GHG Protocol Scope 2 Update
Technical Working Group Discussion Topic Overview

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Contents

1. Purpose and Organization of This Paper

This discussion paper expands from the Statement of Work provided in the Scope 2 Standard Development Plan. Importantly, it provides only a *starting point* intended to help facilitate Technical Working Group (TWG) discussions on Phase 1 updates to the scope 2 accounting and reporting standards. All outputs of this revision process including any changes to scope 2 requirements will be developed in full consultation with the TWG and approval by the Independent Standards Board (ISB), following GHG Protocol process as described in the Standard Development & Revision Procedure (SDRP).

As outlined below each section of this paper seeks to highlight core issues identified by stakeholders, any proposed solutions, and provide preliminary questions for scope 2 TWG discussion based on feedback and evidence received through over 400 survey submissions, 70 proposal submissions, and conversations held with over 1,000 stakeholders. Comprehensive feedback previously provided by stakeholders is summarized in the Detailed Summary of Responses from Scope 2 Guidance Stakeholder Survey, documented in the publicly available stakeholder proposals, and further summarized in the Scope 2 Proposal Summary. For a complete list of Phase 1 and 2 topics, including the timeline for addressing topics, are described in the Scope 2 Standard Development Plan. Additional discussion paper(s) will be published for Phase 2 topics as needed.

For each section, the Secretariat has used the GHG Protocol Decision-Making Criteria and Hierarchy to develop a preliminary straw proposal illustrating a comparative analysis of stakeholder proposals. The content within each analysis is based on stakeholder feedback and relevant research provided as described above. Please see the full GHG Protocol Decision-Making Criteria and Hierarchy for further a complete overview and additional information on the Decision-Making Criteria.

Informed by this public feedback, Phase 1 of the scope 2 standard revisions process will focus on two topic areas which are deemed necessary to address prior to evaluating subsequent Phase 2 topics identified by stakeholders. These priority topics are:

A. Evaluation of the scope 2 reporting methods
i.e., which methods generally are required or recommended to report and how to report them

B. Analysis of potential improvements to the location- and market-based methods
i.e., improvements and clarifications to methodologies, data usage, quality criteria, etc.

To provide a structured evaluation these topics, this discussion paper is organized as follows:

- **Section 2** - A comparative analysis of the existing scope 2 dual reporting requirement relative to proposed changes to what methods are required or recommended by the scope 2 accounting and reporting standard.
    a. This section only compares options for changing which methods are required or recommended across the location-based & market-based inventory methods, and additional project-based methods.
    b. Comparisons of the existing scope 2 methodologies relative to proposed updates to each method are evaluated in subsequent sections.

- **Section 3 -** Introduction to technical improvements

- **Section 4** - Comparisons of the existing scope 2 location-based method to proposed options to update this methodology

- **Section 5** - Comparisons of the existing scope 2 market-based method to proposed options to update this methodology (*to be provided*)

A series of questions are presented following each of these comparisons *as a starting point* for discussion in TWGs. Note that this analysis identifies there may at times be insufficient information to comprehensively assess all proposals. Further discussion and development with TWG members of each Decision-Making Criteria evaluation is planned as part of the Phase 1 revision process. Please see the presentation "*Scope 2 TWG - Meeting #1 Presentation Slide Deck - 16 October 2024 FINAL*" for details on timeline and workplan in addition to the Scope 2 Standard Development Plan.

Generally, this paper follows the proposed sequence of discussion topics that will be conducted through the TWG consultation process. TWG members are encouraged to review this material in advance, be prepared to improve whether and how this information is relevant and appropriately characterized under the Decision-Making Criteria for the proposals in each section, identify what information is missing, share perspectives to help answer questions for discussion, and contribute to the development of revised scope 2 standards and guidance for the Independent Standards Board's consideration and subsequent public consultation as detailed in the SDRP.

2. Changes to the Required Reporting Methods

This section presents a comparative analysis of proposed changes to which scope 2 accounting and reporting methods are *required or recommended.*

The GHG Protocol Decision-Making Criteria are used to evaluate the existing scope 2 requirements – i.e., dual reporting of both the location-based and market-based methods and optional, separate reporting of emissions impacts of individual projects – relative to proposed changes for what methods are required or recommended in an updated GHG Protocol scope 2 accounting and reporting standard. For additional context on the options evaluated as changes to the required reporting methods, please see the Scope 2 Proposal Summary.

Comparisons of specific changes to the location- and market-based methods are evaluated in subsequent sections 4 and 5 (*to be provided*).

Overview

Currently, the GHG Protocol Scope 2 Guidance provides details on accounting and reporting information using three different methods. Two are required, the location-based and market-based methods, and the third is an optional disclosure of avoided emissions information calculated using project accounting methods.

Extensive stakeholder feedback has identified a range of proposals to maintain or improve the details of each of these three methods, as well as suggest which methods are required to report. Further, a preliminary review of the evidence presented through the public consultation process has indicated the likely need for improvements to be made to existing accounting methods to improve their scientific integrity and alignment with GHG Protocol Decision-Making Criteria. These improvements will be discussed in detail in the Technical Improvements section of this document.

To support facilitation of Scope 2 TWG discussion, this paper first presents an overarching analysis of changes to which methods organizations “shall”, “should”, “may” or “should not” include in an emission report (Section 2) using the GHG Protocol Decision-Making Criteria. Following this evaluation, subsequent sections (3-5) provide a comparative analysis of the proposed technical changes to each of these methods using the GHG Protocol Decision-Making Criteria.

Extensive public consultation, including over 400 survey responses, 80 detailed proposals, and engagement with over a thousand stakeholders revealed interest in several possible combinations of required scope 2 reporting methods. While more combinations of reporting methods, and additional iterations of shall/should/may language, are possible, the following four combinations of reporting methods represent the feedback from stakeholders.

Details can be found in in sections B and E of the Detailed Summary of Responses from Scope 2 Guidance Stakeholder Survey and the Scope 2 Proposal Summary.

Broadly, the proposals highlighted four possible combinations of reporting structures (i.e. options):

A. **Maintain dual reporting requirement, with potential updates; Optional project accounting**:
   - Organizations shall report both the location- and market-based inventory methods, potentially incorporating updates to one or both methods as described in sections 4-5
   - Organizations may report emission impacts from projects and interventions, separately from the inventory.

B. **Report only the market-based method, with potential updates; Optional project accounting:**
   - Organizations shall report the market-based inventory method, potentially incorporating updates as described in section 5; organizations should not report the location-based method
   - Organizations may report emission impacts from projects and interventions, separately from the inventory.

C. **Report only the location-based method, with potential updates; Recommend or require project accounting:**
   - Organizations shall report the location-based inventory method, potentially incorporating updates as described in section 4; organizations should not report the market-based method
   - Organizations [shall or should] (to be discussed with the TWG) report emission impacts from projects and interventions, separately from the inventory.

D. **Maintain dual reporting requirement, with potential updates; Recommend or require project accounting:**
   - Organizations shall report both the location- and market-based inventory methods, potentially incorporating updates to one or both methods as described in sections 4-5
   - Organizations [shall or should] (to be discussed with the TWG) report emission impacts from projects and interventions, separately from the inventory.

Analysis of Options According to Decision-Making Criteria

The GHG Protocol Secretariat evaluated these four generalized options proposed by stakeholders using the Decision-Making Criteria and Hierarchy, as outlined below in Table 1. To enable a comprehensive evaluation of all required and recommended reporting options, this evaluation considers the GHG Protocol accounting and reporting principles, as appropriate, from both the Corporate Standard and Project Accounting Protocol. *This evaluation is preliminary*. Further revision and refinement of this initial analysis will be one of the first topics addressed by the Scope 2 TWG using the GHG Protocol Decision-Making Criteria.

Table 1: Preliminary evaluation of options for changes to the required accounting and reporting methods

		Option A: Maintain Dual Reporting Requirement w/ Potential Updates; Optional Project Accounting	Option B: Report Only Market-Based w/ Potential Updates; Optional Project Accounting	Option C: Report Only Location-Based w/ Potential Updates; Recommend or Require Project Accounting	Option D: Maintain Dual Reporting Requirement w/ Potential Updates; Recommended or Require Project Accounting
Scientific integrity		NA	NA	NA	NA
GHG accounting and reporting principles ***Corporate Standard* & *Project Accounting Protocol***	**Relevance**	Mixed / Yes	Mixed / No	Mixed / No	Yes
	Completeness	Mixed / Yes	Mixed / Yes	Yes	Yes
	Consistency	Mixed	Mixed	Mixed / Yes	Yes
	Transparency	Mixed / Yes	Mixed / Yes	Yes	Yes
	Accuracy	NA	NA	NA	NA
	Comparability	Mixed / Yes	Mixed	Mixed	Mixed / Yes
Supports decision making that drives ambitious global climate action		Mixed / Yes	Mixed	Mixed	Yes
Supports programs based on GHG Protocol and uses of GHG data		Mixed / Yes	No	No	Yes
Feasibility to implement		Yes	Yes	Mixed / Yes	Mixed / Yes

The following analysis compares each of the four options for changes to the required accounting and reporting methods against the GHG Protocol decision-making criteria. Due to the nature of this aggregation of stakeholder proposals, specifically only evaluating which accounting methods should be required, not how each method should be implemented, it is not possible to evaluate each criterion fully. Additionally, there is significant overlap in the analysis below as each option consists of one or several accounting methods, and some combinations of methods are similar.

This evaluation of suggested "required accounting and reporting methods" is inclusive of the GHG Protocol accounting and reporting principles, as appropriate, from both the Corporate Standard and Project Protocol.

A. Maintain Dual Reporting Requirement, with Potential Updates; Optional Project Accounting:

Details of the proposed approach:

- Organizations shall report both the location- and market-based inventory methods, potentially incorporating updates to one or both methods as described in the Technical Improvements sections.
- Organizations may report emission impacts from projects and interventions (i.e. the project-based method, or project-based assessments), separately from the inventory.

For a detailed assessment of this approach using the full decision-making criteria, see Appendix A.

Scientific integrity

The concept of scientific integrity can be more specifically applied to proposed technical improvements in subsequent sections of this document. A growing body of research has identified potential challenges with both the existing location- and market-based methods while also providing potential options to increase the scientific integrity of each method. Preliminary analysis suggests that improvements to the location- and market-based methods may be required to ensure the scientific integrity of each method. The level of scientific integrity each method can achieve will depend on the specifics of how they are implemented. See the Technical Improvements section for more details on these improvements.

GHG accounting and reporting principles

A majority of the GHG Protocol accounting and reporting principles are met or partially met through the application of required dual reporting and optional project-based reporting. In particular, the principles of relevance, completeness, and transparency are well supported through this approach. The additional principle of comparability is also supported by this approach. The principle of accuracy cannot be fully assessed without knowing the technical details of each reporting method, however the requirement to report two accounting methods may increase the likelihood that inventories calculated with this approach communicate GHG data that better aligns with the principle of accuracy. The principle of consistency is similarly dependent on the extent to which the details of the accounting methods facilitate a consistent application of accounting approaches, and both the location- and market-based methods have the potential to deliver consistent inventories given the availability of data and reporting tools. However, the principle of consistency may be challenged by the requirement to report market-based emissions year over year given that implementation of the quality criteria can significantly vary region-to-region. The continued optional treatment of project-based assessments, without clear guidance and standardization, may lead to project-level data that is inconsistent over time.

Support decision making that drives ambitious global climate action

Dual reporting of location- and market-based emissions, with optional disclosure of project-based emissions, can incentivize a range of mitigation actions necessary to address climate goals. These mitigation actions may include facility siting decisions, energy efficiency measures, time of use decisions (potentially more so with certain technical improvements), policy advocacy, and energy supply decisions. The impact and alignment of the actions incentivized by these reporting methods with global climate science will depend on the specific details of how the location-, market-, or project-based methods are implemented. However, this option of dual reporting combined with optional project-based reporting may expand the range of potential actions, offering more opportunities for impactful and science-aligned initiatives compared to options that restrict reporting methods to one or two categories.

Support programs based on GHG Protocol and uses of GHG data
The required dual reporting of location- and market-based emissions provides users of GHG data with a range of information to assess a company's overall climate risks, energy use, and emissions mitigation actions. This data is currently relevant for existing mandatory reporting frameworks including IFRS Climate-Related Disclosures (IFRS S2), European Sustainability Reporting Standards: Climate Change (ESRS E1), ISO 14064-1:2018, The Enhancement and Standardization of Climate-Related Disclosures for Investors Rule (U.S. SEC Rule), and California Climate Corporate Data Accountability Act (CA SB 253), as well as voluntary programs including SBTi, RE100, GRI, and CDP, among others. While the optional reporting of project-based emissions assessments can provide a means to share additional relevant information for stakeholders, its status as an optional method without robust guidance may disincentivize reporting of emissions using this method. Further, the required or regular usage of project-based emissions assessments into mandatory and voluntary disclosure frameworks may be hindered by the perception that most organizations do not evaluate emissions using this method regularly or through a consistent, credible methodology. Keeping project-based emissions assessments as an optional category would therefore hinder adoption by other programs.

Feasibility to implement
There is a strong track record of implementation of the existing dual reporting framework globally and across a wide range of organizations, however, technical improvements to these methods may support or hinder feasibility globally. Further, some regions of the world lack high quality data (for both location- and market-based reporting) and/or the ability to make, track, and support supply choices (for the market-based method). While the project-based method generally has a track record of implementation in carbon markets to quantify project-level GHG reductions and removals, its feasibility and use as part of organizations' overall emission reporting, decision-making, and target-setting efforts appears to be limited. As an optional method it can be used by organizations as needed and would not impact the overall feasibility of this approach.

B. Report Only the Market-Based Method, with Potential Updates; Optional Project Accounting:

Details of the proposed approach:

- Organizations shall report the market-based inventory method potentially incorporating updates as described in the Technical Improvements section; organizations should not report the location-based method.
- Organizations may report emission impacts from projects and interventions (i.e. the project-based method, or project-based assessments), separate from the inventory.

For a detailed assessment of this approach using the full decision-making criteria, see Appendix A.

Scientific integrity
See discussion of the concept of scientific integrity in Option A.

GHG accounting and reporting principles
The accounting and reporting principles of relevance and completeness are only partially met by this approach, with both suffering from the elimination of the location-based method as a required

reporting category. The additional principle of comparability is also partially met by this approach, as the elimination of the location-based method removes some useful data to be used in comparisons between companies. Emissions data may be less relevant to both internal and external users of data from this approach without the location-based method, as it omits some key information, such as an organization's overall exposure to electricity consumption, provided by the location-based method. Inventories are also less comparable using only a market-based method, since the availability of clean energy supply options, market boundaries, EAC tracking systems, etc. can vary significantly by location. While a market-based method can be viewed as a means to completely allocate electricity related emissions within a specified boundary, in reality the significant variability in application of the quality criteria may mean that system-wide emissions are not accurately reported in the aggregate. The principle of consistency is mostly met by the proposed approach, assuming a consistent application of quality criteria over time, however in practice the variability in application of this method may impact its ability to produce consistent inventories over time. The market-based method may meet the principle of transparency in theory but may be less easily auditable than the location-based method. For this reason, an approach that eliminates the location-based method may be less transparent than one that retains it, and its communication of an emissions inventory may be less easily understood by the public.

Support decision making that drives ambitious global climate action

In principle, the market-based method can provide reporting organizations with a means to account for and report progress toward climate actions and goals related to their procurement and usage of electricity through incentivizing specific supply choices and potentially managing consumption of electricity based on the availability of clean energy generated on the grid. However, details of the market-based method, including aspects of the quality criteria (vintage, market boundaries, granularity of data, etc.), are important in assessing whether these actions contribute meaningfully toward a net-zero electricity grid. Further, by relying solely on reporting of market-based emissions, this approach may disincentivize some decarbonization actions compared with other approaches that additionally require reporting of location-based method and recommend or require project-based assessments.

Support programs based on GHG Protocol and uses of GHG data

The market-based method can generate useful GHG data as evidenced by its use in many voluntary (e.g., SBTi, RE100, GRI, CDP) and mandatory (e.g., IFRS S2, ESRS E1, ISO 14064-1:2018, U.S. SEC Rule, and CA SB 253) reporting frameworks. However, the lack of location-based method data creates a significant gap in climate risk information used in many mandatory disclosure frameworks, including IFRS S2 and ISO 14064-1 which require location-based emissions disclosures. Relying exclusively on the market-based method, and on inventory accounting generally, may omit relevant information quantified and separately reported using a standardized approach to project-based accounting and reporting.

Feasibility to implement

While many companies in many regions of the world currently report market-based emissions, in some cases the lack of sufficient information to meet the quality criteria (supply-specific emissions rates, EAC tracking systems, residual mix data) or lack of electricity supply choices in certain regions results in companies reporting market-based emissions totals that include some portion of regional grid-average emission factors. Although grid-average emission factors are included in the market-based emission factor hierarchy, further discussion is necessary to assess whether their use for market-based calculations truly aligns with the spirit of the feasibility criteria.

C. Report Only the Location-Based Method, with Potential Updates; Recommend or Require Project Accounting:

Details of the proposed approach:

- Organizations shall report the location-based inventory method potentially incorporating updates as described in Technical Improvements section; organizations should not report the market-based method.
- Organizations [shall or should] (to be discussed with TWG) report emission impacts from projects and interventions (i.e. the project-based method, or project-based assessments), separate from the inventory.

For a detailed assessment of this approach using the full decision-making criteria, see Appendix A.

Scientific integrity
See discussion of the concept of scientific integrity in Option A.

GHG accounting and reporting principles
The GHG accounting and reporting principles of consistency and transparency are met or mostly met by this approach. The principle of relevance is partially met by this approach, as the elimination of the market-based method removes relevant information related to an organization's energy supply and renewable energy procurement actions and decisions from the GHG inventory. The principle of completeness is met by this approach, as the location-based method is a complete allocation of electricity related emissions within a defined boundary. It is worth noting that the completeness principle as defined in the Project Accounting Protocol refers to a complete assessment of inputs for a particular project, and therefore the principle of completeness is assumed to have been met by this approach. The additional principle of comparability is partially met through this approach; however, the elimination of the market-based method provides fewer options for comparability between organizations.

Support decision making that drives ambitious global climate action
The required use of the location-based method would incentivize organizations to lower their emissions by reducing their overall electricity purchases and consumption, investing in onsite clean energy projects, and improving energy efficiency. It may also be used to inform facility siting decisions, though research has pointed to potentially significant inaccuracies in using annual average emission factors to make decisions relating to adding or removing load from a grid and related energy usage considerations (see further discussion in the technical improvements to the location-based method). The location-based method does not incentivize nor provide a means to account and report on clean energy procurement actions other than onsite clean energy projects. Without the reporting of market-based emissions, decarbonization decisions related to an organization's electricity procurement choices are absent from this inventory accounting approach. Regarding the project-based method, this could provide a means to further incentivize decarbonization actions that have a net positive emissions impact, reported separately from an organization's emissions inventory. These actions could include contracting with carbon free generation, load shifting, energy storage applications, and electric vehicle infrastructure among others. However, as the exclusive means to evaluate this information it is notable that it can both be highly complex and no target-setting or mandatory disclosure programs currently recognize project accounting metrics. Incentives to take decarbonization action that rely on reporting of emissions impacts separately from the inventory may not be as strong as those that can directly reduce the emissions inventory.

Support programs based on GHG Protocol and uses of GHG data
The location-based method provides users of GHG data with relevant climate risk information, and has been incorporated in mandatory (IFRS S2, ESRS E1, ISO 14064-1:2018, U.S. SEC Rule, and CA SB 253) and voluntary (CDP, GRI) programs globally. However, several mandatory reporting frameworks have also adopted the market-based method, and corporates participating in voluntary programs like SBTi and RE100 rely largely on the market-based method to signal achievement of goals and targets. While the reporting of project-based emissions assessments can provide additional relevant information for stakeholders, whether this method remains an optional category or is elevated to required or recommended has implications for its use by external programs. Elevating the project-based method to required or recommended could support its adoption by these programs, pending the feasibility of implementation for organizations.

Feasibility to implement
There is a strong track record of implementation of the location-based method globally, and across a wide range of organizations, however, technical improvements to this method may support or hinder feasibility globally. Some regions of the world lack high quality data for location-based calculations, though in general location-based data is readily available. While the project-based method has a long track record of implementation in carbon markets to quantify project-level GHG reductions and removals, its feasibility and significant reliance on the method as part of organizations' overall emission reporting, decision-making, and target-setting efforts is unknown. As such, the decision of whether to maintain it as an optional method or elevate it to a required or recommended reporting method has significant implications for the feasibility of this approach. This added emphasis on the project -based method may lead to a development and refinement period during the initial implementation as organizations build reporting capacity, ultimately increasing long-term feasibility as tools and resources are developed to support implementation. Further discussion and evaluation of this dynamic are needed.

D. Maintain Dual Reporting Requirement, with Potential Updates; Recommend or Require Project Accounting:

Details of the proposed approach:

- Organizations shall report both the location- and market-based inventory methods, potentially incorporating updates to one or both methods as described in the Technical Improvements sections.
- Organizations [shall or should] (to be discussed with the TWG) report emission impacts from projects and interventions (i.e. the project-based method, or project-based assessments), separate from the inventory.

For a detailed assessment of this approach using the full decision-making criteria, see Appendix A.

Scientific integrity
See discussion of the concept of scientific integrity in Option A.

GHG accounting and reporting principles
All five accounting and reporting principles are met or partially met through this approach. While details of each reporting method are necessary to determine full alignment with some principles (accuracy, transparency, consistency), in general required dual reporting and required or recommended project-based reporting provides the most comprehensive quantification of emissions data to meet these principles.

Support decision making that drives ambitious global climate action
Similar to option A, required dual reporting of location- and market-based emissions, but with required or recommended disclosure of project-based emissions, can incentivize a broad range of mitigation actions necessary to address climate goals. These mitigation actions may include facility siting decisions, energy efficiency measures, time of use decisions (potentially more so with certain technical improvements), policy advocacy, energy supply decisions, and a myriad of possible interventions that reduce system-wide emissions as measured by the project-based method. The impact and alignment of the actions incentivized by these reporting methods with global climate science will depend on the specific details of their implementation. However, the presence of dual reporting and required or recommended project-based reporting broadens the range of potential actions, offering opportunities for more impactful and science-aligned initiatives compared to approaches that limit reporting to one or two categories. The elevation of the project-based method to a required or recommended reporting category could support the broader reporting ecosystem surrounding this method, and better incentivize these actions compared with approaches that maintain it as an optional reporting category.

Support programs based on GHG Protocol and uses of GHG data
Similar to option A, required dual reporting of location- and market-based emissions provides users of GHG data with a range of information, and is currently used by mandatory (IFRS S2, ESRS E1, ISO 14064-1:2018, U.S. SEC Rule, and CA SB 253) and voluntary (SBTi, CPD, RE100, GRI, etc.) disclosure programs alike. Project-based method reporting would add to this suite of relevant data, and by elevating it to a required or recommended reporting category with a more rigorous and standardized methodology this approach would likely increase the availability of this data compared with other approaches that exclude it or maintain it as only an optional reporting category with little guidance. However, it is important to note that few existing external reporting frameworks currently require or make use of emissions impacts quantified using a project-based method.

Feasibility
The feasibility of this approach shares many of the same themes already discussed in option 1, with an important difference being the elevation of the project-based method to a required or recommended reporting category instead of optional. While the project-based method has a long track record of implementation in carbon markets to quantify project-level GHG reductions and removals, its feasibility as part of organizations' overall emission reporting, decision-making, and target-setting efforts is unknown. As such, the decision of whether to elevate it to a *required* or *recommended* reporting method has significant implications for the feasibility of this approach. This added emphasis on the project -based method may lead to a development and refinement period during the initial implementation as organizations build reporting capacity, ultimately increasing long-term feasibility as tools and resources are developed to support implementation. Further discussion and evaluation of this dynamic are needed.

Observations

- Several aspects of the decision-making criteria, such as scientific integrity, the principle of accuracy, and supporting decision making that drives ambitious global climate action, are not possible to assess for reporting *categories* alone. See the options discussed in the Technical Improvements section for a discussion of the implications of changes to the reporting categories.
- A reporting option that integrates both inventory and project accounting assessments may have the potential to more credibly and comprehensively align with all of the decision-making criteria and hierarchy compared to relying on a subset of methods. The level of scientific integrity and accuracy that each method can achieve depends on its specific implementation, with certain options possibly demonstrating higher integrity from the outset. This suggests that the proposed combination of reporting options could offer a more robust and accurate outcome compared to other approaches. Further exploration of these considerations is provided in the Technical Improvements section.
- Approaches (option A, option D) with multiple required and recommended reporting categories will provide the most relevant information for users of GHG data and will be the most interoperable with existing voluntary and mandatory reporting and disclosure programs. Limiting reporting categories runs the risk of creating gaps in the broader reporting ecosystem.
- Approaches (option A, option D) with multiple required and recommended reporting categories will likely incentivize a larger portfolio of decarbonization actions. While the details of these reporting categories (to be discussed in the Technical Improvements section) will be important in assessing whether the actions they incentivize are impactful, the number and type of incentivized actions is relevant to consider.

Questions for Technical Working Group Discussion

- Are there evaluations of the Decision-Making Criteria for any of the four options that require further discussion and potential revision?
- Options A and D incentivize the largest suite of potential decarbonization actions by corporates. Is this increased number of actions inherently positive, or is it necessary to evaluate the specific actions and their decarbonization impact(s) before reaching a conclusion on these criteria?
- What is the current rate of corporations using project accounting methods compared to inventory accounting methods, and how would making the project-based method optional, recommended, or required affect the number of companies reporting consequential emissions impacts and the inclusion of such reporting in target-setting programs or mandatory disclosure initiatives?
- Evaluating the project-based method against the decision-making criteria relies in part on assumptions about the broader reporting landscape, and the potential that programs external to GHG Protocol adopt consequential impact assessments at some level. What conclusions can we make about the effectiveness of the project-based method without understanding future adoption by these external groups?

3. Technical Improvements: Introduction

The following sections 4 and 5 discuss proposed options to maintain or update technical requirements of both the location- and market-based methods, including updates to requirements and recommendations for activity data, emission factors, and quality criteria.

The location- and market-based methods were developed to improve the relevance, completeness, consistency, transparency, and accuracy of reported scope 2 totals, and provide individual consumers with greater clarity about the decisions they can make to reduce emissions associated with their purchased and consumed electricity as well as contribute to emission reductions in the grid. This information can help reporting organizations to identify and understand the risks and opportunities associated with emissions from their purchased and consumed electricity and can support decision making that drives ambitious global climate action. Increasingly this data is also useful for general consumers of GHG emission data mandated through regulatory climate disclosure rules.

As outlined in the Corporate Standard and Scope 2 Guidance, there is not always a direct cause-and-effect relationship between a single activity of the reporting organization (purchasing and consuming energy) and the resulting GHG emissions on the grid. However, activities that the Scope 2 Guidance recognize as contributing to a reduction in a reporting organization's indirect emissions should, in aggregate, correspond to reductions in global emissions over time. The Guidance states, "*as long as the accounting of indirect emissions over time recognizes activities that in aggregate change global emissions, any such concerns over accuracy should not inhibit companies from reporting their indirect emissions"*. [1]

Feedback and research provided to the Secretariat through the global survey process highlighted that the current technical requirements of the location- and market-based methods may not be or are now less suited to meet the needs of today's markets. Specifically, these methods may fall short in consistently ensuring that reported scope 2 emissions offer relevant and accurate information necessary to inform ambitious climate actions and goals that genuinely contribute to overall emission reductions in the grid. Various options were proposed to update the technical requirements of the location- and market-based methods emphasizing how revised methods could more effectively capture the link between reported emissions and actual system-wide progress toward decarbonization goals. The following sections discuss these options in detail; the location-based method is discussed in section 4 and the market-based method in section 5.

[1] Corporate Standard, p. 59 and Scope 2 Guidance, p.28

4. Technical Improvements: Location-Based Method

Background

As detailed in Chapter 4 of the Scope 2 Guidance and Chapter 4 of the Corporate Standard, calculating scope 2 emissions requires an allocation method to quantify the emissions from power generation associated with purchased and consumed energy. The Guidance presents the location-based method as a means to allocate the GHG emissions generated by electricity production to end consumers based on the average emission intensity of the grid where the energy consumption occurs.

This is done by applying emission factors to each unit of energy purchased and consumed, reflecting "*the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data).*"[2] The Scope 2 Guidance states that "*[c]ompanies should use the most appropriate, accurate, precise, and highest quality emission factors available for each method."*[3] When available, average emission factors should represent "*all electricity production occurring in a defined grid distribution region that approximates a geographically precise energy distribution and use area. Emission factors should reflect net physical energy imports/exports across the grid boundary*."[4] The "*most appropriate spatial boundaries for emission factors serving the location-based method are those that approximate regions of energy distribution and use, such as balancing areas. All generation and emissions data within this boundary should be aggregated and any net physical energy imports/exports and their related emissions should be taken into account*." Options are also provided to use larger boundaries when necessary.[5]

Advanced grid study estimations

The Scope 2 Guidance also recognizes that some companies may have access to detailed studies or software solutions linking their facilities' time-of-day energy use patterns to the GHG emissions from local generation dispatching during those times. Section 6.10 of the Scope 2 Guidance notes that, at the time of publication in 2015, such studies or analyses had not been widely available or used, however, these advanced grid studies may "*help inform specific demand-side actions more than grid-average emission factors, which may only incentivize overall demand reduction rather than targeted actions."*[6]Where advanced studies (or real-time information) are available, companies may optionally report scope 2 estimations using this data separately as a comparison to location-based grid average estimations, and companies can document where this data specifically informed efficiency decision making or time-of-day operations. "*Because these studies or analyses may be more difficult to use widely across facilities or to standardize/aggregate consistently without double counting, companies should ensure that any data used for this purpose has addressed data sourcing and boundaries consistent with the location-based method."*[7]

Throughout the Guidance, the location-based method is described as: 1) useful for demonstrating, and 2) providing decision-relevant information in the following areas:

[2] Scope 2 Guidance, section 1.5, p. 8
[3] Scope 2 Guidance, section 6.5, p. 45
[4] Scope 2 Guidance, Table 6.2, p.47
[5] Scope 2 Guidance, section 6.10.1, p. 54
[6] Scope 2 Guidance, Box 6.2, p.53
[7] Scope 2 Guidance, section 7.3, p.61-62

1. **Estimating and reflecting emissions based on grid data**
    - Providing a simple method of estimating the pro rata share of total system emissions according to electricity consumed within a defined geographic area and time period using a grid-average emission factor.[8]
    - Reflecting GHG intensity of grids where operations occur, regardless of market type.[9]
    - Reflecting that a consumer is served by all the energy resources deployed on their regional grid.[10]
    - Reflecting the role of "balancing" resources and their emissions.[11]

2. **Risk and opportunity assessment related to grid emissions**
    - Showing risks/opportunities that are better evaluated based on average emissions in a grid (e.g., regulatory).[12]
    - Reflecting risks related to grid operation and maintenance (e.g., maintaining regional grid reliability).[13]
    - Highlighting a company's exposure to geographic risks, including (a) air pollution such as sulfur dioxide (SO_x) or mercury from coal combustion; (b) the impact of hydropower on local waterways and aquatic life; and (c) the risks from nuclear waste disposal or emergencies.[14]

3. **Enabling decision-making for consumers and companies**
    - Enabling facility-siting decisions based on carbon intensities of standard grid-delivered electricity in different regions.[15]
    - Enabling facility-siting decisions based on natural features of a location (e.g., areas with low-carbon natural resources, or additional benefits such as natural ambient cooling or heat).[16]
    - Highlighting opportunities for reduced energy consumption.[17]
    - Reflecting the cumulative effect of consumer or supplier choices over time that change the grid-average emission factor.[18]

4. **Improving comparability**
    - Improving comparability across a reporting organization's operations across multiple markets over time.[19]

[8] Scope 2 Guidance, section 4.1.1, p. 25-26
[9] Scope 2 Guidance, section 4.1.1, p. 26
[10] Scope 2 Guidance, section 2.5, p. 19
[11] Scope 2 Guidance, Box 4.1, p. 27
[12] Scope 2 Guidance, section 6.4.1, p. 45
[13] Scope 2 Guidance, section 2.2, p. 16-17
[14] Scope 2 Guidance, section 2.2, p. 17
[15] Scope 2 Guidance, section 4.3, p. 28
[16] Scope 2 Guidance, section 4.3, p. 28
[17] Scope 2 Guidance, section 2.2, p. 17
[18] Scope 2 Guidance, section 4.3, p. 31
[19] Scope 2 Guidance, section 6.4.1, p. 45

- Comparing the aggregate GHG performance of energy-intensive sectors (e.g., comparing electric train transportation with gasoline or diesel vehicle transit).[20]

Feedback and research provided to the Secretariat highlighted that the current technical requirements of the location-based method may not be or are now less suited to demonstrate or provide relevant and accurate decision-making information for all these use cases.

Various options have been proposed to update the technical requirements of the location-based method, either to better link reported emissions with actual system-wide progress toward decarbonization goals or to revise the method's stated purpose and use cases. The following section provides a preliminary evaluation of options, though additional variations may exist. Importantly, this analysis serves as a *starting point* for the Scope 2 TWG to refine and expand upon during the first phase of the Scope 2 Standard Development Plan.

Location-Based Method Technical Improvements Under Consideration

The current Scope 2 Guidance Chapter 7, "Accounting and Reporting Requirements" details the required information for reporting the scope 2 location-based method, and Chapter 6, "Calculating Emissions" details the scope 2 location-based emission factor hierarchy. Different options were proposed as technical improvements to the location-based method or to revise the stated purpose and use cases associated with the location-based method. Below we describe three proposed options focusing on the location-based method emission factor hierarchy along with further clarification and guidance on how more granular data within the location-based method can produce more appropriate, accurate, precise, and highest quality accounting and reporting outcomes.

A. Maintain the current location-based method accounting and reporting requirements

- Maintain current broad flexibility of the scope 2 location-based method emission factor hierarchy.
    - Companies **should** use the most appropriate, accurate, precise, and highest quality emission factors available for each method.[21]
    - Organizations **should** first try to use **regional or subnational emission factors**: "*Average emission factors representing all electricity production occurring in a defined grid distribution region that approximates a geographically precise energy distribution and use area. Emission factors should reflect net physical energy imports/exports across the grid boundary.*"[22]
    - When such information is unavailable, organizations **may** use **national production emission factors**: "*Average emission factors representing all electricity production information from geographic boundaries that are not necessarily related to dispatch region, such as state or national borders. No*

[20] Scope 2 Guidance, Table 4.1, p. 26
[21] Scope 2 Guidance, section 6.5,p. 45
[22] Scope 2 Guidance, Table 6.2, p. 47

adjustment for physical energy imports or exports, not representative of energy consumption area."[23]

- Maintain broad temporal requirements
  - An annual grid average emission factor is described as an indicative example for an appropriate regional or subnational emission factor."[24]
  - When analyzing location-based scope 2 results, organizations are encouraged to take into account *"temporal representativeness due to time delays between the year in which energy generation and resulting emissions occurred, and the year in which the data is published."*[25]

B. Refine reporting requirements for the location-based method to require temporal and geographic granularity

- Building on the current location-based method requirements, organizations **shall** account and report their location-based method inventory using more temporally and geographically granular accounting and reporting requirements for the location-based method:
  - Organizations **shall** account for and report the location-based method inventory using hourly grid average emission factors and activity data.
  - Organizations **shall** account for and report the location-based method inventory using emission factors that reflect 'deliverable' geographic boundaries.
    1. In this option 'deliverable' geographic boundaries are considered in two ways:
       a. Deliverable boundaries **shall** use granular geographic boundaries (to be discussed and defined in TWG consultation).
       b. Deliverable boundaries **shall** use grid-average emission factors that include energy imports/exports across grid boundaries.

C. Revise location-based method emission factor hierarchy to include power flow modeling

- Revise the location-based method emission factor hierarchy[26] to include emission factors calculated using a 'power flow modeling' approach as the highest (most precise) emission factor. This revision could also include changes to how advanced grid study estimations[27] are reported.

[23] Scope 2 Guidance, Table 6.2, p. 47
[24] Scope 2 Guidance, Table 6.2, p. 47
[25] Scope 2 Guidance, section 6.10.1, p. 54
[26] Scope 2 Guidance, Table 6.2, p. 47
[27] Scope 2 Guidance, section 7.2, p. 61

The Scope 2 TWG and the GHG Protocol Secretariat will continue to review the various options to update or maintain the location-based method relative to the stated objectives and principles in the Scope 2 Guidance and the GHG Protocol Decision-Making Criteria. To this end, an initial assessment is provided in the following table and expanded below. These draft considerations are provided as a *starting point* for further discussion by the Scope 2 TWG.

Table 2. Preliminary evaluation of changes to the location-based accounting and reporting method

		Option A: Maintain the Current Location-Based Method Accounting and Reporting Requirements	**Option B:** Refine Reporting Requirements for the Location-Based Method to Require Temporal and Geographic Granularity	**Option C:** Revise Location-Based Method Emission Factor Hierarchy to Include Power Flow Modeling
Scientific integrity		Mixed	Mixed / Yes	*Further discussion with TWG needed.*
Corporate Standard GHG accounting and reporting principles	**Relevance**	Mixed	Mixed / Yes	
	Completeness	Yes	Yes	
	Consistency	Yes	Yes	
	Transparency	Yes	Mixed / Yes	
	Accuracy	Mixed	Mixed / Yes	
	Comparability	Mixed	Mixed / Yes	
Supports decision-making that drives ambitious global climate action		Mixed / No	Mixed	
Supports programs based on GHG Protocol and uses of GHG data		Mixed	Mixed / Yes	
Feasibility to implement		Yes	Mixed / No	

Further Location-Based Method Considerations

Additional options or combinations of options may be possible for the location-based method, and the Scope 2 TWG is encouraged to raise further options and refinements to build upon this starting point.

For example, the current requirements could remain, with added *recommendations* that organizations should use more granular temporal and geographic data when feasible but may use the existing requirements. This approach could help organizations align their location-based reporting more closely with the principles of relevance and accuracy, supporting decision-making for ambitious climate action in a way similar to Option B. However, because this granularity would only be recommended, not required, it would not necessarily demonstrate greater overall alignment with these criteria than the current location-based method (Option A).

Further consideration may be necessary to determine if recommending, rather than requiring, more granular emission factors might inadvertently reduce alignment with the principles of consistency and comparability. If organizations vary in their use of emission factors depending on the level of data granularity available at reporting time, this could impact consistency, comparability, and performance tracking of scope 2 emissions over time. Conversely, by encouraging more granular reporting, this recommendation may, over time, improve data access as tools and resources are developed.

Analysis using the decision-making criteria could be undertaken by the Scope 2 TWG to evaluate this among other options. Based on a preliminary analysis, without adding new mandatory reporting requirements, this option appears to closely align with Option A, with potential impacts on the criteria of consistency, comparability, and feasibility as noted above.

Option A: Maintain the Current Location-Based Method Accounting and Reporting Requirements

Details of the proposed approach:

- Maintain current broad flexibility of the scope 2 location-based method emission factor hierarchy (see full text above).
- Maintain broad temporal requirements (see full text above).

For a detailed assessment of this approach using the full decision-making criteria, see Appendix B.

Scientific integrity

The current location-based method provides a simplified estimation of the reporting organization's indirect emissions associated with their purchased and consumed electricity. This estimation is determined by allocating a pro rata share of total system emissions within a defined geographic area and time period according to the amount of electricity purchased and consumed by the organization using a grid average emission factor. Under the current location-based method, the emissions reported in an organization's scope 2 location-based inventory will increase or decrease as result of either corresponding increases or decreases in their activities (i.e., electricity purchase and consumption) or changes in the grid-average emission factor used by the reporting organization. Some research has identified that closer consideration of both the time and location where energy is purchased and consumed in relation to energy generation on the grid may improve the scientific integrity of how average system emissions are accurately allocated across different organizations.[28]

[28] Miller, Gregory J., Kevin Novan, and Alan Jenn. "Hourly accounting of carbon emissions from electricity consumption." *Environmental Research Letters* 17, no. 4 (2022): 044073;
de Chalendar, Jacques A., John Taggart, and Sally M. Benson. "Tracking emissions in the US electricity system." *Proceedings of the National Academy of Sciences* 116, no. 51 (2019): 25497-25502;
Ji, Ling, Sai Liang, Shen Qu, Yanxia Zhang, Ming Xu, Xiaoping Jia, Yingtao Jia et al. "Greenhouse gas emission factors of purchased electricity from interconnected grids." *Applied Energy* 184 (2016): 751-758;
Qu, Shen, Sai Liang, and Ming Xu. "CO2 emissions embodied in interprovincial electricity transmissions in China." *Environmental science & technology* 51, no. 18 (2017): 10893-10902;
Schäfer, Mirko, Bo Tranberg, Dave Jones, and Anke Weidlich. "Tracing carbon dioxide emissions in the European electricity markets." In *2020 17th International Conference on the European Energy Market (EEM)*, pp. 1-6. IEEE, 2020.

By its mathematical design, the current location-based method, using annual grid-average emission factors, is poorly suited or unable to reflect any direct or precise causal responsibility between an organization's energy usage or actions and the emissions assigned via the location-based method to the reporting organization. This does not compromise the legitimacy of the method as a means to simply allocate emissions using a grid-average emission rate, however it indicates the method does not fully align with the scientific integrity criteria when it comes to enabling decision-making for reporting organizations. If decisions are made based on the current location-based method using annual average emission factors they may inaccurately reflect the actual emissions outcomes of an organization's actions, potentially misrepresenting the effectiveness of efforts to reduce emissions. There are mixed views in research on whether improving the spatiotemporal granularity of average emission factors could result in improved decision-making utility. Further research is required to evaluate this dynamic. See the discussion under Option B for further analysis of the impact of increased granularity.

GHG accounting and reporting principles

The GHG accounting and reporting principles of completeness, consistency, transparency, and the additional principle of comparability, are well supported through the current location-based method. The principle of relevance is not fully met as the current location-based method using annual average emission factors is largely incompatible with risk and opportunity assessments related to grid emissions, and poorly suited for informing decision-making by internal users seeking to reduce emissions or assess performance. However, the current location-based method may provide relevant information for external decision-makers as a simple and easily understood methodology to make comparisons of average allocation of grid emissions across markets and time. The principle of accuracy is also not fully met as research indicates that in some regions the current location-based method using annual average emission factors may misallocate emissions to individual organizations due to its lack of temporal and spatial granularity, including not requiring accounting for electricity imports/exports across regions[29]. Additionally, while the current location-based method provides an accurate means to allocate the pro rata shares of total system emissions based on electricity consumed within a defined geographic area and time period, the use of annual average grid emission factors introduces significant uncertainty for users to make decisions with reasonable confidence related to facility siting, increases or decreases in electricity consumption, timing of demand shifts, deployment of new technologies, and other related risk or opportunity assessments.

Support decision-making that drives ambitious global climate action

The current Guidance indicates the location-based method using annual average emission factors may incentivize organizations to:

- Report GHG emissions using a simple and comparable allocation method
- Reduce overall grid electricity consumption and improve energy efficiency as a means to reduce reported activity data.
- Make facility-siting decisions based on the annual average grid emission intensity of different regions.
- Make facility-siting decisions based on natural features of a location.

[29] Miller, Novan, and Jenn, "Hourly Accounting," 044073;
de Chalendar, Taggart, and Benson, "Tracking Emissions," 25497-25502;
Ji et al., "Greenhouse Gas Emission Factors," 751-758;
Qu, Liang, and Xu, "CO2 Emissions," 10893-10902;
Schäfer et al., "Tracing Carbon Dioxide Emissions," 1-6.

- Make time-of-use decisions based on the average grid emission intensity at different hours of the day.
- Rely on incremental changes in grid emission intensity to reduce reported emissions. Some organizations may attempt to accelerate this change through indirect actions such as grid decarbonization advocacy and lobbying.

Some of these actions, including reporting GHG emissions using a simple and comparable allocation method, advocacy and lobbying efforts, and decisions that reduce overall electricity purchases and consumption in aggregate, may contribute to ambitious climate actions. However, the current location-based method may not provide accurate information to inform decisions that add, remove, or shift electricity load nor develop clean energy generation resources, due to the limitations inherent in the use of annual average emission factors.

Support programs based on GHG Protocol and uses of GHG data
The location-based method provides a simplified estimation of the reporting organization's indirect emissions associated with purchased electricity. The current location-based method is used by several key programs, including IFRS Climate-Related Disclosures (IFRS S2), European Sustainability Reporting Standards: Climate Change (ESRS E1), ISO 14064-1:2018, The Enhancement and Standardization of Climate-Related Disclosures for Investors Rule (U.S. SEC Rule), and California Climate Corporate Data Accountability Act (CA SB 253), as well as voluntary programs including GRI and CDP, among others.

The effectiveness of the current location-based method in generating data for general users is mixed, as it is highly dependent on the intended use of such data. As described in the sections above, while the location-based method may provide an allocation of system-wide emissions based on total consumption, the use of annual data or large geographic boundaries may introduce limitations for the use of the data to assess a reporter's risks and opportunities related to grid emissions or inform decision-making.

Feasibility to implement

The current location-based method has a strong track record of implementation. Organizations at varying levels of maturity can access the activity data and emission factors required to implement this method. The widespread availability of annual average grid emission factors has facilitated the adoption of location-based reporting globally.

Option B: Refine Reporting Requirements for the Location-Based Method to Require Temporal and Geographic Granularity

Details of the proposed approach:

Building on the current location-based method requirements, organizations **shall** account and report their location-based method inventory using more temporally and geographically granular accounting and reporting requirements for the location-based method:

- Organizations **shall** account for and report the location-based method inventory using hourly grid average emission factors and activity data.

- Organizations **shall** account for and report the location-based method inventory using emission factors that reflect 'deliverable' geographic boundaries (see full text in *Location-Based Method Technical Improvements Under Consideration*).

For a detailed assessment of this approach using the full decision-making criteria, see Appendix B.

Scientific integrity

Similar to the current location-based method outlined above, this proposed approach seeks to provide a simplified, albeit more granular, estimation of the reporting organization's indirect emissions associated with their purchased and consumed electricity. This estimation is determined by allocating a pro rata share of total system emissions within a defined geographic area and time period according to the amount of electricity purchased and consumed. Research has identified that closer consideration of both the time and location where energy is purchased and consumed in relation to energy generation on the grid may improve the scientific integrity of how average system emissions are allocated across different organizations.[30] This option reflects this research by requiring that organizations *shall* use an hourly grid average emission factor matched with hourly activity data and *shall* use 'deliverable' geographic boundaries inclusive of imported/exported energy. Improving the granularity of how system emissions are allocated is not necessarily required for the location-based method to meet its purpose to provide a simple, accessible means to allocate emissions using a grid-average emission rate. However, by improving the accuracy of how emissions are estimated, the location-based method could more closely align with the scientific integrity criteria when it comes to its other stated purposes and use cases as outlined in the Scope 2 Guidance (i.e., assessing risks and opportunities related to grid emissions, enabling decision-making for consumers and companies, and improving comparability).

As discussed earlier, the current location-based method, using annual grid-average emission factors, is poorly suited or unable to reflect any direct or precise causal responsibility between an organization's energy usage or actions and the emissions assigned to the reporting organization. However, some new research by Gagnon et al.[31] may indicate that when using an hourly emission factor there is a slight positive correlation between induced emissions from an organization's load interventions (e.g., adding load to the grid) and the allocated GHG emissions, potentially implying that requiring use of hourly emission factors produces inventory data that better enables decision-making for consumers and customers. However, there are mixed views on whether this correlation exists or is helpful for decision-making. Some research is generally unsupportive or inconclusive of the concept of using average emission factors to inform decision-making (e.g., shifts in demand, usage patterns, or the adoption of new technologies), suggesting that alternate methodologies, such as short-run or long-run marginal

[30] Miller, Gregory J., Kevin Novan, and Alan Jenn. "Hourly accounting of carbon emissions from electricity consumption." *Environmental Research Letters* 17, no. 4 (2022): 044073;
de Chalendar, Jacques A., John Taggart, and Sally M. Benson. "Tracking emissions in the US electricity system." *Proceedings of the National Academy of Sciences* 116, no. 51 (2019):25497-25502;
Ji, Ling, Sai Liang, Shen Qu, Yanxia Zhang, Ming Xu, Xiaoping Jia, Yingtao Jia et al. "Greenhouse gas emission factors of purchased electricity from interconnected grids." *Applied Energy* 184 (2016): 751-758;
Qu, Shen, Sai Liang, and Ming Xu. "CO2 emissions embodied in interprovincial electricity transmissions in China." *Environmental science & technology* 51, no. 18 (2017): 10893-10902;
Schäfer, Mirko, Bo Tranberg, Dave Jones, and Anke Weidlich. "Tracing carbon dioxide emissions in the European electricity markets." In *2020 17th International Conference on the European Energy Market (EEM)*, pp. 1-6. IEEE, 2020.

[31] Gagnon, Pieter, and Wesley Cole. "Planning for the evolution of the electric grid with a long-run marginal emission rate." *Iscience* 25, no. 3 (2022).

emission factors, should be used to inform these actions).[32] Further research is needed to examine the implication of increased spatiotemporal granularity of the location-based method for decision-making, particularly research evaluating these questions in regions outside of the United States.

GHG accounting and reporting principles

The GHG accounting and reporting principles of completeness and consistency are well supported through the proposed location-based method approach. The additional principle of comparability is also well supported, however, compared with Option A, increasing granularity may unintentionally introduce greater data variability. This is due to differences in data availability for hourly emission factors (based on grid regions that may account for imports/exports differently) and hourly activity data from reporting organizations. Such variability could initially affect comparability.

The proposed approach may improve alignment with the principle of relevance. Research, as described in the scientific integrity section above, indicates that use of hourly, regionally-specific emission factors inclusive of imports/exports can more accurately estimate the allocation of system emissions than annual average emission factors. However, there is mixed evidence regarding whether the proposed use of hourly grid average emission factors would provide more relevant information to facilitate internal decision-making concerning load shifting, demand response, and energy storage applications for existing facilities. There is similarly mixed evidence regarding whether the use of more granular emission factors provides relevant information for evaluating emission outcomes from adding new load to the grid (e.g., siting new facilities or significant increases purchased and consumed energy). When considering information relevant for meeting external decision-making needs, the same limitations of this proposed approach appear to apply.

The principle of accuracy is more closely met under the proposed approach than the current location-based method. This approach more precisely defines the 'geographic boundary' and 'time of use' for grid-average emission factors, aligning more closely with new research outcomes that test the implications of refining these boundaries on the accuracy of how the grid's average emissions are allocated to individual reporters. However, the extent to which more accurately allocated inventory emissions data can be used to inform accurate decision-making requires further exploration.

Requiring the use of more granular emission factors and consumption data may complicate location-based emissions calculations and limit the public availability of emission factors. This may affect the auditability of this accounting approach and, consequently, its alignment with the principle of transparency.

[32] Holland, Stephen P., Matthew J. Kotchen, Erin T. Mansur, and Andrew J. Yates. "Why marginal CO2 emissions are not decreasing for US electricity: estimates and implications for climate policy." *Proceedings of the National Academy of Sciences* 119, no. 8 (2022): e2116632119.;
Elenes, Alejandro GN, Eric Williams, Eric Hittinger, and Naga Srujana Goteti. "How well do emission factors approximate emission changes from electricity system models?." *Environmental Science & Technology* 56, no. 20 (2022): 14701-14712;
He, Hua, Aleksandr Rudkevich, Xindi Li, Richard Tabors, Alexander Derenchuk, Paul Centolella, Ninad Kumthekar, Chen Ling, and Ira Shavel. "Using marginal emission rates to optimize investment in carbon dioxide displacement technologies." *The Electricity Journal* 34, no. 9 (2021): 107028;
Siler-Evans, Kyle, Ines Lima Azevedo, and M. Granger Morgan. "Marginal emissions factors for the US electricity system." *Environmental science & technology* 46, no. 9 (2012): 4742-4748;
Hawkes, Adam D. "Long-run marginal CO2 emissions factors in national electricity systems." *Applied Energy* 125 (2014): 197-205;
Gagnon, Pieter, and Wesley Cole. "Planning for the evolution of the electric grid with a long-run marginal emission rate." *Iscience* 25, no. 3 (2022).

Support decision-making that drives ambitious global climate action
The current Guidance indicates the location-based method using annual average emission factors may incentivize organizations to:

- Report GHG emissions using a simple and comparable allocation method.
- Reduce overall grid electricity consumption and improve energy efficiency as a means to reduce reported activity data.
- Make facility-siting decisions based on the average grid emission intensity of different regions.
- Make facility-siting decisions based on natural features of a location.
- Make time-of-use decisions based on the average grid emission intensity at different hours of the day.
- Rely on incremental changes in grid emission intensity to reduce reported emissions. Some organizations may be incentivized to attempt to accelerate this change through indirect actions such as grid decarbonization advocacy and lobbying.

Some of these actions or decisions, including reporting GHG emissions using a simple and comparable allocation method, decisions that reduce overall electricity purchases and consumption in aggregate, and advocacy and lobbying efforts, may support ambitious global climate actions.
As detailed in the scientific integrity section, research is inconclusive about whether the required use of hourly average and 'deliverable' emission factors may provide accurate information to inform time of use decisions, how incremental changes in grid emission intensity reduce emissions, or make facility- or generation-siting decisions.

Support programs based on GHG Protocol and uses of GHG data
Compared to the current location-based method, this approach may provide users with more useful emission data as it is more accurate, relevant, and comparable for the reasons described above.

For reasons of feasibility, it is unclear how this option might impact interoperability with policies and programs that have implemented the location-based method as new legal disclosure requirements including in IFRS S2 and ESRS E1.

Feasibility to implement
This proposed approach would introduce greater barriers to feasibility than the current location-based method for some organizations and/or some regions of the world. Evidence of widespread global implementation of this option, relative to the current location-based method, is limited. The necessary datasets to report location-based emissions under this method are available in some markets, however they remain unavailable or challenging to obtain in many regions globally. Likewise, hourly electricity consumption data for a facility would be challenging to obtain for many organizations globally. However, utilities and energy providers are increasingly making hourly consumption data available to customers, and increased demand for hourly emissions accounting would likely drive further availability of this information.

Option C: Revise Location-Based Method Emission Factor Hierarchy to Include Power Flow Modeling

Details of the proposed approach:

- Revise the location-based method emission factor hierarchy[33] to include emission factors calculated using a power flow modeling approach as the highest (most precise) emission factor. This revision could also include changes to how advanced grid study estimations are reported.[34]

Option C was not assessed in detail by the Secretariat. Further discussion with the TWG is necessary to determine whether this approach should be considered alongside Options A and B as a standalone proposal or addressed as a component of Options A and B and discussed within the context of each.

Questions for Technical Working Group Discussion

- What additional research/evidence should be incorporated into this analysis?
- Are there additional uses of the location-based method, either as stated in the Scope 2 Guidance or in common practice, that should be considered?
- Are the current uses as stated in the Scope 2 Guidance appropriate? Can the location-based method using average emission factors inform the risks and opportunities associated with emissions from purchased and consumed electricity as described in Chapter 2 of the Scope 2 Guidance?[35]
- Is a one-hour period the most appropriate temporal granularity for location-based emission factors under the approach described in Option B? Is there data or research that indicates an alternative time period better aligns with the decision-making criteria (daily, monthly, annually, sub-hourly, etc.)?
- What data or evidence exists that can comprehensively and objectively assess the global feasibility of location-based emission calculations for Options A, B, and potentially C?
- What datasets, tools, or resources are available to help reporting organizations consistently and accurately assess 'deliverable' electricity grid boundaries worldwide?
- How should Option C be considered in the context of the location-based methodology specifically and scope 2 accounting and reporting generally?

[33] Scope 2 Guidance, Table 6.2, p. 47
[34] Scope 2 Guidance, section 7.2, p. 61
[35] Scope 2 Guidance, section 2.2, p. 15

5. Technical Improvements: Market-Based Method

Background

To be provided

Market-Based Method Technical Improvements Under Consideration

To be provided

Questions for Technical Working Group Discussion

To be provided

Appendix A - Detailed Decision-Making Criteria Analysis for Required Reporting Options

A. Maintain Dual Reporting Requirement, with Potential Updates; Optional Project Accounting:

- Organizations shall report both the location- and market-based inventory methods, potentially incorporating updates to one or both methods as described in the Technical Improvements sections.
- Organizations may report emission impacts from projects and interventions (i.e. the project-based method, or project-based assessments), separate from the inventory.

Option A: Maintain Dual Reporting Requirement, with Potential Updates; Optional Project Accounting		
Decision-making criteria		**Evaluation**
Scientific integrity Approaches should ensure scientific integrity and validity, adhere to the best applicable science and evidence (including academic literature, modeling, or other research), and align with the latest climate science.		N/A The concept of scientific integrity can be more specifically applied to the Technical Improvements section of this document. A growing body of research has identified potential issues with both the existing location- and market-based methods while also providing potential options to increase scientific integrity across each method. Preliminary analysis suggests that improvements to the location- and market-based methods may be required to ensure the scientific integrity of each method. The level of scientific integrity each method can achieve will depend on the specifics of how they are implemented. See the Technical Improvements section for more details on these improvements.
GHG accounting and reporting principles Approaches should meet the GHG Protocol accounting and reporting principles of accuracy, completeness, consistency, relevance, and transparency. Additional principles should be considered where relevant: conservativeness (for GHG reductions and removals), permanence (for removals), and comparability (TBD, subject to TWG and ISB discussions). Options may present tradeoffs among principles which should be evaluated.	**1. Relevance** **Corporate Standard:** Ensure the GHG inventory appropriately reflects the GHG emissions (and removals, if applicable) of the company and serves the decision-making needs of users – both internal and external to the company. **Project Accounting Standard:** Use data, methods, criteria, and assumptions that are appropriate for the intended use of reported information.	Mixed / Yes Requiring dual reporting of both the location-based and market-based methods in a Scope 2 inventory, while making project-based assessments optional, presents a moderate alignment with the GHG Protocol Corporate Standard and GHG Protocol for Project Accounting principles of relevance. The dual reporting requirement supports development of a GHG inventory that reflects a comprehensive view of the organization's emissions, enabling an opportunity to reflect both an allocation of regional average emissions based on electricity use (location-based) and a more specific allocation of energy usage and procurement decisions (market-based). This combination can provide a reflection of the organization's GHG emissions and useful information for internal and external decision-making, enabling the organization's GHG inventory to serve as a relevant tool for understanding and managing emissions. However, the optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the relevance of the information provided. While these assessments could offer valuable insights into an organization's specific initiatives, their optional status and lack of standardization might lead to inconsistencies and omissions in the reported data. This could reduce the overall effectiveness of how organizations use project accounting evaluations to assess actions or investments to evaluate their emission abatement or increase potential. Even as an optional methodology, a clear separation of any project accounting assessments from the broader inventory remains necessary to allows stakeholders to assess the information. In summary, while dual reporting can strengthen the relevance of the GHG inventory by offering a broader view of emissions, the optional and less standardized nature of project-based assessments could detract from the overall relevance by potentially omitting critical information needed for comprehensive decision-making by users.

GHG accounting and reporting principles (cont.)	**2. Completeness** **Corporate Standard:** Account for and report on all GHG emissions (and removals, if applicable) from sources, sinks, and activities within the inventory boundary. Disclose and justify any specific exclusions. **Project Accounting Standard:** Consider all relevant information that may affect the accounting and quantification of GHG reductions and complete all requirements.	Mixed / Yes The location-based and market-based methods require accounting for and allocation of all relevant emission sources within the chosen inventory boundary and thus aligns with the Corporate Standard principle of completeness. This reporting option would account for all GHG activities (e.g., purchased and consumed energy) within the inventory boundary. However, the approach may face challenges accounting for all GHG emission activities within the inventory boundary if inconsistencies arise in the application of the market-based method—due to its complexity—or the location-based method—due to variations in activity or grid data, potentially leading to incomplete reporting of the organization's inventory of emissions. See technical improvements for specific parameters within the location-based and market-based methods. The optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the completeness of the information provided. While these assessments could offer valuable insights into an organization's specific initiatives, their optional status and lack of standardization might lead to inconsistencies and gaps in the reported data. This could reduce the overall effectiveness of GHG emission reporting in fully reflecting the organization's emissions and supporting informed decision-making.
	3. Consistency **Corporate Standard:** Use consistent methodologies to allow for meaningful performance tracking of GHG emissions (and removals, if applicable) over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series. **Project Accounting Standard:** Use data, methods, criteria, and assumptions that allow meaningful and valid comparisons.	Mixed Requiring dual reporting of both the location-based and market-based methods in a Scope 2 inventory, while making project-based assessments optional, presents a mixed alignment with the GHG Protocol Corporate Standard and GHG Protocol for Project Accounting principles of consistency. For dual reporting to maintain consistency, the market-based method must apply energy procurement choices uniformly across reporting periods, while the location-based method requires the consistent use of grid average emission factors based on regional data. The optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the ability to provide meaningful and valid comparisons over time. A lack of standardization might lead to inconsistencies and gaps in the reported data.
	4. Transparency **Corporate Standard:** Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.	Mixed / Yes Requiring dual reporting of both the location-based and market-based methods in a Scope 2 inventory, while making project-based assessments optional, presents a moderate alignment with the GHG Protocol Corporate Standard and GHG Protocol for Project Accounting principles of transparency. The degree to which a reporting method or combination of methods meets the transparency principle is largely a factor of the technical specifics of that reporting method(s) and is difficult to assess in the abstract. Given that both reporting methods included in this approach have the capacity to provide transparent and auditable GHG information, it can be concluded that this criterion has been met by the approach.

GHG accounting and reporting principles (cont.)	**Project Accounting Standard:** Provide clear and sufficient information for reviewers to assess the credibility and reliability of GHG reduction claims.	The optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the ability of reporting organizations to provide auditable and detailed disclosures of the data, methods, criteria, and assumptions used in quantifying GHG reductions from specific initiatives. A lack of standardization might lead to inconsistencies and gaps in the reported data.
	5. Accuracy **Corporate Standard:** Ensure that the quantification of GHG emissions (and removals, if applicable) is systematically neither over nor under actual emissions (and removals, if applicable), and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information. **Project Accounting Standard:** Reduce uncertainties as much as is practical.	N/A The accuracy each method can achieve will depend on the specifics of how they are implemented, with some technical improvements initially demonstrating stronger alignment with the accuracy principle than others. Further evaluation of research associated with each dual reporting method is necessary to ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions and that uncertainties are reduced as far as practicable. See the technical improvements section for discussion on both the existing inventory methods' accuracy and details on any improvements that may impact their accuracy. Including both the location-based and market-based methods, along with recommending project-based assessments may increase the likelihood that inventories calculated with this approach communicate GHG data that better aligns with the principle of accuracy. The optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the ability to provide accurate disclosures of the data, methods, criteria, and assumptions used in quantifying GHG reductions from specific initiatives. Furthermore, a clear separation of any project impacts from the broader inventory remains necessary to enable users to make decisions with reasonable confidence as to the integrity of the reported inventory or project-assessment information.
	6. Comparability (subject to discussion on TWG) Apply common methodologies, data sources, assumptions, and reporting formats such that the reported GHG inventories from multiple companies can be compared.	Mixed / Yes Requiring dual reporting can support comparability by providing a comprehensive view of an organization's emissions through two distinct methods of allocating the grid's emissions: the location-based method, which offers a broad estimate of an organization's emissions as an allocation of regional emissions, and the market-based method, which allocates emissions based on the organization's specific energy usage and procurement decisions. This dual approach helps address relevant issues by providing both a general perspective on grid emissions and a detailed view of how the organization's energy choices affect its allocated emissions, supporting a transparent assessment of the reported information. However, comparability depends on the consistent application of key implementation details, such as standardized activity data, emission factor sources, market boundaries, data quality, and vintage criteria. Inconsistent use of these factors could undermine the ability to accurately compare emissions across reporting organizations and may lead to potential misinterpretations of environmental performance. While this option requires dual reporting of Scope 2 market- and location-based methods, it leaves project accounting assessments optional and without necessarily providing clear guidance or standardization. This may limit the ability to provide comparable disclosures of the project-assessment data, methods, criteria, and assumptions used in quantifying GHG reductions from specific initiatives across reporting organizations.

Support decision making that drives ambitious global climate action • Approaches should advance the public interest by informing and supporting decision making that drives ambitious actions by private and public sector actors to reduce GHG emissions and increase removals in line with global climate goals. • GHG Protocol accounting frameworks should accurately and completely measure emissions such that the resulting GHG data informs effective individual and systemwide GHG mitigation action in line with global climate goals. Accounting approaches should not support or incentivize actions that are contrary to global climate goals. • Approaches should provide the necessary information to support sector-specific decarbonization in line with climate goals.	Mixed / Yes Requiring dual reporting of Scope 2 emissions has the potential to offer a more comprehensive and informative framework for supporting global climate action and goals compared to requiring only one method. By including both the location-based and market-based methods, this approach can broaden the range of information that organizations may consider in alignment with a transition to a net-zero emission electricity grid. The location-based method can motivate efforts to reduce overall electricity consumption and improve energy efficiency, while the market-based method has the potential to support the procurement and use of clean energy resources, siting decisions, load management, and other mitigation actions contributing to grid decarbonization. The specific actions incentivized by the location and market-based methods will still depend on how each method is implemented, with some options potentially more strongly supporting the transition to a net-zero electricity grid, as further explored in the technical improvements section. In contrast with other options that require only one reporting method, this approach may reduce the risk of systematically under- or overcounting emissions in the inventory by providing two perspectives on emissions. The inclusion of both methods helps ensure no single reporting method plays an outsized role in informing and supporting ambitious actions to reduce GHG emissions in line with global climate goals. The absence of clear guidance and standardization on data, methods, criteria, and assumptions for project-accounting assessments limits the potential of this option to fully inform climate actions and goals. This gap impacts the overall emissions report by limiting the range of actions an organization might evaluate in the context of global climate action.
Support programs based on GHG Protocol and uses of GHG data • Approaches should promote interoperability with key mandatory and voluntary climate disclosure and target setting programs that are based on GHG Protocol standards, where appropriate, while ensuring policy neutrality. • Approaches should support appropriate uses of the resulting GHG data and associated information by various audiences, including GHG programs, reporting companies, stakeholders, and other users of the resulting GHG information.	Mixed / Yes This option has the potential to support uses of GHG data and programs based on the GHG Protocol by generating emissions data that is both comprehensive and versatile. By offering multiple perspectives on an organization's inventory emissions, this approach can provide useful data for general users of GHG inventory reports and reduce the risk of overreliance on a single method. Additionally, it can generate emissions data that is currently relevant for existing mandatory reporting frameworks including IFRS Climate-Related Disclosures (IFRS S2), European Sustainability Reporting Standards: Climate Change (ESRS E1), ISO 14064-1:2018, The Enhancement and Standardization of Climate-Related Disclosures for Investors Rule (U.S. SEC Rule), and California Climate Corporate Data Accountability Act (CA SB 253), as well as voluntary programs including SBTi, RE100, GRI, and CDP, among others. The optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the ability of this approach to support uses of GHG data. As this methodology is currently under-utilized or not required by many programs, the absence of clear guidance and standardization, may continue to limit its usage.

Feasibility to implement • Approaches which meet the above criteria should be feasible to implement, meaning that they are accessible, adoptable, and equitable. • GHG Protocol accounting approaches should support broad adoption of GHG Protocol standards, including in voluntary and regulatory settings, and consider different users (level of capacity, resources, geography, regulatory environments, etc.). • For aspects of accounting approaches that meet the above criteria but are difficult to implement, the GHG Protocol should aim to improve feasibility, for example, by providing guidance and tools to support implementation.	Yes There is a strong track record of implementation of the existing dual reporting framework globally and across a wide range of organizations, particularly in regions where both the location-based and market-based methods are well understood and supported by existing tools and resources. However, technical improvements to these methods may support or hinder feasibility globally. Further, some regions of the world lack high quality data (for both location- and market-based reporting) and/or the ability to make, track, and support supply choices (for the market-based method). While implementation challenges may vary globally, particularly in regions with less access to high-quality data, the widespread availability of guidance and resources from the GHG Protocol could support broader adoption. While the project-based method generally has a track record of implementation in carbon markets to quantify project-level GHG reductions and removals, its feasibility and use as part of organizations' overall emission reporting, decision-making, and target-setting efforts appears to be limited. A continuation of the optional status for project-based assessments would be feasible as it requires little to no change from the status quo.

B. Report Only the Market-Based Method, with Potential Updates; Optional Project Accounting

- Organizations shall report the market-based inventory method potentially incorporating updates as described in the Technical Improvements section; organizations should not report the location-based method.
- Organizations may report emission impacts from projects and interventions (i.e. the project-based method, or project-based assessments), separate from the inventory.

Option B: Report Only the Market-Based Method, with Potential Updates; Optional Project Accounting		
Decision-making criteria		**Evaluation**
Scientific integrity Approaches should ensure scientific integrity and validity, adhere to the best applicable science and evidence (including academic literature, modeling, or other research) and align with the latest climate science.		N/A The concept of scientific integrity can be more specifically applied to the Technical Improvements section of this document. A growing body of research has identified potential issues with both the existing location- and market-based methods while also providing potential options to increase scientific integrity across each method. Preliminary analysis suggests that improvements to the location- and market-based methods may be required to ensure the scientific integrity of each method. The level of scientific integrity each method can achieve will depend on the specifics of how they are implemented, with some options initially demonstrating higher integrity than others. See the Technical Improvements section for more details on these improvements.
GHG accounting and reporting principles Approaches should meet the GHG Protocol accounting and reporting principles of accuracy, completeness, consistency, relevance, and transparency. Additional principles should be considered where relevant: conservativeness (for GHG reductions and removals), permanence (for removals), and comparability (TBD, subject to TWG and ISB discussions). Options may present tradeoffs among principles which should be evaluated.	**1. Relevance** **Corporate Standard:** Ensure the GHG inventory appropriately reflects the GHG emissions (and removals, if applicable) of the company and serves the decision-making needs of users – both internal and external to the company. **Project Accounting Standard:** Use data, methods, criteria, and assumptions that are appropriate for the intended use of reported information.	Mixed / No Requiring only the Scope 2 market-based method, while eliminating the location-based method and not providing clear guidance and standardization for project-accounting may limit the ability of this option to align with the GHG Protocol principle of relevance. The market-based method can reflect GHG emissions allocated to the organization and provide relevant decision-making information based on energy procurement and consumption decisions, such as procurement and supply choices, managing the timing of their consumption of electricity based on when clean energy is generated on the grid, reducing overall energy consumption, and siting facilities and operations in grids with more clean energy available for procurement. However, by excluding the location-based method, this approach could restrict the comprehensiveness of the GHG inventory, as it no longer also offers a general view of emissions based on the average carbon intensity of the regional grid. This might reduce the ability of the inventory to provide all GHG emission information relevant for the organization, particularly in regions where market-based procurement options are limited. Moreover, without including or clearly defining a project-accounting assessments methodology, this option may further limit the reporting of specific impacts from energy choices and initiatives, making it more challenging for internal and external users to assess the full scope of the organization’s emissions and the effectiveness of its sustainability strategies.

GHG accounting and reporting principles (cont.)	**2. Completeness** **Corporate Standard:** Account for and report on all GHG emissions (and removals, if applicable) from sources, sinks, and activities within the inventory boundary. Disclose and justify any specific exclusions. **Project Accounting Standard:** Consider all relevant information that may affect the accounting and quantification of GHG reductions and complete all requirements.	Mixed / Yes The market-based method requires accounting for and allocation of all relevant emission sources within the chosen inventory boundary and thus aligns with the Corporate Standard principle of completeness. This reporting option would account for all GHG activities (e.g., purchase energy) within the inventory boundary. However, the approach may face challenges accounting for all GHG emission activities within the inventory boundary if inconsistencies arise in the application of the market-based method due to its complexity, potentially leading to incomplete reporting of the organization's inventory of emissions. See technical improvements for specific parameters within the location-based and market-based methods. The optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the completeness of the information provided. While these assessments could offer valuable insights into an organization's specific initiatives, their optional status and lack of standardization might lead to inconsistencies and gaps in the reported data. This could reduce the overall effectiveness of GHG emission reporting in fully reflecting the organization's emissions and supporting informed decision-making.
	3. Consistency **Corporate Standard:** Use consistent methodologies to allow for meaningful performance tracking of GHG emissions (and removals, if applicable) over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series. **Project Accounting Standard:** Use data, methods, criteria, and assumptions that allow meaningful and valid comparisons.	Mixed Requiring only the market-based method can provide a reporting methodology that produces GHG inventory information consistently over time. For this method to maintain consistent GHG emissions data over time the reporting organization must apply energy procurement choices such as market boundaries, EAC vintage, and other metrics uniformly across reporting periods. In practice, this can be more difficult for the market-based method than for the location-based method due to its complexity, data availability, and other factors. The optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the ability to provide consistency over time. A lack of standardization might lead to inconsistencies and gaps in the reported data.
	4. Transparency **Corporate Standard:** Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.	Mixed / Yes Requiring only the market-based method has the potential to align with the GHG Protocol principle of transparency if the reporting organization provides comprehensive data and emission factors during an audit. The degree to which a reporting method or combination of methods meets the transparency principle is largely a factor of the technical specifics of that reporting method(s) and is difficult to assess in the abstract. Since the market-based method has the capacity to provide transparent and auditable GHG information, it can be concluded that this criterion has been met by the approach. However, it is worth noting that in practice the assumptions and market instruments involved in market-based emissions calculations may not be clearly understood by all users. This lack of clarity can hinder a clear understanding of the issues in the context of the reporting company, making it difficult for users to meaningfully assess performance. Additionally, verification and audit challenges may arise due to

	Project Accounting Standard: Provide clear and sufficient information for reviewers to assess the credibility and reliability of GHG reduction claims.	changes in market conditions and assumptions over time, complicating the establishment of a clear audit trail. The use of supplier-specific emission factors that are not publicly disclosed can further obscure the transparency of the inventory, increasing uncertainty and making it harder for third parties to replicate the results, thereby reducing the transparency of the report. The optional nature of project-based assessments, particularly without clear guidance and standardization, may limit the ability to provide transparency to assess the credibility and reliability of GHG reduction claims over time. A lack of standardization might lead to inconsistencies and gaps in the reported data.
GHG accounting and reporting principles (cont.)	**5. Accuracy** **Corporate Standard:** Ensure that the quantification of GHG emissions (and removals, if applicable) is systematically neither over nor under actual emissions (and removals, if applicable), and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information. **Project Accounting Standard:** Reduce uncertainties as much as is practical.	N/A The accuracy each method can achieve will depend on the specifics of how they are implemented, with some technical improvements initially demonstrating stronger alignment with the accuracy principle than others. Further evaluation of research associated with each dual reporting method is necessary to ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions and that uncertainties are reduced as far as practicable. See the technical improvements section for discussion on both the existing method's accuracy and details on any improvements that may impact its accuracy. Only including the market-based method without the location-based method or optional/recommended project-based assessments diminishes the likelihood that users receive a more accurate representation of the reporting organization's GHG emissions, increasing the risk that a single method could systematically misrepresent emissions impacts.
	6. Comparability (subject to discussion on TWG) Apply common methodologies, data sources, assumptions, and reporting formats such that the reported GHG inventories from multiple companies can be compared.	Mixed Only requiring the market-based method may limit comparability as users have fewer options to assess and compare company inventories, potentially leading to inconsistent or misleading evaluations. In theory, market-based to market-based comparisons across companies are possible, but variations in data choices, such as market geographic and temporal boundaries and residual mix calculations, can impact the results. Additionally, data limitations or regulatory policies in some regions may restrict a reporting organization's ability to use the market-based method everywhere, further complicating comparisons. Without consistent use of market boundaries and vintage quality criteria, reports might not clearly convey how a company's emissions relate to the energy grid's emissions where it operates, making it difficult for users to accurately assess environmental performance and potentially leading to misleading comparisons between companies. The absence of the location-based method may impair the ability to evaluate a company's emissions in relation to the specific energy grid emissions of the regions where it operates, hindering accurate and consistent comparisons across organizations. Furthermore, the absence of standardized guidance for project-based assessments reduces the opportunity to compare similar projects across organizations, further limiting the ability to evaluate and compare the specific impacts of emissions reduction initiatives.

Support decision making that drives ambitious global climate action • Approaches should advance the public interest by informing and supporting decision making that drives ambitious actions by private and public sector actors to reduce GHG emissions and increase removals in line with global climate goals. • GHG Protocol accounting frameworks should accurately and completely measure emissions such that the resulting GHG data informs effective individual and systemwide GHG mitigation action in line with global climate goals. Accounting approaches should not support or incentivize actions that are contrary to global climate goals. • Approaches should provide the necessary information to support sector-specific decarbonization in line with climate goals.	Mixed In principle, the market-based method can provide reporting organizations with a means to inform, account for, and report progress towards ambitious climate action and goals related to their procurement and usage of electricity. This is achieved through incentivizing specific energy procurement and supply choices, managing the timing of their consumption of electricity based on when clean energy is generated on the grid, reducing overall energy consumption, and siting facilities and operations in grids with more clean energy available for procurement. Eliminating the location-based method as a required reporting method may omit information such as insights to an organization's overall exposure to electricity consumption or remove incentives for some actions, such as policy advocacy around grid decarbonization. As discussed in the GHG Protocol Principles criteria, the alignment with accuracy and completeness among other principles for each of the proposed market-based method will depend on the specifics of how they are implemented, with some implementation options initially demonstrating stronger alignment than others. Further evaluation of the scientific integrity and alignment with accounting principles for each market-based method proposal is necessary to ensure that GHG emissions are systematically neither over nor under allocated and that uncertainties are reduced as far as practicable. See the technical improvements section for evaluation of the existing market-based method and additional proposals. Relying exclusively on inventory accounting may omit relevant information necessary to fully support grid-related decarbonization actions and climate goals. Using information quantified and separately reported using the GHG Protocol Project Accounting Standard can provide a means to further support and inform effective mitigation actions when used in conjunction with inventory reporting.
Support programs based on GHG Protocol and uses of GHG data • Approaches should promote interoperability with key mandatory and voluntary climate disclosure and target setting programs that are based on GHG Protocol standards, where appropriate, while ensuring policy neutrality. • Approaches should support appropriate uses of the resulting GHG data and associated information by various audiences, including GHG programs, reporting companies, stakeholders, and other users of the resulting GHG information.	No This approach has the potential to only partially support the use of GHG data and programs based on the GHG Protocol. Exclusion of the location-based method would be inconsistent with numerous existing mandatory (IFRS S2, ESRS E1, ISO 14064-1:2018, proposed U.S. SEC Rule, and CA SB 253.) and voluntary climate disclosure and target-setting programs, such as the SBTi, RE100, GRI, CDP. In only providing a single perspective on an organization's emissions, this approach lacks useful data for general users of GHG reports and increases the risk of overreliance on a single method that might misrepresent impacts. The lack of clear guidance and standardization for project-based assessments may further limit the ability to support uses of GHG data and programs based on GHG Protocol. As this methodology is currently under-utilized or not required by many programs, the absence of clear guidance and standardization may continue to limit its usage.

Feasibility to implement • Approaches which meet the above criteria should be feasible to implement, meaning that they are accessible, adoptable, and equitable. • GHG Protocol accounting approaches should support broad adoption of GHG Protocol standards, including in voluntary and regulatory settings, and consider different users (level of capacity, resources, geography, regulatory environments, etc.). • For aspects of accounting approaches that meet the above criteria but are difficult to implement, the GHG Protocol should aim to improve feasibility, for example, by providing guidance and tools to support implementation.	Yes The market-based method is a current scope 2 accounting and reporting methodology that is widely used globally in regions where markets provide "differentiated energy products" such as the availability of contractual instruments including direct contracts, certificates, or supplier-specific information. However, aggregate reporting data from CDP indicates that many organizations still only report location-based emissions, despite often operating in regions where dual reporting would be required. In some cases, the lack of sufficient information to meet the quality criteria (supply-specific emissions rates, EAC tracking systems, residual mix data) or lack of electricity supply choices in certain regions results in companies reporting market-based emissions totals that include some portion of regional grid-average emission factors. Although grid-average emission factors are included in the market-based emission factor hierarchy, further discussion is necessary to assess whether their use for market-based calculations truly aligns with the spirit of the feasibility criteria. While implementation challenges may vary globally, particularly in regions with less access to high-quality data, the widespread availability of guidance and resources from the GHG Protocol is a means to further support broader adoption. Under existing GHG Protocol Standards, any project-based assessments are optional. Continued status as an optional methodology is presumably a similarly feasible option.

C. Report Only the Location-Based Method, with Potential Updates; Recommend or Require Project Accounting

- Organizations shall report the location-based inventory method potentially incorporating updates as described in Technical Improvements section; organizations should not report the market-based method.
- Organizations [shall or should] (to be discussed with TWG) report emission impacts from projects and interventions (i.e., the project-based method, or project-based assessments), separate from the inventory.

Option C: Report Only the Location-Based Method, with Potential Updates; Recommend or Require Project Accounting		
Decision-making criteria		**Evaluation**
Scientific integrity Approaches should ensure scientific integrity and validity, adhere to the best applicable science and evidence (including academic literature, modeling, or other research) and align with the latest climate science.		N/A The concept of scientific integrity can be more specifically applied to the Technical Improvements section of this document. A growing body of research has identified potential issues with the existing location-based method while also providing potential options to increase scientific integrity of the method. Preliminary analysis suggests that improvements to the location-based methods may be required to ensure the scientific integrity of each method. The level of scientific integrity achievable will depend on the specifics of how the method is implemented, with some options initially demonstrating higher integrity than others. See the Technical Improvements section for more details on these improvements.
GHG accounting and reporting principles Approaches should meet the GHG Protocol accounting and reporting principles of accuracy, completeness, consistency, relevance, and transparency. Additional principles should be considered where relevant: conservativeness (for GHG reductions and removals), permanence (for removals), and comparability (TBD, subject to TWG and ISB discussions). Options may present tradeoffs among principles which should be evaluated.	**1. Relevance** **Corporate Standard:** Ensure the GHG inventory appropriately reflects the GHG emissions (and removals, if applicable) of the company and serves the decision-making needs of users – both internal and external to the company. **Project Accounting Standard:** Use data, methods, criteria, and assumptions that are appropriate for the intended use of reported information.	Mixed / No Requiring only the location-based method in a scope 2 inventory along with recommended or required separate project-based assessments and eliminating the market-based methods may limit the ability of this option to align with the GHG Protocol principle of relevance. The location-based method is one of two existing ways to allocate grid emissions to energy purchased and used by the reporting organization. It provides a simplified estimation of the reporting organization's indirect emissions by allocating a pro rata share of total system emissions according to electricity consumed within a defined geographic area and time period using a grid average emission factor and the organization's total energy usage. Exclusive use of the location-based method may have limitations in its relevance to users as a means to serve their decision-making needs. By its mathematical design, the allocation of emissions using a grid average emission rate is not able to reflect any direct or precise causal responsibility between an organization's energy usage or actions and the emissions assigned to the reporting organization. The grid average may provide an estimate of an organization's emissions as an allocation of regional emissions but is potentially unable to capture the specific emissions changes that occur when new electricity demand or reductions occur, from shifts in when usage occurs, or new technologies are introduced. This means any of the method's stated purposes or use cases should acknowledge it may not necessarily represent accurate or relevant emission information directly related to an organization's purchase and consumption of electricity. Recommending or requiring a robust and standardized usage of GHG Protocol's project-accounting assessments can provide an option for organizations to selectively assess actions or investments to evaluate their emission abatement or increase potential. This can be relevant in evaluating what actions could result in the greatest emissions impact per investment. Externally, project-based emissions assessments can be used to communicate the impacts of specific actions undertaken by a reporting organization to reduce or avoid emissions separately from the overall GHG emissions allocated to the reporting organization. Project accounting assessments must be reported separately from the inventory report's emissions estimates of the reporting organization's energy usage. As project-accounting assessments are currently not included in most target-setting or mandatory disclosure programs it is unclear how currently relevant this information is for the decision-making needs of users—both internal and external to the reporting organization. Elevating the project-based method to required or recommended could support its further adoption by these programs.

GHG accounting and reporting principles (cont.)	**2. Completeness** **Corporate Standard:** Account for and report on all GHG emissions (and removals, if applicable) from sources, sinks, and activities within the inventory boundary. Disclose and justify any specific exclusions. **Project Accounting Standard:** Consider all relevant information that may affect the accounting and quantification of GHG reductions and complete all requirements.	Yes The location-based method requires accounting for and allocation of all relevant emission sources within the chosen inventory boundary and thus aligns with the Corporate Standard principle of completeness. This approach helps to account for all GHG activities (e.g., purchase energy) within the inventory boundary. However, the approach may face challenges accounting for all GHG emission activities within the inventory boundary if inconsistencies arise in the application of the location-based method due to variations in activity or grid data, potentially leading to incomplete reporting of the organization's inventory of emissions. See technical improvements for specific parameters within the location-based and methods. By elevating the project-based method to a recommended or required reporting category, this approach may support project-based assessments to incorporate all relevant information that affects a project's potential GHG reductions at a system level, separate from the overall GHG emissions of the reporting organization. While this can be done completely for specific projects, it may provide an incomplete representation of all actions, investments, etc. associated with the reporting organization.
	3. Consistency **Corporate Standard:** Use consistent methodologies to allow for meaningful performance tracking of GHG emissions (and removals, if applicable) over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series. **Project Accounting Standard:** Use data, methods, criteria, and assumptions that allow meaningful and valid comparisons.	Mixed / Yes The location-based method can provide a consistent approach to estimating over time the pro rata shares of total system emissions based on electricity purchased and consumed within a defined geographic area and time period using a grid average emission factor, though current methodologies may benefit from updates to ensure more consistent market boundaries, emission factor vintage, and other parameters. Project-accounting can provide consistent assessments so long as it utilizes standardized data, methods, criteria, and assumptions to ensure consistent and comparable reporting of emissions reductions outside the inventory, reflecting the broader impact of specific initiatives.
	4. Transparency **Corporate Standard:** Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.	Yes The location-based method can provide a transparent and auditable means to estimating over time the pro rata shares of total system emissions based on electricity purchased and consumed within a defined geographic area and time period using a grid average emission factor, though current methodologies may benefit from updates to ensure more consistent market boundaries, emission factor vintage, and other parameters. The degree to which a reporting method or combination of methods meets the transparency principle largely depends on the technical specifics of the reporting method(s) and is difficult to assess in the abstract. Given that the location-based method has the capacity to provide transparent and auditable GHG information, this option appears to be in alignment with this GHG Protocol principle and criterion. Furthermore, the simplicity of location-based emissions calculations and the public availability of emission factors, compared to other accounting methods, enhance the transparency and auditability of this approach.

GHG accounting and reporting principles (cont.)	**Project Accounting Standard:** Provide clear and sufficient information for reviewers to assess the credibility and reliability of GHG reduction claims.	By elevating the project-based method to a recommended or required reporting category, this approach may result in GHG data that in aggregate better meets the transparency principle as the application of the project-based method may be better understood and applied by GHG reporters.
	5. Accuracy **Corporate Standard:** Ensure that the quantification of GHG emissions (and removals, if applicable) is systematically neither over nor under actual emissions (and removals, if applicable), and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information. **Project Accounting Standard:** Reduce uncertainties as much as is practical.	N/A The accuracy each method can achieve will depend on the specifics of how they are implemented, with some technical improvements initially demonstrating stronger alignment with the accuracy principle than others. Further evaluation of research associated with the location-based method is necessary to ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions and that uncertainties are reduced as far as practicable. See the technical improvements section for discussion on both the existing method's accuracy and details on any improvements that may impact its accuracy. Only including the location-based method without the market-based method may impact the accuracy of the inventory and users' ability to make decisions with reasonable confidence and may increase the risk that a single method could systematically misrepresent emissions impacts. Recommended or required project-based assessments may be able to achieve sufficient accuracy to enable users to make decisions with reasonable confidence as to the integrity of the reported information. To ensure such quantifications do not systematically misrepresent emissions impacts, further consideration may be necessary to ensure reporting organization do not exclusively focus on GHG emission abatement projects, while omitting accounting for and reporting on projects or actions that increase emissions.
	6. Comparability (subject to discussion on TWG) Apply common methodologies, data sources, assumptions, and reporting formats such that the reported GHG inventories from multiple companies can be compared.	Mixed Only requiring the location-based method may limit comparability as users have fewer options to assess and compare company inventories, potentially leading to inconsistent or misleading evaluations. Generally, location-based to location-based comparisons across companies are possible, however variations in data choices, such as grid emission factors, geographic and temporal boundaries can impact the results. Furthermore, by its mathematical design the location-based method serves a potentially narrow purpose and should not be used to compare emissions changes between organizations that occur when new electricity demand or reductions occur, from shifts in when usage occurs, or new technologies are introduced. With standardized guidance for project-based assessments there could be opportunity to compare similar projects across organizations, however this may enable evaluation of specific projects without necessarily allowing for comparability across reporting organizations. Additionally, if project-based assessments are recommended (and not required) some organizations may opt to comprehensively use project assessments, others may conduct more limited assessments and others might forgo any evaluations entirely, further hindering any such comparisons.

Support decision making that drives ambitious global climate action • Approaches should advance the public interest by informing and supporting decision making that drives ambitious actions by private and public sector actors to reduce GHG emissions and increase removals in line with global climate goals. • GHG Protocol accounting frameworks should accurately and completely measure emissions such that the resulting GHG data informs effective individual and systemwide GHG mitigation action in line with global climate goals. Accounting approaches should not support or incentivize actions that are contrary to global climate goals. • Approaches should provide the necessary information to support sector-specific decarbonization in line with climate goals.	Mixed The current location-based method (using annual average emission factors) provides a straightforward way to allocate an organization's share of total system emissions. This estimation is determined by allocating a pro rata share of total system emissions according to electricity purchased and consumed within a defined geographic area and time period using an annual grid average emission factor and the organization's total energy usage. Under the current location-based method, the emissions reported in an organization's scope 2 location-based inventory will increase or decrease as result of either corresponding increases or decreases in their activities (i.e., electricity purchases and consumption), or changes in the grid average emission factor used by the reporting organization. While this approach can help ensure the completeness, consistency, comparability, and transparency of an organization's GHG inventory, it has limitations. It does not necessarily provide nor is it intended to inform a detailed or direct assessment of the relationship between an organization's activities (i.e., energy usage) and the grid emissions produced in supplying power. The actual emissions an organization causes can vary based on its specific practices and efforts to reduce emissions, and these may often not align well with the allocated emissions based on a simplified method like an annual average emission factor. For these reasons the current location-based method's ability to inform effective mitigation actions and create incentives for both individual and systemwide GHG reductions in line with global climate goals is limited. Further evaluation and refinement of the location-based method is discussed in the technical improvements section. Recommended or required project-based assessments could provide additional information to assess climate actions and goals. However, the absence of an easily implementable, standardized approach with consistent boundaries for determining which projects are evaluated and which are not may limit overall efficacy. Additionally, to ensure such quantifications do not systematically misrepresent emissions impacts, further consideration may be necessary to ensure reporting organizations do not exclusively focus on GHG emission abatement projects, while omitting accounting for and reporting on projects or actions that increase emissions. For many public target or goal programs as well as internal metrics used by reporting organizations, exclusively or primarily relying on project-based assessments to support climate action and goals may also require a transition period given the current state of practice, availability of standardized methodologies, and inclusion by target-setting programs and mandatory disclosure policies.
Support programs based on GHG Protocol and uses of GHG data • Approaches should promote interoperability with key mandatory and voluntary climate disclosure and target setting programs that are based on GHG Protocol standards, where appropriate, while ensuring policy neutrality. • Approaches should support appropriate uses of the resulting GHG data and associated information by various audiences, including GHG programs, reporting companies, stakeholders, and other users of the resulting GHG information.	No This approach supports some usages of GHG data and programs based on GHG Protocol while eliminating a methodology widely used by organizations and programs globally. The location-based method provides users of GHG data with relevant climate risk information, and has been incorporated in mandatory (IFRS S2, ESRS E1, ISO 14064-1:2018, U.S. SEC Rule, and CA SB 253) and voluntary (CDP, GRI) programs globally. However, in eliminating the market-based method this approach only provides a single perspective on an organization's inventory, which may lack useful data for general users of GHG reports and increases the risk of overreliance on a single method. Exclusion of the market-based method would also be inconsistent with numerous existing mandatory disclosure frameworks (EFRAG CSRD, proposed U.S. SEC Rule and CA SB 253, etc.), and would eliminate the most widely used scope 2 accounting method for tracking progress toward climate goals and targets. While the reporting of project-based emissions assessments can provide additional relevant information for stakeholders, whether this method remains an *optional* category or is elevated to required or recommended has implications for its use by external programs. Elevating the project-based method to required or recommended could support its adoption by these programs, pending the feasibility of implementation for organizations.

Feasibility to implement • Approaches which meet the above criteria should be feasible to implement, meaning that they are accessible, adoptable, and equitable. • GHG Protocol accounting approaches should support broad adoption of GHG Protocol standards, including in voluntary and regulatory settings, and consider different users (level of capacity, resources, geography, regulatory environments, etc.). • For aspects of accounting approaches that meet the above criteria but are difficult to implement, the GHG Protocol should aim to improve feasibility, for example, by providing guidance and tools to support implementation.	Mixed / Yes The location-based method is a current scope 2 accounting and reporting requirement and is currently used globally by a wide range of organizations. Continuing this existing requirement fit for its intended purposes is presumably a feasible option, however, technical improvements made to the location-based method may impact its feasibility for particular regions or organization types. While the project-based method has a long track record of implementation in carbon markets to quantify project-level GHG reductions and removals, its feasibility as part of organizations' overall emission reporting is unknown. As such, the decision of whether to elevate it to a required or recommended reporting method has significant implications for the feasibility of this approach.

D. Maintain Dual Reporting Requirement, with Potential Updates; Recommend or Require Project Accounting

- Organizations shall report both the location- and market-based inventory methods, potentially incorporating updates to one or both methods as described in the Technical Improvements sections.
- Organizations [shall or should] (to be discussed with the TWG) report emission impacts from projects and interventions (i.e. the project-based method, or project-based assessments), separate from the inventory.

Option D: Maintain Dual Reporting Requirement, with Potential Updates; Recommend or Require Project Accounting		
Decision-making criteria		**Evaluation**
Scientific integrity Approaches should ensure scientific integrity and validity, adhere to the best applicable science and evidence (including academic literature, modeling, or other research) and align with the latest climate science.		The concept of scientific integrity can be more specifically applied to the Technical Improvements section of this document. A growing body of research has identified potential issues with both the existing location- and market-based methods while also providing potential options to increase scientific integrity across each method. Preliminary analysis suggests that improvements to the market- and location-based methods may be required to ensure the scientific integrity of each method. The level of scientific integrity each method can achieve will depend on the specifics of how they are implemented, with some options initially demonstrating higher integrity than others. See the Technical Improvements section for more details on these improvements.
GHG accounting and reporting principles Approaches should meet the GHG Protocol accounting and reporting principles of accuracy, completeness, consistency, relevance, and transparency. Additional principles should be considered where relevant: conservativeness (for GHG reductions and removals), permanence (for removals), and comparability (TBD, subject to TWG and ISB discussions). Options may present tradeoffs among principles which should be evaluated.	**1. Relevance** **Corporate Standard:** Ensure the GHG inventory appropriately reflects the GHG emissions (and removals, if applicable) of the company and serves the decision-making needs of users – both internal and external to the company. **Project Accounting Standard:** Use data, methods, criteria, and assumptions that are appropriate for the intended use of reported information.	Yes Required dual reporting of both the location-based and market-based methods in a scope 2 inventory, along with required or recommended separate project-based assessments, enables a range of options for an organization to disclose their overall emissions and the impacts of their initiatives. Depending on specific implementation details, this approach may offer the most comprehensive means to report clear and relevant information, helping inform internal and external users make decisions. The location-based method and the market-based method provide two ways to allocate grid emissions to the reporting organization. The location-based method provides an allocation of regional emissions based on electricity use. The market-based method, depending on its implementation, can allocate emissions based on the organization's specific energy usage and procurement decisions, such as purchasing renewable energy, reflecting their active role in influencing grid emissions. Both methods, when effectively applied, can provide a comprehensive understanding of the organization's responsibility for the emissions associated with purchased energy. Recommending or requiring a robust and standardized usage of GHG Protocol's project-accounting assessments can provide an option for organizations to selectively assess actions or investments to evaluate their emission abatement or increase potential. This can be relevant in evaluating what actions could result in the greatest emissions impact per investment. Externally, project-based emissions assessments can be used to communicate the impacts of specific actions undertaken by a reporting organization to reduce or avoid emissions separately from the overall GHG emissions allocated to the reporting organization. Project accounting assessments must be reported separately from the inventory report's emissions estimates of the reporting organization's energy usage. As project-accounting assessments are currently not included in most target-setting or mandatory disclosure programs it is unclear how currently relevant this information is for the decision-making needs of users—both internal and external to the reporting organization. Elevating the project-based method to required or recommended could support its further adoption by these programs. Together, these three methods provide both internal and external users with the necessary insights to understand the full scope of the organization's emissions and the effectiveness of its sustainability strategies, thereby reflecting the substance and economic reality of the company's business practices.

GHG accounting and reporting principles (cont.)	**2. Completeness** **Corporate Standard:** Account for and report on all GHG emissions (and removals, if applicable) from sources, sinks, and activities within the inventory boundary. Disclose and justify any specific exclusions. **Project Accounting Standard:** Consider all relevant information that may affect the accounting and quantification of GHG reductions and complete all requirements.	Yes The location-based and market-based methods require accounting for and allocation of all relevant emission sources within the chosen inventory boundary and thus aligns with the Corporate Standard principle of completeness. Required dual reporting, combined with recommended or required project-based assessments, can provide a complete view relative to the other options of an organization's electricity-related emissions by ensuring that all GHG sources and activities within the inventory boundary are accounted for (once via the location-based method and once via the market-based method) and that all relevant information affecting the quantification of GHG reductions is considered. This reporting option would account for all GHG activities (e.g., purchase energy) within the inventory boundary. However, the approach may face challenges accounting for all GHG emission activities within the inventory boundary if inconsistencies arise in the application of the market-based method—due to its complexity—or the location-based method—due to variations in activity or grid data, potentially leading to incomplete reporting of the organization's inventory of emissions. See technical improvements for specific parameters within the location-based and market-based methods. By elevating the project-based method to a recommended or required reporting category, this approach may support project-based assessments can incorporate all relevant information that affect a project's potential GHG reductions at a system level separate from the overall GHG emissions of the reporting organization. While this can be done completely for specific projects, it may provide an incomplete representation of all actions, investments, etc. associated with the reporting organization.
	3. Consistency **Corporate Standard:** Use consistent methodologies to allow for meaningful performance tracking of GHG emissions (and removals, if applicable) over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series. **Project Accounting Standard:** Use data, methods, criteria, and assumptions that allow meaningful and valid comparisons.	Yes Required dual reporting, combined with recommended or required project-accounting assessments, can provide reporting methodologies that produce relevant and complete GHG information consistently over time. Dual reporting focuses on all operations within an organization's inventory boundary, while project accounting addresses primary and secondary effects through separate disclosures. For dual reporting to maintain consistency, the market-based method must apply energy procurement and consumption choices uniformly across reporting periods, while the location-based method requires the consistent use of grid average emission factors based on regional data. Project-accounting assessments, on the other hand, must utilize standardized data, methods, criteria, and assumptions to ensure consistent and comparable reporting of emissions reductions outside the inventory, reflecting the broader impact of specific initiatives. This approach also aligns with the established reporting practices of the last decade under the GHG Protocol Scope 2 Guidance, supporting continuity in reporting even if methodologies evolve with new scientific insights and the advancing role of the GHG Protocol.
	4. Transparency **Corporate Standard:** Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate	Yes Required dual reporting, combined with recommended or required project-accounting assessments, can provide a suite of reporting methodologies that transparently disclose comprehensive GHG information. By elevating the project-based method to a recommended or required reporting category, this approach may result in GHG data that in aggregate better meets the transparency principle as the application of the project-based method may be better understood and applied by GHG reporters.

GHG accounting and reporting principles (cont.)	references to the accounting and calculation methodologies and data sources used. **Project Accounting Standard:** Provide clear and sufficient information for reviewers to assess the credibility and reliability of GHG reduction claims.	The degree to which a reporting method or combination of methods meets the transparency principle is largely a factor of the technical specifics of that reporting method(s) and is difficult to assess in the abstract. Given that all three reporting methods included in this approach have the capacity to provide transparent and auditable GHG information, this option appears to be in alignment with the GHG Protocol transparency principle and criterion.
	5. Accuracy **Corporate Standard:** Ensure that the quantification of GHG emissions (and removals, if applicable) is systematically neither over nor under actual emissions (and removals, if applicable), and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information. **Project Accounting Standard:** Reduce uncertainties as much as is practical.	N/A The accuracy each method can achieve will depend on the specifics of how they are implemented, with some technical improvements initially demonstrating stronger alignment with the accuracy principle than others. Further evaluation of research associated with each dual reporting method is necessary to ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions and that uncertainties are reduced as far as practicable. See the technical improvements section for discussion on both the existing method's accuracy and details on any improvements that may impact its accuracy. Including both the location-based and market-based methods, along with recommending or requiring project-based assessments, helps ensure that users receive a more accurate representation of the reporting organization's GHG emissions, reducing the risk of any one method systematically misrepresenting emissions impacts.
	6. Comparability (subject to discussion on TWG) Apply common methodologies, data sources, assumptions, and reporting formats such that the reported GHG inventories from multiple companies can be compared.	Mixed / Yes Requiring dual reporting can enhance comparability by providing a comprehensive view of an organization's emissions through two distinct methods of allocating the grid's emissions: the location-based method, which offers a broad estimate based on regional grid carbon intensity, and the market-based method, which allocates emissions based on the organization's specific energy usage and procurement decisions. This dual approach helps address relevant issues by providing both a general perspective on grid emissions and a detailed view of how the organization's energy choices affect its allocated emissions, supporting a transparent assessment of the reported information. However, comparability depends on the consistent application of key implementation details, such as standardized activity data, emission factor sources, market boundaries, data quality, and vintage criteria. Inconsistent use of these factors could undermine the ability to accurately compare emissions across reporting organizations and may lead to potential misinterpretations of environmental performance. With regard to the project-based method, it is crucial to maintain a clear separation of project impacts from the broader inventory to enable users to make informed comparisons and decisions with reasonable confidence in the integrity of the reported inventory and project-assessment information.

<u>Support decision making that drives ambitious global climate action</u> • Approaches should advance the public interest by informing and supporting decision making that drives ambitious actions by private and public sector actors to reduce GHG emissions and increase removals in line with global climate goals. • GHG Protocol accounting frameworks should accurately and completely measure emissions such that the resulting GHG data informs effective individual and systemwide GHG mitigation action in line with global climate goals. Accounting approaches should not support or incentivize actions that are contrary to global climate goals. • Approaches should provide the necessary information to support sector-specific decarbonization in line with climate goals.	Yes The option of requiring dual reporting of Scope 2 emissions, combined with required or recommended project-based assessments, offers a more comprehensive framework for supporting global climate action and goals. By requiring both the location-based and market-based methods, this approach may incentivize reporting organizations to take a broader range of actions that align with the transition to a net-zero electricity grid. The location-based method encourages organizations to reduce overall electricity consumption and improve energy efficiency, while the market-based method can additionally enable the procurement and use of clean energy resources, facility siting decisions, and load management which can in turn contribute to the decarbonization of the grid. This dual reporting structure, when complemented by project-based assessments, helps ensure that no single method's quantifications are overly weighted, thus providing a more actionable representation of an organization's GHG emissions. It also aims to mitigate the potential weaknesses of relying on a single method by offering multiple perspectives on emissions, which can reduce uncertainties and better support climate goals. The accuracy of each method will depend on its specific implementation, with some technical improvements likely demonstrating stronger alignment with the Decision-Making Criteria and Hierarchy. Further evaluation and refinement of these methods is discussed in the technical improvements section. By encouraging a comprehensive approach to emissions reporting, this combined option has a higher probability of supporting global climate action more effectively than options that use only a subset of these methods. It increases the likelihood that all relevant mitigation actions are considered, providing stakeholders with the necessary information to assess progress toward climate goals and make informed decisions that contribute to the transition to a net-zero future.
<u>Support programs based on GHG Protocol and uses of GHG data</u> • Approaches should promote interoperability with key mandatory and voluntary climate disclosure and target setting programs that are based on GHG Protocol standards, where appropriate, while ensuring policy neutrality. • Approaches should support appropriate uses of the resulting GHG data and associated information by various audiences, including GHG programs, reporting companies, stakeholders, and other users of the resulting GHG information.	Yes This option has the potential to support uses of GHG data and programs based on the GHG Protocol by generating emissions data that is both comprehensive and versatile. By offering multiple perspectives on an organization's emissions, this approach can provide useful data for general users of GHG reports and reduce the risk of overreliance on a single method that might undercount impacts. Additionally, it can generate emissions data that is more likely to be interoperable with existing mandatory (IFRS S2, ESRS E1, ISO 14064-1:2018, U.S. SEC Rule, and CA SB 253) and voluntary climate disclosure and target-setting programs, such as the CDP, SBTi, RE100, and GRI. Project-based method reporting would add to this suite of relevant data, and by elevating it to a required or recommended reporting category with a more rigorous and standardized methodology this approach would likely increase the availability of this data compared with other approaches that exclude it or maintain it as only an optional reporting category with little guidance. However, the reporting of project-based assessments is currently under-utilized or not required by many programs, so it only provides the potential for such support. The effectiveness of this approach also depends on how these programs choose to apply and integrate the suite of methods provided by the GHG Protocol.

Feasibility to implement • Approaches which meet the above criteria should be feasible to implement, meaning that they are accessible, adoptable, and equitable. • GHG Protocol accounting approaches should support broad adoption of GHG Protocol standards, including in voluntary and regulatory settings, and consider different users (level of capacity, resources, geography, regulatory environments, etc.). • For aspects of accounting approaches that meet the above criteria but are difficult to implement, the GHG Protocol should aim to improve feasibility, for example, by providing guidance and tools to support implementation.	Mixed / Yes The option of requiring dual reporting of Scope 2 emissions appears to be feasible for a wide range of organizations and regions. Dual reporting methods have a track record of being implemented by many reporting organizations, particularly in regions where both the location-based and market-based methods are well understood and supported by existing tools and resources. While the project-based method has a long track record of implementation in carbon markets to quantify project-level GHG reductions and removals, its feasibility as part of organizations' overall emission reporting, decision-making, and target-setting efforts is unknown. As such, the decision of whether to elevate it to a required or recommended reporting method has significant implications for the feasibility of this approach While implementation challenges may vary globally, particularly in regions with less access to high-quality data, the widespread availability of guidance and resources from the GHG Protocol could support broader adoption. The inclusion of project-based assessments, though currently under-utilized, has the potential to be integrated more widely as additional tools and resources are developed, making this approach increasingly feasible over time.

Appendix B – Detailed Decision-Making Criteria Analysis for Location-Based Method Technical Improvements

A. Maintain the Current Location-Based Method Accounting and Reporting Requirements:

- Maintain current broad flexibility of the scope 2 location-based method emission factor hierarchy.
  - Companies should use the most appropriate, accurate, precise, and highest quality emission factors available for each method
  - Organizations should first try to use regional or subnational emission factors: "*Average emission factors representing all electricity production occurring in a defined grid distribution region that approximates a geographically precise energy distribution and use area. Emission factors should reflect net physical energy imports/exports across the grid boundary.*"[36]
  - When such information is unavailable, organizations may use national production emission factors: "*Average emission factors representing all electricity production information from geographic boundaries that are not necessarily related to dispatch region, such as state or national borders. No adjustment for physical energy imports or exports, not representative of energy consumption area.*"[37]
- Maintain broad temporal requirements
  - An annual grid-average emission factor is proposed as an indicative example for an appropriate regional or subnational emission factor
  - Organizations are encouraged to take into account *"temporal representativeness due to time delays between the year in which energy generation and resulting emissions occurred, and the year in which the data is published"*[38] when analyzing location-based scope 2 results.

Option A: Maintain the Current Location-Based Method Accounting and Reporting Requirements	
Decision-making criteria	Evaluation
Scientific integrity Approaches should ensure scientific integrity and validity, adhere to the best applicable science and evidence (including academic literature, modeling, or other research) and align with the latest climate science.	Mixed To evaluate if the current location-based method using annual average emission factors ensures scientific integrity and validity, adheres to the best applicable science and evidence, and aligns with the latest climate science, its performance is assessed within the context of its stated purpose and use cases as outlined above. In this context, it shows mixed alignment with the scientific integrity criteria. Note: updates to the stated purpose and use cases will be considered during the revision process. 1. Estimating and reflecting emissions based on grid data The current location-based method provides a simplified estimation of reporting organizations' indirect emissions associated with their purchased and consumed electricity. This estimation is determined by allocating a pro rata share of total system emissions within a defined geographic area and time period according to the amount of electricity purchased and consumed by the organization using a grid average emission factor. Under the current location-based method, the emissions reported in an organization's scope 2 location-based inventory will increase or decrease as result of either corresponding increases or decreases in their activities (i.e., electricity purchase and consumption), or changes in the grid-average emission factor used by the reporting organization. Recent research has highlighted that improving the accuracy of the location-based method's allocation of average system emissions may require closer consideration of both the time and location of energy generation and consumption. Regarding temporal granularity, research shows that the current method of allocating emissions, using an annual average grid emission factor may lead to over or underestimation of how the grid's average emissions are allocated to individual reporting organizations by up to

[36] Scope 2 Guidance, Table 6.2, p. 47
[37] Scope 2 Guidance, Table 6.2, p. 47
[38] Scope 2 Guidance, section 6.10.1, p. 54

Scientific integrity (cont.)	35%, when compared to a location-based method inventory using hourly average emission factors.[39] These differences are greater in regions with high variability in hourly emission intensities and may be exacerbated as additional intermittent clean energy resources are deployed (e.g., wind and solar). Regarding spatial granularity, research has pointed to the importance of requiring 'deliverability' (i.e., the notion that a specific power resource can physically deliver power to a reporting organization) in defining grid regions for use in emission inventories. Research shows that the use of grid-average emission factors that reflect only emissions from electricity generation within a region may lead to over or underestimation of allocated emissions when compared to using an emission factor that considers energy imports/exports across grid boundaries.[40] The extent of the difference is dependent on the average emission intensities and degree of imports and exports between the relevant grid networks. As a result, while it is useful for understanding an allocation of system-wide emissions based on total consumption, the use of annual data or large geographic boundaries may introduce inaccuracies, especially when finer time frames or more localized conditions would show different results. 2. Assessing risks and opportunities related to grid emissions Per the considerations discussed above related to "Estimating and reflecting emissions based on grid data", there is a limited and conflicting scientific basis for use of the current location-based method with annual average emission factors and large regional boundaries as a means to assess a reporter's risks and opportunities related to grid emissions associated with their purchased and consumed electricity. 3. Enabling decision-making for consumers and companies By its mathematical design, the current location-based method using annal grid-average emission factors is poorly suited or unable to reflect any direct or precise causal responsibility between an organization's energy purchasing and usage and the emissions assigned via the location-based method to the reporting organization. Annual average emission factors provide a generalized view of electricity emissions but are not able to account for changes at the grid level that result from shifts in demand, usage patterns, or the introduction of new technologies.[41] This does not compromise the legitimacy of the method as a means to allocate emissions using a grid-average emission rate, however it indicates the current method using annual average emission factors does not fully align with the scientific integrity criteria when it comes to enabling decision-making for consumers and companies. If decisions are made based on the current location-based method using annual average emission factors, they may not accurately reflect the actual emission-related consequences of organizational actions, potentially misrepresenting the effectiveness of efforts to reduce emissions. There are mixed views in research on whether improving the spatiotemporal granularity of average emission factors could result in improved decision-making utility. See Option B for further analysis of the impact of improved granularity in the location-based method. 4. Improving comparability As a basis for comparison using a simple and easily understood methodology for average emission allocations, the current location-based method using an annual average emission factor has mathematical integrity. However, within this methodology, research has shown overly

[39] Miller, Gregory J., Kevin Novan, and Alan Jenn. "Hourly accounting of carbon emissions from electricity consumption." *Environmental Research Letters* 17, no. 4 (2022): 044073.

[40] Ji, Ling, Sai Liang, Shen Qu, Yanxia Zhang, Ming Xu, Xiaoping Jia, Yingtao Jia et al. "Greenhouse gas emission factors of purchased electricity from interconnected grids." *Applied Energy* 184 (2016): 751-758;
Qu, Shen, Sai Liang, and Ming Xu. "CO2 emissions embodied in interprovincial electricity transmissions in China." *Environmental science & technology* 51, no. 18 (2017): 10893-10902;
Schäfer, Mirko, Bo Tranberg, Dave Jones, and Anke Weidlich. "Tracing carbon dioxide emissions in the European electricity markets." In *2020 17th International Conference on the European Energy Market (EEM)*, pp. 1-6. IEEE, 2020.

[41] Hawkes, Adam D. "Long-run marginal CO2 emissions factors in national electricity systems." *Applied Energy* 125 (2014): 197-205;
He, Hua, Aleksandr Rudkevich, Xindi Li, Richard Tabors, Alexander Derenchuk, Paul Centolella, Ninad Kumthekar, Chen Ling, and Ira Shavel. "Using marginal emission rates to optimize investment in carbon dioxide displacement technologies." *The Electricity Journal* 34, no. 9 (2021): 107028;
Holland, Stephen P., Matthew J. Kotchen, Erin T. Mansur, and Andrew J. Yates. "Why marginal CO2 emissions are not decreasing for US electricity: estimates and implications for climate policy." *Proceedings of the National Academy of Sciences* 119, no. 8 (2022): e2116632119.;
Gagnon, Pieter, and Wesley Cole. "Planning for the evolution of the electric grid with a long-run marginal emission rate." *Iscience* 25, no. 3 (2022);
Elenes, Alejandro GN, Eric Williams, Eric Hittinger, and Naga Srujana Goteti. "How well do emission factors approximate emission changes from electricity system models?." *Environmental Science & Technology* 56, no. 20 (2022): 14701-14712.

		broad temporal and geographic grid-average emission factors can result in inaccurate allocation and thus potentially compromise comparability across a reporting organization's operations across multiple markets over time.
GHG accounting and reporting principles Approaches should meet the GHG Protocol accounting and reporting principles of accuracy, completeness, consistency, relevance, and transparency. Additional principles should be considered where relevant: conservativeness (for GHG reductions and removals), permanence (for removals), and comparability (TBD, subject to TWG and ISB discussions). Options may present tradeoffs among principles which should be evaluated.	**1. Relevance** Ensure the GHG inventory appropriately reflects the GHG emissions (and removals, if applicable) of the company and serves the decision-making needs of users – both internal and external to the company.	Mixed A GHG inventory based on the current location-based method using annual average emission factors has mixed alignment with the relevance principle and how it reflects the GHG emissions of the company and serves the decision-making needs of users. Although it can provide a simplified estimation of an organization's emissions associated with purchased and consumed electricity based on grid data, the use of annual average emission factors is largely incompatible with risk and opportunity assessments related to grid emissions and inappropriate for informing decision-making by internal users seeking to reduce emissions or assess performance (see scientific integrity section). Given the shared nature of transmission and distribution on an electricity grid, using an annual grid average emission factor can be an appropriate method to account for an organization's emissions attributable to their electricity purchases and consumption. However, by its mathematical design, the allocation of emissions using an annual grid average emission rate is poorly suited or unable to reflect direct or precise causal relationships between an organization's electricity purchases and usage and the emissions assigned to it. As a result, it has limitations in its relevance to users as a decision-making tool. The current location-based method using annual average emission factors may provide relevant information for external decision-making needs as a simple and easily understood methodology to make comparisons of average allocation of grid emissions across markets and time. For instance, under IFRS S2 requiring use of the location-based method aligns with the qualitative characteristic 'comparability', described by the IFRS Foundation as enhancing the usefulness of sustainability-related financial information. The limitations outlined under the scientific integrity criterion should be factored into the scope and accuracy of any such comparisons.
	2. Completeness Account for and report on all GHG emissions (and removals, if applicable) from sources, sinks, and activities within the inventory boundary. Disclose and justify any specific exclusions.	Yes The current location-based method can provide a means to ensure that all electricity-related indirect GHG emission sources associated with activities within the reporting organization's inventory boundary are accounted for (e.g., all activities, denominated in megawatt hours (MWhs), are accounted for in a complete scope 2 location-based method inventory).

GHG accounting and reporting principles (cont.)	**3. Consistency** Use consistent methodologies to allow for meaningful performance tracking of GHG emissions (and removals, if applicable) over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.	Yes The current location-based method can provide a consistent approach to estimating over time the pro rata shares of total system emissions based on electricity consumed within a defined geographic area and time period using a grid-average emission factor. To achieve this outcome, it is necessary for the reporting organization to use consistent market boundaries, emission factor vintages, and other parameters consistently.
	4. Transparency Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.	Yes The current location-based method can provide a transparent and auditable means to estimating over time the pro rata shares of total system emissions based on electricity purchased and consumed within a defined geographic area and time period using a grid-average emission factor. The simple nature of emissions calculations under the current location-based method and the public availability of annual average emission factors, in comparison with other accounting methods, aids the transparency and auditability of this accounting approach. It is possible the current methodology may benefit from updates to ensure more consistent market boundaries, emission factor vintage, and other parameters.
	5. Accuracy Ensure that the quantification of GHG emissions (and removals, if applicable) is systematically neither over nor under actual emissions (and removals, if applicable), and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.	Mixed The current location-based method can provide an accurate means to allocate the pro rata shares of total system emissions based on purchased and consumed electricity within a defined geographic area and time period using a grid-average emission factor. As stated in the Guidance, the scope 2 location-based method "*reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data)*"[42] and "*is based on statistical emissions information and electricity output aggregated and averaged within a defined geographic boundary and during a defined time period*."[43] It further states that "[*c*]*ompanies should use the most appropriate, accurate, precise, and highest quality emission factors available for each method*."[44] The current location-based method generally achieves these outcomes at a level of accuracy consistent with the range described above. However, as outlined in the scientific integrity criterion, research indicates that in some regions this method may misallocate emissions due to its lack of temporal and spatial granularity and not requiring the accounting of electricity imports across regions. Depending on the degree, these factors may limit the method's ability to provide sufficiently accurate data. Although it provides a broad estimate of regional emissions based on grid averages, by its mathematical design the method is not able to provide the accuracy needed to ensure that a reporting organization's emissions quantifications are neither systematically over- nor underestimated relative to GHG emissions to the atmosphere. The use of annual average grid emission factors introduces significant uncertainties, especially when it comes to achieving sufficient accuracy to enable users to make decisions related to facility siting, increases

[42] Scope 2 Guidance, section 1.5, p. 8
[43] Scope 2 Guidance, section 4.1.1, p. 25
[44] Scope 2 Guidance, section 6.5, p. 45

GHG accounting and reporting principles (cont.)		or decreases in electricity consumption, timing of demand shifts, and deployment of new technologies with reasonable confidence as to the integrity of the reported emission information. See scientific integrity section for more information.
	6. Comparability (not a current principle; subject to discussion in the ISB and TWG) Apply common methodologies, data sources, assumptions, and reporting formats such that the reported GHG inventories from multiple companies can be compared.	Mixed Generally, location-based to location-based comparisons across companies are possible, however variations in data choices, such as precision of activity data, grid emission factors, as well as geographic and temporal boundaries can impact the results. For instance, comparability of reporting organizations consuming electricity from the same grid relies on them using the same grid average emission factors. However, within this methodology, research has shown overly broad temporal and geographic grid-average emission factors can result in inaccurate allocation and thus potentially compromise comparability across a reporting organization's operations across multiple markets over time.
Support decision making that drives ambitious global climate action • Approaches should advance the public interest by informing and supporting decision making that drives ambitious actions by private and public sector actors to reduce GHG emissions and increase removals in line with global climate goals. • GHG Protocol accounting frameworks should accurately and completely measure emissions such that the resulting GHG data informs effective individual and systemwide GHG mitigation action in line with global climate goals. Accounting approaches should not support or incentivize actions that are contrary to global climate goals. • Approaches should provide the necessary information to support sector-specific decarbonization in line with climate goals.		Mixed / No The current Guidance indicates the location-based method using annual average emission factors may incentivize organizations to: • Report GHG emissions using a simple and comparable allocation method. • Reduce overall grid electricity consumption and improve energy efficiency as a means to reduce reported activity data. • Make facility-siting decisions based on the annual average grid emission intensity of different regions. • Make facility-siting decisions based on natural features of a location. • Make time-of-use decisions based on the average grid emission intensity at different hours of the day. • Rely on incremental changes in grid emission intensity to reduce reported emissions. Some organizations may be incentivized to attempt to accelerate this change through indirect actions such as grid decarbonization advocacy and lobbying. Some of these actions, including reporting GHG emissions using a simple and comparable allocation method, advocacy and lobbying efforts, and decisions that reduce overall electricity purchases and consumption in aggregate, may contribute to ambitious climate actions. However, as detailed in the scientific integrity section, the current location-based method using annual average emission factors based on large geographic regions may not provide accurate information to inform decisions that add, remove, or shift electricity load, nor develop clean energy generation resources due to the limitations inherent in the use of annual average emission factors.

Support programs based on GHG Protocol and uses of GHG data • Approaches should promote interoperability with key mandatory and voluntary climate disclosure and target setting programs that are based on GHG Protocol standards, where appropriate, while ensuring policy neutrality • Approaches should support appropriate uses of the resulting GHG data and associated information by various audiences, including GHG programs, reporting companies, stakeholders, and other users of the resulting GHG information.	Mixed The use of the location-based method across various mandatory sustainability reporting directives and programs demonstrates its broad applicability and alignment with global climate disclosure standards. The current location-based method is used by several key programs, including: • A reporting requirement within European Sustainability Reporting Standards: Climate Change (ESRS E1) mandated by the European Union Corporate Sustainability Reporting Directive (CSRD) • A reporting requirement within IFRS S2 Climate-related Disclosures issued by the International Sustainability Standards Board (ISSB) • A reporting requirement within ISO 14064-1:2018 • An option for reporting scope 2 emissions within the Enhancement and Standardization of Climate-Related Disclosures for Investors Rule adopted by the United States Securities and Exchange Commission (U.S. SEC Rule) • A method for scope 2 emissions disclosure under the Global Reporting Initiative (GRI) and CDP, among others The effectiveness of the current location-based method in generating data for general users is mixed, as it is highly dependent on the intended use of such data. As described in the sections above, whilst the location-based method may provide an allocation of system-wide emissions based on total consumption, the use of annual data or large geographic boundaries may introduce limitations for the use of the data to assess a reporter's risks and opportunities related to grid emissions or to inform decision-making.
Feasibility to implement • Approaches which meet the above criteria should be feasible to implement, meaning that they are accessible, adoptable, and equitable. • GHG Protocol accounting approaches should support broad adoption of GHG Protocol standards, including in voluntary and regulatory settings, and consider different users (level of capacity, resources, geography, regulatory environments, etc.). • For aspects of accounting approaches that meet the above criteria but are difficult to implement, the GHG Protocol should aim to improve feasibility, for example, by providing guidance and tools to support implementation.	Yes The current location-based method has a strong track record of implementation. Organizations at varying levels of maturity can access the activity data and emission factors required to implement this method. The widespread availability of annual grid-average emission factors has facilitated the adoption of location-based reporting globally.

B. Refine Reporting Requirements for the Location-Based Method to Require Temporal and Geographic Granularity:

- Building on the current location-based method requirements, organizations **shall** account and report their location-based method inventory using more temporally and geographically granular accounting and reporting requirements for the location-based method.
    - Organizations **shall** account for and report the location-based method inventory using hourly grid average emission factors and activity data.
    - Organizations **shall** account for and report the location-based method inventory using emission factors that reflect 'deliverable' geographic boundaries.
        - In this option 'deliverable' geographic boundaries are considered in two ways:
            - Deliverable boundaries **shall** use granular geographic boundaries (to be discussed and defined by TWG).
            - Deliverable boundaries **shall** use grid-average emission factors that include energy imports/exports across grid boundaries.

Option B: Refine Reporting Requirements for the Location-Based Method to Require Temporal and Geographic Granularity	
Decision-making criteria	Evaluation
Scientific integrity Approaches should ensure scientific integrity and validity, adhere to the best applicable science and evidence (including academic literature, modeling, or other research) and align with the latest climate science.	Mixed / Yes To evaluate if this proposed location-based method using more granular accounting requirements ensures sufficient scientific integrity and validity by adhering to the best applicable science and evidence, its performance is assessed within the context of its stated purpose and use cases as outlined above. In this context, it shows mixed to favorable alignment with the scientific integrity criteria. Note, this stated purpose and use case will be considered during the revision process. 1. Estimating and reflecting emissions based on grid data Similar to Option A (i.e., the current location-based method) outlined above, Option B would seek to provide a simplified, albeit more granular, estimation of the reporting organization's indirect emissions associated with their purchased and consumed electricity. This estimation is determined by allocating a pro rata share of total system emissions within a defined geographic area and time period (i.e., hourly) according to the amount of electricity purchased and consumed. The differences of this proposed approach from the current location-based method are requiring the use of hourly grid average emission factors matched with hourly activity data and requiring the use of 'deliverable' geographic boundaries inclusive of imported/exported energy. As outlined in Option A, the use of annual grid-average emission factors based on large geographic boundaries combined with annual activity data for purchased and consumed electricity is likely unable to consistently provide accurate and relevant information for the intended uses of the location-based method as described in the Scope 2 Guidance. Research highlights that improving the accuracy of the location-based method's allocation of average system emissions likely requires closer consideration of both the time and location of energy generation and consumption. Regarding temporal granularity, a recent study demonstrated that the current method of allocating emissions, using *annual* average grid emission factors, may lead to over or underestimation of how the grid's average emissions are allocated to individual reporting organizations by up to 35% when compared with a location-based method using hourly average emission factors[45]. These differences are greater in regions with high variability in hourly emission intensity and may be exacerbated as additional intermittent clean energy resources are deployed

[45] Miller, Gregory J., Kevin Novan, and Alan Jenn. "Hourly accounting of carbon emissions from electricity consumption." *Environmental Research Letters* 17, no. 4 (2022): 044073.

Scientific integrity (cont.)	(e.g., wind and solar). Another study by de Chalendar et al.[46] considering emissions in the U.S. electricity system demonstrated that trends in fluctuating grid carbon intensity cannot be accurately reflected without temporally granular exchange data. For example, for the Idaho Power Company, the carbon content of imports is much higher than that of local generation (71 kg/MWh), and the reliance on imports depends sensitively on time. In the spring, this region generates almost enough energy to meet its demand, but in other months it relies heavily on imports from the neighboring PacifiCorp East (716 kg/MWh) and North Western Energy (765 kg/MWh).[47] Such trends cannot be accurately captured with annual average emission factors. Regarding spatial granularity, research has pointed to the importance of requiring emission factors used under the location-based method to reflect 'deliverability' (the notion that a specific power resource can physically deliver power to a reporting organization). For this Option, 'deliverability' is considered in two ways: requiring use of granular geographic boundaries and requiring consideration of energy imports/exports across grid boundaries. Use of a large geographic boundary (such as national boundaries or eGRID subregions in the U.S.) for calculating a grid average emission factor may not always accurately reflect the carbon intensity of the specific grid an organization directly consumes electricity from. For instance, a study by de Chalendar et al.[48] found that the overall U.S. electric grid carbon intensity would accurately match the carbon embodied in electricity consumed only in three balancing authorities in the continental U.S. Similar phenomena are evident in national and regional emission rate data published by a variety of governments (e.g., Australia,[49] U.S. eGRID,[50] European Environment Agency (EEA)[51]) which further suggests that granular emission rates are necessary to more accurately allocate emissions based on the specific location where an organization purchases and consumes electricity. Research shows that the use of grid-average emission factors that reflect only emissions from electricity generation within a region may lead to over or underestimation of allocated emissions when compared to using an emission factor that considers energy imports/exports across grid boundaries.[52] The extent of the difference is dependent on the average emission intensities and degree of imports and exports between the relevant grid networks. For example, Schäfer et al.[53] demonstrated that including imports/exports when calculating the emission intensity of European electricity markets has a significant impact on allocated emissions, particularly for well-connected small countries. Another study comparing generation-only emission factors against emission factors inclusive of imports/exports for fifty-three European and Asian countries found that the emission factors inclusive of imports/exports could be 823% greater or 58% less than generation-only emission factors[54]. As outlined in Option A, the location-based method provides a simplified method for estimating and reflecting emissions based on grid data. Improving the granularity of how average system emissions are allocated is not necessarily required for the location-based method to meet its purpose of providing a simple means to allocate emissions using a grid average emission rate. However, the studies outlined above indicate that increasing the granularity of the average emission factor and activity data used under the location-based method tends to improve the accuracy of how emissions are estimated. Hence the rationale for this proposed option is that an improvement in how emissions are estimated and reflected based on grid data may better enable the location-based method to meet its other stated purposes and use cases as outlined in the Scope 2 Guidance. The rest of this section considers these points further.

[46] de Chalendar, Jacques A., John Taggart, and Sally M. Benson. "Tracking emissions in the US electricity system." *Proceedings of the National Academy of Sciences* 116, no. 51 (2019): 25497-25502
[47] de Chalendar, Taggart, and Benson, "Tracking Emissions," 25497-25502
[48] de Chalendar, Taggart, and Benson, "Tracking Emissions," 25497-25502
[49] Department of Climate Change, Energy, the Environment and Water. *National Greenhouse Account Factors 2024*. Australian Government, 2024. https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-account-factors-2024.pdf.
[50] U.S. Environmental Protection Agency. "Summary Data." Last modified October 22, 2024. Accessed October 22, 2024. https://www.epa.gov/egrid/summary-data
[51] European Environment Agency (EEA) Greenhouse gas emission intensity of electricity generation in Europe Accessed October 24, 2024. https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emission-intensity-of-1
[52] Ji, Ling, Sai Liang, Shen Qu, Yanxia Zhang, Ming Xu, Xiaoping Jia, Yingtao Jia et al. "Greenhouse gas emission factors of purchased electricity from interconnected grids." *Applied Energy* 184 (2016): 751-758;
Qu, Shen, Sai Liang, and Ming Xu. "CO2 emissions embodied in interprovincial electricity transmissions in China." *Environmental science & technology* 51, no. 18 (2017): 10893-10902;
Schäfer, Mirko, Bo Tranberg, Dave Jones, and Anke Weidlich. "Tracing carbon dioxide emissions in the European electricity markets." In *2020 17th International Conference on the European Energy Market (EEM)*, pp. 1-6. IEEE, 2020.
[53] Schäfer, Mirko, Bo Tranberg, Dave Jones, and Anke Weidlich. "Tracing carbon dioxide emissions in the European electricity markets." In *2020 17th International Conference on the European Energy Market (EEM)*, pp. 1-6. IEEE, 2020.
[54] Ji, Ling, Sai Liang, Shen Qu, Yanxia Zhang, Ming Xu, Xiaoping Jia, Yingtao Jia et al. "Greenhouse gas emission factors of purchased electricity from interconnected grids." *Applied Energy* 184 (2016): 751-758

Scientific integrity (cont.)	2. Assessing risks and opportunities related to grid emissions Per the considerations discussed above related to "Estimating and reflecting emissions based on grid data", there is a limited and conflicting scientific basis for use of the current location-based method with annual average emission factors and large regional boundaries as a means to accurately and comprehensively assess a reporter's risks and opportunities related to grid emissions associated with their purchased and consumed electricity. Further research is necessary to fully assess how increasing the granularity of the location-based method could enable a more accurate and decision-relevant assessment of the risks and opportunities related to grid emissions associated with generation sources physically 'deliverable' to the reporting organization and operational at the hourly interval of consumption. 3. Enabling decision-making for consumers and companies This option proposes *requiring* hourly emission factors and *requiring* the use of 'deliverable' geographic boundaries to improve the alignment of the location-based method with the scientific integrity criteria. One research paper[55] found, for the U.S. grid in 2024, a slight negative correlation between induced emissions from an organization's load interventions (e.g., adding load to the grid) and allocated GHG emissions using an hourly average emission factor. When modeling a future grid with greater variable renewable generation, however, the correlation gained a slight positive correlation, suggesting that temporally resolved average emissions rates may become more correlated with impact over time. This positive correlation may imply that requiring use of hourly emission factors under the location-based method could produce inventory data that better aligns with the scientific integrity criteria when it comes to enabling decision-making for consumers and customers. However, there are mixed views on whether this correlation exists or is helpful for decision-making. For example, work by Steinsultz et al.[56] indicates that increasing the spatiotemporal granularity of average emission factors beyond the balancing-authority level (BA sub-regions) may potentially misrepresent the effectiveness of efforts to reduce emissions. Other research is generally unsupportive or inconclusive of the concept of using average emission factors to inform decision-making (e.g., shifts in demand, usage patterns, or the adoption of new technologies), suggesting that alternate methodologies, such as short-run or long-run marginal emission factors, should be used to inform these actions.[57] Further research is needed to examine the implication of increased spatiotemporal granularity of the location-based method for decision-making, particularly research evaluating these questions in regions outside of the United States. 4. Improving comparability Research has shown that increasing the spatial and temporal granularity of the location-based method better reflects variations in grid emissions over time and across locations, which can allow for a more accurate allocation of emissions. Consistent application of this approach may enhance comparability across a reporting organization's operations in multiple markets and over time, and reduce potential inaccuracies associated with broader average emission factors. However, compared to Option 1, increasing granularity may unintentionally introduce greater variability due to differences in data availability for both hourly emission factors, based on appropriate grid regions that account for imports and exports, and hourly activity data from reporting organizations. This could affect comparability. For more on comparability and feasibility, see the discussion below.

[55] Gagnon, Pieter, and Wesley Cole. "Planning for the evolution of the electric grid with a long-run marginal emission rate." *Iscience* 25, no. 3 (2022).
[56] Steinsultz, Nat, Pierre Christian, Joel Cofield, Gavin McCormick, and Sarah Sofia. "Validating locational marginal emissions models with wind generation." *Environmental Research: Energy* 1, no. 3 (2024): 035008.
[57] Hawkes, Adam D. "Long-run marginal CO2 emissions factors in national electricity systems." *Applied Energy* 125 (2014): 197-205;
He, Hua, Aleksandr Rudkevich, Xindi Li, Richard Tabors, Alexander Derenchuk, Paul Centolella, Ninad Kumthekar, Chen Ling, and Ira Shavel. "Using marginal emission rates to optimize investment in carbon dioxide displacement technologies." *The Electricity Journal* 34, no. 9 (2021): 107028;
Holland, Stephen P., Matthew J. Kotchen, Erin T. Mansur, and Andrew J. Yates. "Why marginal CO2 emissions are not decreasing for US electricity: estimates and implications for climate policy." *Proceedings of the National Academy of Sciences* 119, no. 8 (2022): e2116632119.;
Gagnon, Pieter, and Wesley Cole. "Planning for the evolution of the electric grid with a long-run marginal emission rate." *Iscience* 25, no. 3 (2022);
Elenes, Alejandro GN, Eric Williams, Eric Hittinger, and Naga Srujana Goteti. "How well do emission factors approximate emission changes from electricity system models?." *Environmental Science & Technology* 56, no. 20 (2022): 14701-14712;
Siler-Evans, Kyle, Ines Lima Azevedo, and M. Granger Morgan. "Marginal emissions factors for the US electricity system." *Environmental science & technology* 46, no. 9 (2012): 4742-4748.

<u>GHG accounting and reporting principles</u> Approaches should meet the GHG Protocol accounting and reporting principles of accuracy, completeness, consistency, relevance, and transparency. Additional principles should be considered where relevant: conservativeness (for GHG reductions and removals), permanence (for removals), and comparability (TBD, subject to TWG and ISB discussions). Options may present tradeoffs among principles which should be evaluated.	**<u>1. Relevance</u>** Ensure the GHG inventory appropriately reflects the GHG emissions (and removals, if applicable) of the company and serves the decision-making needs of users – both internal and external to the company.	Mixed / Yes A GHG inventory based on the proposed option of *requiring* the use of hourly emission factors and *requiring* the use of 'deliverable' geographic boundaries may improve alignment with the principle of relevance. Similar to the current location-based method, this proposed approach provides a broad estimate of grid emissions by using a regional average grid emission rate, offering a general view of the reporting organization's GHG emissions based on their purchased and consumed electricity. Given the shared nature of transmission and distribution on an electricity grid, emissions calculated using a grid average emission factor can be an appropriate method of reflecting a company's emissions attributable to purchased and consumed electricity. Research as described in the scientific integrity criterion indicates that moving from annual average to hourly average, regionally specific emission factors inclusive of imports and exports will more accurately allocate the emissions of the specific power resources used to generate electricity at the time of consumption. The proposed location-based method approach can support some internal decision-making such as incentivizing reductions in total electricity consumption, installing on-site generation, and improvements to energy efficiency. There is mixed evidence regarding whether the proposed use of hourly grid-average emission factors, as opposed to annual average emission factors, would better facilitate internal decision-making concerning load-shifting, demand response, and energy storage applications for existing facilities. There is similarly mixed evidence regarding whether the use of more granular emission factors provides relevant information for evaluating emission outcomes from adding new load to the grid (e.g., siting new facilities or significant increases in purchased and consumed energy). When considering information relevant for meeting external decision-making needs, the same limitations of this proposed approach appear to apply.
	<u>2. Completeness</u> Account for and report on all GHG emissions (and removals, if applicable) from sources, sinks, and activities within the inventory boundary. Disclose and justify any specific exclusions.	Yes The proposed location-based method approach can provide a means to ensure that all electricity-related indirect GHG emission sources associated with activities within the reporting organization's inventory boundary are accounted for (e.g., all activities, denominated in megawatt hours (MWhs), are accounted for in a complete scope 2 location-based method inventory).
	<u>3. Consistency</u> Use consistent methodologies to allow for meaningful performance tracking of GHG emissions (and removals, if applicable) over time. Transparently document any changes to the data, inventory boundary, methods, or any	Yes The proposed location-based method approach can provide a consistent approach to estimating over time the pro rata shares of total system emissions based on electricity consumed within a defined geographic area and time period using a grid average emission factor. To achieve this outcome, it is necessary for the reporting organization to use consistent market boundaries, emission factor vintages, and other parameters consistently.

	other relevant factors in the time series.	
	4. Transparency Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.	Mixed / Yes The proposed location-based method approach can provide a transparent and auditable means to estimating over time the pro rata shares of total system emissions based on electricity purchased and consumed within a defined geographic area and time period using a grid-average emission factor. Requiring the use of more granular emission factors and consumption data may impact the simplicity of location-based emissions calculations and public availability of emission factors, which may affect the transparency and auditability of this accounting approach.
GHG accounting and reporting principles (cont.)	**5. Accuracy** Ensure that the quantification of GHG emissions (and removals, if applicable) is systematically neither over nor under actual emissions (and removals, if applicable), and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.	Mixed / Yes The proposed location-based method approach provides a means to allocate the pro rata shares of total system emissions based on purchased and consumed electricity within a 'deliverable' geographic area at the hourly interval of consumption using a grid-average emission factor. As stated in the Guidance, the scope 2 location-based method "*reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data)*"[58] and "*is based on statistical emissions information and electricity output aggregated and averaged within a defined geographic boundary and during a defined time period.*"[59] It further states that "*[c]ompanies should use the most appropriate, accurate, precise, and highest quality emission factors available for each method*"[60] where: • The most precise factor listed in the location-based emission factor hierarchy is defined as using *"[a]verage emission factors representing all electricity production occurring in a defined grid distribution region that approximates a geographically precise energy distribution and use area. Emission factors should reflect net physical energy imports/exports across the grid boundary.*"[61] • The "*most appropriate spatial boundaries for emission factors serving the location-based method are those that approximate regions of energy distribution and use, such as balancing areas. All generation and emissions data within this boundary should be aggregated and any net physical energy imports/ exports and their related emissions should be taken into account.*"[62] Options are also provided to use larger boundaries when necessary. • No additional specific detail is provided on the temporal resolution in determining the most appropriate, accurate, precise, and highest quality emission factors (e.g., should organizations use hourly emission factors over annual if available). The proposed location-based method generally achieves these outcomes at a level of accuracy suggested above. By further defining the 'geographic boundary' and 'time period' required to be used for grid-average emission factors, this approach aligns more closely with new research outcomes testing the implications of refining these boundaries on the accuracy of how the grid's average emissions are allocated to individual reporters. However, the extent to which more accurately allocated inventory emission data can be used to inform accurate decision-making requires further exploration. See discussion in the scientific integrity section, as well as in the 'Supports decision making that drives ambitious global climate action' section.

[58] Scope 2 Guidance, section 1.5, p. 8
[59] Scope 2 Guidance, section 4.1.1, p. 25
[60] Scope 2 Guidance, section 6.5, p. 45
[61] Scope 2 Guidance, Table 6.2, p. 47
[62] Scope 2 Guidance, section 6.10.1, p. 54

<u>GHG accounting and reporting principles (cont.)</u>	**<u>6. Comparability</u> (not a current principle; subject to discussion in ISB and TWG)** Apply common methodologies, data sources, assumptions, and reporting formats such that the reported GHG inventories from multiple companies can be compared.	Mixed /Yes Location-based to location-based comparisons across reporting organizations using the proposed approach would be possible. Research has shown the use of more granular temporal and geographic grid-average emission factors can result in greater accuracy of emission allocations, so the proposed option of *requiring* hourly emission factors and *requiring* the use of 'deliverable' geographic boundaries may provide more relevant information to assist comparability across a reporting organization's operations and across multiple markets over time. However, compared to Option A, increasing granularity may unintentionally introduce greater variability. This is due to differences in data availability for hourly emission factors (based on grid regions that may account for imports and exports differently) and hourly activity data from reporting organization. Such variability could affect comparability.
<u>Support decision making that drives ambitious global climate action</u> • Approaches should advance the public interest by informing and supporting decision making that drives ambitious actions by private and public sector actors to reduce GHG emissions and increase removals in line with global climate goals. • GHG Protocol accounting frameworks should accurately and completely measure emissions such that the resulting GHG data informs effective individual and systemwide GHG mitigation action in line with global climate goals. Accounting approaches should not support or incentivize actions that are contrary to global climate goals. • Approaches should provide the necessary information to support sector-specific decarbonization in line with climate goals.		Mixed The current Guidance indicates the location-based method may incentivize organizations to: • Report GHG emissions using a simple and comparable allocation method. • Reduce overall grid electricity consumption and improve energy efficiency as a means to reduce reported activity data. • Make facility-siting decisions based on the average grid emission intensity of different regions. • Make facility-siting decisions based on natural features of a location. • Make time-of-use decisions based on the average grid emission intensity at different hours of the day. • Rely on incremental changes in grid emission intensity to reduce reported emissions. Some organizations may be incentivized to attempt to accelerate this change through indirect actions such as grid decarbonization advocacy and lobbying. Some of these actions or decisions, including reporting GHG emissions using a simple and comparable allocation method, decisions that reduce overall electricity purchases and consumption in aggregate, and advocacy and lobbying efforts, may support ambitious global climate actions. As detailed in the scientific integrity section, research is inconclusive about whether the required use of hourly average and 'deliverable' emission factors may provide accurate information to inform time-of-use decisions, whether incremental changes in average grid emission intensity reduces emissions, or and whether this data would inform facility- or generation-siting decisions.

Support programs based on GHG Protocol and uses of GHG data • Approaches should promote interoperability with key mandatory and voluntary climate disclosure and target-setting programs that are based on GHG Protocol standards, where appropriate, while ensuring policy neutrality. • Approaches should support appropriate uses of the resulting GHG data and associated information by various audiences, including GHG programs, reporting companies, stakeholders, and other users of the resulting GHG information.	Mixed / Yes Compared to the current location-based method, this approach may provide various users with more useful emission data as it is more accurate, relevant, and comparable for the reasons described above. For reasons of feasibility, it is unclear how this option might impact interoperability with policies and programs that have implemented the current location-based method (relying on annual-average emission factors) as new legal disclosure requirements including those in IFRS S2 and ESRS E1. Considering this sensitivity, further consideration of how this proposal aligns with this criterion may be necessary.
Feasibility to implement • Approaches which meet the above criteria should be feasible to implement, meaning that they are accessible, adoptable, and equitable. • GHG Protocol accounting approaches should support broad adoption of GHG Protocol standards, including in voluntary and regulatory settings, and consider different users (level of capacity, resources, geography, regulatory environments, etc.). • For aspects of accounting approaches that meet the above criteria but are difficult to implement, the GHG Protocol should aim to improve feasibility, for example, by providing guidance and tools to support implementation.	Mixed / No The option of requiring hourly average emission factors and 'deliverable' geographic boundaries for the location-based method would have barriers to feasibility for some organizations and/or some regions of the world. The global level of participation in this location-based accounting approach relative to the current location-based method is limited. The necessary datasets to report location-based emissions under this approach are available in some markets, however they remain unavailable or challenging to obtain in many regions globally. Likewise, hourly electricity consumption data for a facility would be challenging to obtain for many organizations globally, however utilities and energy providers are increasingly making hourly consumption data available to customers, and increased demand for hourly emissions accounting would likely drive further availability of this information. One proposal to increase the feasibility of this approach includes allowing for load profiles to be used as proxies for estimating hourly electricity consumption where hourly data is not available. This would not address the feasibility of obtaining hourly emission factor data. Further examination of this option is needed.

Appendix C – Detailed Decision-Making Criteria Analysis for Market-Based Method Technical Improvements

To be provided