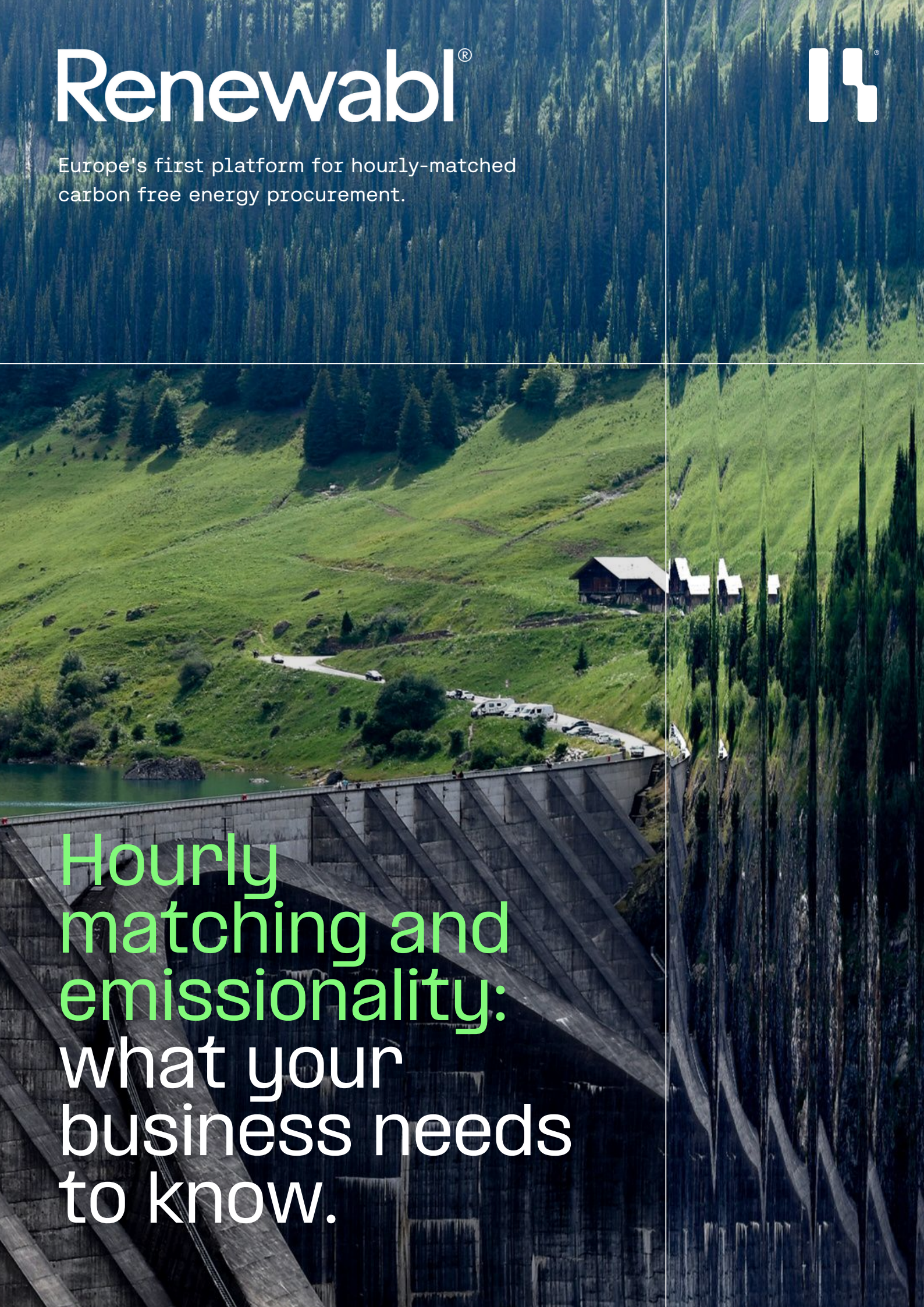
Renewabl®

Europe's first platform for hourly-matched carbon free energy procurement.



Hourly matching and emissionality: what your business needs to know.

Contents

Introduction

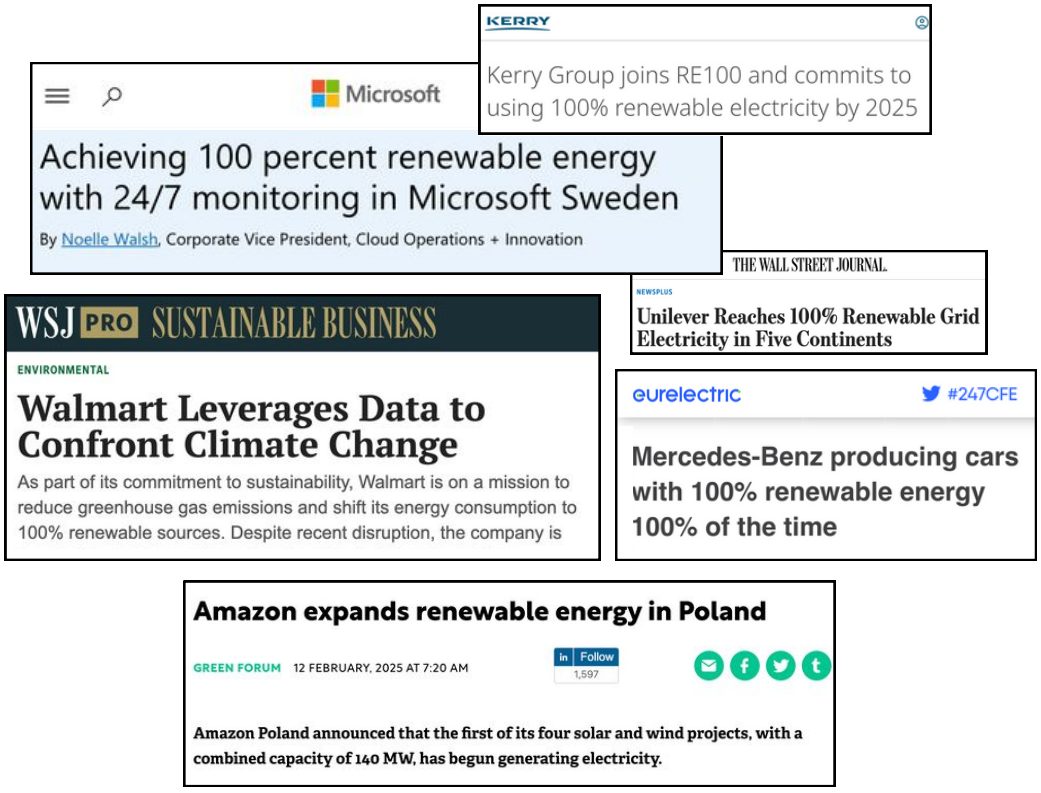
The evolution of renewable energy reporting methodologies.

Renewable energy procurement has evolved in the last few years, particularly in how companies measure and report their clean energy consumption.

Two key methodologies are now widely recognised in the sector:

- ⟶ Emissions-based renewable energy procurement,
- ⟶ 24/7 carbon-free energy (CFE) matching.

While both aim to drive clean energy usage and reduce carbon footprints, **they differ in how energy consumption is matched with renewable generation.**



24/7 Carbon-Free Energy, or granular market-based accounting

24/7 Carbon-Free Energy (CFE), also known as **24/7 hourly matching,** is an advanced market-based accounting method that **aligns electricity use with clean energy generation by time and location.** Rather than relying on annual averages, it reflects when and where electricity is actually consumed.

While full 24/7 matching is an ambitious goal, organisations can set progressive CFE targets (e.g. 30%, 50%, or 100%) depending on data availability, procurement strategy, and climate goals.

This approach provides clear insight into energy usage and grid behaviour, enabling system operators to identify where more renewable energy or flexibility solutions, like battery storage, are needed. The benefits include:

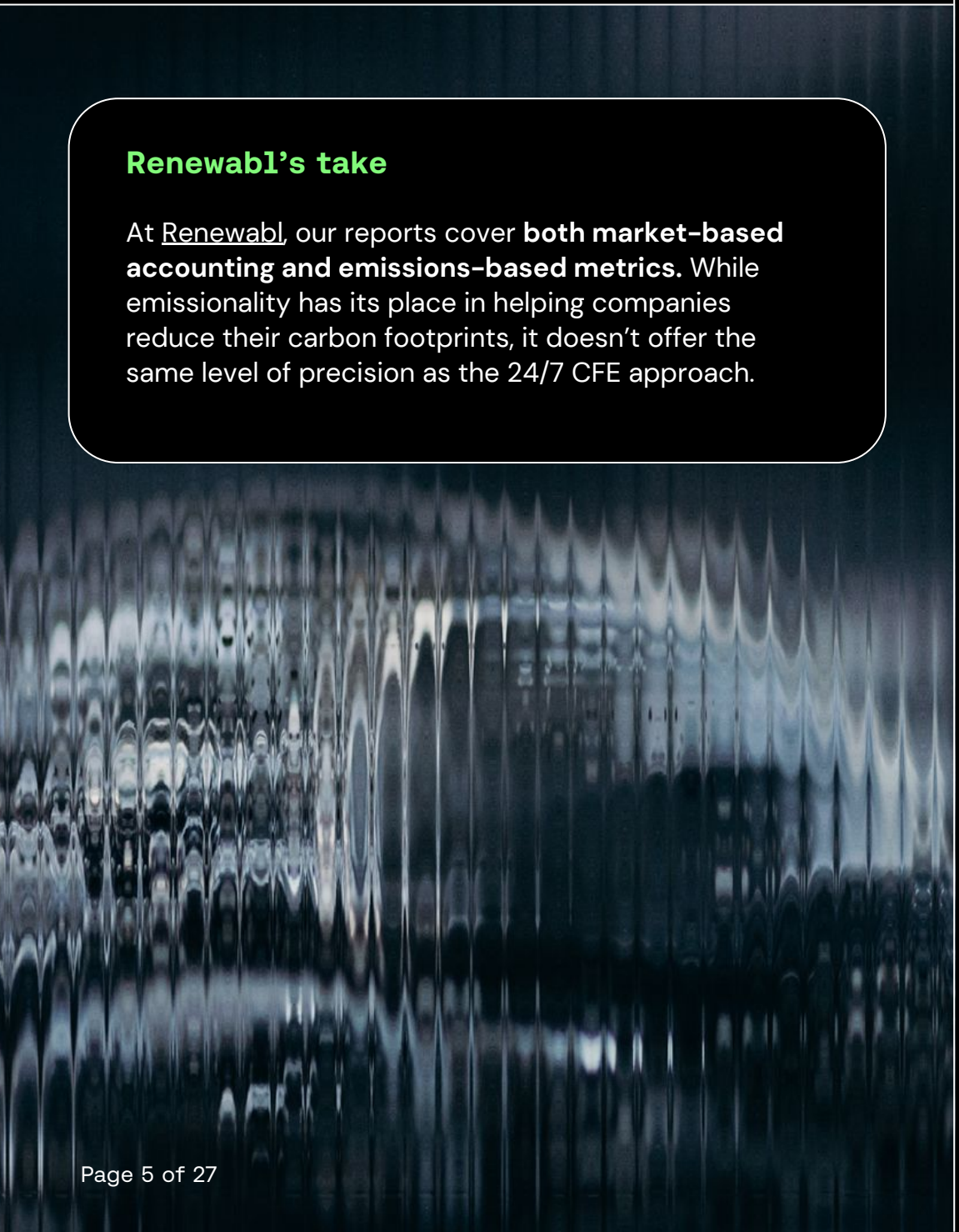
- Greater transparency
- Real-time impact
- Enhanced credibility
- Encourage BESS
- Boost grid reliability
- Cost-effective long term

Emissions-based renewable energy procurement, or Carbon Matching

This approach focuses on **offsetting carbon emissions through renewable energy purchases.** The aim is to neutralise emissions over a longer period, without the need to match energy consumption with renewable generation on an hourly basis.

Renewabl's take

At Renewabl, our reports cover **both market-based accounting and emissions-based metrics.** While emissionality has its place in helping companies reduce their carbon footprints, it doesn't offer the same level of precision as the 24/7 CFE approach.



Why it matters

GHG Protocol Scope 2 update: What it means for energy buyers.

Regulations are likely to change in the near term. The GHG Protocol is currently updating its corporate standards, including the 2015 Scope 2 Guidance, to be published by the end of 2027.

Updated inventory rules based on hourly and regional matching

The Scope 2 Technical Working Group is developing new inventory rules that reflect **when and where electricity is consumed**, to strengthen the credibility of reported emissions.

The preferred approach — **supported by most TWG members and the Independent Standards Board** — introduces spatial and temporal matching requirements.

To ensure feasibility, it is proposed to exempt buyers using under 5 GWh per market from hourly matching. It also allows profile-based estimates where needed and offers optional criteria for newer facilities or causal procurement, though these received less support.

The aim is to **shift electricity accounting closer to real-world grid impact**, creating stronger demand signals for clean energy that's available when and where it's needed.

Why it matters

> Granular accounting is emerging as the preferred direction of travel. Crucially, the GHG Protocol is an accounting standard — it will not require any company to be 24/7 carbon-free by a given date.
>
> – Killian Daly, EnergyTag, TWG member

Marginal Emissions Impact as a complementary metric

To account for the emissions benefits of clean energy actions that fall outside the inventory rules — such as procurement not matched to the same grid or time as a company's usage — the Scope 2 TWG is introducing a complementary metric: **Marginal Emissions Impact** (also known as **emissionality**).

Today, a company might count clean energy toward its Scope 2 total even if it wasn't used at the same time or in the same region. Under proposed rules, it wouldn't qualify — but if the same purchase displaced fossil power in a carbon-intensive grid, it could still count towards impact via MEI.

The combined framework supports a core principle of the Scope 2 update:

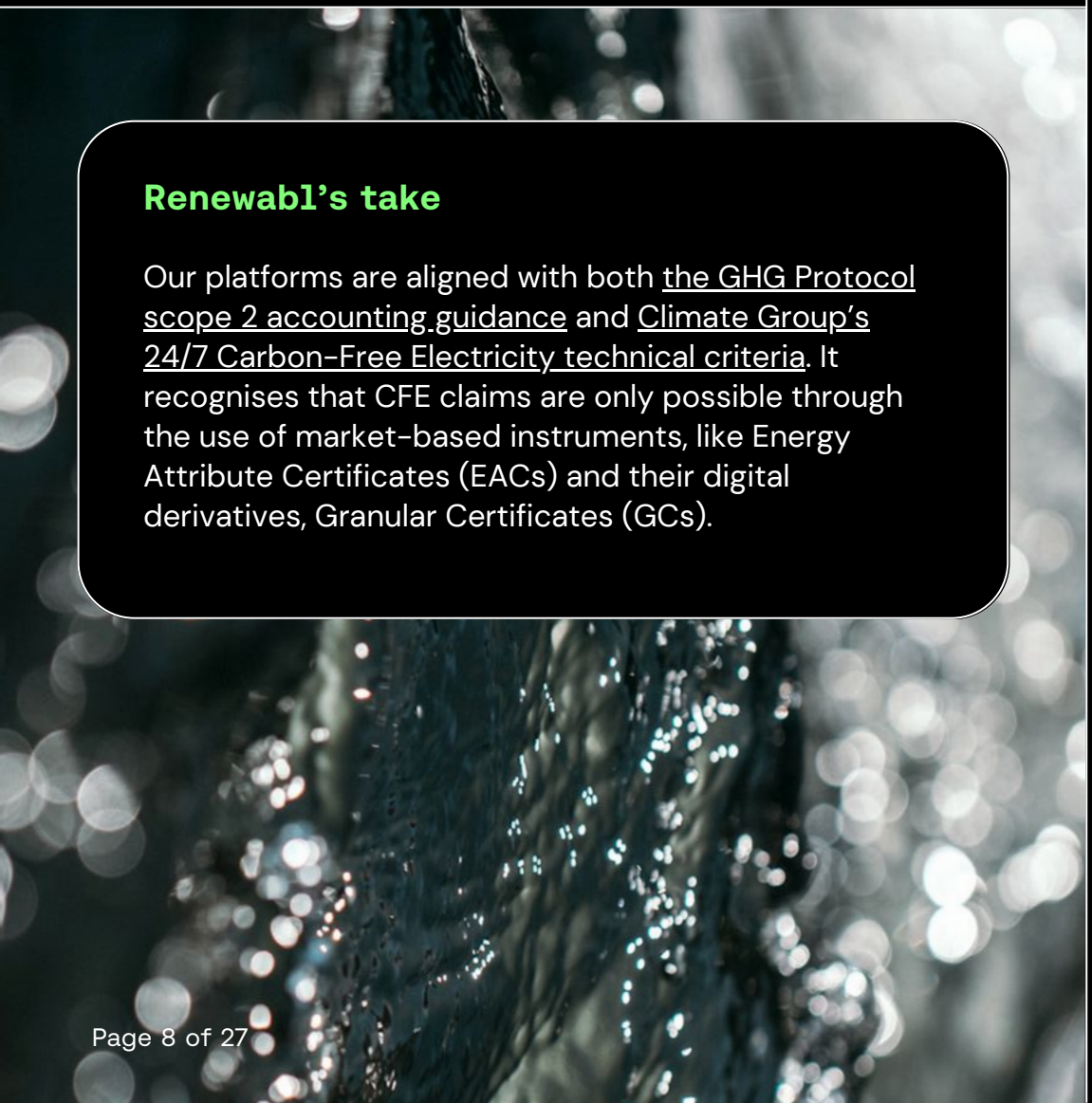
- **Inventory reporting** is being refined to improve consistency, comparability, and scientific alignment in how emissions from electricity use are measured.
- **Impact reporting** offers an additional way to reflect emissions reductions from clean energy actions beyond a company's immediate electricity consumption.

Together, these proposed changes are designed to make electricity accounting more credible, science-based, and fit for purpose as climate disclosure frameworks continue to evolve.

Why it matters

Climate Group's 24/7 Carbon–Free Coalition: Technical guidance.

In autumn 2024, Climate Group launched a new initiative alongside RE100, the 24/7 Carbon-Free Coalition. It supports the view that hourly matching can accelerate grid decarbonisation while delivering operational and reputational benefits for businesses.



Renewabl's take

Our platforms are aligned with both the GHG Protocol scope 2 accounting guidance and Climate Group's 24/7 Carbon-Free Electricity technical criteria. It recognises that CFE claims are only possible through the use of market-based instruments, like Energy Attribute Certificates (EACs) and their digital derivatives, Granular Certificates (GCs).

Qualifying criteria

What procurements qualify as 24/7 Carbon Free?

→ Eligible sources

A generator qualifies as a CFE source only if its operational CO2 intensity (excluding lifecycle assessment) **equals 0 kgCO2eq/kWh.** Qualifying CFE includes:

– Wind
– Solar
– Zero-emissions geothermal
– Marine (wave and tidal)
– Sustainable hydropower
– Nuclear (fission and fusion).

The 24/7 Carbon-Free Coalition also recognises electricity from **energy storage** as carbon-free if the storage was charged using qualifying CFE.

Can standard grid-supplied energy be considered an eligible source?

This question often comes up, as standard grid supply includes some renewable content. However, the short answer is no, in almost all cases. That's because any renewable energy on the grid has likely already been claimed — either by a supplier or another end user.

This is exactly the role that EACs play in energy markets: they assign ownership to the party that has contracted and paid for the right to make the renewable claim. So we must assume that any renewable share of the grid mix has already been claimed, and therefore can't be claimed again — avoiding double counting.

There are a few limited cases where grid supply (or 'default supply') can count towards your CFE target. We explain this in more detail later in the document when discussing CFE calculation.

Qualifying criteria

→ Location based matching to load

Generation must come from the same local or regional grid where the electricity is consumed. For many, this extends beyond the market boundaries typically assumed for renewable energy procurement.

In Europe, this usually refers to the national grid, as most system operators work at the country level. In multi-grid markets, like the US, it refers to the same Independent System Operator (ISO) or Regional Transmission Organisation (RTO).

→ Time based matching to load

Each hour of consumption is fully matched with carbon-free electricity generated in the same hour.

Since most global Energy Attribute Certificates registries don't currently issue hourly certificates, **24/7 CFE requires new methods to track, and validate buyer progress.**

Renewabl's take

While it's technically possible to separate and transfer individual EACs to match volumes with consumption for each hour, registry systems aren't universally designed for this at scale. To address this, Granular Certificates (GCs) are created and linked to underlying registry EACs, making it easier for buyers to trade and make 24/7 CFE claims.

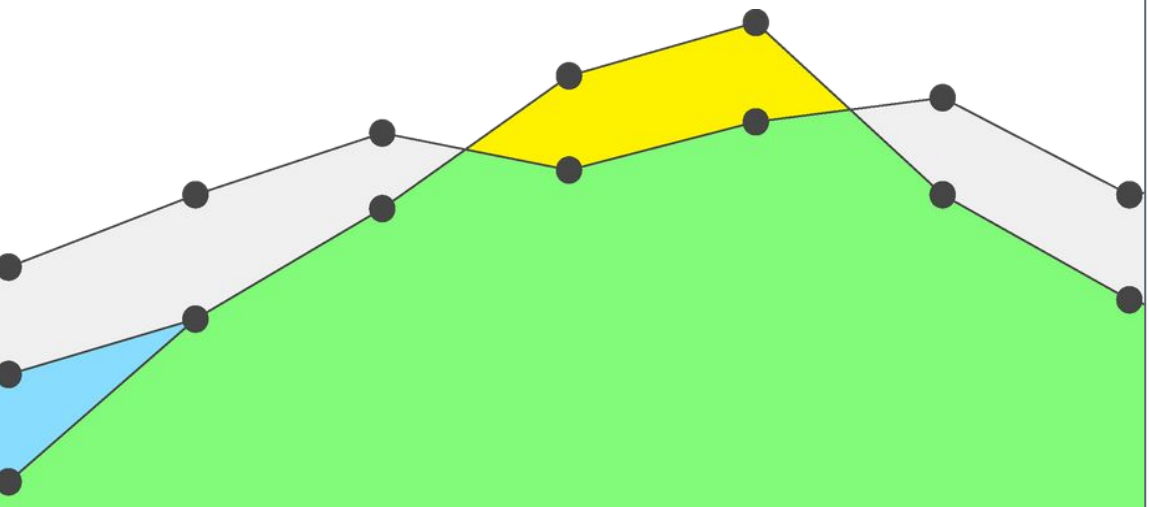
Qualifying criteria

→ Asset specifications

Procurement of CFE must adhere to a fifteen-year commissioning or re-powering date limit, with some exceptions for long-term, project-specific agreements.

Renewabl's take

Renewabl considers both new and existing generation assets, although some companies may prioritise additionality — meaning their procurement helps fund the specific new renewable energy project(s) and capacity.



Why it matters

More frameworks shaping energy reporting.

→ Renewable Energy Directives (RED II and RED III)

The EU's Renewable Energy Directive (RED) establishes renewable energy consumption targets that must be achieved by the bloc as a whole. RED III, the latest iteration, encourages the shift from annual to hourly-matched certificates. It clarifies the unit size GOs can be split into, setting a standard proportion of 1 MWh which can be issued in smaller fractions.

→ RECS' proposals for RED IV

The proposals for RED IV include a requirement for all corporate energy consumers to report the origin of all the energy they purchase. RECS would also like to see a move to shorter disclosure periods; reducing the validity period of GOs, for example, from 1 year to 1 month.

→ EU Green Claims Directive

Brussels' proposed Directive on Green Claims is designed to stop companies from misleading consumers with false or exaggerated statements about their environmental record. Companies reporting levels of renewable energy consumption — for example, advertising that they are powered by 100% carbon free energy — will need to provide detailed and specific evidence to back up the claim.

Why it matters

→ Corporate Sustainability Reporting Directive (CSRD)

Under the revised CSRD rules, any company exceeding 1000 employees **and** either €50 million in turnover or €25 million in assets must report sustainability data — replacing the previous 250-employee threshold.

Tthe directive now requires contractual proof of renewable energy consumption, such as PPAs, Guarantees of Origin (GOs) or unbundled certificates. Merely operating in a high-renewables region no longer qualifies.

The new ESRS standards explicitly mandate the use of market-based instruments as the sole allowable method for claiming renewable energy in sustainability reports.

→ The Code of Standards for Advertising and Marketing Communications by ASAI

→ The Green Claims Code in the UK, set by the The Competition and Markets Authority

Renewabl's methodology

How the CFE score of any given hour is calculated on Renewabl.

Renewabl calculates a CFE Score as **the percentage of a buyer's load matched by CFE within the regional grid.** This can be measured over different time periods, such as annually, monthly, weekly, or hourly.

We strongly recommend that buyers focus on the highest resolution available, which is usually **hourly**, based on data availability.

A daily, monthly, or annual hourly CFE score can then be calculated using the volume-weighted average of all hourly matching calculations over the required period.

$$\text{CFE Score \% (h)} = \left[\frac{\text{Contracted CFE (MWh)} + \text{Default Delivered CFE (MWh)}}{\text{Load (MWh)}} \right] \times 100$$

Load (MWh) – The buyer's electricity demand for the period, measured in megawatt hours.

Contracted CFE (MWh) – The amount of CFE purchased by the buyer (through PPAs or EACs), measured in megawatt hours.

As the maximum achievable CFE score is 100%, the contracted volume cannot exceed the buyer's demand for that period (Load MWh). Excess contracted CFE in any hour is ignored in the calculation.

Default Delivered CFE (MWh) – This is the CFE in the electricity utility/supplier mix that has not been voluntarily procured by corporate buyers but is delivered by default.

The use of **Default Delivered CFE** can be claimed if, and only if, **an equivalent amount of EACs with hourly or sub-hourly granularity is retired by the utility/supplier.** Corporate buyers wishing to claim use of this CFE must seek relevant information from their utility/supplier to justify their claims. Please note:

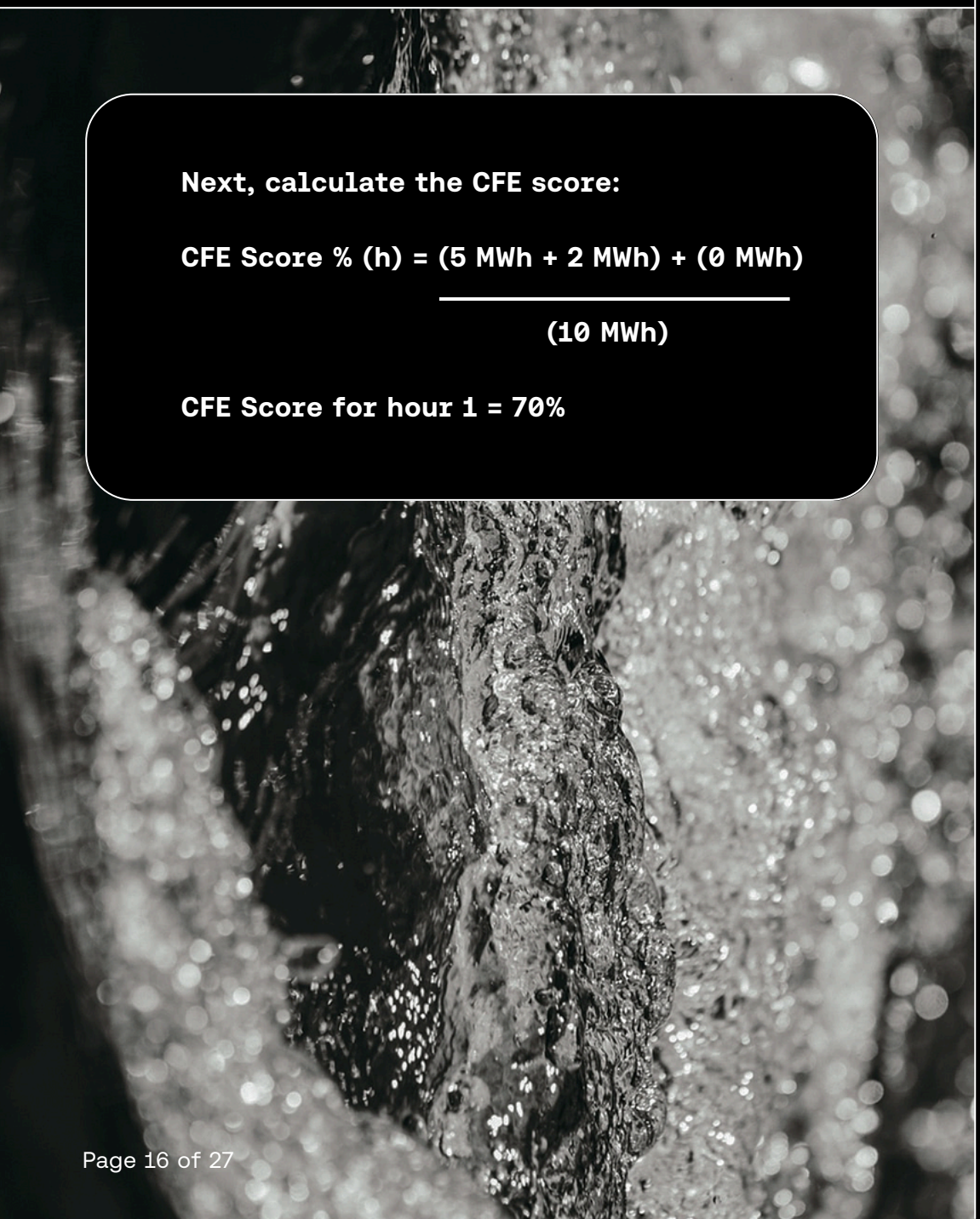
- Renewabl adheres to Climate Group's 24/7 CFE technical criteria to determine what qualifies as Default Delivered CFE.
- The most common examples of 'default' delivered CFE occur in the US (e RPS/CES-type compliance mandates) and Australia (Large-scale Generation Certificates (LGCs) under the Renewable Energy Target (RET)), so **this has less relevance for European buyers.**
- **If the energy is non-compliant,** Compliant Consumed Grid CFE is considered zero.

Example calculation

In the UK, during hour 1, the buyer has a load of 10 MW. They have a PPA supply of 5 MW and have purchased 2 MW of EACs generated in that hour. The remaining 3 MW to meet their demand is supplied through their electricity contract using grid energy.

First, consider the grid energy supply, does it include any Default Delivered CFE?

Default Delivered CFE = 0 MWh



Next, calculate the CFE score:

$$\text{CFE Score \% (h)} = \frac{(5\ \text{MWh} + 2\ \text{MWh}) + (0\ \text{MWh})}{(10\ \text{MWh})}$$

CFE Score for hour 1 = 70%

Renewabl's approach to emissionality.

Renewabl uses **hourly grid operations data from (ESO (UK) and ENTSO-E (Europe)**, detailing the active generators, their technology, and the volume of electricity produced. This data allows us to calculate **the average grid carbon intensity** for each hour of every day.

Using this data, combined with an **hourly assessment of the buyer's purchased electricity instruments (e.g. PPAs, EACs)**, Renewabl calculates the total emissions impact, including the emissions avoided through renewable procurement.

For example, by contracting a renewable (zero-carbon) PPA, the buyer avoids purchasing grid electricity, which has measurable carbon intensity. This avoidance can be tracked and measured for internal carbon reporting.

Methodology to calculate emissionality

Renewabl calculates the emissionality metrics as **the buyer's total scope 2 carbon emissions within the regional grid for a given hour.** This is based on the buyer's load and the grid carbon intensity, while also factoring in any avoided carbon due to the buyer's carbon-free energy purchasing decisions.

The score can also be measured over various time periods, such as annually, monthly, or weekly.

Total Grid Emissions (h) =
Load (MWh) x Grid Carbon Intensity (kg CO2e/MWh)

Avoided emissions (h) =
Contracted CFE x Grid Carbon Intensity

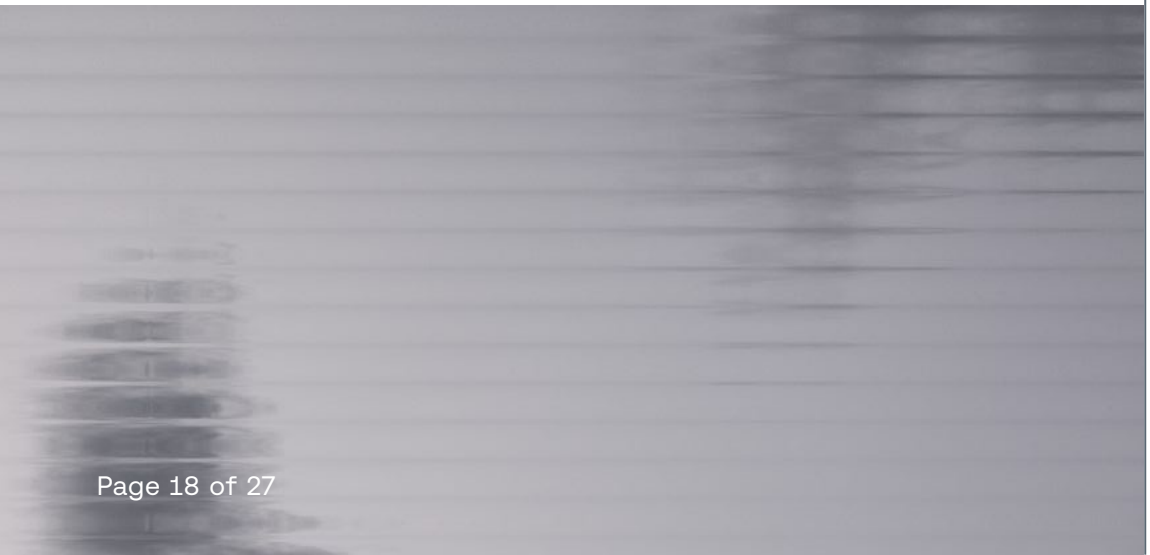
Net Grid Emissions (h) =
Total Grid Emissions – Avoided Emissions

Load (MWh) – The buyer's electricity demand for the period, measured in megawatt hours.

Contracted CFE (MWh) – The amount of CFE purchased by the buyer (through PPAs or EACs), measured in megawatt hours.

Grid Carbon Intensity (kg CO2e/MWh) – A measure of how many kilograms (kg) of carbon dioxide equivalent (CO2e) emissions are produced per megawatt hour (MWh) of electricity consumed from, or produced in, a power grid.

To calculate the emissionality metric for a specified period, e.g. daily, monthly or annual the platform sums up the emissionality results of all hours in the required period.



Example calculation

In Germany, during hour 1, the buyer has a load of 10 MW. They have a PPA supply of 5 MW and have purchased 2 MW of EACs generated in that hour.

The remaining energy to meet their demand (3 MW) is supplied through their electricity supply contract, using grid energy.

Total Grid Emissions (h) = 10 x 0.142
= 1.420 kg CO2e per MWh

Avoided Emissions (h) = 7 x 0.142
= 0.994 kg CO2e per MWh

Net Grid Emissions (h) = 1.420 - 0.994
= 0.426 kg CO2e per MWh

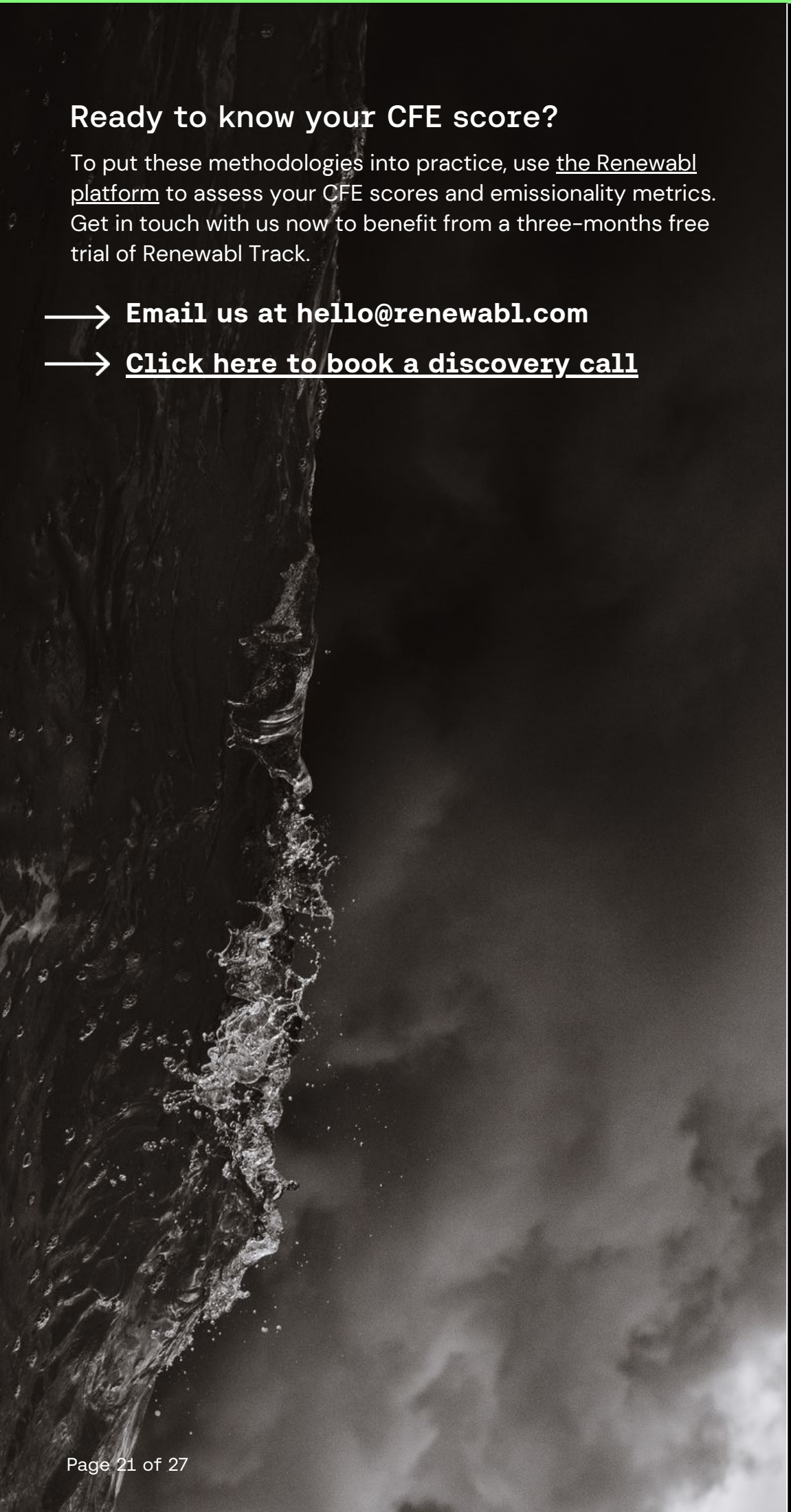
Conclusion

Methodologies that meet the moment.

Renewabl's reporting methodologies are aligned with **the latest 24/7 CFE technical criteria from Climate Group** and the recent developments in **GHG Protocol's market-based scope 2 guidance.** By combining high-resolution consumption data, hourly grid intensity, and verified procurement instruments, our platform enables more precise, credible reporting – and more targeted decarbonisation decisions.

Compared to traditional annual matching, the monthly and hourly CFE scores offer clearer insight into when and where fossil fuelled power is displaced, allowing buyers to prioritise interventions that deliver real system impact. For strategies to boost your CFE performance, see our guide to 24/7 hourly matching.

Scan to find 24/7 Carbon Coalition's guidance:



Ready to know your CFE score?

To put these methodologies into practice, use the Renewabl platform to assess your CFE scores and emissionality metrics. Get in touch with us now to benefit from a three-months free trial of Renewabl Track.

→ **Email us at hello@renewabl.com**

→ **Click here to book a discovery call**

Renewabl®

FAQs

Common questions, answered.

→ Who is this methodology for?

This methodology is designed for energy procurement teams and sustainability leads at businesses that report their scope 2 emissions. Renewabl's CFE & emissionality metrics tracking enables such energy buyers to move beyond basic annual certificate matching and start measuring real-time clean energy performance – without the complexity of building custom tools.

→ Can this methodology be used for compliance reporting?

Yes. It's aligned with the GHG Protocol's market-based accounting guidance and incorporates the Climate Group's 24/7 CFE technical criteria (2025). It supports credible disclosure under upcoming policies like RED III and the EU Green Claims Directive.

→ How does this compare to annual matching?

Annual matching only shows that you bought the right volume of renewables – regardless of when you used electricity. Our methodology enables hour-by-hour matching and emissions calculations, so you can see exactly when your energy is clean and when it isn't.

→ What's the difference between the CFE score and emissionality metrics?

The CFE Score tracks the share of your electricity matched with carbon-free energy by hour, helping you procure for the identified gaps. The emissionaltiy metrics measure the carbon impact of that match – quantifying emissions avoided. Together, they give a fuller view of clean energy performance.

FAQs

Is it only for companies targeting 100% 24/7 CFE?

Not at all. Most companies start with partial hourly matching and improve over time. Our methodology supports incremental targets and helps prioritise action where it has the most impact – whether your goal is 50% or 100%. Emissionality metrics provide the required empirical data for companies looking to drive greater impact with their clean energy procurement.

What data is required for CFE calculations?

High-resolution, metered data is crucial for calculating the CFE score. Buyers typically obtain this data from their supplier or meter operator, and it is usually available in 15, 30, or 60-minute intervals. In some markets, higher-resolution data may be available, depending on the specific operations and meter configuration.

Generation meter data is also necessary for hourly matching, and this can typically be requested from the supplier. Our platform helps collect, structure, and align this data to calculate accurate CFE scores.

How are corporate PPAs considered in our CFE calculations?

In corporate PPA contracts, buyers typically have the contractual right to access generation data. This data can be used to calculate the CFE score, based on the percentage of off-take the buyer has contracted. This assumes that EACs are included as part of the PPA agreement, which is usually the case. PPAs will therefore contribute as contracted CFE, provided the generation data is available to support the calculation.

How are corporate unbundled EACs considered in our CFE calculations?

Unbundled EACs can contribute towards the CFE score, provided there is a clear data package that evidences when each specific EAC was generated. If the buyer can supply sufficient supporting EAC transaction data, it is possible to allocate a digital hourly time stamp to each certificate via the Renewabl platform. The buyer will need to provide hourly generation data from the asset that generated the EACs.

By aligning this data with the corresponding EAC IDs, Renewabl can create a proxy hourly time stamp in the form of a digital granular certificate (GC). This creates a parallel hourly instrument that matches directly to the underlying registry EACs. These GCs can then be matched, hour by hour, with the buyer's consumption and will contribute towards the Contracted CFE volumes.

How is storage considered in our CFE calculations?

In addition to direct sources of CFE, the 24/7 Carbon-Free Coalition recognises electricity discharged from an energy storage facility as carbon-free if it was charged using qualifying CFE.

The CFE status of storage discharge can be demonstrated by tracking a storage facility's charge and discharge records on a granular basis and matching these records with energy attributes. Alternatively, all discharge from the storage device during a reporting period can be claimed as CFE if the storage was charged exclusively with CFE throughout that period.

FAQs

How are green tariffs considered in our CFE calculations?

Standard ‘vanilla’ annual-based green tariffs score zero on hourly CFE metrics. This is because, without specific asset information and generation data, it is not possible to calculate the hourly impact. However, these basic, non-specific, and low-data tariffs will still contribute to your annual CFE score.

Green tariffs or supply contracts that provide the required transparency and data at hourly or higher resolution will contribute to the Contracted CFE volumes, provided other key criteria (such as carbon-free status, location, etc.) are satisfied.

How is self-generation considered in our CFE calculations?

For companies that have invested in self-generation, such as rooftop solar, the energy produced will contribute to your CFE score calculation. Self-generated energy is measured and treated as Contracted CFE. The energy generated in each hour will be added to any EAC and PPA contributions during the period, thus enhancing the score.

Projects might be on-site or off-site, on the grid, or entirely off-grid. Corporate buyers must retain energy attributes to claim use of CFE. This means corporate buyers can consume directly from their projects, retain the attributes, and claim use of CFE. It also means corporate buyers can sell energy to the grid, retain the attributes, and claim use of CFE (up to the volume that they purchase from the grid).

How is grid-supplied energy considered in our CFE calculations?

In addition to PPAs, green tariffs, and EACs, companies may consider the energy they consume from the grid as contributing to their CFE score. For example, if a company has procured EACs or PPAs to cover 50% of their consumption for a given period, they can look at the grid data for the remaining 50% (the uncovered portion). By determining the renewable percentage of the grid generation during that period, the company can claim that percentage toward their CFE score.

This scenario is known as 'Passive' procurement, where the buyer takes no direct action to mitigate their scope 2 carbon emissions, instead considering only the energy delivered through default supply. Renewabl's position on default supply aligns with the technical criteria set by the Climate Group's 247 Carbon-Free Coalition.

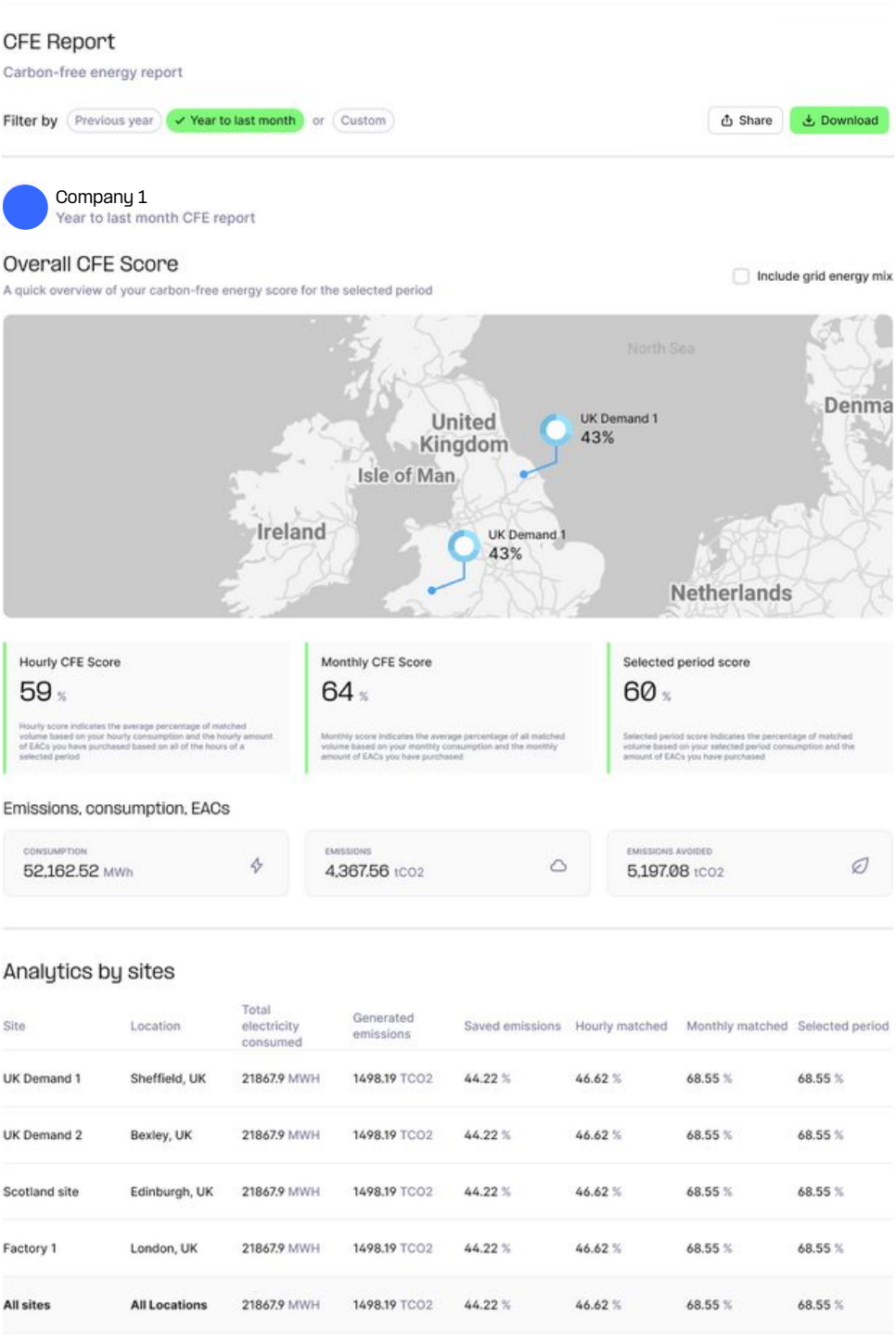
Their criteria recognise two types of qualifying passive procurement:

1. Corporate buyers with credible claims to passively delivered market-based instruments (EACs) included in their default supplies.
2. Corporate buyers on highly renewable grids where no market-based instruments exist.

For more in-depth explanations and examples of default supply scenarios, please refer to the latest version of the Climate Group 247 Carbon-Free Coalition's 24/7 CFE technical criteria.

Sample

Renewabl's report example.



CFE Report

Carbon-free energy report

Filter by Previous year ✓ Year to last month or Custom

Share Download

Company 1

Year to last month CFE report

Overall CFE Score

A quick overview of your carbon-free energy score for the selected period

Include grid energy mix

North Sea

United Kingdom

UK Demand 1 43%

Isle of Man

Ireland

UK Demand 1 43%

Netherlands

Denma

Hourly CFE Score

59 %

Hourly score indicates the average percentage of matched volume based on your hourly consumption and the hourly amount of EACs you have purchased based on all of the hours of a selected period

Monthly CFE Score

64 %

Monthly score indicates the average percentage of all matched volume based on your monthly consumption and the monthly amount of EACs you have purchased

Selected period score

60 %

Selected period score indicates the percentage of matched volume based on your selected period consumption and the amount of EACs you have purchased

Emissions, consumption, EACs

CONSUMPTION 52,162.52 MWh

EMISSIONS 4,367.56 tCO2

EMISSIONS AVOIDED 5,197.08 tCO2

Analytics by sites

Site	Location	Total electricity consumed	Generated emissions	Saved emissions	Hourly matched	Monthly matched	Selected period
UK Demand 1	Sheffield, UK	21867.9 MWH	1498.19 TCO2	44.22 %	46.62 %	68.55 %	68.55 %
UK Demand 2	Bexley, UK	21867.9 MWH	1498.19 TCO2	44.22 %	46.62 %	68.55 %	68.55 %
Scotland site	Edinburgh, UK	21867.9 MWH	1498.19 TCO2	44.22 %	46.62 %	68.55 %	68.55 %
Factory 1	London, UK	21867.9 MWH	1498.19 TCO2	44.22 %	46.62 %	68.55 %	68.55 %
All sites	**All Locations**	21867.9 MWH	1498.19 TCO2	44.22 %	46.62 %	68.55 %	68.55 %

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