>
Page 9	Section 1.5, First bullet point in paragraph 1	Technical	<p>Is there a separate mechanism (outside of project developer reporting per D065 scheme approval and offset reporting) that the AER utilizes to determine a loss of containment?</p>

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Page 9	Section 1.5, third bullet point in paragraph 1	Technical	<p>IETA believes that the use of “foreseeably reach the atmosphere within 100 years” is <b>vague language and results in too much subjectivity on the part of the expert reviewer</b>. For example, a 1% chance of reaching atmosphere is still “foreseeable”. Suggest that the language <b>be changed to a more definitive statement using language like “determines the CO<sub>2</sub> is expected to reach the atmosphere...”</b></p> <p>Also, <b>is the project developer responsible for facilitating an expert investigation</b> to determine whether the loss of containment will reach atmosphere within 100 years of occurrence?</p> <p>The co-existence of these requirements with those applicable under D065 need attention vis-à-vis requirements for CO<sub>2</sub> containment assurance,</p>
Page 9	Section 1.5, paragraph 2	Overarching	<p>“Emissions associated with reversal that can be remedied...” <b>clarification needed</b>: What are the ‘allowed’ or appropriate mechanisms for remedy? If remediation occurs, is it still considered a reversal? If remediation occurs after true-up, are those credits returned?</p>
Page 9	Section 1.5, paragraph 3	Technical	<p><b>IETA is concerned that the “last-in, first-out” concept creates complications</b>. Namely, it:</p> <ol style="list-style-type: none"> <li>1) can lead to disproportionate liability among projects that are injecting into the Basal Cambrian Sands. Recommend APEA clarify in the final Protocol whether “into shared pore space” means the formation and how this will be managed for multiple emitters under the same Carbon Sequestration Agreement.</li> <li>2) is poorly linked to monitoring requirements regarding simultaneous injection by multiple companies or situations where a reversal is found to have an “at fault” party.</li> </ol>
Page 9	Section 1.5	Technical	<p>Are there specific definitions for what constitutes a ‘terrorist act’ for this purpose? Assuming this is referring to legislation or federal designation, IETA believes that legislation/designation should be referred to explicitly.</p>
Page 10	Section 1.6, Removal Credits	Editorial	<p>The “section 1.3.1” referred to in this section does not exist, we suggest Section 1.3, requirement 1 may be more appropriate.</p>
Page 10; Page 32	Section 1.6, Removal Credits; Section 4.2, Net Geological Sequestration	Technical	<p>IETA seeks confirmation that removal credits (e.g., from sequestering biogenic CO<sub>2</sub>) are quantified the same way as a reduction credit under Section 4.2?</p>
Page 11	Section 1.6	Editorial	<p><b>The glossary of terms is missing key definitions</b> such as last-in, first-out, removal, co-mingling, mixed stream, priced emissions, non-priced emissions. Some are defined in the text itself, but we would like to see them here, too, with increased clarity.</p>

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			Additionally, the <b>section numbering is repeated</b> . The prior section, 1.6 Removal Credits, has the same section number.
Page 13	Section 1.6	Technical	Definition of “New CO <sub>2</sub> ” references “anthropogenic CO <sub>2</sub> ”. <b>As this protocol is inclusive of biogenic CO<sub>2</sub>, IETA suggests the reference to anthropogenic is removed or expanded to also include biogenic.</b>
Page 13	Section 1.6	Overarching	Please include a definition of ‘priced’ and ‘non-priced’ emissions, as the distinction between the two is not very clear. TIER regulated entities appear to be considered ‘non-priced,’ but carbon emissions are priced under the program. <b>If “priced” is referring to the federal fuel charge, then that should be explicitly stated.</b>
Page 14	Section 2.1	Editorial	The first sentence in the last paragraph “ <i>Based on the process flow diagram...</i> ” ends in a blank -- the reference is not visible in the text.
Page 18	Section 3.0	Overarching	Although there could potentially be opportunities to capture biogenic CO <sub>2</sub> from a regulated or opted-in facility, biogenic CO <sub>2</sub> is not reported in a Regulated facility’s TRE and is not reported as exported CO <sub>2</sub> . There are also opportunities to capture and sequester biogenic CO <sub>2</sub> from non-regulated facilities. BECCS projects would not meet the requirement in Section 3 which states “ <i>only New CO<sub>2</sub> reported as exported from a regulated large emitter or opted-in facility that is ultimately captured is eligible.</i> ” <b>IETA requests further consideration/clarification regarding eligibility of BECCS projects.</b> Perhaps a new Flexibility mechanism, or a revision to Flexibility Mechanism #1 to encompass carbon removal through biogenic CO <sub>2</sub> sequestration, could remedy this problem.
Page 18	Section 3.0	Technical	CO <sub>2</sub> Capture and Compression: references to GHG emissions associated with capture and compression processes are accounted for either at the large emitter (if under TIER) or in the project condition as part of the offset project. This is likely to occur in cases where the large emitter owns the capture/compression equipment. <b>Please provide detail on how this would impact the associated project emissions related to capture and compression (P4, P5, P10, P12, P13, P14, P15, P21, etc.)</b>
Page 18	Section 3.0	Overarching	Does the offset project owner need to have an ownership stake in all process elements to be part of the offset project? For example, the capture equipment is owned by a different entity than the transportation & sequestration, but is still part of the offset project boundary, is there a default entity that would create the credits? <b>IETA seeks further clarity regarding and/or a clear definition regarding who the credit creator is, or additional guidance on how that should be determined.</b>
Page 19	Section 3.1	Editorial	The first sentence in the last paragraph “ <i>These sources and/or sinks are further refined...</i> ” ends in a blank. The reference is not visible in the text.

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Page 32	Section 4.1, paragraph 1	Editorial	<i>"The project developer will need to determine if the SSRs are subject to a carbon price and whether or not to include them in offset-eligible or priced emission reduction, depending on the project and the regulatory status of the site at which the project is implemented."</i> IETA agrees with this statement, and it is important that AEPA understand as a verifier, but we have seen precedent before of the agency not consistent as to what qualifies as acceptable evidence to demonstrate an applicable carbon price and has resulted in verifiers having to ensure this consistency. <b>It's important for AEPA to determine what evidence is acceptable as much as possible ahead of Protocol publication.</b>
Page 32	Section 4.1, paragraph 3	Editorial	This paragraph discusses the treatment of carbon pricing on the calculation of offset eligible emissions reductions. IETA notes that the Fuel Charge Exemption Certificate from the Canada Revenue Agency is needed for registered emitters to receive an exemption from this charge, and simply being regulated under the Regulation is not enough for these to be exempt. <b>IETA recommends this clarification be added in the final Protocol.</b>
Page 32, 38	Section 4.2, Net Geological Sequestration; Table 6	Technical	P3 Emissions Construction and Well Drilling: <b>Additional clarity should be provided</b> on when emissions due to well kicks occur prior to the first project crediting period. Which project report should account for those emissions?
Page 34	Section 4.3, Offset Eligible Emission Reductions	Technical	<b>How does the formula in 4.3 align with the formula given in 4.2 for net geological sequestration?</b> 4.2 does not specify if those variables (including the discount) are non-priced.
Page 34	Section 4.3	Editorial	Suggest repeating that the Clean Fuels Regulations are treated distinctly from any other carbon pricing under 4.3.1.
Page 39	Table 6, P4	Technical	<b>Suggest providing default values for emission factors, similar to those provided for natural gas extraction and processing in the handbook.</b> Project proponents could still choose between their own factors if they have better information.
Page 41	Table 6, "Off-set electricity generation," P8	Technical	P8 requires the use of the grid emission intensity factor for each year obtained from the Carbon Offset Emission Factors Handbook. <b>IETA supports the simplification of the emission quantification for off-site electricity generation. IETA recommends that for the specific scenario where the off-site electricity is obtained via direct connection to a TIER regulated large emitter, the use of the TIER benchmark for power be used.</b> This is similar to the benchmark treatment under P9 for off-site heat generation, and is a fairer method of emission allocation, as the TIER facility exporting the power would be exporting at the TIER power benchmark. In addition, for a direct connection between the exporting facility and the capture facility, the grid emission intensity is irrelevant.

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			<p>Separate and notwithstanding the comment above, IETA agrees that the parameter to be measured is the Total Quantity of Delivered Electricity Consumed for the Emission Offset Project as identified in the second column of the table. However - this “method” in the 5th column indicates that electricity must be measured for each piece of individual equipment/load in the capture, compression, transport, injection and storage of CO<sub>2</sub> and then summed. Individual equipment is not typically metered for electricity and this provision may inadvertently require installation and maintenance of multiple measurement devices when fewer may suffice. <b>IETA suggests clarifying that it can be a single measurement for all pieces of equipment, or the sum of individually metered components (if available), within the project boundary.</b> This would be consistent with the measurement flexibility provided for in Table 9</p> <p>Also with respect to the last row of the Method column: <i>“No reduction target to be removed”</i>. <b>It is unclear what is meant by this</b> as there is no reduction target specified in the Handbook and the grid emission intensity factor is supposed to align with the HPB in 2030+.</p>
Page 42	Table 6, “Off-site heat generation,” P9	Technical	<p>In previous versions of the protocol, this was accompanied by a line item in the quantification methodology table (Table 6), where waste heat is assigned an emission factor of 0. This recognizes the fact that waste heat integration does not require or cause incremental emissions and should be encouraged as a way to reduce emission intensity of the capture facility by reducing the need for incremental heat generation to meet the capture facilities’ needs. The current protocol draft requires the measurement of waste heat, however, and Table 6 assigns all off-site heat use from TIER large emitters to use the industrial heat benchmark. Therefore, the waste heat integrations with another TIER large emitter will result in an emission penalty, even though this process heat does not cause any incremental emissions, and the exporting facility is also not generating an emission allocation. <b>This unfairly penalizes the use of energy efficient design.</b></p> <p>In addition, imported waste heat from process is very difficult to accurately measure. <b>As there are no incremental emissions resulting from the use of waste heat, and waste heat use is energy efficient and should be encouraged, IETA recommends not requiring the quantity of waste heat used to be measured.</b> The verification process will ensure that waste heat streams are actually waste heat and do not require incremental fuel use.</p>



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			<b>Overall, IETA supports removing the reference to waste heat in the above paragraph, or add a line item under P9 of Table 6 establishing a 0 emission factor for waste heat imported.</b>
Page 42	Table 6, “Off-site heat generation,” P9	Technical	Subject to the view on “waste heat” above, IETA supports the option to use the established industrial heat benchmark for the emission quantification for imported heat from a TIER large emitter facility. <b>In addition, IETA recommends including the previous approach of using fuel quantities and emission factors as emission quantification options.</b>
Page 43	Table 6, P10	Technical	P10: Variable EF Fuel_i is not defined.
Page 47	Table 6, P11	Technical	P11 is missing. IETA suspects it should be where Emissions_carbon capture and storage facility operation is located.
Page 50	Table 6, P20	Technical	P20: Details on how this parameter changes because of flexibility mechanism 3 should be included here. Subject to our comments on migration out of the targeted geological zone, information on how to estimate any such migrated mass of CO <sub>2</sub> may also be needed.
Page 51	Table 6, P21	Technical	P21: IETA <b>suggests providing default values for emission factors</b> , similar to those provided for natural gas extraction and processing in the handbook. Project proponents could still choose between their own factors if they have better information.
Page 56	Section 5.1.4	Editorial	References to 'physical system' or 'physical network' or 'physical emissions' should be defined in the glossary as the intent of this section is not clear.
Page 58	Section 5.2	Editorial	The last six bullets in the list under “ <i>Documentation requirements for the emission offset project are as follows:</i> ” seem to be sub-bullets and should be indented further to match.
Page 59	Section 5.3	Editorial	“ <i>Raw baseline period data, independent variable...</i> ” should be part of the bulleted list.
Page 61	Table 8/Concentration of gas stream	Technical	In the event of validation failures or analyzer issues limiting a project developer’s ability to accurately obtain the concentration of the gas stream, <b>IETA recommends AEPAs provide clear direction and next steps for project developers to implement and maintain gas stream concentration measurement (for example, manual sample requirements and frequency).</b>
Page 68	Appendix B	Technical	The methodology in Appendix B requires a determination of uncertainty associated with estimating releases to surface. For almost any loss of containment scenario, IETA believes it to be unlikely that the volume of the release could be estimated with maximum uncertainty of +/- 7.5%. It is similarly challenging, and arguably not possible, to accurately determine the

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			uncertainty. <b>IETA would like to request that the Department reconsider this approach.</b>
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