Impact Accounting and Hourly Matching: A Review

A review of the research on the costs and impacts of proposed accounting standards on voluntary corporate renewable energy procurement

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WattTime

Summary

The emissions impact of corporate voluntary renewable procurements depends critically on the accounting standards that govern how consumers match their electricity use with clean generation. This metastudy synthesizes findings from multiple recent studies, along with complementary analyses we conducted, to evaluate how different accounting approaches and their implementation affect the actual emissions reductions achieved.

Across studies, we find four robust conclusions:

- **Location matters more than timing.** The location of renewable procurement has a much larger effect on emissions outcomes than timing. Investing in high-emitting grids consistently yields substantially greater avoided emissions per dollar than investments that restrict procurement to the consumer's local grid.
- **Impactful hourly matching portfolios come at a high cost**. Hourly matching portfolios are only impactful at high matching rates that impose steep cost premiums. This is likely to reduce willingness for consumers to participate in voluntary procurement and therefore reduces total emissions reductions.
- **Emissions matching can address global inequity in renewables.** Emissions matching directs capital toward emerging economies that have long been underserved by renewable investment, delivering greater emissions reductions while advancing global equity and providing benefits such as improved air quality, lower electricity costs, and expanded access to clean energy jobs in these regions.
- **An additionality requirement is needed for impact.** Meaningful emissions reductions depend on strong additionality requirements: without strict rules that prevent counting pre-existing clean energy assets, even very high levels of hourly matching yield little real emissions benefit.

These conclusions have strong implications for how a revision to the accounting standards will impact total global emissions. The currently proposed local hourly matching standard is likely to come at a high cost that could reduce total

participation in voluntary procurement. Without a stronger additionality constraint, procurement will not lead to actual reductions in emissions. And a local deliverability requirement may reinforce the existing bias of investment into the USA and Europe. By contrast, an emissions matching standard could guide renewable energy purchasing into the dirtiest grids where projects have the most cost effective impact on reducing emissions. This freedom in location could also lead to redistribution of investment to the Global South where grids are dirtiest and renewable investment is the lowest today. A consequential reporting standard focused on emissions could provide the strongest signals to voluntary corporate renewable energy purchasers to reduce more global greenhouse gas emissions more quickly.

Introduction

Voluntary corporate renewable energy procurement has become an important mechanism for accelerating global decarbonization. Corporations with sustainability and environmental impact goals can play a major role in reducing global emissions, with over half of the world's 2,000 largest companies having now committed to net-zero targets. Multinational companies now purchase large volumes of clean electricity through power purchase agreements (PPAs), renewable energy certificates (RECs), and other contractual mechanisms to meet sustainability targets. For example, in 2024, companies purchased a total of more than 270 TWh of renewable energy through PPAs. However, the impact of how these sustainability mechanisms are measured significantly affects both emissions outcomes and investment patterns.

The Greenhouse Gas Protocol (GHGP) is currently considering two competing frameworks for accounting renewable electricity purchases: *hourly matching* and *emissions matching*. Within this framework, the Scope 2 Guidance governs how companies report emissions associated with electricity consumption. The GHGP is currently undergoing a process to revise this guidance in response to growing calls to better reflect the actual emissions impact of electricity use. However, there are competing proposals for how these updates should be defined.

The three renewable procurement strategies considered in recent literature are:

- **Annual volumetric matching:** Procuring renewable generation equivalent to the buyer's total annual consumption, irrespective of timing.
- **Hourly matching (24/7 CFE):** Procuring renewable generation that matches a certain renewable energy percentage within the same grid region at an hourly level.
- **Emissions matching (emissionality):** Prioritizing renewable projects in regions or times with the highest consequential emissions reduction potential.

The current standard for renewable electricity procurement is annual volumetric matching, where consumers balance their total volume of electricity consumption with procured clean generation over the course of a year. While this approach has been useful in driving renewable growth, annual matching ignores the hourly variability of renewable generation. For example, under this strategy, a flat electricity load could be "matched" with solar generation even though the actual consumption during nighttime hours is still supplied by fossil fuels.

To address the aforementioned shortcoming of annual volumetric matching, the hourly matching strategy, also referred to as "24/7 Carbon Free Energy (CFE)", requires that renewable generation be temporally matched at an hourly level and requires it be supplied locally (i.e., procured in the same grid region). Both these requirements are designed to align a consumer's electricity consumption to renewable generation in both time and location, so that carbon accounting more closely represents the physical constraints of electricity distribution.

Emissions matching, sometimes called impact accounting or "emissionality", instead aims to measure the total change in emissions resulting from renewable procurements, regardless of location or time. This strategy recognizes that there are regions and times where renewable generation can produce outsized impacts on emissions reduction. Building renewable generation in regions with predominantly fossil-fuel generation, for example, can produce greater emissions reduction than building the same renewable generation in already clean grids, where it will mostly displace existing renewable generation.

This report synthesizes the findings of recent modeling studies that evaluate these competing approaches to voluntary renewable procurement. We reviewed previous studies that model these procurement strategies using grid simulation tools such as PyPSA and GenX, and conducted complementary analyses for the United States, Europe, and global energy systems to compare emissions impacts and costs across different regions and assumptions. Because of the inherent complexity of power systems, individual studies necessarily rely on different modeling frameworks and assumptions, which makes their results difficult to compare directly. By bringing these findings together, our goal is to identify broader patterns and clarify how different procurement standards, and the ways they are implemented, shape the emissions outcome of corporate renewable energy procurements.

Study Descriptions

Riepin & Brown

Riepin and Brown model many procurement scenarios in the European grid using the PyPSA capacity expansion and dispatch model. They model the grid as 37 bidding zones with interconnections, and estimate the change in total emissions from all sources on the grid in response to interventions in one of four selected zones: Ireland, Denmark (zone DK1), Germany, or Poland for both 2025 and 2030. They model procurement using a local annual volume match and for local temporal matches with varying levels of match from 80-100%. Their model assumes that all corporate procurement is additional by solving the capacity expansion model first for the grid without the participating load, and then solving with the additional load and procurement. In this way, the procurement does not compete with the rest of the grid's expansion, so every project is additional by definition of the model.

Their results show that both annual matching and 24/7 matching reduce total emissions in all scenarios, with high levels of temporal matching having somewhat higher avoided emissions rates. However, the difference between avoided emissions rates in different locations is much higher than the difference between matching strategies within a given location. For example, annual volumetric matching in Poland has an avoided emissions rate of 109 kg CO_2/MWh which is greater than 98%

24/7 matching in any other location in the study, and is 2.5x larger than the avoided emissions rate of 100% temporal matching in Ireland (43 kg CO_2/MWh). Thus for any load located in locations other than Poland, emissions matching can avoid more emissions than the majority of temporal matching profiles, using portfolios that are more cheaply and quickly deployed.

Notably, the avoided emissions rates drop substantially from 2025 to 2030, driven by low-cost renewable energy and national clean energy policies. While it is still true that annual matching in Poland has a higher avoided emissions rate than most 24/7 matching levels in other countries, the gap is much smaller; annual matching in Poland avoids 45 kg CO_2/MWh, which is only 32% higher than the 34 kg CO_2/MWh avoided in 100% 24/7 matching in Ireland.

Xu et al

Xu et al. modeled procurement with hourly matching, annual volume and local short-run emissions matching constraints in 2030 in two regions: California and Wyoming/Colorado. Unlike their previous study, they did not assume a constraint that procured energy is additional to state clean energy policies. Their model of emissions matching used a short run marginal emissions signal to measure emissions and only considered projects in the same grid region as the load. For the hourly matching scenario, they assumed that all projects built were new and that no credits from the grid counted towards the hourly matching targets. These details are important when comparing to other studies or proposed regulations on hourly matching, as they can significantly change the results.

They found that hourly matching can reduce total emissions, but that hourly matching only exceeded the amount of emissions induced by load, if the hourly matching score was above 98%. While local hourly matching was impactful on emissions, their findings still show that location differences can still be substantial, as demonstrated by the result that 100% hourly matching in Colorado and Wyoming had an avoided emissions rate twice as high as 100% hourly matching in California.

They find that local short-run emissions matching does not have an impact on emissions in many scenarios they studied. Under existing clean energy standards, they found that projects procured for emissions matching would only displace projects that would have been procured anyway for a least cost grid. They examine a scenario where the clean energy standard is increased to 80% and find that emissions matching can be additional and have an impact on emissions under that scenario. Their results have a high level of renewable energy in the baseline scenario, as it is limited to the Western US which has high levels of existing renewables and renewable potential, along with modeling strong government price incentives including the 2022 Inflation Reduction Act (IRA).

He et al.

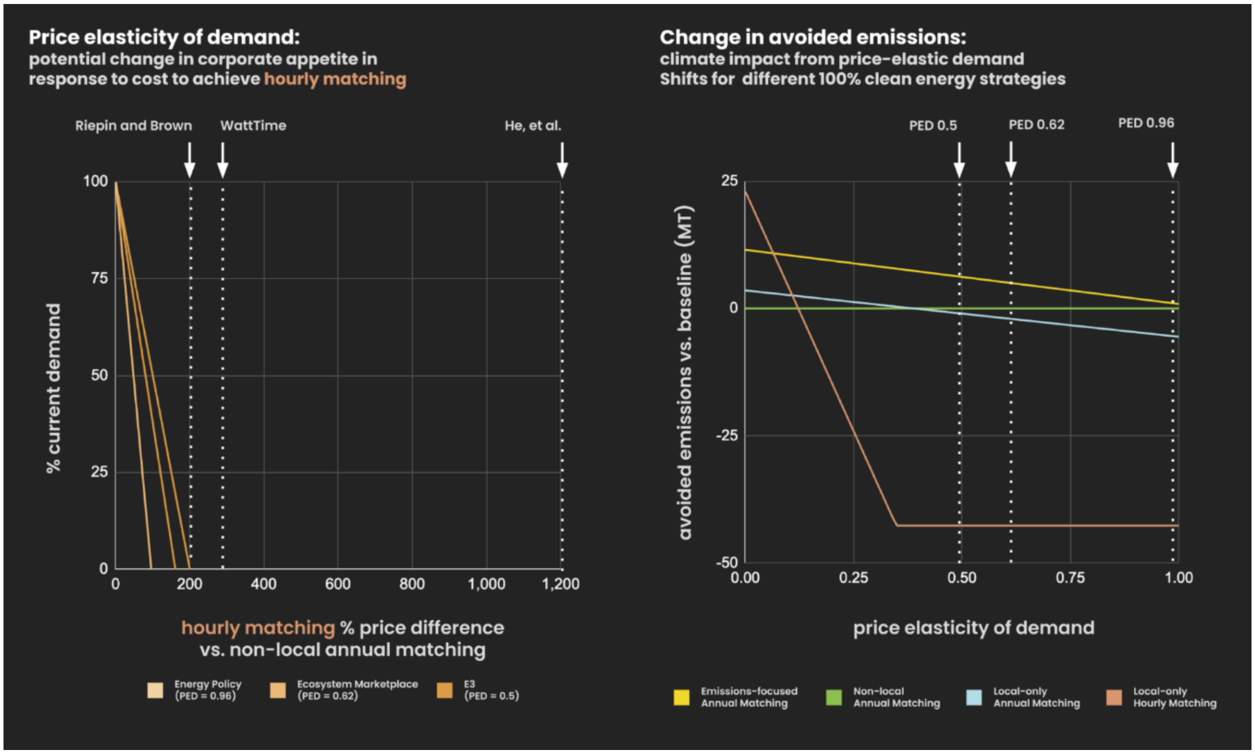
This paper analyzes the cost and carbon impacts of four corporate clean energy procurement strategies for large electricity consumers located in five U.S. balancing authorities: CAISO, PJM, Duke Energy, LADWP, and PG&E. The strategies include U.S.-wide annual matching, which allows clean energy to be procured outside the consumer's balancing authority; local annual matching, which restricts procurement to resources within the same balancing authority as the load; hourly energy matching; and emissions matching. For both U.S.-wide annual matching and emissions matching, clean energy can be sourced from one of five balancing authorities: CAISO, PJM, MISO, ERCOT, or SPP. The optimal portfolio for participating customers were then computed using a least-cost method, and the emissions computed using a locational marginal emissions rate model.

The study found that emissions matching is the most cost-effective method, with a cost between $4.7 and $7.6/MWh, and an abatement cost of $13/t CO_2 displaced. Hourly matching has the highest costs, between $68/MWh to $181/MWh, and is the least cost-effective at abating carbon, with costs between $77/t CO_2 to $161/t CO_2. Hourly matching is between 9 and 38 times more expensive per MWh than emissions matching and between 6 and 12 times more expensive per ton of CO_2 avoided. The study found that both annual matching strategies have a cost range in between carbon matching and hourly matching, but do not guarantee carbon neutrality.

US Cost Analysis

This study evaluates the cost-effectiveness of annual matching, hourly matching, and emissions matching procurement strategies in the US, and highlights the implications of this differing cost profiles. These strategies were implemented as constraints in a least-cost optimization framework, and the emissions produced by each strategy were estimated using Cambium long run marginal emissions rates (LRMER). This analysis shows that hourly matching in the US can achieve emissions reductions larger than those caused by the demand, but only for high levels of matching (>90%), and at substantial cost premiums. If 5% of commercial and industrial loads voluntarily participated in renewable procurement, hourly matching levels of 90%, 98%, and 100% are 2.0, 3.1, and 4.1 times more expensive than non-local annual matching.

The study also investigates how the cost of different procurement strategies influences voluntary participation. More expensive strategies are less attractive to companies and therefore lead to lower participation rates in a voluntary standard. As a result, if a high-cost strategy such as hourly matching is adopted as the standard, overall emissions reductions could end up lower than under an emissions matching approach, even if the former would achieve greater reductions under an assumption of equal participation. To quantify this, we modeled participation as a function of price using a range of potential price elasticities. The study finds that even for modest elasticities above ~0.2, which is well below values suggested by studies of voluntary carbon markets, 100% hourly matching will avoid less total emissions than non-local annual matching due to dropping participation rates. By contrast, the emissions matching strategy outperforms annual matching across the full elasticity range. While its cost is slightly higher than annual matching, its avoided-emissions rate is high enough to offset reduced participation.



Finally, this study shows that even if corporations were price-insensitive, an equivalent budget spent on annual or emissions matching portfolios would still avoid more than twice the emissions of an hourly matching portfolio. This highlights that high-cost strategies like hourly matching may underperform not only because of participation effects but also because of lower emissions reduction per dollar.

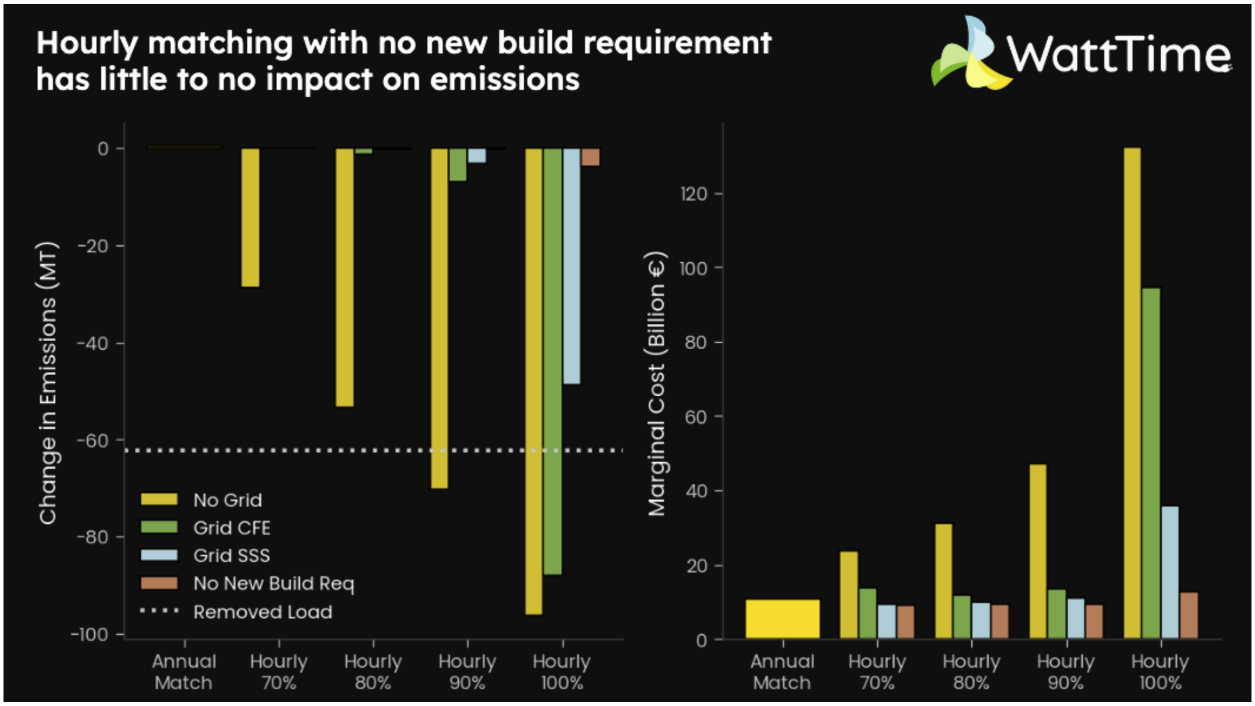
Hourly Additionality Standards

To reduce emissions, voluntary renewable procurement must be "additional", i.e., resulting in the construction of new renewable generation that would not have occurred otherwise. Without additionality, in grids with already high commitments to decarbonization, voluntary renewable procurement may simply displace other renewable investment. This study examines the impact of different additionality standards on hourly matching in the European grid. With a capacity expansion and dispatch model, the study finds that hourly matching has little to no impact on total system emissions if implemented without a strict additionality requirement.

This study analyzed the following standards in which the grid's clean energy mix can be counted towards a participating consumer's hourly matching matching percentage, in order of increasing strictness:

- No additionality requirement: Participating consumers are allowed to count any clean energy credits available on the grid, regardless if they have procured new renewable generation.
- Standard Supply Service (SSS): Participating consumers can count the portion of clean energy embedded in the grid's standard supply in addition to any new clean generation procured.
- Proportional to grid supply: Participating consumers can count only the share of the grid's clean generation that corresponds to the portion of their load supplied by the grid rather than covered by their own procured renewable energy.
- No grid attributes counted: Participating consumers are credited solely for new renewable generation they procure themselves.

Except for the strictest standard, the other standards allow consumers to claim partial credit for the grid's existing carbon-free mix. This study found that the emissions reduction of hourly matching strategies depend sensitively on which standard was chosen. Notably, under all but the strictest standard, hourly matching strategies provide minimal emissions reductions even at 90% matching. At 100% matching, the no additionality requirement standard still results in almost no avoided emissions. Furthermore, the stricter requirements come with substantial costs, with the "no grid attributes counted" standard costing roughly ten times more than the "no additionality requirement" standard at 100% matching. This high cost could potentially reduce the participation rate of voluntary customers, thereby reducing the overall impact of the more expensive standards.



UNFCCC Marginal Emissions

Most studies on the emissions impacts of renewables have focused on limited regions in the US or Europe, excluding countries in the rest of the world which can have much dirtier grids. To understand the impact of renewable projects worldwide, this study analyzed marginal emissions factors from the UNFCCC (The UN body that oversees the Paris Agreement). These emissions factors are produced using data from the IEA's Global Energy and Climate Model to estimate the future impact on emissions from new electricity generation sources. These marginal emissions factors are produced globally by country and cover a breadth of locations that are often excluded from emissions impact studies.

This study found that the emissions impact of renewables could be 2-3 times larger in countries in the Global South compared to projects built in Annex I countries. Projects built in Annex I countries had an average avoided emissions rate of only 345 kg CO_2/MWh, while the top 50% of most polluting power grids had an avoided emissions rate of 702 kg CO_2/MWh and the top 10% had an avoided emissions rate of 979 kg CO_2/MWh. These results highlight that there is a bias in the study and investment of renewable technologies to the Global North, which misses opportunities for more efficient and impactful renewable investment. In addition to a higher impact on carbon emissions, investing in renewables in the Global South could have added benefits to local economies and air quality in places where particulate matter pollution is the highest.

Global Impact Analysis

This study applies a least-cost optimization model to simulate country-level global renewable voluntary procurement under alternative procurement strategies. Using corporate purchase data reported to CDP in 2024 and technology cost projections from the IEA World Energy Outlook 2024, the study compares global procurement portfolios under hourly matching and emissions matching procurement. A linear programming method was used to minimize costs subject to constraints representing these strategies. A key point in this analysis is that for hourly matching, the load has to be co-located with the renewable procurement, whereas the emissions matching procurement strategy allows for renewable assets to be procured globally.

For an identical investment level of approximately $4.6 billion, this study found that the emissions matching procurement strategy substantially outperforms hourly matching. Under hourly matching, the resulting portfolio avoids 45 million metric tons (Mt) of CO_2 per year. Under global emissions matching, the same budget avoids 211 Mt CO_2 per year. The superior performance of emissions matching arises from its ability to direct new renewable investment toward high-emission grids, such as those in parts of Asia and Latin America, where renewable procurement can more effectively displace fossil fuel generators. In contrast, this study showed that hourly matching constrains investment to already low-carbon grids in North America and Europe, where additional renewable projects increasingly displace existing clean energy rather than fossil sources. From this perspective, emissions matching procurement represents a more efficient strategy for emissions reduction, achieving greater avoided emissions per dollar invested than hourly matching strategies.

This study also finds that the spatial distribution of impacts differs dramatically between the two approaches. Hourly matching concentrates procurement in the

United States and Europe where there is already a high level of renewable penetration. Emissions matching procurement instead reallocates investment toward emerging economies with a relative lack of renewable investment such as India, Indonesia, and Pakistan. Clean energy investment in emerging markets delivers benefits such as improved air quality and more equitable energy access. The emissions-matching standard therefore not only maximizes global carbon efficiency but also aligns corporate procurement with international equity goals and just transition principles.

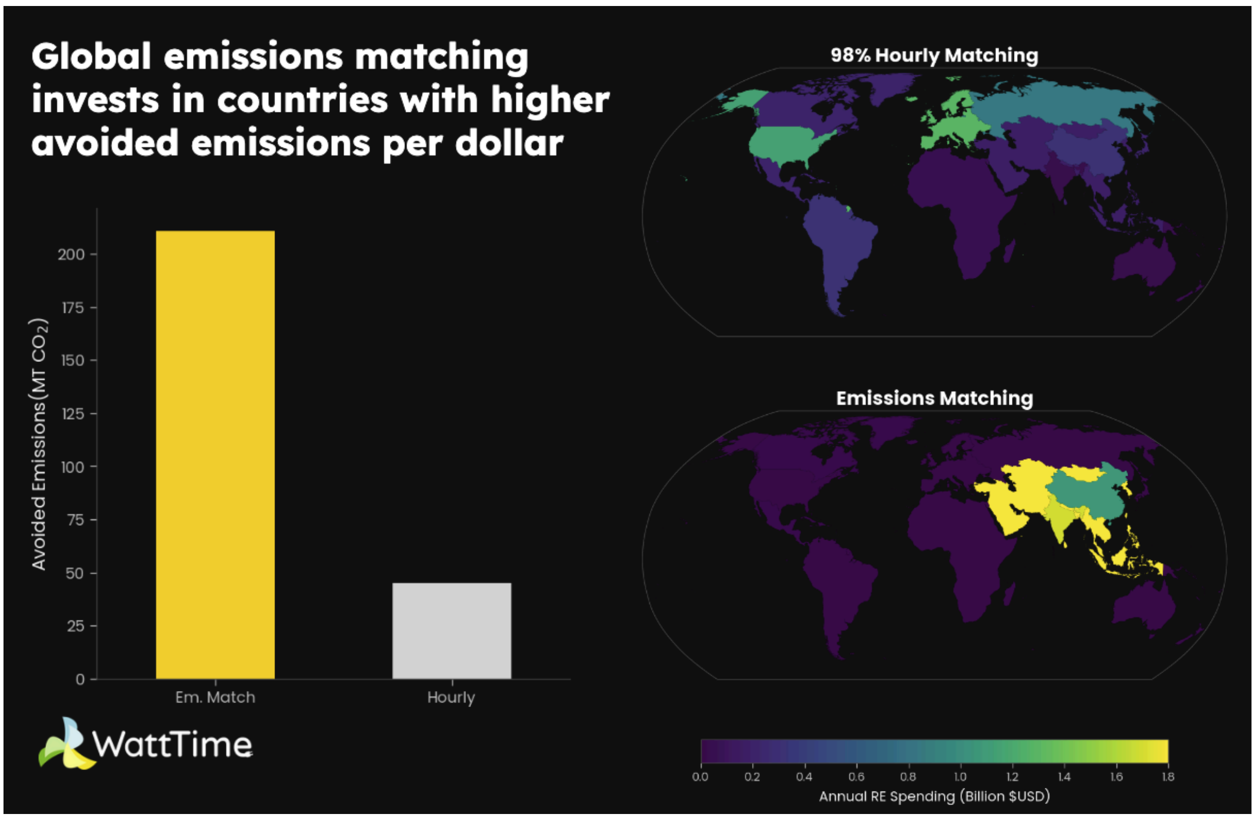


Table 1 - Summary of Reviewed Studies

Study	Regions Studied	Model Used	Procurement Strategies Compared	Assumptions on Additionality
Riepin & Brown (2024)	Europe (Ireland, Denmark, Germany, Poland)	PyPSA	- Annual Matching - Hourly Matching	Non-compete
Xu et al (2024)	US (California, Wyoming & Colorado)	GenX	- Annual Matching - Hourly Matching - Emissions Matching	Compete
He et al (2024)	US (California, Duke, PJM)	Least-cost Portfolio, emissions measured using short-run locational marginal emissions rates	- Annual Matching - Hourly Matching - Emissions Matching	Non-Compete
US Cost Analysis	US (all grid regions)	Least-cost Portfolio, emissions measured using Cambium LRMER	- Annual Matching - Hourly Matching - Emissions Matching	Non-Compete
Hourly Additionality Standards	Europe (all grid regions)	PyPSA	Compared different standards of Hourly Matching	Compete
UNFCCC marginal emissions	Entire World (Country level)	UNFCC	Compared long run avoided emissions rates	None
Global Impact Analysis	Entire World (Country Level)	Least-cost Portfolio, emissions measured using combined marginal emissions rate (CMER)	- Hourly Matching - Emissions Matching	Non-Compete

Key Findings

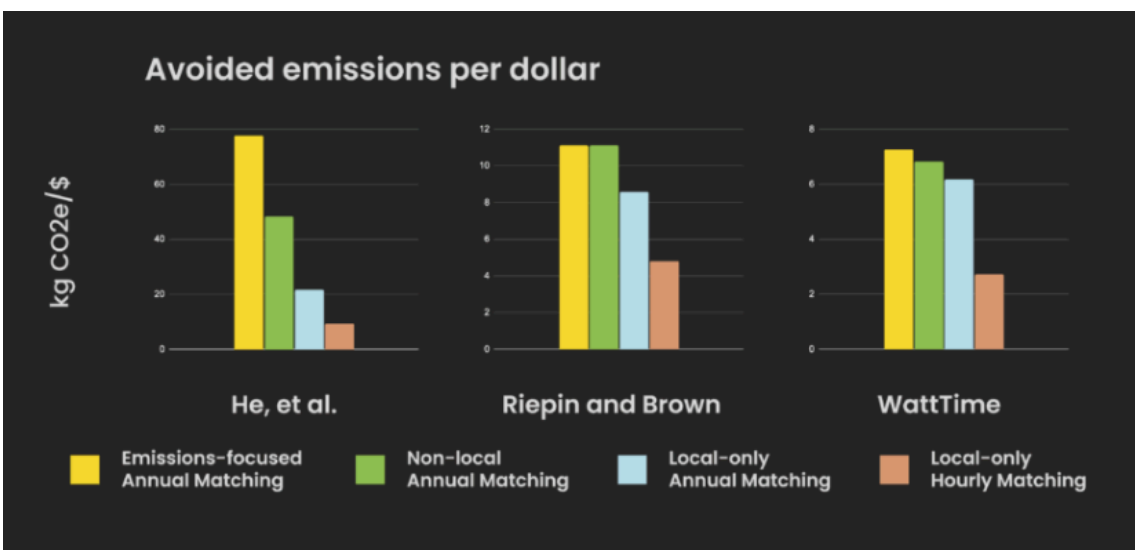
Location matters more than timing

While hourly matching has focused largely on the differences in emissions rates at different hours, there is much greater variation in emissions between locations than timing. A procurement strategy that prioritizes projects in the locations with the dirtiest grids will avoid emissions more efficiently than hourly matching in every location equally. Riepin and Brown found that annual matching in Poland (1,008~gCO_2/kWh) avoids more emissions than even 100% 24/7 matching in Ireland (365~gCO_2/kWh). The Long Run Marginal Emissions Rates (LRMER) from the Cambium 2023 mid-case scenario show a six-fold difference between the dirtiest and cleanest grids. This variation in emissions impact increases as a wider variety of locations are considered. A global analysis reveals that there is even more opportunity for reducing emissions when looking outside of the Annex I countries in the Global North. Our review of the combined marginal emissions rates from the UNFCCC found that the average avoided emissions rate is nearly three times higher in the dirtiest 10% of countries than in the Annex I countries. Our further impact study on global impact found that countries like Saudi Arabia, Indonesia and Pakistan had avoided emissions rates greater than 140 lbs CO_2 per $USD, compared with a rate of 34 and 27 lbs CO_2 per $USD for Europe and USA respectively.

Impactful hourly matching portfolios come at a high cost

Hourly matching can reduce emissions, under certain conditions, if the level of hourly matching is high enough. But the impactful portfolios also come at a severe cost premium, such that it seems unlikely that many of the companies purchasing renewable energy today would continue to participate at high levels of matching. Riepin and Brown found that a 100% hourly matching portfolio in Europe was 2.95 more expensive than the current least cost annual matching standard, while He et al. found that 100% hourly matching was 13.3 times more expensive. Our own analysis of costs in the US found that 100% annual matching was 3.87 times more expensive than the current Scope 2 standard, while 100% emissions matching was only 1.2 times more expensive. In our global model, we found that for a given cost, emissions matching was 4.7 times more effective at reducing emissions per dollar than a 98% hourly matching portfolio. Hourly matching at levels below 90% is less expensive, but also does not do much to actually reduce emissions. The impactful part of an hourly portfolio are the hours where emissions are hard to abate and renewable energy is expensive. So the benefits of an hourly matched portfolio necessarily go hand in hand with the higher costs.

These high costs are a particular concern because corporate renewable energy procurement is largely voluntary. As the costs of achieving a carbon-free status increase, we expect that fewer companies will choose to participate in voluntary offsets of their electricity usage. Previous studies, such as Xu et al. and Riepin and Brown, assume that voluntary participation stays fixed regardless of the portfolio standard. In our analysis of procurement in the US, we looked at the impact of the price elasticity of demand on the total amount of avoided emissions and found that unless demand is extremely inelastic (i.e. demand does not change very much with cost) that hourly matching is likely to reduce the total amount of emissions reduced. While high levels of hourly matching can reduce a significant amount of emissions, they have a proportionally much higher cost to do so. So a target of high levels of hourly matching could result in the majority of existing voluntary purchasers to opt out because of high costs, reducing the total impact.



Emissions matching can address global inequity in renewables

Current voluntary renewable purchasing is highest in the US and Europe. In 2024, over half of all global voluntary renewable purchasing reported to CDP occurred in the US and Europe. While a local hourly matching standard would require those purchases to stay in the US and Europe, a global emissions matching standard would encourage investment in the highest impact grids across the world. Our study of global impact found that an emissions matching strategy would avoid 4.7 times more emissions per dollar spent than 98% hourly matching, while directing investment away from the US and Europe to countries in the Global South. In addition to being more effective at reducing carbon emissions, this would also likely have secondary benefits that improve local air quality and reduce electricity prices. Countries in the Global South are the most likely to suffer the effects of climate change while also having contributed the least to cumulative total emissions.

Additionality requirement is critical

For corporate procurement to have an impact on reducing emissions, it must be additional to procurement that would have occurred anyway. This additionality requirement has been modeled differently in different studies. Some works, such as Riepin & Brown, explicitly assume that all corporate procurement is completely additional, by using a "non-compete" model where corporate procurement portfolios are optimized independent of the rest of the grid's portfolio, such that they are not affecting each other or competing for low cost renewable projects. Other studies, such as Xu et al., optimize for grid and corporate procurement simultaneously, in a "compete" model, where an increase in corporate renewable procurement can lead to a proportional decrease in renewable procurement from the larger grid. In “compete” models, procurement is only additional if it creates demand for resources that would not have already been built because of economic or policy assumptions about renewable costs and clean energy standards (CES). This makes models very sensitive to the accuracy of their assumptions on future renewable costs and CES policies.

While additionality may be easy to model using assumptions in a capacity expansion model, it is harder to measure in the real world. One practical standard that is often used as a requirement for additionality is a new build requirement -- i.e. procurement must be from projects that are not already constructed. This standard is so widely used that almost every study in this review assumes that all procured projects are new builds. However, the currently proposed revisions to the Scope 2 standard do not have a new build requirement. To understand this better, we studied this in our Hourly Additionality Standards analysis and found that hourly matching without a new build requirement had little to no impact on emissions. Without a new build requirement, corporations are able to source low cost clean energy attributes from already existing generators that do not lead to the build out of additional renewables.

Conclusion and Recommendations

Voluntary corporate procurement is a large portion of total renewable energy purchasing. In this metastudy synthesis paper, we show that the emissions outcomes of these procurements depend strongly on how procurement standards are defined and implemented. By comparing a wide range of studies utilizing different modeling approaches, several consistent themes are identified. Based on these insights, we aim to provide evidence-based recommendations for policy standards that guide corporate renewable procurement toward the greatest emissions impact.

First, location is the dominant driver of emissions impact. Across studies, strategies that direct procurement toward regions with the dirtiest grids yield greater emissions avoidance than those that restrict renewable projects to the same grid as consumption. This geographic limitation is a key constraint of hourly matching approaches, which require renewable generation to be locally supplied. Such forced alignment prevents investment in regions where new clean capacity would displace the most carbon-intensive generation, thereby limiting overall emissions benefits. **If the goal is to maximize emissions benefits, then future procurement standards should allow for geospatial flexibility**, allowing clean energy investments to target areas with the greatest potential for emissions reduction.

Second, while hourly matching can achieve high levels of emissions reduction, it comes with steep cost premiums, between 3 and 13 times higher than the current annual matching standard. Because voluntary participation depends on corporate willingness and affordability, higher costs can limit overall engagement and reduce total impact. In contrast, emissions matching procurement typically achieves greater avoided emissions per dollar spent. Recognizing that voluntary participants operate under budget constraints, **procurement standards should prioritize financially efficient approaches like emissions matching if the aim is to improve cost-effectiveness, support broader participation and maximize overall emissions reductions**.

Third, procurement strategies such as emissions matching that direct capital toward regions that have historically been underserved by renewable energy investors can promote global equity in renewable investments. This not only increases avoided emissions per dollar, but also expands access to the secondary benefits of a clean energy grid, such as cleaner air, lower energy costs, and new job opportunities in renewable energy. Procurement standards that strictly require renewable generation to be located in the same region as consumption would discourage investment in parts of the world that need it most. **If the aim is to promote global equity and address historical inequities in renewable investment, procurement standards should avoid strict requirements that limit renewable procurement to the consumer's own grid region**.

Finally, an additionality requirement is essential for a procurement standard to actually drive emissions reduction. Without a strict additionality requirement, even strategies such as high percentage of hourly matching fail to achieve substantial emissions avoidance. **To actually drive emissions reductions, voluntary procurement standards should enforce a strict additionality criterion**, particularly in limiting the extent to which existing clean energy in the grid can be counted toward a consumer's clean energy matching percentage.

Acknowledgements

Support for the work was provided by Apple, Meta Platforms, HPE Foundation, James and Kaye Slavet, Reid Hoffman and Climate Breakthrough. Access to linear optimization software was provided by Gurobi. The views expressed in the article do not necessarily represent the views of the sponsors.