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Rethinking the Greenhouse Gas Protocol: Insights from an Expert Stakeholder Engagement

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The Greenhouse Gas Protocol (GHGP) was originally designed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) in 1998 to provide public and private sector organizations in the United States tools for measuring and reporting their greenhouse gas emissions. Since then, it has expanded to include standards, guidance, and trainings that hundreds of organizations draw on in seeking to fulfill their climate commitments. These commitments can support accelerated progress toward achieving broader climate change mitigation goals (e.g., net-zero targets) if they result in real and permanent emissions reductions. But as more organizations turn to the GHGP for guidance on tracking their own emissions, they have raised questions as to whether the GHGP in its current form is still fit for that purpose or, if not, how it can be updated.

As a response to such questions, in 2022 WRI and WBCSD initiated a process for reexamining the long-standing GHGP. Because this process is technically complex, requiring extensive stakeholder

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engagement through online surveys and an open call for proposals as well as technical analysis of the merits of proposed solutions for real emissions reductions, it risks the creation of echo chambers where similarly minded groups provide input but dialogue is absent.

In 2022–23, the Center on Global Energy Policy (CGEP), Columbia University SIPA held a series of five workshops aimed at fostering such a dialogue in support of the larger goal of identifying potential improvements to the GHGP that WRI and the organizations that participate in future working groups may wish to consider. Participants included a diverse group of stakeholders in the GHGP, including representatives of WRI, though the series was not commissioned by WRI. Topics discussed included the overall purpose of the GHGP; proposed changes to Scope 2 and (separately) Scope 3 accounting and reporting; the overall policy and regulatory landscape affecting norms for greenhouse gas accounting and reporting beyond the GHGP, including the development of e-liability; climate justice and the implications of equivalences; and the potential impacts of proposed changes to the GHGP, specifically for Scope 2 and Scope 3.

CGEP has published a summary of these workshops separately.[1] This commentary reflects on the insights that emerged from them. These insights focus on electricity sector emissions due to their significant role in current total emissions as well as the electricity sector's large role in pathways to achieving net zero. At a high level, this commentary identifies six areas that WRI could prioritize in its ongoing reexamination process and presents a set of recommendations for each.

These areas include:

1. The stakeholder "tradeoffs" lens
2. The allocation of emissions
3. Mapping emissions and defining the relevant market
4. Temporal considerations
5. Accounting treatment of resources built during the development of and transition to new GHGP rules
6. Geographic diversity in grid data

The commentary also discusses the potential value of future partnerships with fellow convening organizations in terms of leading specific work streams or building understanding and constructive dialogue across stakeholder groups around particular issues.

The Stakeholder 'Tradeoffs' Lens

The group of stakeholders in the workshop series was diverse, and individuals frequently lacked familiarity with each other's business models, never previously having interacted or crossed paths. Organic conversations followed a somewhat predictable pattern: establishing a shared baseline, probing for the parameters of a problem, identifying subsets of problems or solutions, and then prioritizing them based on their merits. In these conversations, stakeholders frequently discussed specific problems of their field without explicitly stating their individual contexts and any biases attached to them (e.g., "I come from agriculture, and so..."). Sharing language, definitions, and/or parameters, they would initially assume agreement or alignment on a given problem or solution. Before long, though, they would realize that the implications of that problem or solution for their specific organization, industry, or region might actually put them at odds with other stakeholders. In essence, stakeholders had different understandings of shared problems and also potential solutions based on their individual contexts or needs.

Recommendations

1. As WRI engages with highly diverse stakeholders to negotiate the future of the GHGP it may benefit from explicitly establishing individual contexts. This could be done after establishing a shared baseline understanding of a problem or solution but prior to deepening the discussion. It is reasonable to expect that negotiations are more likely to succeed when the parties understand who sits across the table.

2. Every change in the GHGP is a choice that is accompanied by tradeoffs, the impacts of which will be borne across stakeholder groups unsymmetrically. Viewing future discussions through the lens of tradeoffs may be a constructive approach to establishing consensus among stakeholders.

Allocating Emissions

Participants in the workshop series generally agreed that the existing Scope 2 market-based model has incentivized the deployment of wind and solar generation and gigawatt-scale investments in clean energy technologies. However, participants suggested that Scope 2 accounting is not incentivizing enough investment to support ambitions related to the Paris Climate Agreement (i.e., rapidly reducing emissions to net zero while limiting cumulative greenhouse emissions to the point where global average temperature rise is limited to well below 2°C). They also expressed concerns that the current GHGP is not accurately measuring emissions from electricity use, which, depending on the context, could lead to either undercounting or double counting.

One potential response to these concerns could be an approach in which all entities use a common framework of responsibility and comparable methodology to their consumption. The former would require that all entities use the same locational grid data over a specified time period for settlement. The latter would ensure that the sum of emissions from electricity production that is allocated to each user of a given electricity system equals 100 percent of total system emissions (i.e., the total emissions across all consumers would equal the emissions produced on a pool-wide basis, adjusted for imports/exports and behind-the-meter production and consumption). The share could be weighted by carbon intensity or other metrics, while accounting for all greenhouse gas emissions across the relevant market.

Related to this, current consumer commitments to reduce greenhouse gas emissions frequently involve procuring 100 percent renewable electricity on an annual basis (i.e., contracting for the amount of kilowatt-hours the consumer uses over the course of a year). However, as shown in a previous analysis by CGEP,[2] this approach may not mean that a company actually reduces its power carbon footprint to zero due to timing mismatches between when a consumer uses electricity and when that electricity is produced. This previous analysis estimated that companies that contract for 100 percent renewables draw between 20 and 50 percent of their annual electricity from the regional electric grid, depending on their location, demand profile, and mix of contracted renewable supplies.

Including emissions from the residual system mix is a critical component of individual customer greenhouse gas accounting. In these calculations, "residual system mix" represents the carbon intensity of any resources that emit greenhouse gases and takes into account any resources needed to ensure the reliability of the grid (e.g., what's needed for resource adequacy, ancillary services, and other related services). Put another way, these resources make sure that electricity supply is enough to meet the customer's demand at any instant in time. Batteries can provide some of these services, but other electricity supply technologies—in addition to variable renewables—are likely needed to support a reliable, affordable, and low-carbon electricity system. This accounting approach can provide strong investment signals that target high emission hours and support investments in electricity markets that have emissions-intensive residual system mixes. This approach could also help to avoid the situation in which customers take credit for purchases of clean energy that do not, in practice, result in reducing their emissions to zero.

One potential pathway forward is to determine the impact of clean energy purchases by the entity on the residual system mix by looking at the short-run or long-run marginal carbon intensity of the grid at the time when the energy was produced, or on the basis of another temporal metric as discussed in greater detail below.

Recommendation

Consider adopting a principle that the sum of emissions from electricity generation allocated to each user of a given electrical system should equal 100 percent of total system emissions.

Mapping Emissions and Defining the Relevant Market

Consider adopting a principle that the sum of emissions from electricity generation allocated to each user of a given electrical system should equal 100 percent of total system emissions.

While electricity that is purchased by but not deliverable to a particular customer may contribute to a cleaner electricity system overall, it is unlikely to entirely eliminate the greenhouse gases attributable to the purchasing entity. Furthermore, the current practice of allowing a megawatt-hour for megawatt-hour offset based on today's framework of annual accounting and wide geographic boundaries is unlikely to support total decarbonization of the power grid and could result in double counting of emissions reductions, something that critics have called greenwashing. The importance of geographic matching was highlighted in a report by CGEP3 that also found that hourly matching is essential to achieving net-zero goals at a company level.

Any type of deliverability metric would likely require defining the electrical boundaries of the relevant market (i.e., the footprint of a purchasing entity) in which the load is located and measuring emissions from resources within the relevant market. In general, smaller (i.e., more granular) market boundaries would be preferred over larger zones. It is reasonable to suggest that:

- The boundaries of a given organized electricity market (ISO/RTO in the United States or the equivalent globally) likely represent the broadest geographic area in which electricity that is purchased should be considered to be deliverable.
- It is reasonable to require that any accounting allocations should respect the boundaries established by known transmission constraints within a larger market area.
- The reporting organization should use the highest level of transmission granularity permitted by the available data.

Recommendation

Consider adopting an emissions reporting approach that starts by defining the relevant electrical boundaries of the market or utility area in which each electricity consumer operates. Preference should be given to more granular market definitions when possible, given available data.

Temporal Considerations

Moving away from the current annual netting periods (e.g., use of weekly, monthly, seasonal, peak versus off-peak, or other possible comparable measurements given data availability and other practical constraints) and toward hourly periods would likely represent an improvement over the current approach. Among the workshop participants, most agreed that hourly matching of electricity consumption and generation was preferable and, in most (if not all) situations, possible.

Moving toward more precise temporal requirements is likely to be increasingly important, particularly in areas of the electricity grid that are already low carbon or have predictable daily or seasonal emissions profiles. An hourly requirement has the potential to send consumers of electricity a price signal that provides more carbon mitigation credit for actions that result in more emissions reductions (e.g., investments that produce zero-carbon electricity that directly displaces high emissions electricity generation). Hourly requirements may also encourage reporting entities to shift the timing of their electricity consumption from windows when the grid is producing high levels of emissions to windows when the grid is producing lower levels of emissions.

One option for addressing temporal variability is to adopt a carbon-indexed emissions accounting model that “weights” clean energy investments based on their impact on the real-time carbon emissions rate in the relevant electricity market. Carbon-weighting addresses a key concern of convening participants that current carbon accounting regimes do not differentiate between clean energy investments that have limited carbon reduction benefits and those that drive substantial carbon reductions.

This type of carbon-weighting approach recognizes that—from the perspective of emissions mitigation—capital investments that result in production of energy when the real-time carbon intensity of the grid is high is preferred over investments that lead to additional production of low-carbon electricity when the grid is already relatively clean. Thus, it is reasonable to say that a carbon-weighted allocation would incorporate two data points:

- The carbon intensity of the relevant electric grid at the time and place the purchasing entity is taking power off the grid (i.e., consumption)
- The carbon intensity of the relevant electric grid at the time and place the clean energy is produced

Where these data are available, they should be utilized and would result in greenhouse gas accounting metrics that reward electricity production that has higher environmental impact. Using a carbon-emissions rate could fulfill the need for a transparent and replicable carbon tracking mechanism that can achieve many of the hourly and locational matching goals cited by participants in CGEP's prior convenings and publicly available Scope 2 survey feedback to WRI.[4]

Recommendation

Consider moving toward weighting the carbon intensity of consumption and production as the basis for carbon accounting based on hourly carbon intensity metrics at individual points on the electric grid. If real-time data are not available due to data limitations or other significant practical considerations (e.g., timelines for obtaining real-time data), a preference should be given to hourly data or the most granular period of time for which data is available (e.g., use of weekly, monthly, seasonal, peak versus off-peak, or other possible comparable measurements).

Accounting of Resources Built during the Development of and Transition to New GHGP Rules

Among the most contentious issues discussed by workshop participants was the role of "additionality" requirements in greenhouse gas accounting: many viewed additionality requirements as preferable but logistically challenging to implement. A move by GHGP toward requiring consumers to invest in new zero-carbon generation in order to take carbon accounting credit could help to overcome some of these challenges.

The authors believe additionality requirements tend to make existing resources less valuable for carbon compliance and incent investment in new resources. Numerous studies have pointed out that additional clean energy attribute purchases do not necessarily translate into better environmental outcomes unless they induce investment in *new* clean energy resources that would not have been built without a particular set of actions and/or incentives,[5] while economic theory argues that clean megawatts are fungible and that, so long as demand outstrips supply, the price of clean energy will rise to match the long-run cost of adding additional supply.

Thus, the question of whether any given purchase of clean energy attributes will elicit new investments is a complicated and thorny one that could warrant an additional workshop series and further research. In particular, care should be given to questions around what constitutes "new" supply (i.e., do repowerings or uprates count) and how any additionality requirements would affect incentives to maintain existing equipment. Research should also consider how any additionality requirements would affect corporate willingness to continue to invest in early-to-midstage clean energy developments. Since the GHGP revision process is ongoing, "new" investments may become "existing" investments by the time the process is completed. Therefore, regardless of whether the GHGP eventually requires a showing of additionality, the way investments made during the development of and transition to any new rules are treated may be an area of immediate commercial concern to GHGP participants. It is reasonable to think that uncertainty regarding the treatment of near-term investments in the updated GHGP could lead clean energy investors to pull back on new investments until the updates are finalized.

One option for addressing this issue could be to allow investments made prior to finalization of the revised GHGP to lock in the current accounting treatment for a set number of years to ensure that investments continue to be commercially attractive, even during the transition period. Of course, the benefits of such a move would need to be weighed against the added complexity of the accounting process and the reality that some investments would be treated as "new" even though they may have been operating for years and therefore are part of the greenhouse gas emissions baseline.

Recommendation

Consider providing express guidance on how investments made during the period of pending revisions are treated, with the goal of ensuring that investments in clean energy continue throughout what is expected to be a lengthy standards development process.

Geographic Diversity in Grid Data

There is a significant gap in the availability of data and mechanisms to track renewable energy generation, including time and location matching, in many parts of the globe. High-data access markets are those with access to high-quality sources of data, including nodal or zonal pricing and granular energy attribute tracking. Conversely, low-data access markets have less access to transparent data and/or lack access to granular carbon intensity data. This diversity in data availability between regions leads to a risk of "cherry-picking," where organizations pick the reporting methodology that produces the most favorable greenhouse gas emissions outcomes.

Relatedly, a major benefit of the GHGP is its ability to compare corporate operations in various localities and select the areas with the lowest carbon intensity. This also relates to ongoing conversations around the potential for carbon border adjustment policies. Care will need to be taken to ensure that there is a common "translation factor" between high-data access markets and low-data access markets.

Recommendations

1. Consider requiring organizations to use the most sophisticated data available in each region where they operate.

2. Develop protocols for markets with access to abundant grid data and alternative methodologies for regions for which less information is available (i.e., a phased approach).

3. Address markets that may be moving from low-data access to high-data access, including those that are deploying global databases and improving the reporting scheme for greenhouse gas emissions or that are in the process of deploying smart meters or comparable electricity tracking hardware and software.[6]

Notes

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Dr. Melissa C. Lott is a Senior Research Scholar and the Senior Director of Research at the Center on Global Energy Policy, where she leads the Center's research team. She also serves as the lead of the Canter's Power Sector and Renewables Research Initiative and serves as the Acting Director of the Center's Carbontech Development Initiative and Energy Opportunity Lab. Dr. Lott is also an Adjunct Professor in Columbia University's Climate School, where she teaches the graduate level course "Climate Change Mitigation".

Dr. Lott has worked as an engineer and advisor for nearly 20 years in the United States, Europe, and Asia. While her work has spanned the entire energy system, Dr. Lott is internationally recognized for her work in the electricity and transportation sectors. In 2022, she was selected to serve on the United Nations Council of Engineers for the Energy Transition (CEET), which will serve as an independent advisory council to the UN Secretary-General. Dr. Lott is also a current member of the World Economic Forum's Global Future Council on the Future of Economics of Equitable Transition

Dr. Lott specializes in technology and policy research, working to increase our understanding of the impacts of our energy systems on air pollution and public health. She directly applies this understanding to help decision-makers mobilize technology and policy solutions to support the transition to net-zero energy systems. She has authored more than 350 scientific articles, columns, op-eds, journal publications, and reports. Dr. Lott was previously a founding author on Scientific American's Plugged In. An active public speaker, she has been featured in interviews with international news organizations including the New York Times, Wall Street Journal, PBS Newshour, PBS NOVA, the BBC World Service, BBC Singapore, The Guardian, Good Morning America, National Public Radio, Bloomberg, Axios, ABC News PM in Australia, and Scientific American magazine's French edition. She was recently featured in the PBS documentary "Chasing Carbon Zero," which discusses the net-zero energy transition in the United States.

Prior to joining the Center on Global Energy Policy, Dr. Lott served as the Assistant Vice President of the Asia Pacific Energy Research Centre (APERC), where she led the development of the flagship APEC Energy Demand and Supply Outlook. Dr. Lott has also held roles at the International Energy Agency, where she served as the primary author of the IEA's technology roadmap on energy storage. In 2011, Dr. Lott was selected as a U.S. Presidential Management Fellow (PMF). She went on to work as the Lead of Energy Modeling and Simulation for the Program Analysis and Evaluation Office at the U.S. Department of Energy. Dr. Lott has also served as an advisory board member for Alstom and GE and contributed as an expert advisor for government organizations including the London Sustainable Development Commission under Mayor Boris Johnson. Throughout her career, Dr. Lott has worked as a Principal Engineer at YarCom Inc., providing her clients with a practical engineering understanding of the relationships between our energy sources, our energy uses, and the impacts of our choices on the environment. Dr. Lott has been featured as a Solar 100 Thought Leader, an IEEE Women in Power, and a Forbes 30 under 30 in Energy as recognition for her research and contributions to global energy sector dialogues.

Dr. Lott holds degrees from the University of California, Davis (Bachelor of Science – Engineering), the University of Texas at Austin (Master of Science – Engineering and Master of Public Affairs), and University College London (Ph.D. in Sustainable Energy Resources and Engineering). While in university, Dr. Lott completed internships at the White House Council on Environmental Quality under President Obama, the U.S. Energy Information Administration, and Sandia National Laboratories in Albuquerque, New Mexico.

Abraham Silverman joined the Center as the Director of the Non-Technical Barriers to the Clean Energy Transition initiative. The Non-Technical Barriers initiative is designed to identify major legal and regulatory bottlenecks to the clean energy transition and then provide state and federal policy makers pragmatic solutions to address those challenges. Major focus areas include Legal and Regulatory Barriers at the state and federal level, Market Rules and Economic Incentives, and Social Acceptance & Just Deployment of Infrastructure.

Before joining the Center, Abe served at the New Jersey Board of Public Utilities as the General Counsel and Executive Policy Counsel. Abe's portfolio included developing offshore wind, solar, electric vehicle, energy storage, and interconnection reform programs, along with quantifying and managing ratepayer impacts of the clean energy transition. Abe also led the State's engagement with PJM Interconnection, the regional grid operator for New Jersey, on topics such as implementing New Jersey's first-in-the-nation offshore wind transmission solicitation, resource adequacy, clean energy market design, and transmission policy.

Previously, Abe spent more than a decade at NRG Energy, Inc., as the Deputy Generator Counsel & Vice President of Regulatory Affairs. Abe supported NRG's power markets team, power plant operations group, renewable development and state retail electricity market programs. Abe also led the company's advocacy at the Federal Energy Regulatory Commission, as well as anti-trust compliance work at the Department of Justice/Federal Trade Commission. Abe has also worked as an associate at Perkins Coie LLP and as a staff attorney at FERC. Abe has a Bachelor's Degree from the University of Maryland and a JD from the George Washington University Law School.

Abe has testified before the United States Senate's Energy & Commerce Committee, the Federal Energy Regulatory Commission, the New Jersey Senate, and is the author of numerous pleadings at the state and federal level, including before the U.S. Supreme Court and various U.S. Courts of Appeals.

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Dr. Harry Kennard is a Senior Research Associate at the Center on Global Energy Policy. His research is centered on the impacts of energy use, particularly on health in the context of the built environment. Since 2020 he has been a lead contributor to the Lancet Countdown's Mitigation Actions and Health Co-benefits Working Group, developing research and producing global and regional reports. He co-leads the production of the Global Alliance for Buildings and Construction annual Global Status Report, focusing on tracking building energy codes and national commitments to building sector decarbonization.

Dr. Kennard's PhD thesis, from University College London, examined the relationship between domestic energy use, experienced temperature and health. He also holds degrees in Physics from the University of Oxford (BA) and Cambridge (MaSt), an MPhil in Applied Mathematics from the Open University, an MA in Linguistics from Queen Mary and an MRes in Energy Demand studies from UCL. While at UCL, he produced and hosted the Climate Change and Health podcast. He maintains a keen interest in furthering the public understanding of energy science.

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Before joining CGEP, Jackie was Senior Project Manager at the National Center for Disaster Preparedness, another think tank at Columbia University. She managed a portfolio of applied research and consulting projects contributing to disaster risk reduction, decision support tools, and business intelligence for clients in industry and government. She has been an American Geophysical Union science policy fellow, a DAT/Artathon data visualization fellow, and international contributor to science outreach and communication initiatives. Drafted under her leadership, the issue brief series for Resilient Children Resilient Communities was recommended as a policy resource to the Biden Presidential transition team. Prior to joining Columbia, she led the non-profit sector in two counties through cooperative long-term disaster recovery after Superstorm Sandy. Earlier research focused on utilizing crowd-sourced structure-from-motion as a solution to volcanic hazard GIS data scarcity in Latin America, undertaken during DPhil studies at the University of Oxford. Her BS with honors in environmental geology was earned at UNC Chapel Hill with a research minor in marine science.

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