GHG Protocol Scope 2 Training

Mt. Stonegate Green Asset Management I July 2026

Company Profile

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01 RENEWABLE ENERGY SOLUTIONS

International Market Instruments:

CN	USA	EU	Global
GECs	RECs	GOs	I-RECs

Additional Voluntary Label from EKO energy and Green-E

Project Owner Assistance for I-REC Applications

02 CARBON ASSET MANAGEMENT

Sourcing high quality carbon credits from our experienced team for corporates.

Supporting project owners develop carbon credits from start to finish.

03 STRATEGIC SUSTAINABILITY CONSULTANCY

Intellect Edge

We offer a tailored country market report for clients entering unfamiliar markets, providing essential insights and guidance.

Decarbonization Roadmap

We offer a customized service that guide clients through strategic planning and implementation to achieve their sustainability and net-zero goals.

GHG Inventory

We offer a customized service that helping clients measure, track, and report their greenhouse gas emissions in alignment with international standards.

Trainings & Workshops

We offer expert-led trainings and workshops to equip clients with practical knowledge and skills to navigate renewable energy, carbon markets, and sustainability strategies effectively.

ESG Scores & Performance Benchmark

We offer a strategic ESG advisory to help companies significantly elevate their ESG scores, close performance gaps, and position themselves as leaders aligned with global sustainability benchmarks.

01

Scope 2 Reporting under GHG Protocol

Purpose of GHG Accounting

Measure and Transparency

✓ Measure and quantify greenhouse gas emissions across operations.
✓ Identify emission hotspots and reduction opportunities.
✓ Provide a baseline for target setting and performance tracking.

Reduce and Decarbonization Management

✓ Improve energy efficiency and optimize resource consumption.
✓ Transition to low-carbon energy sources and fuels.
✓ Develop and track decarbonization roadmaps and targets.

Report and Compliance

✓ Enable independent assurance and third-party verification.
✓ Meet SBTi, RE100, and other regulatory disclosure requirements.
✓ Enhance transparency and credibility with stakeholders.

How are GHG Emissions Classified?

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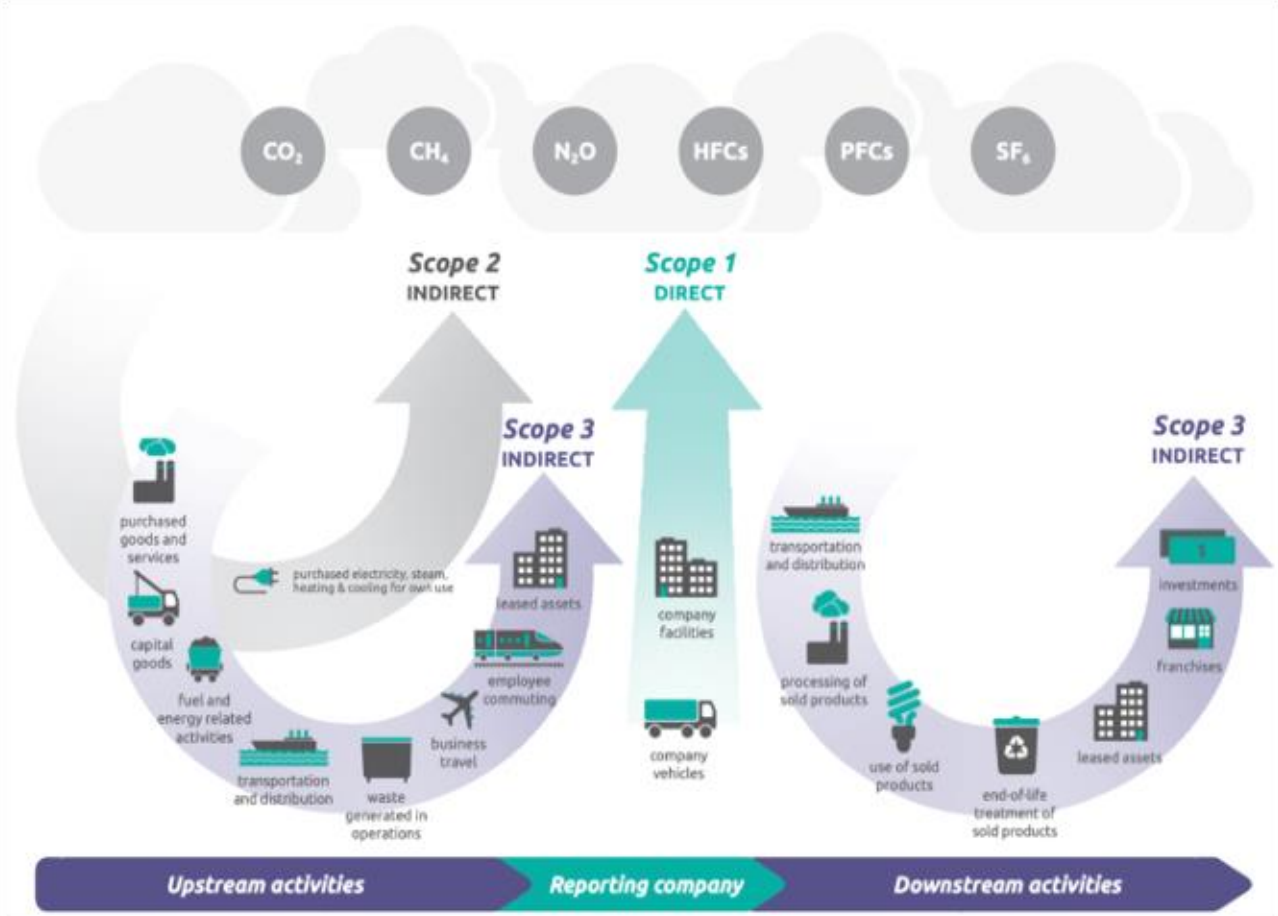

Source: Scope 3 Calculation Guidance

How is Scope 2 data's being used?

Scope 2 emissions reflect an organization's energy consumption, efficiency improvements, and renewable electricity procurement choices.

For some organizations, purchased electricity represents a major share of their carbon footprint and offers a practical pathway for emissions reduction.

Helps quantify the emissions impact of renewable energy purchases, PPAs, EACs/RECs, green tariffs, and other electricity sourcing strategies.

Provides insights that can guide energy planning, facility location decisions, investment strategies, and long-term decarbonization efforts.

Significance of Scope 3

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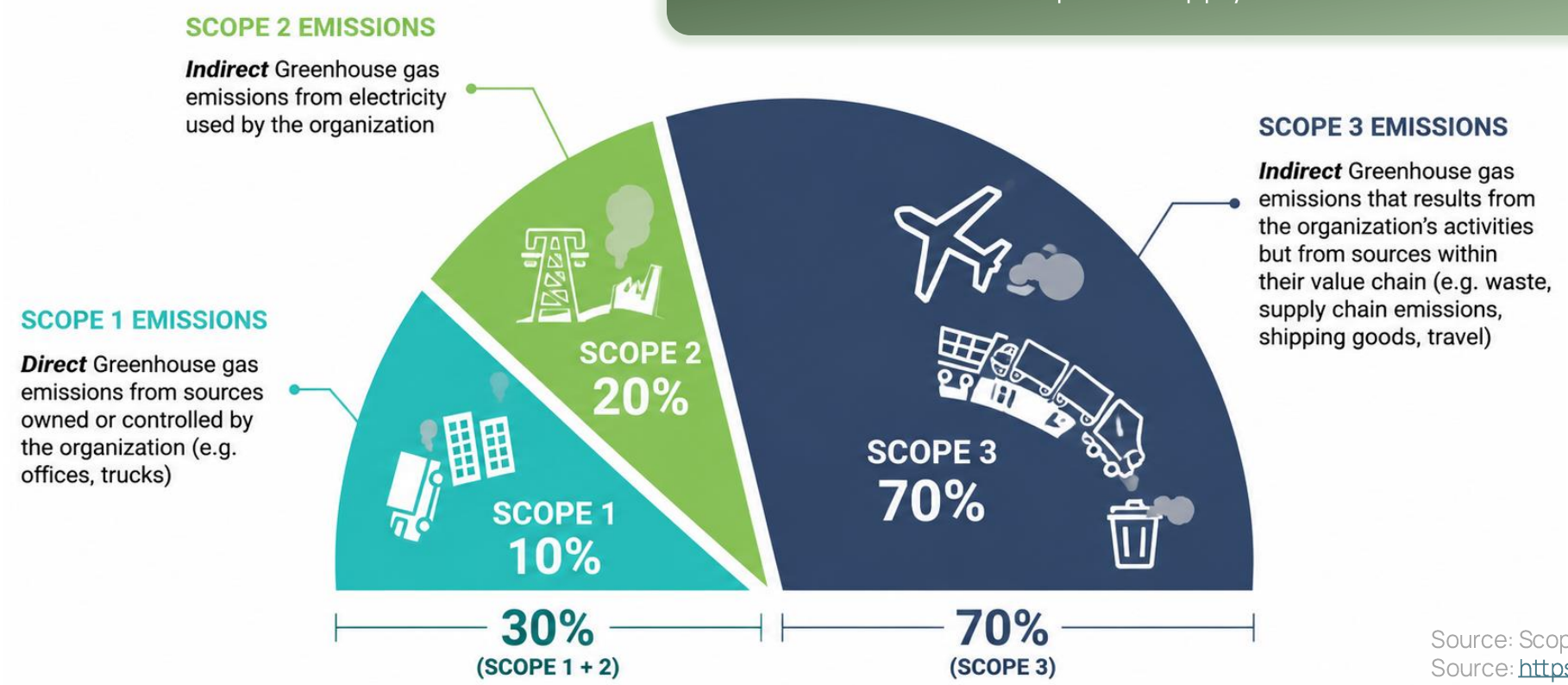
VALUE OF SCOPE 3 MANAGEMENT

- Enhance Value Chain Emissions Visibility
- Strengthen Supplier Engagement and Sustainable Procurement
- Identify Key Emission Hotspots and Reduction Opportunities
- Improve Supply Chain Resilience and Climate Risk Management



Source: Scope 3 Calculation Guidance and CDP Report
Source: https://mmcm.in/blog/scope-1-2-3-emissions/

Types of Scope 2 Accounting

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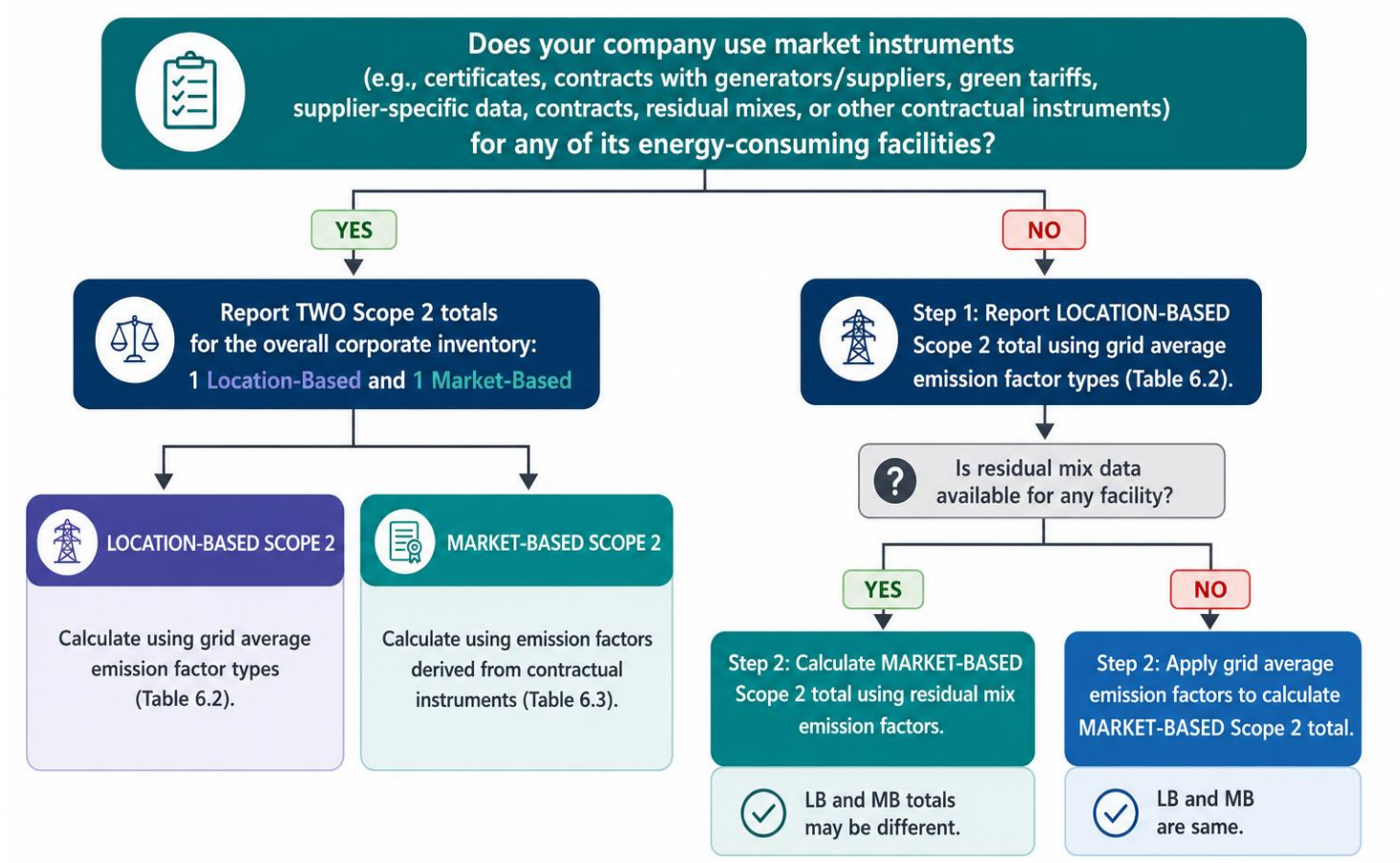
Attribute	Location-Based Method (LB)	Market-Based Method (MB)
Definition	A method to calculate Scope 2 emissions using average emission factors of the local electricity grid	A method to calculate Scope 2 emissions using contractual electricity purchases and associated energy attributes
Reflects	Actual emissions from the grid supplying electricity	Electricity purchasing decisions of the consumer
Importance	Necessary	Complementary & Necessary*
Purpose	Shows dependency on grid emissions	Shows impact of renewable electricity procurement
Emission Factors Hierarchy	Regional mix → Sub-national→ National grid mix	EACs → PPAs → Utility Emission Rates → Residual Mix

*The importance of MB varies depending on whether a company has contractual instruments (like PPAs, RECs, green tariffs). If a company has none, CDP still requires both methods to be reported without no exceptions.

SOP of Scope 2



Source: Scope 2 Calculation Guidance

What is dual reporting?

Dual reporting is the practice of reporting Scope 2 emissions using both the Location-Based (LB) and Market-Based (MB) methods to reflect grid emissions and electricity procurement choices.

Why is dual reporting important?

- ✓ Procurement Impact Visibility
- ✓ Scope 2 Transparency
- ✓ Risk & Opportunity Management
- ✓ Stakeholder Confidence
- ✓ Global Comparability
- ✓ Reporting Readiness

Key Takeaway

Dual reporting applies to all organizations, irrespective of Market Instruments availability.

Market Instruments

Emission factors	Indicative examples	Precision
Energy attribute certificates or equivalent instruments (unbundled, bundled with electricity, conveyed in a contract for electricity, or delivered by a utility)	• Renewable Energy Certificates (U.S., Canada, Australia and others) • Generator Declarations (U.K.) for fuel mix disclosure • Guarantees of Origin (EU) • Electricity contracts (e.g. PPAs) that also convey RECs or GOs • Any other certificate instruments meeting the Scope 2 Quality Criteria	Higher
Contracts for electricity, such as power purchase agreements (PPAs)[a] and contracts from specified sources, where electricity attribute certificates do not exist or are not required for a usage claim	• In the U.S., contracts for electricity from specified nonrenewable sources like coal in regions other than NEPOOL and PJM • Contracts that convey attributes to the entity consuming the power where certificates do not exist • Contracts for power that are silent on attributes, but where attributes are not otherwise tracked or claimed	
Supplier/Utility emission rates, such as standard product offer or a different product (e.g. a renewable energy product or tariff), and that are disclosed (preferably publicly) according to best available information	• Emission rate allocated and disclosed to retail electricity users, representing the entire delivered energy product (not only the supplier's owned assets) • Green energy tariffs • Voluntary renewable electricity program or product	
Residual mix (subnational or national) that uses energy production data and factors out voluntary purchases	• Calculated by EU country under RE-DISS project [b,c]	
Other grid-average emission factors (subnational or national) – see location-based data	• eGRID total output emission rates (U.S.).[d] In many regions this approximates a consumption-boundary, as eGRID regions are drawn to minimize imports/exports • Defra annual grid average emission factor (UK) • IEA national electricity emission factors[e]	Lower

ON-SITE RENEWABLE

Renewable energy produced on self-owned facility.

PPA

Signing a power purchasing agreement RE supplier.

GREEN TARIFF

Paying a fix price to utility as a green option.

EACs

Purchasing renewable energy through verified tracking system.

Source: Scope 2 Calculation Guidance

Market Instruments

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ON-SITE RENEWABLE

Renewable electricity generated and consumed by the company through self-owned facilities, typically solar PV or onshore wind systems.

PURPOSE

On-site renewable electricity reduces emissions by displacing purchased grid electricity.

KEY BENEFITS

01 Supports long-term decarbonization.
02 Demonstrates corporate sustainability commitment.
03 Reduces renewable electricity procurement risks.

PPA

A long-term agreement between a buyer and a renewable energy generator to purchase electricity under market-based Scope 2 accounting.

TYPES

Short-term (2-5 years)
Medium-term (5-10 years)
Long-term (10-25 years)

KEY BENEFITS

01 Supports large-scale renewable energy procurement.
02 Provides long-term price and energy supply stability.
03 Enables renewable electricity and decarbonization claims.

Market Instruments

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GREEN TARIFF

A green tariff is a utility-provided premium electricity product that supports renewable energy generation and may be backed by EACs.

COMMON STRUCTURES

Tariffs & Riders
Subscriber Programs

KEY BENEFITS

01 Offered by utilities or electricity suppliers.
02 Supports renewable electricity procurement.
03 Enables renewable energy claims and emissions reduction reporting.
04 Often structured similarly to utility-led PPAs.

EACs

An Energy Attribute Certificate (EAC) is a tradable instrument that represents the environmental attributes associated with the generation of 1 MWh of electricity.

EXAMPLES

GO (Europe)
RECs (U.S.)
I-REC (International)

KEY BENEFITS

01 1 EAC represents 1 MWh of renewable electricity generation.
02 Tracked through verified registry systems
03 Must be retired/cancelled to avoid double counting.
04 Used to support renewable energy and net-zero claims.

Quality Criteria of EACs

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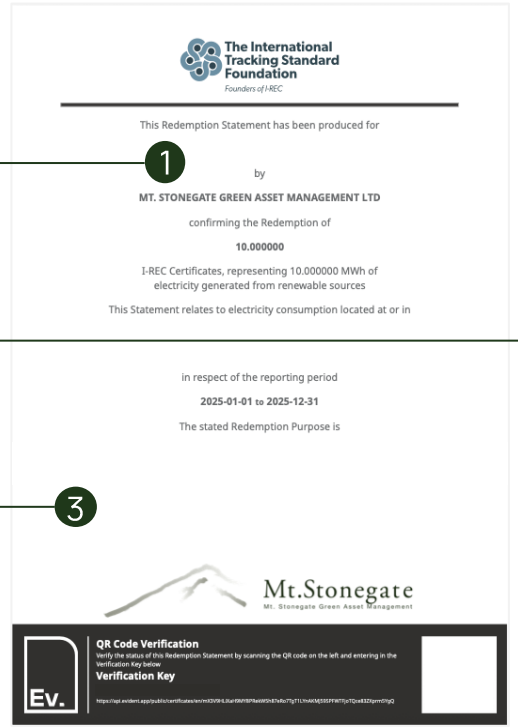
SAMPLE OF EAC (I-REC)

1 Conveying GHG emission rate claims
Instrument must carry valid electricity emissions attributes.

2 Unique claims
Renewable claim must belong to only one entity

3 Retirement for claims
Instrument must be traceable and permanently retired



The International Tracking Standard Foundation
Founders of I-REC

This Redemption Statement has been produced for

1

by

MT. STONEGATE GREEN ASSET MANAGEMENT LTD

confirming the Redemption of

10.000000

I-REC Certificates, representing 10.000000 MWh of electricity generated from renewable sources

This Statement relates to electricity consumption located at or in

in respect of the reporting period

2025-01-01 to 2025-12-31

The stated Redemption Purpose is

3

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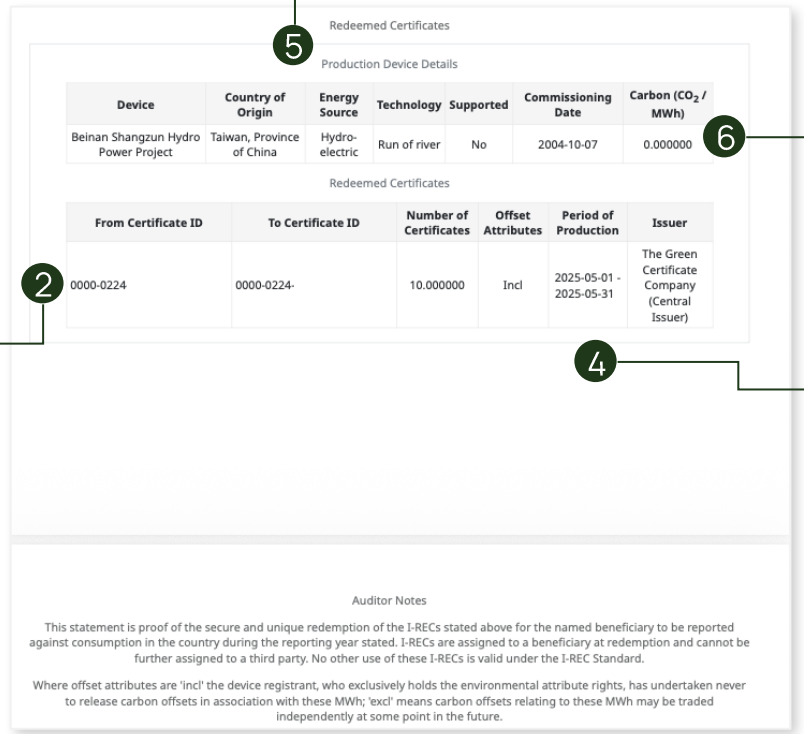
QR Code Verification
Verify the status of this Redemption Statement by scanning the QR code on the left and entering in the Verification Key below
Verification Key



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Redeemed Certificates

Production Device Details

Device	Country of Origin	Energy Source	Technology	Supported	Commissioning Date	Carbon (CO_2 / MWh)
Beinan Shangzun Hydro Power Project	Taiwan, Province of China	Hydro-electric	Run of river	No	2004-10-07	0.000000

6

Redeemed Certificates

From Certificate ID	To Certificate ID	Number of Certificates	Offset Attributes	Period of Production	Issuer
0000-0224	0000-0224-	10.000000	Incl	2025-05-01 - 2025-05-31	The Green Certificate Company (Central Issuer)

2

4

Auditor Notes

This statement is proof of the secure and unique redemption of the I-RECs stated above for the named beneficiary to be reported against consumption in the country during the reporting year stated. I-RECs are assigned to a beneficiary at redemption and cannot be further assigned to a third party. No other use of these I-RECs is valid under the I-REC Standard.

Where offset attributes are 'incl' the device registrant, who exclusively holds the environmental attribute rights, has undertaken never to release carbon offsets in association with these MWh; 'excl' means carbon offsets relating to these MWh may be traded independently at some point in the future.

5 Market boundaries
Instrument must originate from relevant electricity market

6 Supplier or utility-specific emission factors
Supplier EF must properly account for retired attributes

4 Vintage
Instrument period should align with electricity consumption period

Source: Scope 2 Calculation Guidance

RE100: Procurement Requirements

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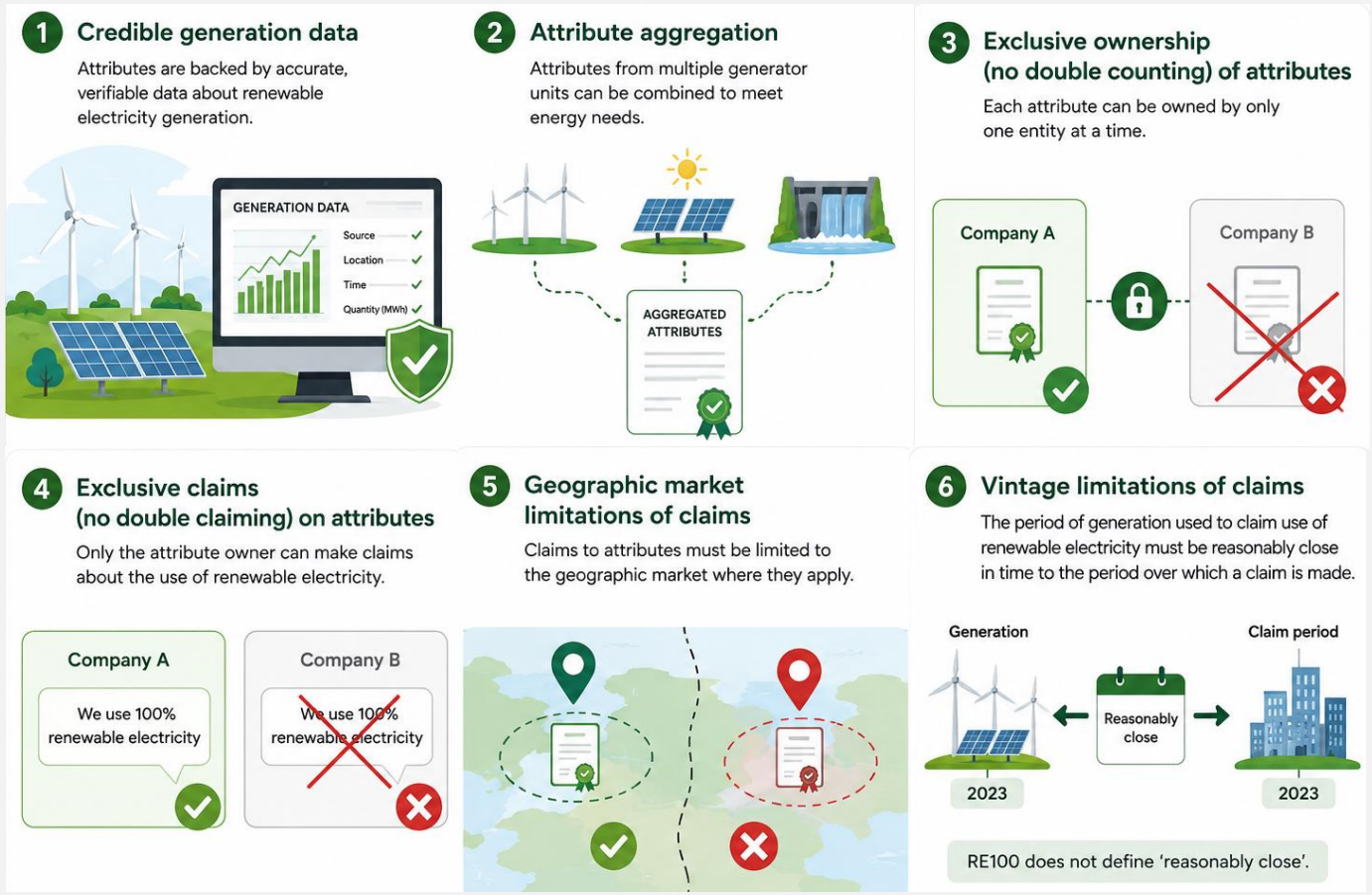
CREDIBILITY OF CLAIMS



MUST-KNOW

IMPACTFUL PROCUREMENT

green-e

EKOenergy

Gold Standard for the Global Goals

Voluntary labels can enhance the credibility and impact of EACs by promoting renewable electricity from newer projects.

UPDATES

Age of Renewable Assets:

✓ Renewable electricity must come from projects commissioned/repowered within the last 15 years.

✓ Older projects can only contribute up to 15% of total claims.

Challenges in Scope 2 Reporting

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Procurement Challenges	Reporting Challenges
Selecting suitable EACs based on market and regulatory requirements (e.g. IRECs or National RECs).	Difficulty in obtaining data and the accuracy of the data (e.g., electricity consumption, emission factors etc).
Alignment with Scope 2 Quality Criteria for EACs (e.g. Time Matching, Vintage, Spatial, etc).	Defining appropriate reporting boundaries.
Long-term contract commitments and complex PPA negotiations.	Ensuring alignment and consistency in Scope 2 reporting across global sites.
Choosing a PPA arrangement aligned with organizational objectives (e.g. Physical PPA or Virtual PPA).	Difficulty in aligning across multiple framework requirements like CDP, SBTi, and RE100.
Obtaining regulatory approvals and permits for on-site renewable energy projects.	Lack of awareness when new updates are released.

Case study 1: Reporting using PPA

XYZ Data Center in India

PPA Reporting

Activity	Unit	Quantity
Grid Electricity	kWh	42,000,000
Grid emission factor in India	kg CO_2/kWh	0.72

Assume that the company signed a 25-year solar for 30 GW/yr (equivalent to 30,000,000 kWh).

Scope 2 Calculation

LB: (42,000,000 kWh) × (0.72 kg CO_2/ kWh) = 30,240 tCO_2e
MB: (42,000,000-30,000,000)kWh × (0.72 kg CO_2/kWh) + (30,000,000 kWh) × (0 kg CO_2/kWh) = 8,640 tCO_2e

Market-based scope 2 drops from 30,240 tCO_2e to 8,640 tCO_2e because of signing solar PPA.

Case study 2: Reporting using EACs

Activity	Unit	Quantity
Grid Electricity	kWh	96,000,000
Grid emission factor in Thailand	kg CO_2/kWh	0.383

Assume, the company has purchasing EACs, which matches the 100% power consumption.

Scope 2 Calculation

LB: (96,000,000 kWh) × (0.383 kg CO_2/ kWh) = 3,676.8 tCO_2e
MB: (96,000,000-96,000,000) kWh × (0 kg CO_2/kWh) = 0 tCO_2e

Since the emission factor provide by the utility is 0 kg CO_2/kWh, the market-based accounting has become 0 tCO_2e.

Manufacturing Company Verification Report Sample

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CASE STUDY FOR ISO14064-1
VERIFICATION CERTIFICATES/ STATEMENT

Site	Electricity Consumed (MWh)	Scope 2 Location-based (tCO2e)	Scope 2 Market-based (tCO2e)	Instrument Types
Site 1	7,938.40	4,199.41	0	I-REC to cover 100% of consumption*
Site 2	7,411.31	3,920.58	0	I-REC to cover 100% of consumption **
Site 3	11,790.71	6,237.29	6,219.30	I-REC to cover parts of consumption***

*I-REC Serial number: Serial number:0000-0000- ~ 0000-0000- 0000-0000- ~ 0000-0000-
0000-0000- ~ 0000-0000-
**I-REC Serial number: 0000-0000- ~ 0000-0000- 0000-0000- ~0000-0000-
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Source: : A Verification Statement from a Company using the I-REC Tool

GIVEN DATA

Grid emission: 0.52 kg CO_2e / MWh
Company buys I-RECs to cover 100% of consumption

DUAL REPORTING (FOR SITE 1)

LB: 7,938.40 x 0.52 = 4,199.41 tCO_2e
MB: 7,938.40 x 0 = 0 tCO_2e
(In site 2 & 3, the same procedure is applied corresponding to the % of I-REC covered to the consumption)

02

GHG Protocol Scope 2 Draft Updates

GHGP Scope 2 Update: Location-Based

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UPDATES

New emission factor **hierarchy prioritizing** emission factors with the **highest spatial precision**, followed by the highest temporal precision.

Hierarchy = the most "local" emission factor available for the grid + most granular temporal emission factor (hourly before monthly).

TIME GRANULARITY VS. SPATIAL GRANULARITY

Category	Temporal granularity	Spatial Granularity
Definition	Most precise **time matching**	Most precise **location information**
Accuracy	Temporal (Hourly) → Daily → Monthly	Regional → National Emission factor
Difficulty	Electricity consumption curve; Hourly EACs (Granular Certificates) are unavailable in most markets globally	Data availability and quality; Technical complexity; Market structure limitations

PRODUCTION VS CONSUMPTION-BASED

Type	What is Represents	Example
Production-Based	Emissions from electricity generated within the region	The grid mix of one province only – only local generators counted
Consumption-Based	Emission from electricity consumed in the region, including traded electricity	The actual power mix customers use **after grid imports & exports are accounted for**

GHGP Scope 2 Update: Market-Based

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UPDATES

- **Hourly Matching**
  All certificates must be matched on an **hourly basis**.
- **Deliverability**
  All certificates sourced from generation are **deemed deliverable**.
- **Standard Supply Service (SSS)**
  New guidance and requirement that a reporting entity **shall not claim more than** its pro-rata share of SSS.
- Updated definition of residual mix and where no residual mix is available, use of only fossil rates.

Type	What is Changes	Why it Matters
Hourly Matching	**Match clean energy purchases** to the same hours you use power	Makes claims more accurate and prevents "24/7 greenwashing"
Deliverability	Defines eligible renewable sources by **physical grid connections** and not just borders	Ensures only realistic electricity are claimed
Standard Supply Service (SSS)	Limits how much public or regulated clean energy companies can claim	Prevents double-counting and ensures fairness
Residual Mix	Removes grid-average fallback, using fossil only data instead	Avoids overstating renewables in emissions reporting

03

24/7 CFE

24/7 CFE Introduction

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What is 24/7 CFE?

The next-frontier of clean-energy procurement approach to match electricity demand with carbon-free supply hour-by-hour, 24/7, instead of annually.

Why does it matter?

01 Annual renewable claims can hide gaps – companies may still use fossil power **at night or when renewables** aren't available.

02 24/7 CFE closes the gap by **tracking and matching electricity use in real time**, ensuring carbon-free operations.

Global Initiatives

UN ENERGY

UN 24/7 CFE Compact (launched in 2021 at COP26): Bring together companies, governments, and NGOs to accelerate adoption.

CLIMATE GROUP 24/7 CARBON-FREE COALITION

The Climate Group and Google Coalition: Works on creating market structures, policy support, and digital tracking tools.

24/7 CFE Market Tools	Granular Certificates	24/7 PPAs/Hybrid PPAs
Function	Track clean energy use by **hour** instead of annual matching	Contracts that **bundle multiple renewable sources** + storage to cover round the clock demand
Examples	M-RETS (US), ELEXON (UK)	Google-AES (US), Microsoft-EDF (EU)
Status in Asia	Not yet mainstream; some pilots are being studied (Taiwan, Japan exploring upgrades to REC systems)	Not yet mainstream; some pilots are being studied (Taiwan, Japan exploring upgrades to REC systems)

Market Outlook: Key Takeaways and Challenges

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BENEFITS FOR CORPORATES

Greater Carbon Impact & Credibility

- Achieves greater actual emission reduction from electricity consumption.
- Strengthens ESG credibility; mitigates greenwashing concerns.
- Aligns with GHGP direction on temporal and location-based accuracy.

Energy & Financial Resilience

- Reduces exposure to electricity price volatility: Mix of intermittent + firm clean resources improves load coverage.
- Future cost benefit: In some markets, early 24/7 procurement may be more expensive.
- However, the initial premium will dissipate as systems mature.

GROWING INTEREST AND PILOT PROJECTS IN ASIA

Taiwan: Grid supports 15-minute settlement, while T-REC currently issues monthly certificates (hourly-ready). Google's 10 MW geothermal deal supports 24/7 CFE by 2029.

Japan: Early Pilots Kyocera Communications Systems' "Zero Emission" Hokkaido data center for 24/7 supply.

India: Round the Clock (RTC) tender targeting 89-90% hourly availability; 1.3 GW ReNew project as example.

CHALLENGES

✓ Market Readiness: Most electricity markets only track energy annually not hourly.
✓ Grid Flexibility: Requires more storage, demand response, and diverse clean generation.
✓ Regional Gaps: Few Asian markets have the infrastructure for hourly tracking or sufficient clean energy supply diversity.

Case Study: Google and Microsoft

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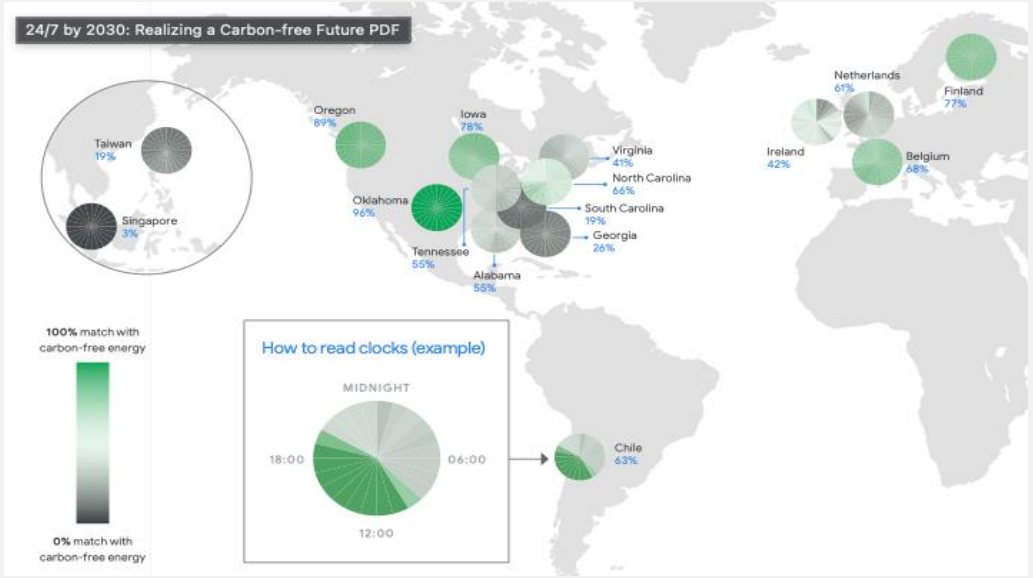
Google

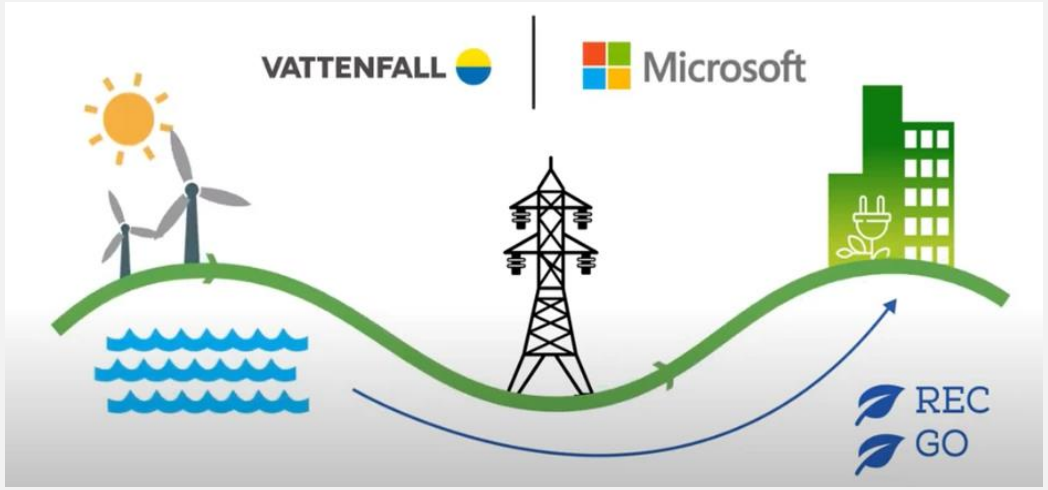
- Procurement from multi-source & multi-technology blended PPAs.
- Developed a machine learning system that predicts wind energy output 36 hours in advance.
- Floating solar project in Taiwan (40,000 panels).



Google's Hourly Matching Performance Across the World

Microsoft

- Restart of 835 MW Nuclear energy plant in Pennsylvania
- 5-year PPA with Brookfield Renewable partners about 10.5 GW of hybrid renewable Power, largest single corporate PPA ever.
- Agreement with Powerex for hourly matching using hydropower and BESS over a year.



World's First Hourly Matching PPA by Microsoft

04

Scope 2 Reporting under CDP

Why Scope 2 Accounting Matters under CDP

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About CDP

23,000+
Companies disclose through CDP globally

#1
Global environmental disclosure platform

D- to A
Scoring scale, A List is the highest rating

Reasons why CDP Requests Scope 2 Data

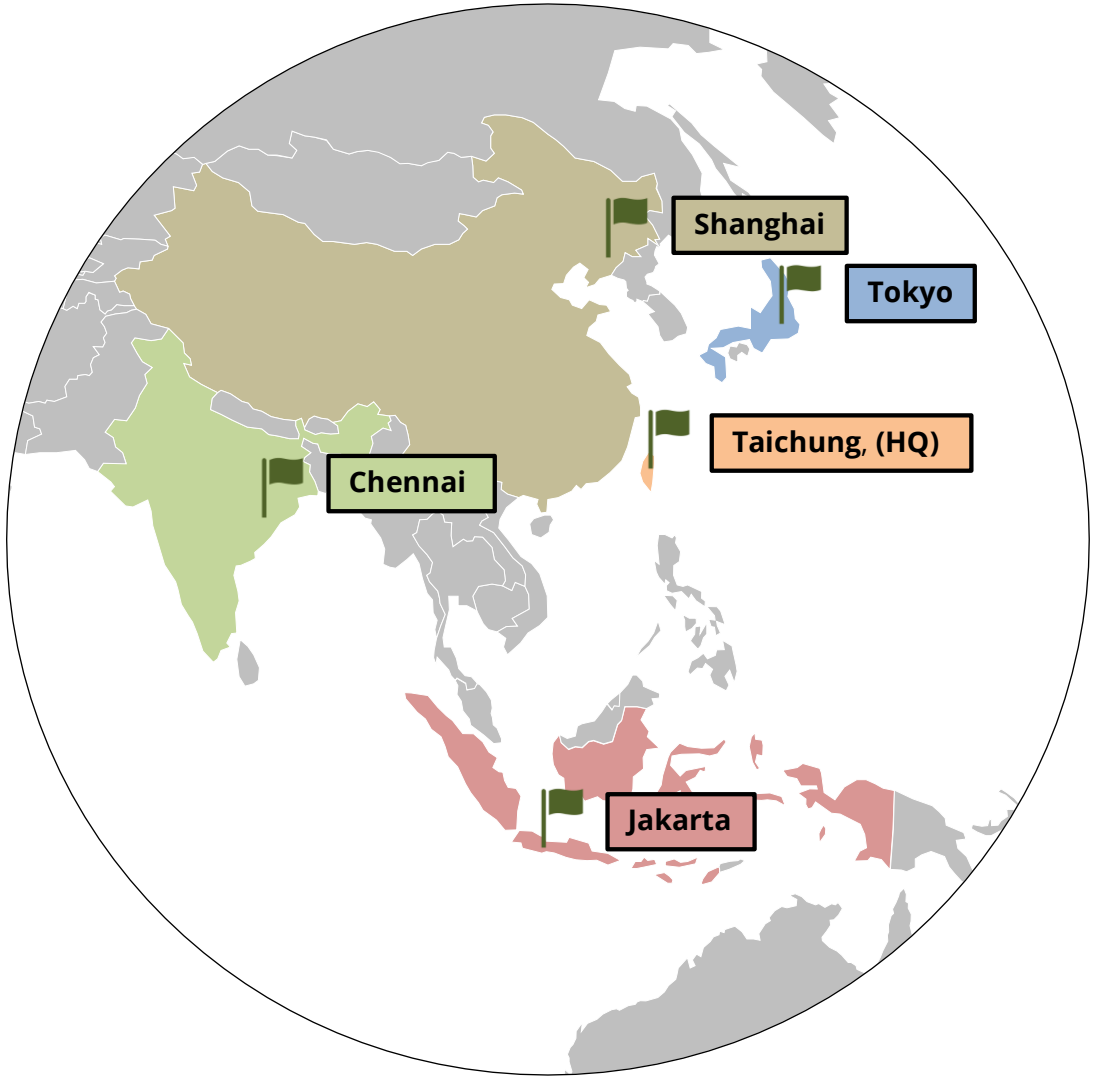
Electricity = Biggest Lever
For most companies, purchased electricity is the single largest controllable emission source. CDP uses Scope 2 to assess how seriously an organization manages this.

Dual Reporting is Mandatory
CDP requires both Location-Based and Market-Based figures. Reporting only one is scored as incomplete, which directly lowers your disclosure score.

Renewable Procurement Signal
The gap between LB and MB figures tells investors how much renewable electricity you actually procure, a core metric for RE100, SBTi, and ESG ratings.

Target Validation
Science-Based Targets (SBTi) for electricity require a credible MB Scope 2 approach. CDP checks that your targets and data are internally consistent.

Contact Us!



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