Template for submitting proposals related to GHG Protocol's *Corporate Standard, Scope 2 Guidance, Scope 3 Standard, Scope 3 Calculation Guidance* and market-based accounting approaches

(Optional)

Proposal instructions

GHG Protocol is conducting four related surveys in reference to the following GHG Protocol standards, guidance and topics:

1. Corporate Accounting and Reporting Standard (Revised Edition, 2004) ("Corporate Standard")
2. Scope 2 Guidance (2015)
3. Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011) ("Scope 3 Standard"), and Technical Guidance for Calculating Scope 3 Emissions, version 1.0, 2013 ("Scope 3 Calculation Guidance")
4. Market-based accounting approaches

The survey is open until March 14, 2023. To fill out the survey, click here.

As part of the survey process, respondents may provide proposals for potential updates, amendments, or additional guidance to the *Corporate Standard, Scope 2 Guidance, Scope 3 Standard, or Scope 3 Calculation Guidance*, by providing the information requested in this template. You may also use this template to provide justification for maintaining a current approach on a given topic.

Submitting proposals is optional. Respondents may submit multiple proposals related to different topics.

Proposals should be as concise as possible while providing the requested information. Submissions that are outside of the template may not be considered. Proposals may be made publicly available.

To submit the proposal, please save this file and fill out the fields below. When you've completed your proposal, please upload the file via this online folder. Please name your file STANDARD_Proposal_AFFILIATION, e.g., *Scope 2_Proposal_WRI*.

Respondent information

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If proposals are made publicly available, would you like your proposal to be made publicly available? Please write either "Yes" (make publicly available) or "No" (do not make publicly available).

Yes

If your proposal is made publicly available, would you like it to be made publicly available with attribution (with your name and organization provided) or anonymous (without any name or organization provided)? Please write either "With attribution" or "Anonymous".

With attribution

Proposal and supporting information

1. **Which standard or guidance does the proposal relate to (Corporate Standard, Scope 2 Guidance, Scope 3 Standard, Scope 3 Calculation Guidance, general/cross-cutting, market-based accounting approaches, or other)? If other, please specify.**

Scope 2 Guidance: Emissions Impact Disclosures Proposal

2. **What is the GHG accounting and reporting topic the proposal seeks to address?**

Add Discussion and Assessment of Consequential Avoided Emissions to Help Prioritize High Impact Actions and Substantiate Claims about Emissions Reductions into the Atmosphere

This proposal seeks to:

- More accurately measure the *actual* emissions impact (avoided emissions) to the atmosphere resulting from a reporting entity's electricity procurement and other interventions.[1]
- Enable the Guidance and related disclosures to distinguish between next generation transactions with high carbon reduction impact and reporting entity actions with lower carbon reduction impact.[2]
- Make disclosure of actions that reduce emissions into the atmosphere and the calculation of avoided emissions impact a much more prominent best practice. *(The current Guidance explains that reporting entities may disclose estimates of avoided emissions from the use of low-carbon electricity separate from their Scope 2 inventories on an optional basis using the GHG Protocol Project Protocol or Guidelines for Grid-Connected Electricity Projects. Disclosing estimates of avoided emissions is not common practice today, and entities that estimate avoided emissions impact, whether for voluntary disclosure or to inform their own decision making, do not rely on the Project Protocol and use alternative methods.)*
- Address current concerns of "greenwashing" where an organization can report a greatly reduced or zero Scope 2 market-based emissions inventory (in an attributional accounting framework) even when the reporting entity does little to reduce actual emissions into the atmosphere.[3]
- Measure buyer actions that are needed to decarbonize the grid at all times and in all locations by recognizing the importance of incremental CFE generation and balancing resources (e.g., firm, variable, balancing, transmission, and load management resources).
- Recognize the value of calculating both attributional Scope 2 market-based inventories and consequential avoided emissions and the differences in these calculations.[4, 5]
- Enhance accuracy, relevance, and transparency of information provided to potential users of the Protocol (e.g., recognition programs, ESG rating companies, investors, consumers, etc.), while continuing to allow flexibility in reporting since reporting entities' abilities, procurement goals, and access to markets and data differ.[6]

[1] Other interventions could include investments in energy storage, load management, transmission, etc. that could impact grid emissions.

[2] Some stakeholders have supported eliminating Scope 2 market-based accounting and replacing it with only a consequential avoided emissions disclosure. The market-based accounting method should be maintained and improved to reflect the emissions associated with a reporting entity's electricity use taking into account the location and timing of purchased CFE supply and EACs relative to the location and timing of a reporting entity's consumption. See separate NB/GS Market-Based Modernization Proposal.

[3] Ben Elgin and Sinduja Rangarajan, *What Really Happens When Emissions Vanish*, Bloomberg, October 2022. *Carbon Offset: Last Week Tonight with John Oliver*, John Oliver, August 2022. Anders Bjørn, Shannon Lloyd, Matthew Brander, and H. Damon Matthews, *Renewable Energy Certificates Threaten the Integrity of Corporate Science-Based Targets*, Nature Climate Change, June 2022. Phred Dvorak, *Climate-Reporting Rules Could Let Companies Look Greener Than They Are*, Wall Street Journal, April 2022. *University of Edinburgh's Resources and Evidentiary Literature on Renewable Energy Purchasing and the Market-based (Scope 2) Method*, January 2023. Caroline O'Doherty, *Electricity Firms Told to Drop 'False' 100% Green Power Claims*, February 2023.

[4] Google, *24/7 Carbon-Free Energy: Methodologies and Metrics*, February 2021, at 1, 6, 8, 12, 14, and 20. Matthew Brander, *The Most Important GHG Accounting Concept You May Not Have Heard of: the Attributional Consequential Distinction*, GHG Management Institute, March 2021, at 1-5. Enrique Gutierrez, Julia Guyon, Craig

3. What is the potential problem(s) or limitation(s) of the current standard or guidance which necessitates this proposal?

The Scope 2 Guidance has been successful in encouraging the development of wind and solar in the most economically viable locations. However, the Scope 2 Guidance does not address the actions needed to achieve new, more ambitious net zero goals to decarbonize electricity grids in all locations and times, to maximize carbon emissions reductions, and to ensure a diverse mix of CFE generation and balancing resources are developed to provide reliability. As the goals and market uses of GHG reporting have changed, the Scope 2 Guidance needs to be updated to provide more relevant and accurate information. Our proposals address three fundamental problems with the current Scope 2 Guidance.

1) It does not accurately measure the emissions associated with a reporting entity's electricity use and fails to take into account the location and timing of purchased CFE supply bundled with Energy Attribute Certificates (EACs)[7] and unbundled EACs relative to the location and timing of a reporting entity's consumption (i.e., an organization can report zero Scope 2 market-based emissions and claim to consume 100% clean energy even when the buyer clearly relies on grid supply, including fossil generation, to serve its consumption).

2) It does not measure the *actual* emissions impact (avoided emissions) to the atmosphere resulting from a reporting entity's electricity procurement. The Protocol therefore cannot distinguish between high and low emission impact actions taken by reporting entities.[8]

3) It does not ensure the diversity of carbon-free resources (firm, variable, balancing, etc.) needed to achieve net-zero goals reliably and affordably.[9]

This proposal focuses on the second and third of these problems. Also see responses to Scope 2 Guidance Survey and submitted Scope 2 NB/GS Market-Based Modernization Proposal (Proposals 1a through 1h) and NB/GS Standardized Reporting Format Proposal, including an illustrative Carbon Facts label (Proposals 3a through 3c).

Hart, Zoe Hungerford, and Luis Lopez, *Advancing Decarbonisation Through Clean Electricity Procurement*, International Energy Agency, November 2022, at 12-14, 23-25, 54-65, and 72-73. Roger Ballentine, Patrick Falwell, Liana Biasucci and Neil Fisher, *Modernizing How Electricity Buyers Account and are Recognized for Decarbonization Impact and Climate Leadership*, Green Strategies and The NorthBridge Group, August 2022, at 32-45.

[5] On December 13, 2022, a group of global corporations and investors, including Akamai Technologies, Amazon, General Motors, Hannon Armstrong, Heineken, Intel, Meta, Rivian, Salesforce, and Workday, launched the *Emissions First Partnership*, calling for a shift in corporate carbon accounting standards toward an emissions impact-centric system with a focus on maximizing greenhouse gas reductions.

[6] See proposal to implement a standardized reporting format like a Carbon Facts label.

[7] EACs in this proposal refer to energy attribute certificates with carbon-free emissions.

[8] Though the Guidance offers (currently underutilized) options for estimating avoided emissions on a voluntary basis, measuring real world impact of buyer transactions is not a feature of Scope 2 location-based and market-based reporting and leading climate recognition programs currently do not seek or prioritize that information.

[9] To be fair, the GHG Protocol was never intended to a) accurately measure emissions associated with the timing and location of an organization's electricity use, b) actual emission reductions on the grid, or c) ensure a diverse mix of resources needed to achieve full decarbonization of the electric grid. Because of this, the existing Protocol cannot be relied on in its current form to measure (in a pure accounting sense), incentivize, or recognize actions that will do the most to speed decarbonization.

4. Describe the proposed change(s) or additional guidance.

A reporting entity shall describe the actions it has taken to reduce emissions into the atmosphere both in terms of incremental resources (MW and MWh), and when possible, in terms of avoided emissions (tons of CO_2). The following changes are recommended.

a) **Proposal 2a: In addition to calculating a location-based and market-based Scope 2 emissions inventory, the Scope 2 Guidance shall require reporting entities to disclose incremental actions taken in the reporting year that it believes reduced actual emissions into the atmosphere.** A buyer's procurement actions can impact overall grid emissions by supporting incremental CFE resources (including new-carbon free resources, life extensions of existing CFE projects, repowering of hydro, uprates, etc.) that displace unabated fossil generation either on the grid where its load is located or on another grid irrespective of the location of a buyer's consumption. To begin, a buyer could identify and disclose the quantity of incremental carbon-free resources (MW and MWh) it currently supports via contract and/or finances, inclusive of all forms of incremental CFE supply (e.g., wind, solar, and other). As part of this disclosure, buyers could also identify the incremental firm CFE supply and storage capacity added. These and perhaps other categories, such as investments in new emerging technologies or transmission expansion, may also be important to consider when assessing the carbon impact of buyer actions and measuring progress toward full decarbonization. A buyer could also identify other potential actions or interventions (e.g., load shifting, energy efficiency, etc.) that it believes could impact grid emissions overall. Numerous empirical studies on decarbonization of the electricity sector indicate that the fastest, most cost-effective, and reliable pathway to grid decarbonization is through a diverse portfolio of carbon-free technologies.[10, 11, 12] Tracking and supporting the development of a diverse portfolio of CFE generation and balancing resources will be critical to achieving the transition to a carbon pollution-free electricity sector.

b) **Proposal 2b: In addition to calculating a location-based and market-based Scope 2 emissions inventory, the Scope 2 Guidance should encourage, when possible, the development and reporting in parallel of a separate calculation of the consequential avoided emissions of a reporting entity's interventions.** Measuring avoided emissions will help focus efforts on maximizing carbon reductions by identifying the specific locations and times when the dirtiest unabated fossil generation can be displaced.[13] A key objective of measuring and disclosing decarbonization impact is to prioritize incremental carbon-free development in locations and times that yield the greatest carbon impact. Avoided emissions

[10] Bruce Phillips, Neil Fisher, and Anjie Liu, *Review and Assessment of Literature on Deep Decarbonization in the United States: Importance of System Scale and Technological Diversity*, The NorthBridge Group, April 2021, p. 4.
[11] Sepulveda et al., *The Role of Firm Low-Carbon Electricity Resources in Deep Decarbonization of Power Generation*, November 2018.
[12] Jesse Jenkins, Max Luke, and Samuel Thernstrom, *Getting to Zero Carbon Emissions in the Electric Power Sector*, December 2018.
[13] An avoided emissions approach has already been adopted for renewable energy procurement by diverse organizations including Salesforce, Nucor, Boston University, Clearloop, Edison Energy, and others.

calculations measure the real-world reductions in carbon emissions associated with a reporting entity's interventions.[14]

This separate calculation, distinct from the calculation of a market-based inventory, could be included within or outside the existing Scope 2 framework. In any event, it's an important yet missing metric related to electricity procurement and other interventions (e.g., load management) that are currently evaluated using Scope 2 location-based and market-based accounting methods.

Relationship to Time and Location of Consumption: Avoided emissions can occur without regard to the timing and location of a reporting entity's consumption.

Potential Interventions: Avoided emissions may result from a variety of interventions, including deployment of on-site generation, development of incremental CFE financed by long-term PPA, energy storage, investments in transmission, and load management (energy efficiency, shifting, curtailing), etc.

Granularity: Avoided emissions, like market-based emissions inventories, can be calculated more accurately using more granular location and time supply and emissions factor data, but this methodology can also be calculated with publicly available data sources that cover the globe including eGRID non-baseload factors, EPA's AVERT, and UNFCCC's Harmonized IFI Default Grid Factors.[15] Approaches vary and can range from relatively simple to extremely complex (e.g., avoided emissions could be calculated using annual figures or an hour-by-hour basis).[16] More granular data can provide a more accurate climate impact assessment. Nevertheless, the imperative of focusing on decarbonization impact suggests that we begin to encourage and eventually require such disclosures as soon as possible and with the best available data and methodologies.

Emissions Factor: Carbon impact can be measured over different timeframes depending on the type of buyer intervention. In the short run, changes are considered based on emissions assuming no change in the existing fleet of generators. In the long run (such as 5 years or more), forward looking projections consider changes that can induce both operational and structural changes to the grid (e.g., the building of new carbon-free resources and the retirement of unabated fossil generation). Various emissions factors have been used in calculating avoided emissions, including short-run LMER, long-run LMER, EPA AVERT, eGRID non-baseload or fossil, average hourly for total output, etc. While long-term forecasts of avoided emissions may be used for internal company decision-making, reporting disclosures of avoided emissions may more appropriately be based on actual empirical evidence about

[14] There is not always a direct cause-effect relationship between the single activity of the reporting entity (purchasing and consuming energy) and the resulting GHG emissions into the atmosphere, so not all transactions will have an avoided emissions impact. For most smaller consumers of electricity, their energy procurement choices help to increase aggregate demand to drive the development of new CFE generation.

[15] Henry Richardson, *Accounting for Impact*, WattTime, September 2022.

[16] Methods to calculate avoided emissions have been explored by organizations including Tabors Caramanis Rudkevich, REsurety, WattTime, Singularity, and others.

what happened during a prior year (i.e., using historical marginal emissions factors assuming the grid resources in place during the reporting period).

c) **Proposal 2c: In addition to calculating a location-based and market-based Scope 2 emissions inventory, the Scope 2 Guidance should encourage the calculation and disclosure of a Carbon Emissions Baseline (CEB).** The CEB equals a buyer's consumption at a specific time and location multiplied by the marginal emissions factor at that time and location.[17, 18] This metric is like the modified location-based method proposed (i.e., hourly load multiplied by the applicable hourly system average emissions factors for the market area). However, it should be based on a buyer's hourly consumption and marginal emission factors (instead of average emission factors).[19] The CEB can be used to more accurately measure the marginal impact of changes in customer consumption levels (energy efficiency) or load patterns (load shifting and curtailment), holding all else on the grid constant. Disclosure of this metric incentivizes reporting entities to move electricity load to low-emissions times and locations. The CEB also can be used as a benchmark to compare with a reporting entity's avoided emissions calculation.

d) **Proposal 2d: In addition to calculating a location-based and market-based Scope 2 emissions inventory, the Scope 2 Guidance should encourage, when possible, the calculation and disclosure of an Avoided Emissions Score.** Disclosing the avoided emissions (as described in proposal 2b) as a percentage of its CEB (as described in proposal 2c) could be a potential way to compare the magnitude of actions taken relative to a reporting entity's size. This "Avoided Emissions Score," expressed as a percentage, or some other fair and accurate way to contextualize the avoided emissions figure could prove useful. "We calculate emissions reduction as a percentage of the quantity of emissions caused by the corporate load in the absence of procurement."[20, 21] Organizations whose avoided emissions are equal

[17] The Carbon Emissions Baseline is similar to what WattTime refers to as "induced" emissions caused by electricity consumption or Tabors et al call the "carbon footprint of consumption," where both induced and avoided emissions would be calculated in a consistent, apples-to-apples manner, using marginal emissions rates. (Henry Richardson, *Accounting for Impact, Refocusing GHG Protocol Scope 2 Methodology on 'Impact Accounting'*, WattTime, September 2022, at 5); (Also see Hua He, Aleksandr Rudkevich, Xindi Li, Richard Tabors, Alexander Derenchuk, Paul Centolella, Ninad Kumthekar, Chen Ling, Ira Shavel, *Using Marginal Emission Rates to Optimize Investment in Carbon Dioxide Displacement Technologies*, Tabors Caramanis Rudkevich, The Electricity Journal, Volume 34, November 2021, at 2.)

[18] Note that the emissions factors used to calculate the CEB would be linked to the timing and location of customer consumption; whereas the emissions factors used to calculate the avoided emissions should be based on the location of the intervention, which may or may not be the same as the location of the customer.

[19] If hourly customer load and marginal emissions factors are not available, annual load and average eGRID fossil (or non-baseload) emissions factors could be used as a proxy for marginal emissions associated with consumption absent any buyer contracts or purchases.

[20] Enrique Gutierrez, Julia Guyon, Craig Hart, Zoe Hungerford, and Luis Lopez, *Advancing Decarbonisation Through Clean Electricity Procurement*, International Energy Agency, November 2022, at 84. "Using marginal emissions calculations gives a more accurate picture of how interventions reduce load or increase generation at specific times" (at 57).

[21] This proposal also is similar in concept to the "Renewable Energy Score" recommended by RMI, represented by the percentage of Weighted Avoided Emissions (defined as the renewable energy purchased multiplied by the marginal emissions factor of the location of that renewable energy), relative to the Total Induced Emissions

to their CEB (i.e., Avoided Emissions Score equals 100%) could be said to be "impact neutral" under this approach. A reporting entity also could have an Avoided Emissions Score that exceeds 100% ("impact positive") when its avoided emissions exceed its CEB.[22]

e) **Proposal 2e: WRI should provide guidance and work with recognition programs, ESG rating companies, and climate leadership programs to improve accuracy, transparency and credibility of climate claims based on the GHG Protocol.** Greater guidance is necessary regarding reporting entity claims related to the Protocol and Guidance (e.g., what can be claimed given certain calculations). This will especially be true if the Guidance recognizes an expanded menu of options for reporting (e.g., annual versus hourly matching, different market boundaries, annual versus hourly matching when calculating Scope 2 inventories, and/or inclusion of avoided emissions calculations, etc.). Reporting entities should be provided clear guidance about claims with respect to:

   - When and under what conditions can a reporting entity claim to be "using" 100% clean energy,
   - How to characterize (and changes to) emissions in Scope 2 market-based inventories or CFE Score % with annual versus hourly matching,
   - How to characterize annual matching across broad geographic boundaries (e.g., RE100 or CFE100), and
   - When and under what conditions can a reporting entity claim reductions in emissions into the atmosphere (avoided emissions).

   (See comments also submitted in Scope 2 NB/GS Market-Based Modernization Proposal to improve accuracy, transparency and credibility of climate claims based on the GHG Protocol.)

   Related to this Proposal, claims about emissions reductions into the atmosphere should be accompanied by a calculation of avoided emissions. To reduce the risk of deception, we suggest that the Scope 2 Guidance require companies to disclaim whether or not they have calculated the emissions impact to the atmosphere of their clean energy procurement decisions. If a company has not estimated the emissions impact, they should only be allowed to make claims on clean energy transactions and not on climate benefit. Without such calculations, companies should disclose that the climate impact related to their clean energy claim has not been estimated and cannot be substantiated. By requiring more precise language when discussing a reporting entity's procurement of CFE, the Guidance can reduce the risk that the reasonable consumer is misled by claims about the energy used to produce the goods and services they consume and avoid unwarranted and unjustified conclusions about the real benefit to the climate from reporting entity actions. Further, if a company has calculated avoided emissions, we suggest that the Scope 2 Guidance recommend that the

(defined as the total electricity purchases multiplied by the marginal emissions factor of the location of that power usage). (Samuel Huestis, Charles Cannon, Sahithi Pingali, *Approach to Quantify Net Material Emissions Impact of Renewable Energy Purchases*, RMI, May 2022, at 5.)

[22] See Henry Richardson, *Accounting for Impact, Refocusing GHG Protocol Scope 2 Methodology on 'Impact Accounting'*, WattTime, September 2022, at 5.

reporting entity disclose the calculated emissions impact in addition to their Scope 2 location-based and market-based inventories. This added disclosure will prevent the consumer from overestimating positive climate impact arising from reporting entity actions and instead allow the consumer to better understand and compare the real environmental impacts of their clean energy procurement actions.

f) **Proposal 2f: If WRI wants to continue to be the guardian of internationally recognized standards for calculating and reporting GHG emissions, WRI should commit the resources to maintain and update the Protocol on a more regular basis.** Climate goals have changed. Reporting entity goals have become more ambitious, complex and diverse. Data capabilities and calculation methodologies have changed. Given the critical importance of this effort to accelerate decarbonization across world economies and the dynamic, fast-paced nature of markets with diverse capabilities and needs, the Protocol needs to be modernized on a more regular and consistent basis.[23]

5. Please explain how the proposal aligns with the GHG Protocol decision-making criteria and hierarchy (A, B, C, D below), while providing justification/evidence where possible.

A. GHG Protocol accounting and reporting approaches shall meet the GHG Protocol accounting and reporting principles (see Annex for definitions):

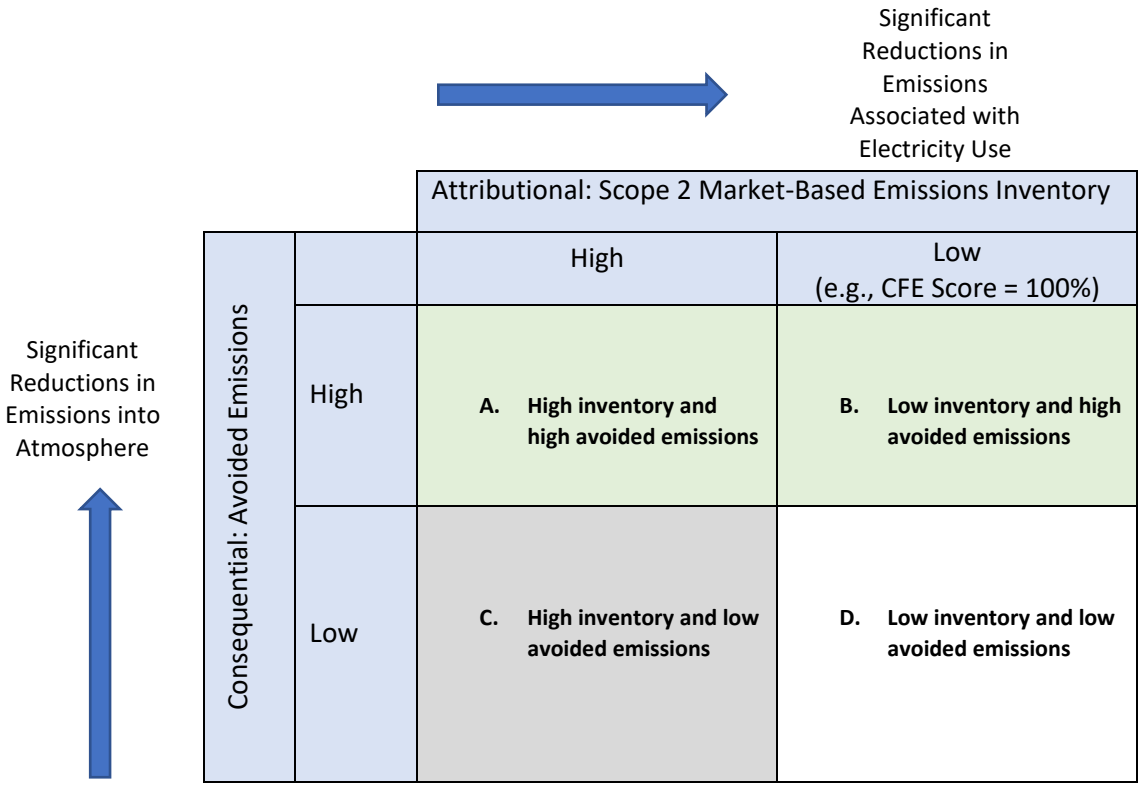
- Accuracy, Completeness, Consistency, Relevance, Transparency
- Additional principles for land sector activities and CO_2 removals: Conservativeness, Permanence, and Comparability if relevant

The Greenhouse Gas Protocol, developed by WRI and the World Business Council on Sustainable Development (WBCSD), sets the global standard for how to measure, manage, and report greenhouse gas emissions. At the heart of modernizing GHG accounting and reporting – and of changing the focus of third-party leadership and recognition programs – is incentivizing and rewarding buyer decisions and interventions that make real-world decarbonization impact (i.e., reduce emissions into the atmosphere). The type of changes to attributional accounting practices discussed in our separate Scope 2 Market-Based Modernization Proposal would improve the relevance (and accuracy) of disclosures related to emissions associated with electricity use but do not squarely address the disclosure of emissions reductions into the atmosphere.

Scope 2 inventories do not measure the *actual* emissions impact (avoided emissions) to the atmosphere resulting from a reporting entity's electricity procurement or other actions. The Protocol is not currently able in many instances to distinguish between next generation transactions with high carbon reduction impact and buyer actions with lower carbon reduction impact. Additional disclosures related to emissions reductions into the atmosphere are needed so that accounting and reporting approaches can provide accurate, complete, consistent, relevant and transparent information. Consumers need to be provided with more information to fully evaluate CFE claims and their related climate impact. All else equal, we want to measure, recognize, and reward actions that

[23] For example, the *Responsible Steel Standard Development Procedures*, version 2.0, calls for regular review and revision within a maximum of five years (at 15).

actually reduce emissions into the atmosphere (e.g., A>C and B>D). The Protocol does not currently require such disclosure, making it difficult to manage or evaluate what we do not measure. Even with more granular accounting in a modernized Scope 2 market-based inventory, a reporting entity can achieve a zero emissions inventory with little or no consequential avoided emissions (e.g., D).[24] It is also possible that a reporting entity could have a high emissions inventory related to its electricity use but make significant contributions in reductions in emissions to the atmosphere independent from the timing and location of its consumption (e.g., A). It is also possible that a reporting entity pursues a procurement strategy that simultaneously lowers its Scope 2 market-based inventory and results in high avoided emissions (e.g., B). Emerging next generation electricity procurement approaches seek to make more positive climate impact, and reporting entities should have pathways to disclose the results of those interventions more clearly.[25] Attempting to measure decarbonization impact, even if not perfectly, is a prerequisite.



The measurement of avoided emissions, in addition to the proposed changes to the Scope 2 market-based emissions inventory, would more fully align the Protocol's reporting and accounting approaches with the actions needed to achieve decarbonization of the electric grid by considering

[24] For example, it is possible for a company to acquire RECs from projects where renewable energy production is already relatively abundant and the displacement of fossil energy is minimal. Additionally, a company could acquire RECs from an existing project, whose emissions reduction potential has already been achieved.

[25] On December 13, 2022, a group of global corporations and investors, including Akamai Technologies, Amazon, General Motors, Hannon Armstrong, Heineken, Intel, Meta, Rivian, Salesforce, and Workday, launched the *Emissions First Partnership*, calling for a shift in corporate carbon accounting standards toward an emissions impact-centric system with a focus on maximizing greenhouse gas reductions.

impacts beyond what might be "attributed" to a given buyer's footprint. "Tracking environmental goals in traditional units of MWh of clean energy is an outdated and imprecise approach that does not measure the carbon emissions reductions actually achieved."[26] We know that matching CFE MWh purchased with consumption is not the same as reducing emissions to the atmosphere. We know that not all CFE MWh, even if from new resources, have the same environmental benefit. We know that not all CFE MWh provide the same reliability or system balancing benefits.[27] Even when pursuing strategies to reduce Scope 2 market-based inventories (e.g., by matching EACs with consumption on a 24/7 basis), calculating avoided emissions is useful to identify which location to invest in first, and prioritize the staging of technology investments within and across market areas to maximize emissions reductions.[28, 29] If such calculations are considered useful for reporting entity decision-making and goal setting, it follows that disclosures related to emissions reductions into the atmosphere are needed so that accounting and reporting approaches can provide accurate, complete, consistent, relevant and transparent information.

B. GHG Protocol accounting and reporting approaches shall align with the latest climate science and global climate goals (i.e., keeping global warming below 1.5°C). To support this objective (non-exhaustive list):

- Direct emissions reported in a company's inventory should correspond to emissions to the atmosphere. Reductions in direct emissions reported in a company's inventory should correspond to reductions in emissions to the atmosphere.
- Indirect emissions reported in a company's inventory should in the aggregate correspond to emissions to the atmosphere. Reductions in indirect emissions reported in a company's inventory should in the aggregate correspond to reductions in emissions to the atmosphere.

[26] Dr. David Luke Oates and Dr. Kathleen Spees, *Locational Marginal Emissions A Force Multiplier for the Carbon Impact of Clean Energy Programs*, REsurety and The Brattle Group, March 2022, at 1.

[27] For example, there is a difference between clean firm MWh that are available whenever demanded versus intermittent MWh contingent on wind or sunshine.

[28] "There are two primary metrics we use to measure our progress towards 24/7 CFE and our associated impact. The first, CFE Score, measures the degree to which each hour of our electricity consumption on a given regional grid is matched with CFE on an hourly basis. This is calculated using both carbon-free electricity under contract by Google, as well as CFE coming from the overall grid mix. The second metric, Avoided Emissions (tCO2e), measures the carbon emissions impact of our procurement decisions, and is used to help prioritize our procurement activities across time and geography" and "While we are focused on moving toward round-the-clock CFE at every site, we also use a secondary emissions-related metric to differentiate the grids where we operate and prioritize both the grids and the hours where early action will have a greater impact on reducing carbon emissions. This is important because the CFE Score metric can mask significant variation in carbon intensity of electricity grids, as well as the sources of those grid emissions." Google, *24/7 Carbon-Free Energy: Methodologies and Metrics*, February 2021, at 6 and 12.

[29] "To elucidate these tradeoffs and help prioritize procurement activities, we calculate the electricity-related carbon emissions that we are responsible for in every hour and on every Regional Grid where we operate." "To evaluate a project's value within our 24/7 CFE program, we measure how much it will improve both our CFE Score and our Avoided Emissions metric in relation to the cost of the project…The objective of the second transaction score (TS2) is to measure the spend efficiency of a project per tCO2e avoided. Again, this is a relative measure that is used to compare transactions across or within regions." Google, *24/7 Carbon-Free Energy: Methodologies and Metrics*, February 2021, at 12 and 14.

Neither reductions in Scope 2 market-based emissions inventories nor adding new MWh of CFE (sometimes referred to as additionality) should be equated or confused with measuring *actual* emissions reductions into the atmosphere.

> "Too often environmental professionals, policy-makers, and standard-setters fail to distinguish between two major types of GHG accounting methods – which are appropriate for fundamentally different purposes. Using the wrong type of method can lead to bad decision-making – and unfortunately, this happens all too often. Many GHG accounting practitioners will be familiar with 'attributional' type methods, which create inventories of emissions—for example, corporate GHG inventories, national GHG inventories, and traditional product life cycle assessments. Often practitioners mistakenly assume that attributional is the only type of method, and try to use such methods to answer questions that they cannot and should not be used to answer – like how much a mitigation action reduces emissions. A fundamentally different type of GHG accounting method is 'consequential', which aims to quantify the change in emissions caused by decisions or interventions."[30]

Reductions in Scope 2 Market-Based Inventories vs. Avoided Emissions

Numerous studies, articles, and analyses indicate that attributional reductions in Scope 2 inventories and consequential avoided emissions calculations should not be confused.[31] Even if market-based reporting is modified to better match the timing and location of consumption, a reduction in market-based emissions may or may not be related to actual emissions reductions. A company could report zero emissions by purchasing EACs within the same regional grid that match its hourly consumption with little reduction in actual grid emissions. For example, if a reporting entity is located on a grid with a high percentage of CFE resources already[32] and/or can purchase EACs from unclaimed *existing* CFE within the same grid, it may be able to report zero Scope 2 market-based emissions, even with 24/7 time and location matching, with little incremental impact on emissions into the atmosphere. Purchases of EACs that match a reporting entity's consumption by hour and location can zero out its Scope 2 market-based inventories. In this case, the impact on emissions into the atmosphere will depend on other factors – e.g., whether purchased EACs are increasing from a 0% CFE Score to 100% or from 80% to 100%; whether incremental CFE resources are added, what existing grid resources are displaced, etc.[33]

[30] Matthew Brander, *The Most Important GHG Accounting Concept You May Not Have Heard of: the Attributional Consequential Distinction*, GHG Management Institute, March 2021, at 1.

[31] Google, *24/7 Carbon-Free Energy: Methodologies and Metrics*, February 2021, at 1, 6, 8, 12, 14, and 20. Matthew Brander, *The Most Important GHG Accounting Concept You May Not Have Heard of: the Attributional Consequential Distinction*, GHG Management Institute, March 2021, at 1-5. Enrique Gutierrez, Julia Guyon, Craig Hart, Zoe Hungerford, and Luis Lopez, *Advancing Decarbonisation Through Clean Electricity Procurement*, International Energy Agency, November 2022, at 12-14, 23-25, 54-65, and 72-73. Roger Ballentine, Patrick Falwell, Liana Biasucci and Neil Fisher, *Modernizing How Electricity Buyers Account and are Recognized for Decarbonization Impact and Climate Leadership*, Green Strategies and The NorthBridge Group, August 2022, at 32-45.

[32] For instance, this could be due to mandatory RPS programs or utility non-bypassable CFE.

[33] It is also possible that a reporting entity could have a high Scope 2 market-based inventory but have a significant impact on emissions to the atmosphere due to its procurement actions outside its market boundary.

The current Scope 2 Guidance recognizes that changes in inventories may not accurately reflect actual emissions reductions to the atmosphere and was not designed to calculate avoided emissions.[34] The same situation is likely to continue under a modernized Scope 2 market-based inventory. Again, the purpose of an improved Scope 2 market-based inventory should be to more accurately reflect the emissions associated with a buyer's electricity use by taking into account the location and timing of CFE supply and/or EAC purchases relative to the timing and location of a buyer's consumption. While potentially related, reductions in Scope 2 market-based inventories should not be conflated with calculations of avoided emissions.

Additionality vs. Avoided Emissions

Additionality, which we define here as helping achieve the deployment of new CFE capacity, is sometimes prioritized in buyer procurement strategies presumably with the intention to enhance the carbon reduction impact of buyer actions.[35] But additionality is not equivalent to measuring actual reductions in carbon emissions into the atmosphere. Not all CFE MWh, even if from new resources, have the same environmental benefit. Analyses have demonstrated that an additional MWh of CFE can have widely different carbon emissions impacts depending on the timing and location of when that CFE is produced and the types of resources that new CFE displaces. For example, WattTime found that an Illinois wind project can have three times the emissions impact as a California solar project.[36] Similarly, Salesforce concluded that a West Virginia solar project had almost three times the emissions impact as a California solar project,[37] and a Boston University study found that a South Dakota wind project would have two to three times the emissions impact as a similar project in New England.[38]

> "The net change in system-wide emissions depends on the marginal generating units and will be different depending on where clean electricity is added and the hours in which it is generated. What we have demonstrated in this paper is that the net reduction in carbon emissions can vary by several hundred percent from one location to another within a given electric power region and from one hour to another within the same day. Optimizing clean energy investments can often more than double their impact on reducing carbon emissions."[39]

[34] The Guidance also notes that calculating avoided emissions would provide "strategic benefits" including identifying where low-carbon energy generation can have the biggest impact. (Scope 2 Guidance, at 28, 52.)

[35] Current Scope 2 Guidance does not require additionality. Adding additionality criteria to Scope 2 market-based accounting could reduce the approaches available to many consumers, particularly small and medium customers who are not able to sign long-term contracts with significant financial guarantees for new resources.

[36] Henry Richardson, *Accounting for Impact, Refocusing GHG Protocol Scope 2 Methodology on Impact Accounting*, WattTime, September 2022, at 6-7.

[37] Salesforce, *More than a Megawatt: Embedding Social & Environmental Impact in the Renewable Energy Procurement Process*, October 2020, at 10.

[38] *https://www.bu.edu/sustainability/projects/bu-wind/*.

[39] Hua He, Aleksandr Rudkevich, Xindi Li, Richard Tabors, Alexander Derenchuk, Paul Centolella, Ninad Kumthekar, Chen Ling, Ira Shavel, *Using Marginal Emission Rates to Optimize Investment in Carbon Dioxide Displacement Technologies*, Tabors Caramanis Rudkevich, The Electricity Journal, Volume 34, November 2021, at 7.

Additionality is a poor proxy for measuring avoided carbon emissions, especially as renewable resource penetration increases and these resources increasingly displace other CFE resources.[40] Therefore, we recommend that WRI consider having reporting entities more directly measure actual changes in emissions resulting from CFE procurement (whether near or far from load) and other actions (e.g., on-site generation, storage, load management). Measuring avoided emissions directly, and as accurately as possible, will help prioritize interventions that correspond to reductions in emissions into the atmosphere. This can be done in combination with reducing Scope 2 inventories when matching EACs with a company's consumption (e.g., when selecting the appropriate CFE technology or CFE site location within a regional grid) as well as inform decisions about how best to prioritize projects across market areas and maximize carbon emissions reductions at the lowest possible cost. While potentially related, additionality should not be conflated with calculations of avoided emissions.

Scope 2 Market-Based Inventories and Avoided Emissions Should Be Measured in Parallel
An updated Scope 2 market-based inventory (as part of attributional accounting) and actual emissions impact (as part of consequential accounting) should ideally be measured separately and in parallel. Both attributional and consequential accounting provide valuable insight and answer different questions.

Attributional Accounting

1. Location-Based Inventory: What is the emissions inventory associated with the grid mix used to serve the timing and location of a reporting entity's electricity consumption?
2. Market-Based Inventory: What is the emissions inventory associated with a reporting entity's purchases to serve the timing and location of their electricity consumption?

   (See NB/GS Market-Based Modernization Proposal.)

Consequential Accounting

3. Avoided Emissions: What is the emissions impact to the atmosphere associated with a reporting entity's procurement and other actions?
4. Carbon Emissions Baseline: What is the emissions impact associated with a marginal change in the timing and location of a reporting entity's electricity consumption?

Measuring avoided emissions directly, and as accurately as possible, will help measure, incentivize, and reward procurement decisions and other interventions that reduce emissions into the atmosphere.

> "What is striking is that the attributional-consequential distinction is still not recognized widely enough by GHG management practitioners. Too often governments or companies implement climate change mitigation actions because doing so reduces emissions within an attributional boundary, without proper consideration of the system-wide consequences. Another mistake that sometimes occurs is mixing elements of attributional and consequential approaches within a single method or analysis, such as including values for avoided emissions

[40] The development of new CFE resources, or additionality, is certain to be an important consideration in calculating avoided emissions, but the timing and location of that generation and the resources displaced on the grid are also important.

within what should be an inventory of actual emissions and removals… **Importantly, BOTH attributional and consequential methods are needed – with each used for their appropriate purposes. Attributional methods can be used for allocating responsibility, setting reduction targets, and tracking progress towards the achievement of those targets within specified boundaries. But any actions aimed at reducing emissions should be checked with a consequential method to ensure they do not unintentionally increase emissions outside the inventory boundary. Further, you should be skeptical of any claims regarding or implying that actions taken led to "emission reductions" that are based solely on attributional GHG inventory reporting.** Such claims should be supported with impact estimations using an appropriately chosen consequential method."[41] (GHG Management Institute)

"Given these practical benefits, in principle this methodology [impact accounting] could conceivably replace existing approaches to Scope 2. **But existing approaches are widespread, and it is important not to disrupt the existing thriving decarbonization ecosystem that GHGP has already nurtured. We propose that a more practical near-term approach is to begin requiring reporting a third value in parallel with current Scope 2 methodologies to present a comprehensive view of an organization's electricity emissions.** Note that, importantly, adding this new reporting approach would not introduce a significant new reporting burden, as it can be quickly and easily calculated from the existing data institutions already collect for current approaches."[42] (WattTime)

"Measuring emissions reductions is fundamental. Update emissions accounting approaches to better align calculated and actual emissions impact…While reducing carbon emissions is an important objective of clean electricity procurement strategies, existing frameworks fail to fully consider all aspects that affect emissions. In particular, accounting frameworks based on matching electricity demand and supply on an annual basis create a risk of discrepancies between attributed and actual emissions reduction."[43] (IEA)

For example, a report produced by the Long Duration Energy Storage Council, estimates the average carbon intensity of 100% solar or 100% wind claims based on an annual matching methodology.[44] A company matching its entire annual electricity consumption with purchases of solar power across the year would be able to claim zero emissions associated with its electricity use even though the actual emissions associated with its electricity consumption is only reduced by approximately 40-50%. Matching annually with wind power yields higher emission reductions of approximately 60-70%, but still far below the claimed 100%. (LDES)

[41] Matthew Brander, *The Most Important GHG Accounting Concept You May Not Have Heard of: the Attributional Consequential Distinction*, GHG Management Institute, March 2021, at 4-5, (emphasis added).
[42] Henry Richardson, *Accounting for Impact, Refocusing GHG Protocol Scope 2 Methodology on Impact Accounting*, WattTime, September 2022, at 10, (emphasis added).
[43] Enrique Gutierrez, Julia Guyon, Craig Hart, Zoe Hungerford, and Luis Lopez, *Advancing Decarbonisation Through Clean Electricity Procurement*, International Energy Agency, November 2022, at 12-13.
[44] LDES Council and McKinsey & Company, *A Path Towards Full Grid Decarbonization with 24/7 Clean Power Purchase Agreements*, May 2022, at 3.

C. GHG Protocol accounting frameworks should support ambitious climate goals and actions in the private and public sector.

- Would this proposal enable organizations to pursue more effective GHG mitigation/decarbonization efforts as compared to the existing standards and guidance? If so, how?
- Would this proposal better inform decision making by reporting organizations and their stakeholders (e.g. related to climate-related financial risks and other relevant information associated with GHG emissions reporting)?

Yes. The proposed changes would better inform decision making by reporting organizations and their stakeholders. Measuring actual emissions reductions into the atmosphere, when possible, is a critical element of GHG disclosures that is frequently not considered in the current Protocol. Some stakeholders have criticized the Protocol for failing to connect disclosures with actual emissions reductions.[45] And as noted above, reporting organizations are already starting to calculate avoided emissions to better inform their decision making.[46]

> "The flaw in this system is that 'all certificates are equal in the eyes of GHG accounting' – they do not show the context of renewable energy procurement or measure the level of material impact that actually occurred" and "As a result, organizations with ambitions to drive the electricity sector toward cleaner, renewable energy must go beyond traditional corporate GHG accounting."[47] (RMI)
>
> "Avoided emissions calculations can be used to prioritize investment both within and across regions to maximize near-term emissions savings. For example, for a buyer operating in multiple regions, avoided emissions estimates can be used to identify which location to invest in first, and prioritize the staging of technology investments in each region to maximize emissions reductions."[48] (RMI)
>
> "Organizations pursuing net-zero Scope 2 emissions are currently purchasing enough MWh of RECs to match what they consume. A more effective strategy would be measuring the real outcome (i.e., emissions) directly. This would make accounting more consistent with decarbonization goals and ensure that accounting practices better enable measurable progress towards this objective. Moreover, current Scope 2 accounting treats all renewable generation equally as zero-emissions resources. Yet there is growing acknowledgement that not all renewable energy projects provide the same emissions-reduction benefit, a dynamic

[45] See footnotes 2 and 3.

[46] On December 13, 2022, a group of global corporations and investors, including Akamai Technologies, Amazon, General Motors, Hannon Armstrong, Heineken, Intel, Meta, Rivian, Salesforce, and Workday, launched the *Emissions First Partnership*, calling for a shift in corporate carbon accounting standards toward an emissions impact-centric system with a focus on maximizing greenhouse gas reductions. Also see footnotes 28 and 29.

[47] Samuel Huestis, Charles Cannon, Sahithi Pingali, *Approach to Quantify Net Material Emissions Impact of Renewable Energy Purchases*, RMI, May 2022, at 3-4.

[48] Mark Dyson, Sakhi Shah, and Chaz Teplin, *Clean Power by the Hour Assessing the Costs and Emissions Impacts of Hourly Carbon-Free Energy Procurement Strategies*, RMI, July 2021, at 17.

that is not captured in the current GHGP Scope 2 calculations that focus on matching MWh of load with MWh of renewable energy."[49] (WattTime)

"Despite these complexities, since emissions reduction is a central objective of corporate net zero strategies, quantifying emissions impacts and being guided by this information is a way for companies to improve their decision making and ensure that they achieve the underlying aims of their clean electricity procurement goals. Emissions-based approaches could be followed directly or could also be pursued as a complement to the other types of clean electricity goals described above." (*IEA study*, at 25)

"Currently, market-based accounting is the most widely applied approach for calculating electricity emissions. It provides more options for corporates to support net zero claims but is nonetheless challenging to quantify actual emissions reduction. In effect, under the market-based approach, the emissions impact of specific procurement actions is not directly assessed." (*IEA study*, at 56)

"Using marginal emissions calculations gives a more accurate picture of how interventions reduce load or increase generation at specific times." (*IEA study*, at 57)

"To directly compare or balance emissions linked to an entity's activities, and the degree to which its interventions reduce emissions, both aspects need to be calculated with a consistent methodology. Calculating, for example, the company footprint from an hourly average emissions factor while using a marginal approach to compensate for these emissions, would give a misleading result that only reflects a fraction of produced emissions." (*IEA study*, at 59)[50]

"While the use of annual average approaches remains relevant for some reporting requirements, marginal approaches are more appropriate to guide decision making around procurement actions as they more accurately describe the effect of changes to generation and load. Hourly average approaches also provide value to guide decision making for the timing when generation or demand response are valuable but may be misleading for overall emissions attribution. From this perspective, **it may be appropriate to use two methods in parallel, which implies undertaking two separate accounting exercises**…The actual impact corporate procurement has on emissions depends on where and when both load and generation take place. As the market-based approach to emissions accounting lacks any strong enforcement requiring companies to match generation to the location of load, it can lead to substantial discrepancies between the emissions caused and reduced on the system." (*IEA study*, at 59-60, emphasis added)

"Based on these considerations, companies wanting to credibly claim that they are fully addressing their electricity emissions, should ensure that where possible their strategy

[49] Henry Richardson, *Accounting for Impact, Refocusing GHG Protocol Scope 2 Methodology on 'Impact Accounting,'* WattTime, September 2022, at 3.

[50] In other words, average emissions factors used to calculation Scope 2 market-based inventories should not be mixed with avoided emissions calculations based on marginal emissions factors. These calculations should remain separate and done in parallel.

includes an explicit assessment of how their clean procurement actions impact emissions – regardless of their specific procurement goals." (*IEA study*, at 64)

"Having a detailed understanding of the emissions impact of different locations for load and generation will allow companies to make the best decision in terms of power system decarbonization." (*IEA study*, at 80)

D. GHG Protocol accounting frameworks which meet the above criteria should be feasible. (For aspects of accounting frameworks that meet the above criteria but are difficult to implement, GHG Protocol should provide additional guidance and tools to support implementation.)

- What specific information, data or calculation methods are required to implement this proposal (e.g., in the case of scope 2, data granularity, grid data, consumption data, emission information, etc.)? Would new data/methods be needed? Are current data/methods available? How would this be implemented in practice?
- Would this proposal accommodate and be accessible to all organizations globally who seek to account for and report their GHG emissions? Are there potential challenges which would need to be further addressed to implement this proposal globally? What would be the potential solutions?

To improve accuracy of the calculation of the carbon emissions baseline and avoided emissions, the Guidance should encourage the use of the most accurate data available (with the purpose of more accurately reflecting the marginal emissions impact associated with a buyer's electricity use, and incremental changes to that use, taking into account the location and timing of a buyer's consumption and calculating the avoided emissions associated with a buyer's interventions taking into account the timing and location of those interventions and their impact on emissions to the atmosphere):

Load Data Hierarchy (in order of preference)

- Actual buyer hourly metered load (Utilities / Buyers)
- Estimated hourly load data based on utility load profiles applied to actual buyer monthly meter reads that are used to determine hourly retail supply obligations (Utilities)
- Estimated hourly load data based on standard load profiles by customer type and location that could be applied to actual buyer metered monthly or annual data. (NREL, 2021, *End-Use Load Profiles for the U.S. Building Stock*); Also, see DOE *Load Profiles* data)[51]
- Actual monthly load (Buyers)
- Actual annual load (Buyers)

[51] When actual hourly data is not available, use of supply and load profiles may be used as an interim step but should not serve as a replacement for hourly (sub-hourly) accounting based on actual data.

Marginal Emissions Factor (EF) Hierarchy (in order of preference)

- Hourly (or sub-hourly) locational marginal emissions rate or LMER (RTO or third party)
- Hourly eGRID non-baseload or fossil emissions factors (EIA)
- Annual AVERT avoided CO_2 emissions factor (EPA)
- Annual eGRID non-baseload or fossil emissions factors (EIA)

CFE/EAC Supply Hierarchy (in order of preference)

- Granular certificates by hour and location (based on actual contracted CFE or LSE allocation of CFE output from specific plants)
- Estimated hourly EACs could be calculated using standard supply profiles by resource type and location applied to monthly or annual EACs if granular certificate or actual hourly supply data is not available (RTO generation profiles by resource type, e.g., *PJM*, *NREL PV Watts Tool*, EIA)
- Monthly EACs
- Annual EACs

In the United States, data to develop more time and location-granular Scope 2 inventories and inform avoided emissions calculations is already available, but public entities including the EPA and Department of Energy need to provide additional data, analytic tools, and guidance on what data should serve as substitutes if preferred data is not available. See comments of CATF, NorthBridge, and Green Strategies regarding data needs to improve the granularity, accessibility, and transparency of electric system data to support modernized Scope 2 Guidance.[52]

1. EPA should support the reporting of currently reported eGRID generation and emissions factor data–especially total output, fossil, and non-baseload emissions factors on an hourly basis for all the geographic boundaries covered in the eGRID dataset.
2. When plant-specific emissions factors or actual hourly generation supply data are not available, EPA should provide guidance on what emissions rate and/or supply profile would be most appropriate to use by resource type and U.S. location.
3. When actual hourly data or specific utility load profiles are not available, the EPA should provide guidance on what hourly load profile would be most appropriate to use by customer type and U.S. region.

[52] *Docket ID No. EPA-HQ-OAR-2022-0878*, Jan. 18, 2023.

6. Consistent with the hierarchy provided above, are there potential drawbacks or challenges to adopting this proposal? If so, what are they?

We recommend that the Guidance adopt new provisions to report the calculation of a Carbon Emissions Baseline and avoided emissions but anticipate several challenges. While not all data is readily available, calculations are not automated/standardized, and corporate goals, abilities and access to markets differ, flexibility is needed in GHG reporting since not all buyers can do 24/7 accounting or calculate avoided emissions impact. This will require greater transparency and reporting options that allow entities flexibility to select different market boundaries and time intervals with a transition towards and recognition of buyers who rely on more granular and accurate data to support claims.

Challenges	Solutions
Access to granular data (load, marginal emissions factor, incremental CFE supply)	• While not all data is readily available, flexibility is needed in reporting since not all buyers can calculate avoided emissions. • Improvement not perfection should be the immediate goal. The underlying methodologies, data and rigor of calculations that may be used today can be improved and perfected over time. • As first steps, reporting entities a) shall disclose incremental actions taken in the reporting year that it believes reduced actual emissions into the atmosphere (see Proposal 2a above), b) should calculate avoided emissions, when possible, using annual data when hourly data is not available, and/or c) may engage third parties to provide support for emissions reductions claims. • Support data accessibility as described in our Scope 2 Guidance Survey responses to questions #29 and #30.
Comparability	• The Scope 2 Guidance should seek to provide accurate, complete, consistent, relevant and transparent information. This requires a clear distinction between actions that reduce attributional inventories (Scope 2 market-based emissions) and actions that actually reduce emissions into the atmosphere (avoided emissions). These are separate and distinct accounting calculations that should be done in parallel. It is possible that actions can accomplish both, one or the other, or neither. • The Scope 2 Guidance should require reporting entities wishing to make claims about emissions reductions into the atmosphere to substantiate those claims, or alternatively,

	disclaim that they have not calculated the emissions impact to the atmosphere. (See Proposal 2e above). • More relevant and accurate accounting metrics (like shown in the NB/GS Standardized Reporting Format Proposal) will allow third party recognitions programs to distinguish and reward high impact actions.	
Resistance to change from some reporting entities (e.g., as emissions inventories increase due to changes in guidance)	• Allow buyers greater opportunity to report progress pursuing a variety of goals (e.g., 24/7 matching, RE100, avoided emissions, incremental CFE development, etc.) as illustrated on the Carbon Facts label shown in our standardized reporting format proposal. • Improve transparency, accuracy, and credibility of claims. • Phase-in changes. As methodologies for calculating emissions are developing and relevant data is still not universally available, the requirement for disclosure of avoided emissions could be phased in over time.	

7. Would the proposal improve alignment with other climate disclosure rules, programs and initiatives or lead to lack of alignment? Please describe.

Yes, in comparison with the existing Guidance, the proposal would improve alignment with recent large electricity buyer next generation procurement initiatives and policy mandates focused on actually reducing emissions into the atmosphere. Science tells us that to avoid the worst effects of climate change, the world needs to dramatically reduce greenhouse gas emissions and reach a state of net-zero emissions by mid-century.[53] The proposal would recognize that not all CFE MWh used for attributional accounting to reduce Scope 2 market-based inventories are equivalent from a climate benefit perspective.

The Protocol, along with recognition programs that rely on it, has influenced buyer electricity procurement strategies and efforts to reduce estimated Scope 2 emissions (indirect emissions from purchased electricity). A common approach for buyers has been to adopt renewable procurement goals – either as standalone goals or as part of internal or third-party structured greenhouse gas reduction commitments. By procuring renewable energy and/or EACs, such as Renewable Energy Certificates or (RECs), buyers have sought to match on an annual basis the megawatt hours (MWh) of wind and solar generation underlying the RECs that they procure against the MWh of their electricity consumption. The Guidance reinforces this approach, recognizing REC acquisition and retirement as a

[53] "To avoid the worst impacts of climate change, the world must reduce emissions ~50% by 2030, and offsetting fossil fuel used to generate electricity is one of the best near-term opportunities to do so. Achieving climate stability will require terawatt-scale CFE deployment over the next decade in the United States and other global markets." (Mark Dyson, Sakhi Shah, and Chaz Teplin, *Clean Power by the Hour Assessing the Costs and Emissions Impacts of Hourly Carbon-Free Energy Procurement Strategies*, RMI, July 2021, at 7.)

mechanism to reduce reported Scope 2 inventories. Several companies have set – and achieved – a 100% annual matching of renewable electricity/RECs and their electric load. Having met or in the process of meeting initial goals, many buyers are evaluating how to further leverage their electricity procurement to have greater carbon impact under a "next generation" of approaches.

While this Protocol's approach and buyer targets to purchase 100% renewable electricity have worked synergistically, the Guidance's methods for measuring Scope 2 emissions in their current forms are not adequately aligned with the pathways and actions that are urgently needed in the electric grid to achieve net-zero GHG emission goals in an affordable and reliable manner. The incumbent Scope 2 accounting methods do not accurately measure the emissions associated with a buyer's purchase and use of electricity or convey the emissions reduction impact (if any) resulting from a buyer's procurement of clean electricity and/or attributes.

Since fully decarbonizing the electricity sector will require carbon-free electricity to be always available at all times and locations on the electric grid, with firm generating and storage resources to complement variable wind and solar, current Scope 2 accounting and disclosure practices are not sufficient to drive the deployment of the full suite of carbon-free electric resources necessary to support net-zero emission goals. The current rules and rewards ecosystem is not sufficiently optimized to address evolving stakeholder needs toward disclosing, incentivizing, and rewarding emerging best practices in electricity procurement. Scope 2 accounting and reporting practices should be modernized to provide more accurate information about the emissions arising from a buyer's consumption of electricity and a buyer's carbon impact when procuring clean electricity and/or attributes.

These recommended disclosures (described in NB/GS Proposals for Market-Based Modernization, Emissions Impact Disclosures, and Standardized Reporting Format) would provide a strong foundation for large electricity buyers to continue to improve their procurement practices and support the electricity sector investments needed to achieve net-zero emission goals, including a broadened focus beyond just wind and solar resources by encouraging the deployment of a full suite of existing and emerging firm carbon-free generation, energy storage, load management, and other technologies needed to achieve a carbon-free electricity sector. Reporting information that more accurately reflects emissions from electricity procurement and use and decarbonization impacts will allow buyers to better evaluate alternative electricity procurement actions and provide better and more relevant information that can then be used by third-party leadership and recognition programs, investors, and environmental, social and governance (ESG) ratings entities.

Currently, GHG accounting is predominantly based on ownership and retirement of EACs. But tracking clean energy generation measured in MWh is not the ultimate goal. It is important to measure the carbon emissions reductions actually achieved, expressed in tons. The Protocol should be updated to include a separate measurement, when possible, of GHG emissions reductions. This would be a significant improvement in emissions accounting. WRI, in its publication, *Actions Large Energy Buyers Can Take to Transform and Decarbonize the Grid: Procurement Practices for Achieving 100% Carbon Free Electricity*, also recognized the need to shift criteria for buyer recognition.

> "Looking forward, recognition programs (e.g., RE 100, EPA Green Power Partnership), awards, and other incentives that encourage large energy buyers to undertake clean energy action

(e.g., clean energy awards) should also recognize the impact that buyers have on accelerating grid decarbonization and reducing overall GHG emissions. The right incentive and reward structures must be present to encourage buyers to undertake advanced procurement measures, particularly given that they can be more complex or possibly more expensive than conventional forms of procurement today."[54]

If the Protocol and Guidance does not evolve to enable accounting of actual emissions reductions into the atmosphere, which is arguably one of the most important objectives of buyer procurement initiatives and climate policies, it may lead to confusion and even questions regarding the Protocol's relevance.

8. Please attach or reference supporting evidence, research, analysis, or other information to support the proposal, including any active research or ongoing evaluations. If relevant, please also explain how the effectiveness of the proposal can be evaluated and tracked over time.

There is significant evidence, research, and analysis to support the following points:

1) **We Are Not Decarbonizing Fast Enough.** According to the October 2022 report by the UN Environment Programme[55] there exists today "no credible pathway to 1.5C." Across the globe, we are failing to develop the array of clean energy technologies to achieve decarbonization at the rate needed to remove structural barriers to climate success. Beyond the reach of policy incentives, carbon-free electric generation must increase exponentially in both the U.S. and globally. Progress to date has come from *both* policy and growing demand for clean electricity from large power users: more than a third of wind and solar capacity deployment has been driven by private demand above and beyond policy incentives. Electricity buyers have enabled the deployment of many gigawatts of new wind and solar generation capacity, helping to significantly drive down the costs of these technologies by aligning their procurement strategies with the Protocol and the requirements of third-party programs.[56]

2) **We Are Not Developing the Resources Needed to Achieve Decarbonization in a Reliable, Cost-Effective and Less Risky Manner.** The immense decarbonization challenge is best met not just with additions of wind and solar capacity, but also by rapidly deploying firm and dispatchable CFE

[54] Lori Bird et al., *Actions Large Energy Buyers Can Take to Transform and Decarbonize the Grid: Procurement Practices for Achieving 100% Carbon Free Electricity*, World Resources Institute § 4.3, August 20, 2021.
[55] *https://www.unep.org/resources/emissions-gap-report-2022.*
[56] See CEBA Deal Tracker (58 GW of clean energy in the US since 2014, representing 37% of U.S. CFE capacity additions); EU PPAs (IHS) 12 GW in 2020; James Kobus, Ali Ibrahim Nasrallah, and Jim Guidera, *The Role of Corporate Renewable Power Purchase Agreements in Supporting US Wind and Solar Deployment*, Columbia University Center on Global Energy Policy, March 2021; Jenny Heeter, Eric O'Shaughnessy, and Rebecca Burdet, *Status and Trends in the Voluntary Market (2020 data)*, NREL, September 2021; "Sustainable Energy in America Factbook," Business Council for Sustainable Energy, Bloomberg New Energy Finance (BNEF), 2021 43, *https://bcse.org/factbook/*; Doug Miller, *The NextGen Activator Community Guide: A Guide on How to Update the Voluntary Carbon-Free Electricity (CFE) Market System to Activate a Broader Menu of Procurement Options Available to Energy Customers and Advance Systemic Grid Decarbonization*, Clean Energy Buyers Institute (CEBI), September 2022, at 6.

resources to complement and balance variable renewable resources – a role largely filled today by fossil generation. In 2021, The NorthBridge Group published a review and assessment of over 40 studies from a diverse group of analysts at consulting firms, universities and research organizations examining the technological and economic feasibility of deep decarbonization. Among its conclusions, The NorthBridge Group found broad agreement that "a diverse portfolio of clean energy technologies, including variable renewables (primarily wind and solar) and firm electric generating technologies, is needed to maintain reliable low-cost electric service, provide flexibility to overcome important economic and deployment uncertainties, achieve decarbonization goals in regions of the country where variable renewable technologies are less competitive and decarbonize non-electric sectors of the economy."[57] Similarly, a 2018 study by Sepulveda, et al. provides a "comprehensive techno-economic evaluation of two pathways: one reliant on wind, solar, and batteries, and another also including firm low-carbon options (nuclear, bioenergy, and natural gas with carbon capture and sequestration)." The study finds that, "[a]cross all cases, the least-cost strategy to decarbonize electricity includes one or more firm low-carbon resources. Without these resources, electricity costs rise rapidly as CO2 limits approach zero. Batteries and demand flexibility do not substitute for firm resources. Improving the capabilities and spurring adoption of firm low-carbon technologies are key research and policy goals."[58] A 2018 literature review by Jenkins, et al. reviews 40 studies of pathways to achieve 80-100% reduction in power sector emissions. Certain studies assess meeting decarbonization targets while relying primarily or entirely on variable renewable energy in combination with energy storage and demand management, while other studies rely on those resources plus a range of firm carbon-free resources. Among the literature review's conclusions, the authors find: "Whichever path is taken, we find strong agreement in the literature that reaching near-zero emissions is much more challenging – and requires a different set of low carbon resources – than comparatively modest emissions reductions (e.g., CO2 reductions of 50%–70%). This is chiefly because more modest goals can readily employ natural gas-fired power plants as firm resources. Pushing to near-zero emissions requires replacing the vast majority of fossil fueled power plants or equipping them with CCS." [59]

3) **The Existing GHG Protocol Is Not Aligned with the Actions Needed to Achieve Decarbonization.** The rapid decarbonization of the electricity sector is an essential component in achieving net-zero emissions by mid-century, both to mitigate that sector's emissions and because of the need to use electrification to decarbonize other sectors of the economy. However, the Protocol's methods for measuring Scope 2 emissions in their current forms are not adequately aligned with the pathways and actions that are urgently needed in the electric grid to achieve new, more ambitious net-zero GHG emission goals in an affordable and reliable manner. Existing rules and rewards programs for large buyer decision making effectively impede the very actions buyers must take to help decarbonize the global electricity sector. Scope 2 gives equal credit to electricity

[57] Bruce Phillips, Neil Fisher, and Anjie Liu, *Review and Assessment of Literature on Deep Decarbonization in the United States: Importance of System Scale and Technological Diversity*, The NorthBridge Group, April 2021, p. 4.
[58] Sepulveda et al., *The Role of Firm Low-Carbon Electricity Resources in Deep Decarbonization of Power Generation*, November 2018.
[59] Jesse Jenkins, Max Luke, and Samuel Thernstrom, *Getting to Zero Carbon Emissions in the Electric Power Sector*, December 2018.

procurement transactions irrespective of the degree to which those transactions actually reduce emissions associated with a reporting entity's electricity use, actually impact emissions into the atmosphere, or enhance reliability in balancing CFE with load at all times and locations.[60] This allows companies to report emissions reductions even in the absence of true reductions. The Protocol is not currently able in many instances to distinguish between next generation transactions with high carbon reduction impact and buyer actions with lower carbon reduction impact.[61, 62]

4) **Temporal and Locational Matching of EACs with Consumption on a 24/7 Basis Supports the Development of a Diverse Mix of CFE Technologies and Balancing Resources Needed to Achieve Deep Grid Decarbonization.**

Detailed system analysis across various markets supports the link between pursuing 24/7 procurement goals and the development of a diverse mix of CFE generation and balancing resources.[63]

- "24/7 supports development of wider mix of technologies needed to reach net zero. A key finding is that when companies set more granular goals – such as matching their electricity demand hourly (rather than annually as has been the dominant practice) – it can stimulate deployment of the wider portfolio of flexible technologies needed for net zero transitions in the power sector." (*IEA study*, at 3)
- "Annual goals do not support all the solutions needed. Goals based on annual matching of electricity or only targeting emissions do not deliver all the technologies that will be needed as power systems decarbonize and reach higher renewables integration phases." (*IEA study*, at 7)

[60] Not all CFE MWh have the same value. Timing, location, and transmission constraints matter when matching customer load within a market area. Timing, location and the resources displaced by incremental CFE matter when determining avoided emissions. A diverse mix of resources, including firm, dispatchable, balancing, load management, and transmission resources are needed to maintain reliability on the grid within a market area.
[61] These problems are discussed at length in *Modernizing How Electricity Buyers Account and are Recognized for Decarbonization Impact and Climate Leadership*, Roger Ballentine, Patrick Falwell, Liana Biasucci and Neil Fisher, Green Strategies and The NorthBridge Group, August 2022.
[62] Ben Elgin and Sinduja Rangarajan, *What Really Happens When Emissions Vanish*, Bloomberg, October 2022. *Carbon Offset: Last Week Tonight with John Oliver*, John Oliver, August 2022. Anders Bjørn, Shannon Lloyd, Matthew Brander, and H. Damon Matthews, *Renewable Energy Certificates Threaten the Integrity of Corporate Science-Based Targets*, Nature Climate Change, June 2022. Phred Dvorak, *Climate-Reporting Rules Could Let Companies Look Greener Than They Are*, Wall Street Journal, April 2022. *University of Edinburgh's Resources and Evidentiary Literature on Renewable Energy Purchasing and the Market-based (Scope 2) Method*, January 2023.
[63] Enrique Gutierrez, Julia Guyon, Craig Hart, Zoe Hungerford, and Luis Lopez, *Advancing Decarbonisation Through Clean Electricity Procurement*, International Energy Agency, November 2022. Iegor Riepin and Tom Brown, *System-Level Impacts of 24/7 Carbon-free Electricity Procurement in Europe*, Department of Digital Transformation in Energy Systems, TU Berlin, October 2022. Xu and Jenkins, *Electricity System and Market Impacts of Time-based Attribute Trading and 24/7 Carbon-free Electricity Procurement*, Princeton University, Zero-carbon Energy Systems Research and Optimization Laboratory (ZERO Lab), September 2022. Long Duration Energy Storage Council, *A Path Towards Full Grid Decarbonization with 24/7 Clean Power Purchase Agreements*, May 2022. Melissa Lott & Bruce Phillips, *Advancing Corporate Procurement of Zero Carbon Electricity in the United States: Moving from RE100 to ZC100*, Columbia University and The NorthBridge Group, December 2021. *24/7 Carbon-Free Energy Compact*, United Nations, September 2021.

- "Matching the corporate demand profile on an hourly basis (or less) with demand and generation both located within the same grid delivers more robust emissions reduction in high-renewables systems and drives deployment of a more diverse and flexible portfolio of clean technologies and solutions." (*IEA study*, at 7)
- "IEA modelling for India and Indonesia shows that hourly matching strategies (as compared to annual) lead to a more diverse technology portfolio, including clean dispatchable generation and storage." (*IEA study*, at 11)
- "Importantly, as achieving hourly matching requires more control over generation and demand, these goals guide corporates to procure more diverse and flexible clean technologies and solutions…As a result, corporates adopting these strategies provide a more comprehensive contribution to bringing power systems along the net zero transition and can lead the way in developing the technologies needed." (*IEA study*, at 23)
- "Early deployment by corporates of firm clean electricity generation or advanced storage options that have higher costs can help spur cost declines, ultimately making these technologies more cost-effective." (*IEA study*, at 70)
- "For companies seeking to help lead net zero transitions, more granular strategies such as hourly matching can deliver the full portfolio of technologies needed to decarbonise the entire power sector." (*IEA study*, at 74)
- "24/7 CFE drives early deployment of advanced, "clean firm" generation and / or long-duration energy storage, creating initial markets for deployment, innovation, and cost-reductions that make it easier for societal at large to follow the path to 100% carbon-free electricity." (*Princeton study*, at 5)
- "24/7 CFE can eliminate carbon dioxide emissions associated with a buyer's electricity consumption, going beyond the impact of procurement of renewable energy to meet 100% of annual volumetric demand. 24/7 CFE can also drive greater system level emissions reductions than 100% annual matching if the CFE target is high enough, via expediting the exit of natural gas generating capacity and production from the electricity system." (*Princeton study*, at 5)
- "24/7 CFE procurement would create an early market for the advanced technologies, stimulating innovation and learning from which the whole electricity system would benefit." (*TU Berlin study*, at 11)
- "24/7 carbon-free energy (CFE) procurement leads to lower emissions for both the buyer and the system, as well as reducing the needs for flexibility in the rest of the system." (*TU Berlin study*, at 11)
- "Hourly procurement strategies can create demand for emerging technologies needed to fully decarbonize the grid." (*RMI study*, at 21)
- "Hourly procurement strategies can illustrate technology combinations and balancing strategies that, at scale, could contribute to balancing a fully decarbonized grid." (*RMI study*, at 9)
- "Science-based targets for climate change mitigation call for both maximizing near-term emissions reductions, in order to limit the cumulative carbon emissions that drive temperature rise, and reaching net-zero emissions by mid-century or sooner to avoid further warming. Carefully designed hourly procurement strategies can best support both outcomes

if they take into account current grid dynamics and emissions reduction opportunities, as well as create incentives for the technology needed to fully decarbonize the grid." (*RMI study*, at 7)

- "To fully decarbonize our electricity supply, we will focus on ensuring that each hour of our consumption is fully matched by carbon-free electricity generation. Focusing on hourly measurement helps connect our corporate sustainability goals to the physical reality of the grid systems and energy markets where we operate." (Google, *24/7 Carbon-Free Energy: Methodologies and Metrics*, at 4)
- "…our 24/7 CFE goal is focused on decarbonizing our electricity supply on every grid where we operate. The emissions that Google is responsible for through our electricity consumption vary based on the carbon intensity of the grids where we operate and our procurement of clean electricity on those same grids. Focusing on the locations where we operate is the only way to drive the electricity-related emissions that we are directly responsible for to zero." (Google, *24/7 Carbon-Free Energy: Methodologies and Metrics*, at 4)
- "With our new 24/7 CFE goal, we are deliberately opening up the technology envelope to encompass all carbon-free energy technologies which we believe will play important roles in enabling decarbonization of electricity grids. Existing CFE sources like hydro and nuclear power already make significant carbon-free contributions to grids around the world, and numerous studies show that reducing emissions to zero by mid-century, so-called 'deep decarbonization,' is more feasible and cost-effective with a diverse portfolio of carbon-free resources." (Google, *24/7 Carbon-Free Energy: Methodologies and Metrics*, at 4-5)
- "The results of our analysis demonstrate that targeting a diverse portfolio of carbon-free technologies can most cost-effectively decarbonize electricity demand. This approach is particularly helpful at higher levels of decarbonization, as the marginal contribution of any one type of technology decreases." (Google, *24/7 Carbon-Free Energy: Methodologies and Metrics*, at 19)
- Market experience also demonstrates that organizations pursuing 24/7 procurement strategies are more likely to include some form of firm CFE and storage resources in their clean energy portfolio mix[64] compared to organizations that rely on traditional wind and solar PPAs when pursuing goals related to annual matching or maximizing avoided emissions.

5) **Reducing Scope 2 Market-Based Emissions Inventories or Additionality Should Not Considered as a Replacement for a More Accurate and Direct Assessment of Emissions Reductions to the Atmosphere.**

See responses to questions #5a through #5c above. The effectiveness of this proposal can be evaluated and tracked over time using a standardized reporting format, like shown in the NB/GS Standardized Reporting Format Proposal. Modernization of the measurement of reductions in Scope 2 market-based emissions inventories is discussed more fully in the NB/GS Market-Based Modernization Proposal (See Proposals 1a through 1h).

[64] Google_AES includes repowered hydro and storage (announced May 2021); Google_NV Energy includes storage (Dec 2020), Google_Fervo includes geothermal (May 2021), Iron Mountain_RPD Energy includes nuclear (April 2021), Microsoft_Vattenfall includes hydro (Nov 2019), Peninsula Clean Energy includes geothermal, small hydro and storage (Jan 2023), Standard Power_Energy Harbor includes nuclear (July 2021).

9. If applicable, describe the process or stakeholders/groups consulted as part of developing this proposal.

Over the past four years, we have participated in numerous discussions with stakeholders and working groups as part of developing this proposal, including:

- **NextGen Carbon-Free Electricity Procurement Project**, partnership with Clean Air Task Force, Green Strategies, Inc. and The NorthBridge Group, Inc.
- Conferences and consultations with Clean Energy Buyers Alliance (CEBA) members and Clean Energy Buyers Institute's (CEBI) Next Generation Carbon-Free Electricity Procurement Initiative
- Participation in Columbia University Center on Global Energy Policy stakeholder workshops on the GHG Protocol update
- Participation in EnergyTag granular certificate standards development and working groups[65]
- Consultations with utilities and wholesale suppliers
- Consultations with other environmental non-profits and registries[66]
- Consultations with technology software and blockchain developers[67]

We also reviewed numerous studies, academic papers, and articles in the process of developing this proposal (see response to question #10 below). Based on our participation in these conversations and review of these studies and articles, we have found that stakeholder positions related to Scope 2 market-based accounting fall into four general categories:

1) Some stakeholders support continuing **Scope 2 market-based attributional inventory reporting and adding a preference for use of more granular data** tied to the timing and location of a buyer's consumption.

2) Some stakeholders support **eliminating Scope 2 market-based** accounting **and replacing it with only a consequential avoided emissions impact** accounting/disclosure (Avoided Emissions). Some also suggest comparing this to a buyer's carbon emissions baseline (CEB) to provide

[65] The EnergyTag Granular Certificate Scheme Standard details how certificates should be issued, transferred and retired to avoid double-counting. The Standard has the support of over 100 organizations from around the world, including UN Energy and most of the world's largest electricity providers, buyers, and trade associations. It was developed with the oversight of the world's leading energy attribute system experts. EnergyTag's Chair founded and ran the Association of Issuing Bodies, which oversees the world's largest energy attribute system today, the European Guarantee of Origin, which tracks over 30% of European electricity.

[66] In the United States, M-RETs, the world's largest registry operator, has piloted GCs successfully and can offer hourly tracking across many states in the U.S today. The I-REC registry operates in over 55+ countries and is offering its GC solution for customers around the world.

[67] Various granular certificate and hourly matching software providers can offer hourly tracking today to their customers (e.g., Flexidao, Granular Energy, Powerledger, Cleartrace, etc.).

better context, where the CEB equals a buyer's consumption at a specific time and location multiplied by the marginal emissions factor at that time and location.

3) Some stakeholders support **retaining and improving the accuracy of Scope 2 market-based inventories** (like in #1) **and separately reporting the consequential emissions impact of their actions.** (like in #2).

4) Some stakeholders support **combining both approaches** – e.g., **calculating avoided emissions (#2 above) and comparing them to / netting them against their emissions inventory from their load (#1 above)**.

Our recommendation at this time is to adopt the third approach, which we believe would address many of the concerns raised by stakeholders, and provide better insight to measure, incentivize, and recognize the climate impact of the range of procurement and other actions taken by reporting entities.

10. If applicable, provide any additional information not covered in the questions above.

Next Generation Procurement – Key Papers and Articles

The NorthBridge Group assembled the following list of papers and articles that discuss efforts to 1) match CFE with load on a 24/7 basis; 2) measure avoided emissions; 3) modernize the GHG Protocol and Scope 2 accounting; 4) understand the impact and value of voluntary procurement efforts; and 5) develop environmental liability accounting.

(Sorted by topic and date)

Matching CFE Supply with Load (24/7)

1. Jan Pepper, Greg Miller, Sara Maatta and Mehdi Shahriari, *Achieving 24/7 Renewable Energy By 2025*, Peninsula Clean Energy, January 2023.
2. Adam Diamant, *24/7 Carbon-Free Energy: Matching Carbon-Free Energy Procurement to Hourly Electric Load*, EPRI, December 2022.
3. Emily Pontecorvo, *How a New Subsidy for 'Green Hydrogen' Could set off a Carbon Bomb, Grist*, December 2022.
4. International Energy Agency, *Advancing Decarbonisation Through Clean Electricity Procurement*, November 2022.
5. Iegor Riepin and Tom Brown, *System-Level Impacts of 24/7 Carbon-free Electricity Procurement in Europe*, Department of Digital Transformation in Energy Systems, TU Berlin, October 2022.
6. Xu and Jenkins, *Electricity System and Market Impacts of Time-based Attribute Trading and 24/7 Carbon-free Electricity Procurement*, Princeton University, Zero-carbon Energy Systems Research and Optimization Laboratory (ZERO Lab), September 2022.
7. Roger Ballentine, Patrick Falwell, Liana Biasucci and Neil Fisher, *Modernizing How Electricity Buyers Account and are Recognized for Decarbonization Impact and Climate Leadership*, Green Strategies and The NorthBridge Group, August 2022.
8. Long Duration Energy Storage Council, *A Path Towards Full Grid Decarbonization with 24/7 Clean Power Purchase Agreements*, May 2022.

9. *CATF Comments on U.S. Federal Government Request for Information Regarding its Plan to Transition the Federal Government to a Carbon-Free Electricity Supply*, March 2022.
10. Melissa Lott & Bruce Phillips, *Advancing Corporate Procurement of Zero Carbon Electricity in the United States: Moving from RE100 to ZC100,* Columbia University and The NorthBridge Group, December 2021.
11. *24/7 Carbon-Free Energy Compact*, United Nations, September 2021.
12. Bruce Phillips, Neil Fisher, and Anjie Liu, *Review and Assessment of Literature on Deep Decarbonization in the United States: Importance of System Scale and Technological Diversity*, The NorthBridge Group, April 2021.
13. Google*, 24/7 Carbon-Free Energy: Methodologies and Metrics,* February 2021.
14. Sepulveda et al., *The Role of Firm Low-Carbon Electricity Resources in Deep Decarbonization of Power Generation*, ScienceDirect, November 2018.
15. Google, *Moving toward 24x7 Carbon-Free Energy at Google Data Centers*, *https://storage.googleapis.com/gweb-sustainability.appspot.com/pdf/24x7-carbon-free-energy-data-centers.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top*, October 2018.

Measuring Avoided Emissions

1. Emissions First Partnership, https://www.emissionsfirst.com/, December 2022.
2. Greg Miller, *Applying the Consequential Emissions Framework for Emissions-Optimized Decision-Making for Energy Procurement and Management* and *Guide to Sourcing Marginal Emissions Factor Data*, Clean Energy Buyers Institute, November 2022.
3. Enrique Gutierrez, Julia Guyon, Craig Hart, Zoe Hungerford, and Luis Lopez, *Advancing Decarbonisation Through Clean Electricity Procurement*, International Energy Agency, November 2022.
4. David Luke Oates, *Making It Count Updating Scope 2 Accounting to Drive the Next Phase of Decarbonization*, REsurety, October 2022.
5. Gavin McCormick, *How Impact Accounting Can Accelerate Corporate Emissions Reductions*, WattTime, GreenBiz, October 2022.
6. Henry Richardson, *Accounting for Impact, Refocusing GHG Protocol Scope 2 Methodology on 'Impact Accounting,'* WattTime, September 2022.
7. Roger Ballentine, Patrick Falwell, Liana Biasucci and Neil Fisher, *Modernizing How Electricity Buyers Account and are Recognized for Decarbonization Impact and Climate Leadership*, Green Strategies and The NorthBridge Group, August 2022.
8. Samuel Huestis, Charles Cannon, Sahithi Pingali, *Approach to Quantify Net Material Emissions Impact of Renewable Energy Purchases*, RMI, Draft V1.0, May 2022.
9. *Rivian and Clearloop Partner on Solar Project That Carves a New Path for More Impactful Corporate Renewable Procurement*, Clearloop, April 2022.
10. Pieter Gagnon and Wesley Cole, *Planning for the Evolution of the Electric Grid with a Long-Run Marginal Emission Rate*, National Renewable Energy Laboratory, March 2022.
11. Dr. David Luke Oates and Dr. Kathleen Spees, *Locational Marginal Emissions A Force Multiplier for the Carbon Impact of Clean Energy Programs*, REsurety and The Brattle Group, March 2022.
12. Hua He, Aleksandr Rudkevich, Xindi Li, Richard Tabors, Alexander Derenchuk, Paul Centolella, Ninad Kumthekar, Chen Ling, Ira Shavel, *Using Marginal Emission Rates to Optimize*

Investment in Carbon Dioxide Displacement Technologies, Tabors Caramanis Rudkevich, The Electricity Journal, Volume 34, November 2021.
13. Qingyu Xu et al., *System-level Impacts of 24/7 Carbon-free Electricity Procurement*," Zero-carbon Energy Systems Research and Optimization Laboratory, Princeton University, November 2021.
14. Olivier Corradi, Gavin McCormick, Henry Richardson, Trevor Hinkle, *A Vision for how Ambitious Organizations can Accurately Measure Electricity Emissions to take Genuine Action*, Electricity Map and WattTime, August 2021.
15. Richard Tabors, *Marginal Emission Rate: The Needed Metric of Carbon Displacement in an Increasingly Electrified World*, Tabors Caramanis Rudkevich, July 2021.
16. Mark Dyson, Sakhi Shah, and Chaz Teplin, *Clean Power by the Hour Assessing the Costs and Emissions Impacts of Hourly Carbon-Free Energy Procurement Strategies*, RMI, July 2021.
17. Dr. Wenbo Shi and Mohammad Karimzadeh, *Automating Load Shaping for EVs: Optimizing for Cost, Grid Constraints, and… Carbon?*, Singularity Energy and Sense Labs, June 2021.
18. Matthew Brander, *The Most Important GHG Accounting Concept You May Not Have Heard of: the Attributional Consequential Distinction*, GHG Management Institute, March 2021.
19. *Nucor, Emissionality, and the Pursuit of Green Steel*, WattTime, December 2020.
20. Salesforce, *More than a Megawatt: Embedding Social & Environmental Impact in the Renewable Energy Procurement Process*, October 2020.
21. *WattTime Partners with Salesforce to Incorporate 'Emissionality' into Renewable Energy Procurement Strategy*, WattTime, October 2020.
22. *A Study in Emissionality: Why Boston University Looked Beyond New England for Its First Wind Power Purchase,* Renewable Energy World, January 2019.
23. Matthew Brander, Michael Gillenwater, Francisco Ascuia, *Creative Accounting: A Critical Perspective on the Market-Based Method for Reporting Purchased Electricity (Scope 2) Emissions,* Centre for Business and Climate Change at University of Edinburgh Business School and GHG Management Institute, Elsevier, 2018.
24. Rudkevich, A. & Ruiz, Pablo, (2012), *Locational Carbon Footprint of the Power Industry: Implications for Operations, Planning and Policy Making*, March 2012.
25. Rudkevich, Aleksandr, John Hancock Tower, and T. Clarendon Street, *Locational Carbon Footprint and Renewable Portfolio Standards*, Proceedings of the 7th conference economics energy markets, 2010.

Need for Modernization of GHG Protocol or Concerns About Greenwashing

1. Caroline O'Doherty, *Electricity Firms Told to Drop 'False' 100% Green Power Claims*, February 2023.
2. *University of Edinburgh's Resources and Evidentiary Literature on Renewable Energy Purchasing and the Market-based (Scope 2) Method*, January 2023.
3. Heather Clancy, *Emissions Accounting Needs a Makeover, and It's Coming*, Greenbiz, January 2023.
4. Matthew Brander and Anders Bjørn, *Principles for Accurate Corporate GHG Inventories and Options for Market-Based Accounting – Working Paper*, December 2022.
5. United Nations' High-Level Expert Group on the Net Zero Emissions Commitments of Non-State Entities, *Integrity Matters: Net Zero Commitments By Businesses, Financial Institutions, Cities And Regions*, November 2022.
6. Ben Elgin and Sinduja Rangarajan, *What Really Happens When Emissions Vanish*, Bloomberg, October 2022.

7. Roger Ballentine, Patrick Falwell, Liana Biasucci and Neil Fisher, *Modernizing How Electricity Buyers Account and are Recognized for Decarbonization Impact and Climate Leadership*, Green Strategies and The NorthBridge Group, August 2022.
8. *Carbon Offset: Last Week Tonight with John Oliver*, John Oliver, August 2022.
9. Anders Bjørn, Shannon Lloyd, Matthew Brander, and H. Damon Matthews, *Renewable Energy Certificates Threaten the Integrity of Corporate Science-Based Targets*, Nature Climate Change, June 2022.
10. Phred Dvorak, *Climate-Reporting Rules Could Let Companies Look Greener Than They Are*, Wall Street Journal, April 2022.
11. *Clean Air Task Force Comments on SEC's Proposed Climate Risk Disclosure Rules*, CATF and Green Strategies, June 2022
12. Meredith Fowlie, *Here Comes Climate Disclosure Regulation*, Energy Institute Blog, UC Berkeley, October 2021.

Next Generation Procurement (General) and Value of Voluntary Procurement

1. Doug Miller, *The NextGen Activator Community Guide: A Guide on How to Update the Voluntary Carbon-Free Electricity (CFE) Market System to Activate a Broader Menu of Procurement Options Available to Energy Customers and Advance Systemic Grid Decarbonization*, Clean Energy Buyers Institute (CEBI), September 2022.
2. *Transcript (and Podcast): Ezra Klein Interviews Jesse Jenkins*, September 2022.
3. Armond Cohen, *It's Time We Update Our Corporate Electricity Procurement Standards to Decarbonize the Electric Grid*, Clean Air Task Force, August 2022.
4. James Sallee, *Voluntary Green Power to the Rescue?*, Energy Institute at Haas Blog, August 2022.
5. Jenny Heeter, Eric O'Shaughnessy, and Rebecca Burdet, *Status and Trends in the Voluntary Market (2020 data)*, NREL, September 2021.
6. Lori Bird, Eric O'Shaughnessy, and Norma Hutchinson, *Actions Large Energy Buyers Can Take To Transform And Decarbonize The Grid: Procurement Practices For Achieving 100% Carbon Free Electricity*, WRI, August 2021.
7. James Kobus, Ali Ibrahim Nasrallah, and Jim Guidera, *The Role of Corporate Renewable Power Purchase Agreements in Supporting US Wind and Solar Deployment*, Columbia University Center on Global Energy Policy, March 2021.
8. *Why Corporate Energy Buyers Should "Go to 11"*, Roger Ballentine and Armond Cohen, Green Strategies and Clean Air Task Force, GreenBiz, February 2021.

Environmental Liability Management Accounting

1. Alicia Seiger and Marc Roston, Working Paper, *The Road to Climate Stability Runs through Emissions Liability Management*, Stanford Steyer-Taylor Center for Energy Policy & Finance, November 2022.
2. Alicia Seiger and Marc Roston, Authors' Note, *From Carbon Counting to Carbon Accounting: The Case for Emissions Liability Management*, Stanford Steyer-Taylor Center for Energy Policy & Finance, November 2022.
3. Robert Kaplan and Karthik Ramanna, *Accounting for Climate Change*, Harvard Business Review, November/December 2021.
4. Robert Kaplan and Karthik Ramanna, *We Need Better Carbon Accounting. Here's How to Get There, Harvard Business Review*, April 2021.

Proposal Annex

GHG Protocol Decision-Making Criteria and Hierarchy

A. First, GHG Protocol accounting and reporting approaches shall meet the GHG Protocol accounting and reporting principles:

- Accuracy, Completeness, Consistency, Relevance, Transparency
- Additional principles for land sector activities and CO_2 removals: Conservativeness, Permanence, and Comparability if relevant
- (See table below for definitions)

B. Second, GHG Protocol accounting and reporting approaches shall align with the latest climate science and global climate goals (i.e., keeping global warming below 1.5°C). To support this objective (non-exhaustive list):

- Direct emissions reported in a company's inventory should correspond to emissions to the atmosphere. Reductions in direct emissions reported in a company's inventory should correspond to reductions in emissions to the atmosphere.
- Indirect emissions reported in a company's inventory should in the aggregate correspond to emissions to the atmosphere. Reductions in indirect emissions reported in a company's inventory should in the aggregate correspond to reductions in emissions to the atmosphere.

C. Third, GHG Protocol accounting frameworks should support ambitious climate goals and actions in the private and public sector:

- Accounting framework/s would enable organizations to pursue more effective GHG mitigation/decarbonization efforts as compared to the existing standards and guidance
- Accounting framework/s would better inform decision making by reporting organizations and their stakeholders (e.g. related to climate-related financial risks and other relevant information associated with GHG emissions reporting)

D. Fourth, GHG Protocol accounting frameworks which meet the above criteria should be feasible to implement for the users of the frameworks.

- For aspects of accounting frameworks that meet the above criteria but are difficult to implement, GHG Protocol should provide additional guidance and tools to support implementation.

GHG Protocol Accounting and Reporting Principles

Principle	Definition
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.
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.

Consistency	Use consistent methodologies to allow for meaningful performance tracking of emissions (and removals, if applicable) over time and between companies. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.
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.
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.
Conservativeness (Land Sector and Removals Guidance)	Use conservative assumptions, values, and procedures when uncertainty is high. Conservative values and assumptions are those that are more likely to overestimate GHG emissions and underestimate removals, rather than underestimate emissions and overestimate removals.
Permanence (Land Sector and Removals Guidance)	Ensure mechanisms are in place to monitor the continued storage of reported removals, account for reversals, and report emissions from associated carbon pools.
Comparability (optional) (Land Sector and Removals Guidance)	Apply common methodologies, data sources, assumptions, and reporting formats such that the reported GHG inventories from multiple companies can be compared.