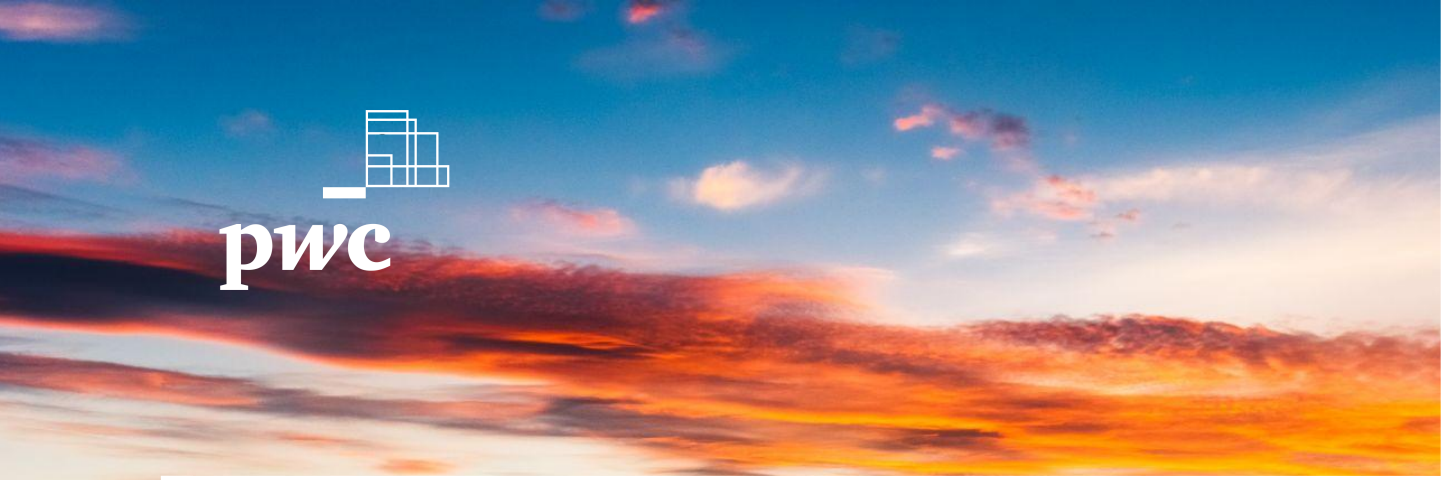

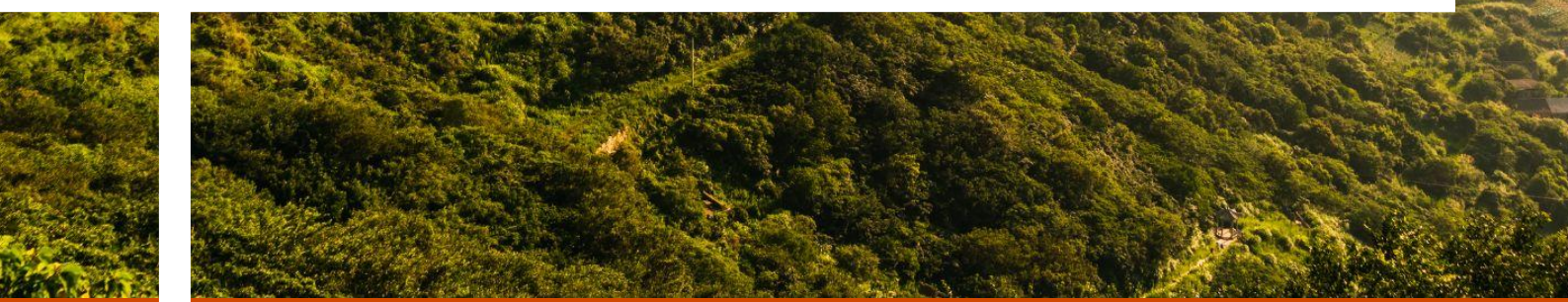

Enabling a Net Zero world

Exploring corporate decarbonisation ambitions and aspects of renewable energy procurement and carbon offsets in Southeast Asia

December 2023

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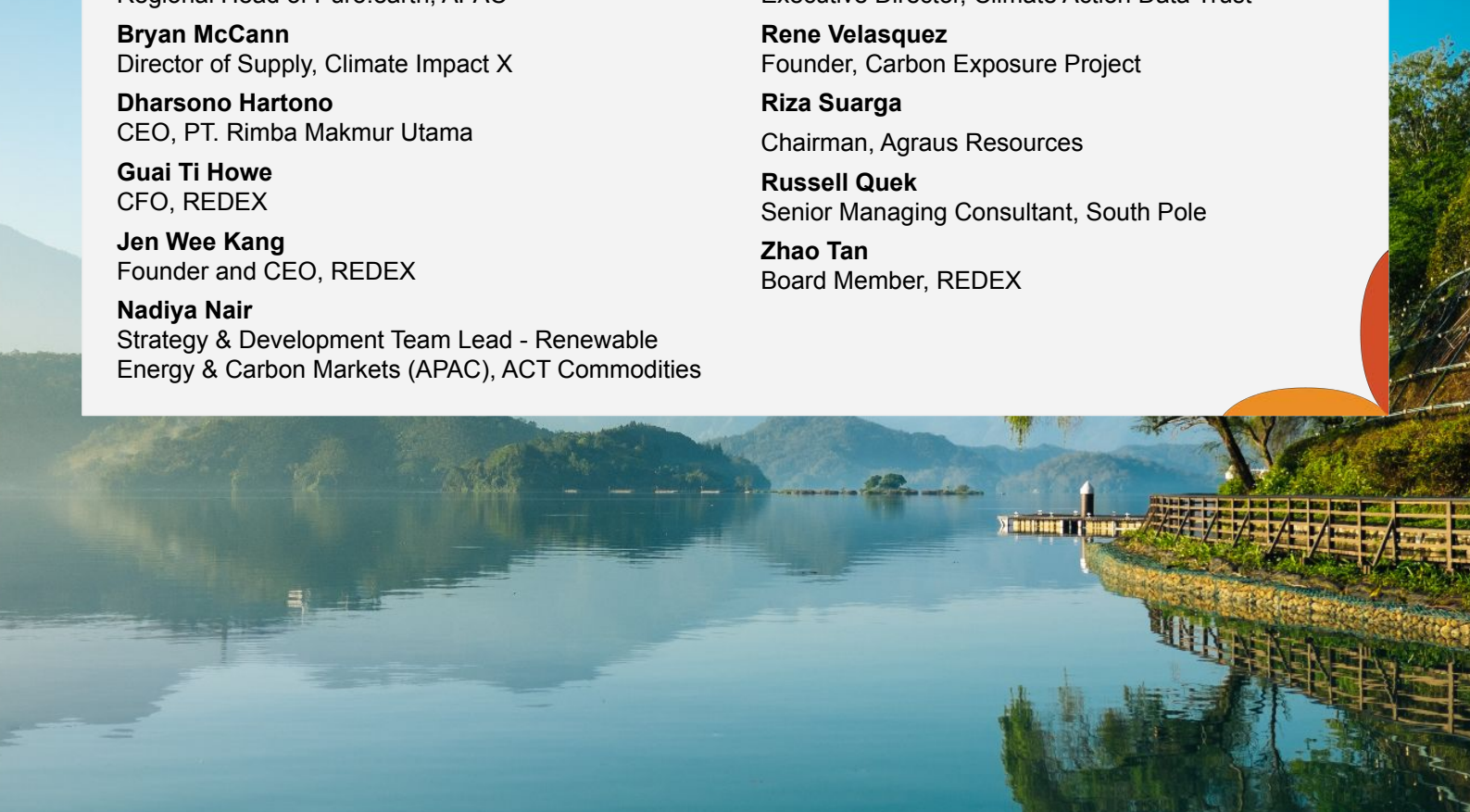


Contents

1

Report highlights

1

Report highlights

The report aims to:

- Highlight the state of Net Zero ambitions in SEA (including corporates)
- Inspire corporates to raise their ambitions, and to contribute further to the development of decarbonisation in SEA
- Inform what respective emission reduction ambitions entail
- Provide considerations for corporates in SEA as they decarbonise and utilise RECs and carbon credits (CCs), including understanding developing areas.

The decarbonisation landscape in Southeast Asia (SEA): The critical importance of reducing emissions in SEA is driving both governments and corporates to act, despite the unique regional challenges present.

As one of the regions most impacted by climate change anywhere in the world, a majority of countries in SEA have now outlined their Net Zero ambitions. While countries in SEA are taking various initiatives to operationalise their Net Zero ambitions, significant challenges remain such as its higher exposure to fossil fuels. Nonetheless, countries in SEA are making its decarbonisation efforts through new and emerging government policies. It is also observed that there can be significant potential for renewable energy and nature-based and technology-based solutions in the region.

Corporates in SEA are increasingly taking action on decarbonisation due to various reasons including increasing jurisdictional and international pressures.

Unpacking Net Zero: Corporate commitments and ambitions and what they mean.

Commitments that corporates are choosing to follow include “Net Zero” or “Carbon neutral”, and taking actions beyond their Net Zero commitments.

This paper explores the differences between these and its nuances, and the steps that companies can take to “Reduce”, “Replace and “Remove or Avoid” carbon emissions.

Reduce involves the mitigation of emissions through a company’s own operations, which should be the first and primary step taken by an entity to decarbonise.

Replace sources of emissions and energy from fossil fuels with greener alternatives such as renewable energy. This is crucial to reducing Scope 2 emissions.

Remove or **avoid** carbon - this is also necessary in the overall decarbonisation journey to manage hard to abate emissions or make efforts outside corporates’ business activities. However, this should not be used as a substitute for either Reduce or Replace.

RECs and CCs can be explored to aid with respective commitments. Financing arising from such also support further development of such projects in SEA.

We highlight in the following page an overview of considerations over the use of RECs and CCs in SEA.

Overview: Considerations over the use of RECs and carbon credits

The summary below provides a one-page overview covering the reasons for corporates to decarbonise, common ambitions levels observed, corporate decarbonisation steps, as well as considerations for corporates to take regarding RECs and carbon credits.

Reasons to decarbonise (Page 11)

External: National or regional compliance; Disclosure compliance; Supply chain compliance; Stakeholder pressure

Internal: Initiatives (RE100 or SBTi); Voluntary sustainability ambition

Ambition (Page 14 and 15)

Carbon neutral — CC REC

Net Zero — CC* REC

Actions beyond a company's Net Zero targets — CC REC

* To be used for residual emissions

Decarbonisation steps (Page 16)

Reduce → Replace REC → Remove or avoid CC

Making efforts to prevent, reduce, or eliminate sources of emissions within a company's business activities

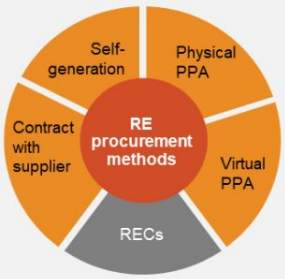
Replacing electricity generated by fossil fuels with renewable energy.

Efforts to offset emissions through carbon removal and avoidance projects.

Usage of carbon credits and RECs: REC Renewable energy certificates (RECs); CC Carbon credits (CCs)

REC Considering Renewable Energy Certificates (Page 17)

RE procurement methods (Page 19)



PPA - Power Purchase Agreement
SBTi - Science Based Targets initiative
GHG - Greenhouse Gas

Key standards (Page 18 and 20)

RE100
A global corporate initiative aimed at getting the world's most influential businesses to commit to 100% renewable energy by 2050

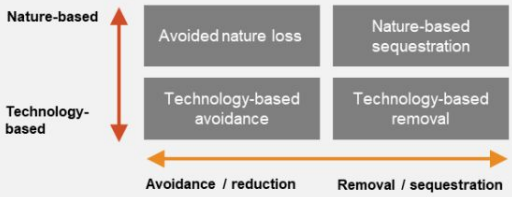
SBTi
Provides a standardised and robust approach for corporates to set net zero targets aligned with climate science.

Singapore Standards 673
Addresses the limited RE in Singapore, provides an alternative standard that recognises ASEAN RECs purchased for entities in Singapore.

CC Considering carbon credits (Page 27)

Why purchase CCs? (Page 27)
Carbon offsets may not be used to deliver Net Zero targets, aside from residual emissions, but they are essential to financing the projects that will be increasingly crucial to the successful delivery of global Net Zero aspirations.

Classifications of CCs (Page 29)



Key certification (page 33) — Not exhaustive

Verra | Gold standard | Puro.earth

Consideration steps over REC procurement (Page 22)

- **Step R1** Understand the types of RE projects to procure
- **Step R2** Determine quantity of RE required
- **Step R3** Understand REC standards
- **Step R4** Choose the REC platform
- **Step R5** Purchase and retire RECs
- **Step R6** Disclose RECs

Key points for consideration:

- RECs must be generated within the **same market** to under the SBTi and RE100 or within ASEAN under SS 673
- RECs must be claimed within the **same vintage year**
- RECs must be **disclosed** according to the **GHG Protocol**

(Pages 18, 20, and 25)

Ongoing discussion (Page 25)

- Increasing scrutiny in the additionality of RECs. SBTi has opened a Call for Evidence to tackle the topic.

Consideration steps over the purchase of CCs (Page 29)

- **Step C1** Understand the characteristics of CCs to purchase
- **Step C2** Determine the quantity of CCs required
- **Step C3** Understand verified CCs
- **Step C4** Decide on CC procurement methods
- **Step C5** Purchase and retire CCs
- **Step C6** Disclose CCs

Key points for consideration:

- Consider referencing the **10 Core Carbon Principles** when determining high quality carbon credits (page 30)
- **Doing your due diligence**: While it is highly encouraged for credits to be purchased to support projects, efforts should be taken to ensure the credits are of high quality (page 34)

Ongoing discussion (Page 36 and 37)

- **Convergence** of the voluntary and compliance market.
- An increasing number of groups are working on creating a standardised definition of high- and low-quality credits.

2

The decarbonisation landscape in Southeast Asia

2

2.1. Net Zero ambitions in Southeast Asia

According to the Intergovernmental Panel on Climate Change (IPCC), in order to limit global warming to 1.5°C, greenhouse gas (GHG) emissions must peak before 2025 and be reduced by 43% by 2030[1]. This will require rapid decarbonisation and collaboration across both the public and private sector. Given the scientific consensus, many countries globally have made Net Zero commitments. Over 100 countries have set Net Zero targets, with most having done so between 2019 and 2020[2].

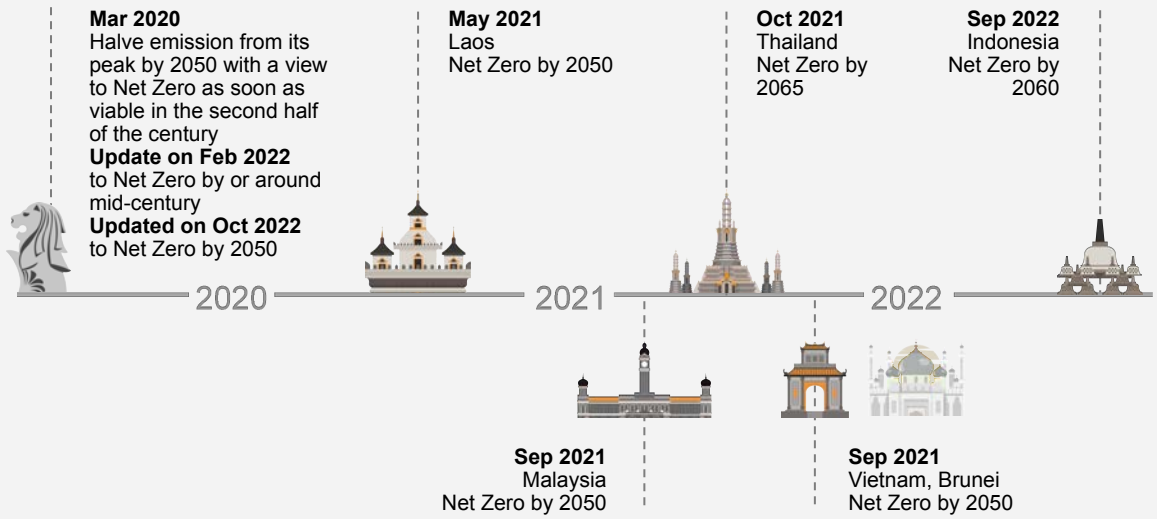
Southeast Asia (SEA) is especially susceptible to the worst impacts of climate change[3], and the region is continuing to make efforts to decarbonise[4]. Of those SEA countries which have set targets, most did so between 2020 and 2022.

In order to achieve Net Zero, countries can take various steps. These include but are not limited to the following:

- Apply market mechanisms aimed at delivering emissions reductions such as carbon taxes or emissions trading schemes (ETS)
- Apply industry-related regulations e.g. energy efficiency for buildings, incentivising the rollout of electric vehicles adoption
- Incentives for low carbon businesses
- Planning for a diverse energy mix with more clean energy

The progress of implementation strategies in SEA and other parts of the world are highlighted in Table 1.

Figure 1: Timeline of Southeast Asia countries setting Net Zero targets



[1] Code Red - Asia Pacific's Time To Go Green (2021), PwC Asia Pacific
[2] Southeast Asia's Challenge of Decarbonizing While Growing Rapidly (2022), Center for Strategic and International Studies (CSIS)
[3] IPCC Sixth Assessment Report (2022), IPCC
[4] Net Zero Tracker Database (2023), Net Zero Tracker

Table 1: Overview of decarbonisation targets and initiatives taken by SEA countries and global peers[5] [6].

	Country	Net Zero targets	Carbon mechanisms	RE* targets	Example RE strategies/ regulations
Southeast Asia	**Brunei**	Net Zero 2050	🟧	30% generation by 2035	Energy White Paper sets framework
	Cambodia	Carbon Neutral 2050	🟥	27.7% hydro, 17.9% solar, etc capacity by 2030[7]	Power Development Master Plan 2022-2040[7]
	Indonesia	Net Zero 2060	🟩	44% generation by 2030**[8]	2023 National budget Renewable Energy Development
	Laos	Net Zero 2050	🟥	30% consumption by 2025	Renewable Energy Development Strategy in Lao PDR
	Malaysia	Net Zero earliest by 2050	⬜	70% capacity by 2050[9]	National Energy Transition Roadmap (NETR)[9]
	Myanmar	No Net Zero targets have been set	🟥	11% new capacity by 2030[10]	Myanmar Energy Policy (2015), National Electricity Master Plan (2014)[10]
	Philippines	No Net Zero targets have been set	⬜	RE mix of 35% by 2030 and 50% by 2050	Green Energy Auction Programme (GEAP)[11] Green Energy Option Program
	Singapore	Net Zero 2050	🟩	4 GW of renewable electricity imports by 2035 2GWp domestic solar capacity by 2030	Singapore Green Plan 2030
	Thailand	Net Zero 2065	*** 🟧	30% consumption by 2037[12]	Power Development Plan 2018-2037
	Vietnam	Net Zero 2050	**** 🟧	60% solar and wind capacity by 2050[13]	Support mechanism for development of RE 2014
Other countries	**EU**	Economy Net Zero by 2050	🟩	45% mix by 2030	RePowerEU Plan
	India	Net Zero 2070	🟧	500 GW capacity by 2030	Renewable energy investment
	UK	Net Zero 2050	🟩	70 GW solar by 203W[14]	Power Up Britain - Energy Security Plan[14]
	US	Net Zero 2050	🟩 (in some states)	80% generation by 2030	America's Strategy to Secure the Supply Chain for a Robust Clean Energy Transition
	New Zealand	Net Zero 2050	🟩	50% consumption by 2035	Climate Change Response (Zero Carbon) Amendment Act 2019[15]

🟩 Implemented 🟧 In progress of implementation ⬜ Considerations taken 🟥 No news on implementations

* Renewable energy (RE) targets that have been announced
** Target is conditional if the JETP commitment can be met
***Thailand has an ETS exchange launched and a carbon tax under consideration
**** Vietnam has ETS legalised - Pilot Carbon Exchange from 2025

[5] Policies database (2023), IEA
[6] ICAP ETS Map (2023), International Carbon Action Partnership (ICAP)
[7] Power Development Masterplan 2022-2040 (2022), Royal Government of Cambodia
[8] JETP Investment Plan Launched: Indonesian Government Aims for Swift Implementation (2023), JETP
[9] Summary of the National Energy Transition Roadmap: Navigating the transient stage (2023), PwC Malaysia
[10] Renewable Energy Situation In Myanmar (2023), Technology and Informatics Institute for Sustainability
[11] Green Energy Auction Program in the Philippines (2021), Department of Energy Philippines
[12] Thailand - Renewable Energy (2021), International Trade Administration
[13] Vietnam's Eighth National Power Development Plan (2023), PwC Vietnam
[14] Powering Up Britain - Energy Security Plan (2023), HM Government
[15] New Zealand 2023 Energy Policy Review (2023), IEA

Southeast Asia' potential and decarbonisation efforts

Southeast Asia's context

Based on PwC's reports "Code Red - Asia Pacific's Time to Go Green"[16] and "Regional electricity trade in ASEAN - The road ahead to an integrated and greener electricity future"[17], SEA needs to accelerate its pace of decarbonisation. However, SEA is also facing its unique challenges. These challenges include, but are not limited to:

1. Dependence on fossil fuels
2. Rising energy demands due to expected economic growth[18]
3. Uneven distribution of renewable resources
4. Absence of regional electricity trading platform in Southeast Asia

Given the context, SEA can be seen to be relatively less advanced in its progress of implementing decarbonisation strategies and levers compared to other parts of the world due to unique challenges.

Renewable energy potential

However, SEA does have notable potential in areas such as renewable energy development. For example, the prospects for wind power generation in Vietnam are significant, with an estimated potential of 311 GW[19]. Additionally, Vietnam has also surpassed Malaysia and Thailand to reach the largest installed capacity of solar panels in SEA[20].

Countries such as the Philippines also show potential in wind power, which is expected to drive the regional market growth. Concurrently, governments have also begun to prepare strategic plans to pursue renewable energy. For example, Cambodia's Power Development Plan aims to have two-thirds of the country's power derived from renewable energy by 2030. As a whole, there are growing opportunities for SEA to enhance the role of renewables within regional energy mixes and in turn deliver decarbonisation.

Utilisation of RECs and CCs by corporates

The increasing provision of renewable energy in SEA could also benefit corporates in efforts to decarbonise their operations.

With the region requiring capital and finance to improve its infrastructure and technology, private capital and funding could help to harness and capitalise on the potential of renewable energy in the region. Renewable energy procurement methods such as renewable energy certificates (REC) provide both finance for these renewable energy projects in SEA and act as recognised certificates for companies to claim renewable energy usage and reduce their Scope 2 emissions.

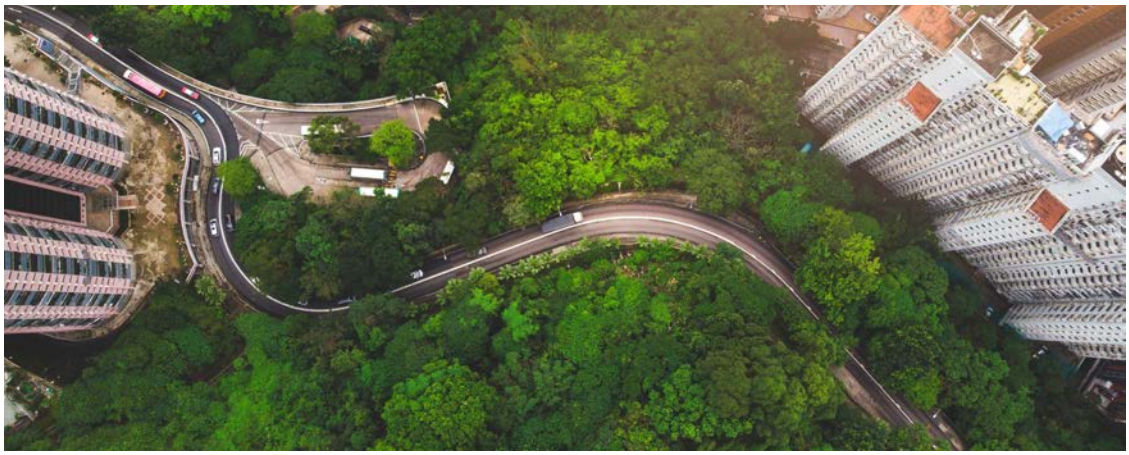
Similarly, the appropriate use of carbon credits (CCs) could be leveraged upon to further direct capital into nature-based solutions and technological innovations that can help remove carbon from the atmosphere, reduce emission from existing projects or avoid it being produced in the first place (for more information, see page 29). As the global voluntary carbon market (VCM) continues to grow, currently at over USD 2 billion, it is a potential financing tool for a region with vast carbon offsetting opportunities[21].

Furthermore, countries such as Malaysia, Indonesia, and Vietnam have forest cover of approximately 55%, 53% and 47% respectively, providing many opportunities for forest management, afforestation, and REDD+ projects.

Aside from nature-based solutions, some of the largest carbon credit projects in the region stem from emerging technological solutions to promote low-carbon infrastructure such as biomass cookstoves, rice husk biochar and direct air capture.

As such, with the necessary capital and finance, renewable energy and carbon offset projects can not only help countries in SEA to reach their national targets, but corporates to leverage and harness such financing options to decarbonise. Against that backdrop, this report aims to explore the use of renewable energy procurement and carbon offsets and specifically, the nuances of RECs and carbon credits and give consideration to operationalise the potential use of RECs and carbon credits for corporate decarbonisation.

[16] Code Red - Asia Pacific's Time To Go Green (2021), PwC Asia Pacific
[17] Regional electricity trade in ASEAN - The road ahead to an integrated and greener electricity future (2022), PwC Singapore
[18] Southeast Asia's Green Economy: Cracking the Code (2023), Bain & Company
[19] ASEAN Renewables: Opportunities and Challenges (2023), IEA
[20] Why companies should consider Southeast Asia for their renewable energy projects (2023), Singapore Economic Development Board
[21] Southeast Asian countries' ambitions for voluntary carbon market (2023), Reccessary



2.2 Corporates are facing pressures to decarbonise

In recent years, there has been increasing pressure and a brighter spotlight on companies to disclose their sustainability and climate change efforts and initiatives. The evolving reporting standards and compliance landscape, made up of standards such as those from the Taskforce for Climate-related Financial Disclosures (TCFD) and the International Sustainability Standards Board (ISSB), are ensuring companies are being held increasingly accountable in this area.

This includes corporate accountability for GHG emissions, efforts to decarbonise their operations and setting targets for their environmental performance. Companies are beginning to take steps in pursuit of decarbonisation and respond to these various external and internal incentives and pressures.

The table below provides a summary of the most common reasons why corporates decarbonise.

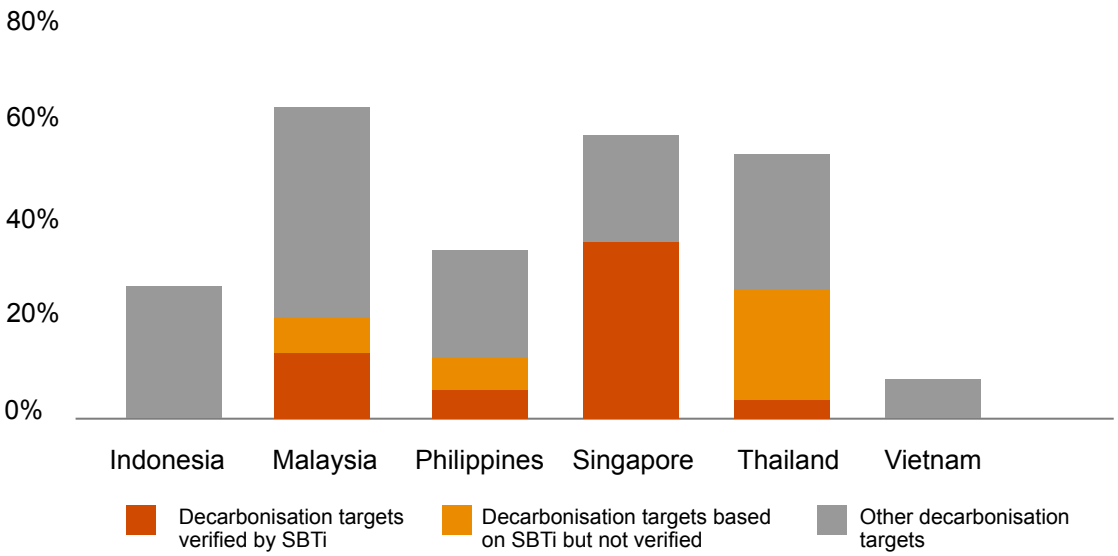
Table 2: Reasons for corporates to decarbonise[22]

Reasons to decarbonise	Description	Internal or external
National or regional compliance	National or regional regulations which require a company to reduce emissions, use a certain amount of renewable energy or other decarbonisation regulations.	External
Disclosure compliance	Requirements to disclose sustainability information may put a company in a position where they are incentivised to decarbonise, for example, needing to disclose decarbonation targets and efforts.	External
Supply chain compliance	Business customers of a company who may want to decarbonise their supply chain either voluntarily or to comply with regulations such as the EU's Carbon Border Adjustment Mechanism.	External
Stakeholder pressure	There is increasing pressure coming from business customers, investors and internal staff to decarbonise.	External
Initiatives (RE100 or SBTi)	A company may want to purchase RECs and carbon credits in to meet targets set by initiatives such as the RE100 or SBTi. As such, care should be taken to be familiar with what is allowed under such initiatives.	Internal
Voluntary sustainability ambition	A company may have their own ambitions to be more sustainable and to decarbonise. This may also include the desire to support the underlying projects generating RECs and CCs.	Internal

[22] PwC analysis

Within SEA there have been an increase of corporates setting decarbonisation targets, however, not all targets are validated or based on the SBTi, such is represented in the figure below. For more information on decarbonisation targets, refer to the next section.

Figure 2: Statistics of the top 50-listed companies' (by market capitalisation) decarbonisation targets in selected SEA countries[23].



International pressures - Spotlight on the EU Carbon Border Adjustment Mechanism (CBAM)

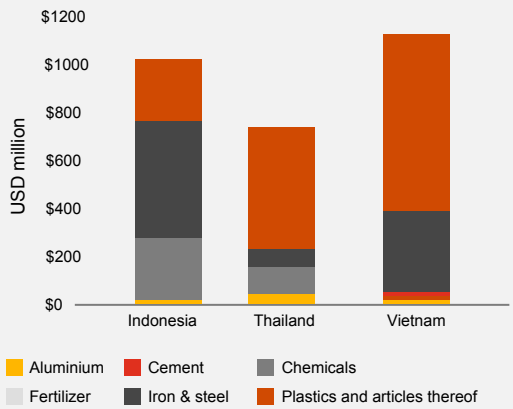
The Carbon Border Adjustment Mechanism (CBAM) is a carbon tariff on carbon intensive products which will require EU importers to report the GHGs released during production of specific resources and in 2026. From 1 October 2023, CBAM has entered into effect, starting with a transitional phase that runs until the end of 2025.

SEA economies' dependencies on EU exports range from between 8 and 25%[24]. The effects of such regulations could have a significant impact on certain SEA countries and industries, and serve as a driver to decarbonise.

The countries of SEA most affected by CBAM are Vietnam, Indonesia, and Thailand largely due to the export of plastic, iron, chemicals, and aluminum to the EU[25] (more information on CBAM and its impacts on SEA can be found in Appendix C).

Therefore, CBAM may have a key impact on certain products from affected companies. In addition, there can be pressures to decarbonise an organisation's supply chain emissions, of which suppliers reside in SEA.

Figure 3: Export value of CBAM-relevant commodities to the EU, based on 2019 trade data



[23] Sustainability Counts II - State of sustainability reporting in Asian Pacific (2023), PwC
[24] The Observatory of Economic Complexity (2023), MIT
[25] Trading-off: Exploring the potential implications of the EU's new Carbon Border Adjustment Mechanism for Southeast Asian economies (2023), New Climate

3

Unpacking Net Zero

3

With national Net Zero targets being set in SEA, it is also important to understand the various types of commitments which companies set to establish their decarbonisation ambitions.

3.1 Context

This section explores the primary commitments a company can make, how offsets are applied to such commitments, as well as the nuance within relevant terminology.

3.2. Carbon neutral

Carbon neutral is commonly understood where an organisation's emissions are "balanced" or "neutralised" by purchasing an equivalent volume of emissions offsets[26]. Corporate carbon neutrality commitments mainly only take into consideration of carbon dioxide emissions but may include other GHG emissions. Additionally, covered business activities should include Scope 1, 2, and may include Scope 3 emissions (for more information on Scope 1, 2, and 3 emissions, please refer to page 16).

As carbon neutrality may be achieved without necessarily having reduced emissions by amounts consistent with reaching Net Zero at a global level[27], the pursuit of carbon neutrality does present a potential risk of concealing the need for more ambitious decarbonisation efforts. As such, companies who wish to set carbon neutrality commitments should still decarbonise their operations to the best of their ability. A recent study[28] shows that it is usually the case, as companies that are material users of carbon credits decarbonise twice as fast as those who do not.

3.3. Net Zero

Net Zero at a global level in line with the Paris agreement refers to a balance of carbon sources and sinks to achieve temperature goals[29] (for more on the Paris agreement, see Appendix A).
Net Zero targets for businesses require them to first reduce corporate GHG emissions at a pace aligned with the Paris goals by 2050, and then tackle residual emissions with carbon offsets.

Some companies may additionally choose to align with the SBTi. The SBTi contains its own requirements for achieving the Net Zero based on the Net-Zero Standard. According to the Standard, companies must use permanent carbon removal and storage to neutralise the final <10% of residual emissions that must be eliminated after a company has achieved its long-term target and cut emissions by >90%[30].
In other words, SBTi targets do not recognise carbon offsets as counting towards interim targets, and only allow for removals offsetting to counter balance residual emissions.

[26] Achieving Carbon Neutrality (2020), Carbon Offset Guide
[27] Net-Zero Jargon Buster - a guide for common terms (2021), SBTi
[28] Corporate emission performance and the use of carbon credits (2023), MSCI

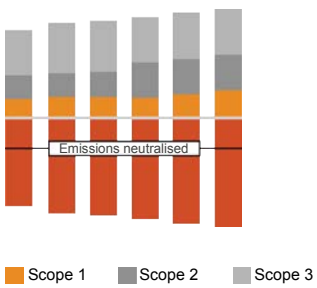
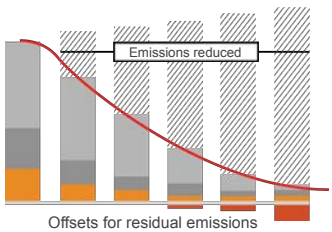
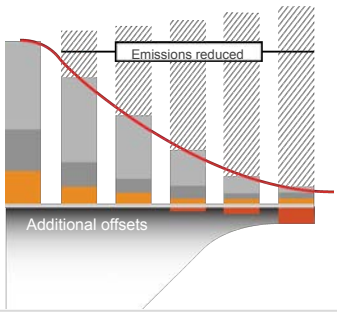
[29] What is Net Zero? (2023), University of Oxford
[30] The Corporate Net-Zero Standard (2023), SBTi

3.4. Actions beyond a company's Net Zero targets

While decarbonising at a pace aligned with the Paris Agreement is critical, companies are often also encouraged to avoid delaying critical investments into climate solutions which are available today[31]. The purchase of carbon credits can be seen as a means of taking further action beyond corporate level Net Zero ambitions.

In addition, other actions from corporates that can contribute to the pursuit of global Net Zero, outside of a company's own Net Zero commitment, include the purchase of RECs as investments to further renewable energy developments, rather than them being used to reduce Scope 2 emissions.

Table 3: Summary of commitment ambition levels and the use of RECs and carbon credits within the commitments

	Carbon neutral	Net Zero	Actions beyond a company's Net Zero target
Diagram representation			
Definition	Emissions produced by company activities will be balanced by an equivalent volume being removed from the atmosphere. This applies to Scope 1, 2, and potentially Scope 3 emissions.	Companies commit to reduce Scope 1, 2, and 3 GHG emissions to as close to zero as possible.	Companies fund or purchase carbon offsets in addition to their Net Zero efforts.
RECs	Can be used to balance out Scope 2 emissions	Can be used to replace Scope 2 emissions	Can be purchased to achieve Net Zero commitments under Scope 2 as well as to aid further renewable energy development.
Carbon credits	Can be used to balance out emissions	Can be used for residual emissions but not to be used to progress reduction of Scope 1, 2 or 3 emissions in accordance with the Net-Zero Standard	Can be purchased to compensate an organisation's unabated emissions, and to contribute to beyond that.

[31] The Evolving Voluntary Carbon Market Paper (2023), IETA

3.5 Steps for corporate decarbonisation

The following are steps companies can take towards decarbonisation:

Step 1: Reduce

Often referred to as mitigation, this activity is essential to getting to Net Zero. Mitigation actions are measures that prevent, reduce, or eliminate sources of emissions within a company's business activities (e.g. ensuring minimal coolant leaks or improving efficiency of operations to reduce energy use). This should be the priority in a company's decarbonisation strategy.

Companies are responsible for, and expected to account for 3 types of emissions:

- Scope 1: Direct emissions such as carbon dioxide emitted by a power generator used by the company, emissions from gas leaks from pipes, or emissions from non-electric fleet vehicles.
- Scope 2: Indirect emissions that come from energy purchased and used such as the equivalent energy from electricity usage.
- Scope 3: Emissions not produced by the company itself, but emissions from its value chain such as those from its suppliers to make materials needed for products, and from its products after being purchased.

Step 2: Replace

The next step is to replace or substitute by replacing electricity purchased with renewable energy sources or other low-carbon alternatives (e.g. replacing electricity that is reliant on fossil fuels with low-carbon sources is another method to decarbonise and reduce Scope 2 emissions).

The renewable energy methods as recognised by the RE100 (please refer to page 18 for more information) include self-generation, physical power purchase agreements (PPAs), virtual PPAs, contracts with suppliers, and energy attribute certificates (EACs) (which include RECs). For more information on the various renewable energy procurement methods, please refer to page 19.

Other examples include replacing diesel with biodiesel, or high Global Warming Potential (GWP) GHG gases with lower or zero GWP gases to decarbonise and reduce Scope 1 emissions too.

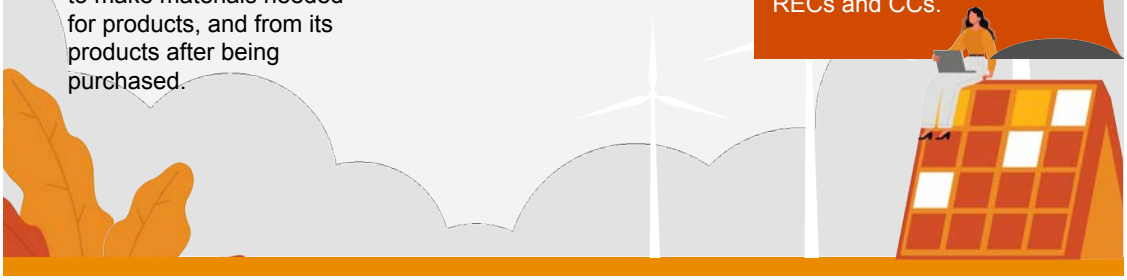
Step 3: Remove or avoid

After reducing and replacing, corporates can tackle the residual emissions for those emissions that are hard to abate. In such cases, carbon offsets such as carbon credits may be useful to offset any residual emissions.

Additionally, carbon credits are key instruments to funding carbon offsetting projects (more information on carbon offsetting projects can be found on page 27).

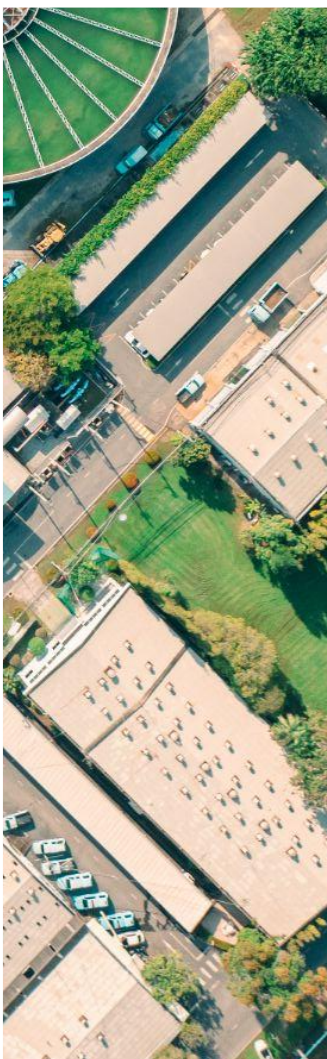
Although carbon offsets are useful instruments in a corporate's decarbonisation journey, they should not be used as a substitute for either the Reduce or Replace stage. As discussed in section 3.3, they should not be used to reach a company's Net Zero targets.

This report will analyse the nuances and provide guidance on how decarbonisation can be aided through the use of RECs and CCs.



4

Exploring renewable energy procurement methods and renewable energy certificates (RECs)



4

SEA is a region with promising renewable energy potential[32]. Some suggest that one of the greatest hurdles to realising this potential is a lack of bankable projects to finance[33]. As such, it appears that securing adequate financing is a necessary prerequisite if SEA is going to effectively transition its supply of energy towards renewables - and in turn, accelerate the pace of decarbonisation within the region.

4.1. Why procure renewable energy

4.1.1. What are the RE100 and SBTi?

The RE100 and the SBTi are both initiatives available for companies to join. Doing so can increase the credibility of Net Zero targets and climate change disclosures.

RE100

The RE100 is a global corporate renewable energy initiative with the goal of getting the world's most influential businesses to commit to 100% renewable energy and reach this target by 2050. RE100 is aimed at larger corporations, however companies with smaller consumption are also eligible, under certain conditions.

SBTi

The SBTi's objective is to help companies create effective GHG emission reduction pathways and provide confidence in the effectiveness of company decarbonisation strategies.

The SBTi's Net-Zero Standard was developed to provide a standardised and robust approach for corporates looking to set Net Zero targets aligned with climate science. It contains guidance, criteria, and recommendations to support corporates in setting Net Zero targets.

4.1.2. Application of renewable procurement methods under the SBTi, RE100 and the GHG Protocol

The RE100 technical criteria are mostly an interpretation of the GHG Protocol Corporate Standard Scope 2 accounting guidance, while the SBTi similarly uses the GHG Protocol Scope 2 Quality Criteria to determine the quality of RECs.

The three sets of standards and criteria cross reference each other. For requirements on reporting renewable energy procurement, the GHG Protocol should be referenced. For eligibility of RECs, the RE100 should be referenced.

The procurement methods listed in Table 4 are recognised by the GHG protocol, RE100 and the SBTi.

For these renewable energy instruments to be eligible to report Scope 2 reduction, they must meet certain criteria and be reported according to the GHG Protocol.

The RE100 recommends renewable energy procurement methods that provide more direct support to new generation. However it is recognised that these options may not always be available for a company.

RE procurement options with more direct support to projects should be explored first. The following sections provide information on and a guide to the procurement of RECs in the context of SEA, often where such options may be unavailable.

[32] Renewable Energy: The Top-Priority for Southeast Asia to Fully Blossom (2023), Renewable Energy Institute
[33] Southeast Asian nations face growing energy security challenges and need to accelerate their clean energy transitions (2022), IEA

Table 4: Comparison of renewable energy procurement methods[34] [35] [36]

	Self-generation	Contract with green electricity products supplier	Physical PPA	Virtual PPA	RECs
Description	RE procured from an on-site or offsite project owned by the corporate buyer themselves.	This is project specific and is described as an arrangement whereby the supplier procures from specified projects on behalf of the corporate buyer. It is often advertised as a "green tariff".	A type of contract between a corporate buyer and generator as purchased from on-site projects owned by third parties or off-site projects where there is a direct line, or off-site grid-connected RE generation projects.	A purely financial transaction where a corporate buyer assumes market risk related to the sale of a generator's electricity and receives RECs. There is no physical electricity transmitted with the contract.	RECs are certificates that permit a claim to having consumed electricity with the attributes conveyed by the REC.
Upfront capital investment	Yes	No	No	No	No
Ongoing expenditures relative to incumbent electricity option	Likely cost saving over the life of the project	Cost premium, tariff may offer savings	Likely cost saving over the life of the contract	Likely cost saving over the life of the contract	Cost premium
Term of commitment	Operational life of installed technology	Monthly, multiyear for green tariff	Multiyear**	Multiyear**	Varies, significant flexibility
Level of risk for corporation	Production risk	Low to medium risk, little control	Basis risk* if the project is in a different region		No project level risk, contract duration risk
Transaction complexity	Medium to high	Low	Medium	High	Low
Supports regional RE deployment	High	High	High	Medium	Medium
Active or Passive	Active	Active	Active	Active	Passive
**Key requirements according to the RE100 and GHG Protocol ** **	Relevant emissions to be reported as Scope 1. Electricity consumed from project is not reported as Scope 2.	Disclose emission factor that applies to all energy delivered and method of calculation.	Bundled certificates can be claimed. Audit trail or other mechanisms are needed to demonstrate no double counting.	The vintage must be "reasonably close" (claimed the same calendar year they are generated). They are only recognised to be claimed if the certificate is generated in the same market as they will be claimed.	

* Basic risk is the potential risk that can arise from mismatches in a hedging position.
** Tenure is typically between 10 to 20 years
*** More on reporting RE procurement and RECs can be found on page 25.

For more information on the various RE procurement methods according to the RE100, see Appendix B.

[34] Green Power Product Options (2023), U.S. EPA
[35] Green Power Supply Options Comparison Tab (2023), U.S. EPA
[36] Policies for Enabling Corporate Sourcing of Renewable Energy Internationally (2017), National Renewable Energy Laboratory (NREL)

4.2. RECs in the context of SEA

4.2.1. REC market boundaries

REC market boundaries based on the RE100

According to the RE100, claims to use of renewable electricity must be based on generation occurring in the same market as the location it is to be used in. A market for renewable electricity refers to an area in which:

- The laws and regulatory framework governing the electricity sector are consistent between the areas of production and consumption.
- Electricity grids are substantially interconnected, indicating a level of systemwide coordination.
- Utilities/suppliers recognise each other's energy attributes and account for them in their trade of energy and energy attributes.

The market exceptions are the USA with Canada and the single market in Europe. As of December 2022, **SEA does not meet the criteria to be considered a single market**. In 2022, RE100 held a public consultation around changes to the RE100 technical criteria which included a proposal to recognise physical procurement of renewable electricity across a market boundary under certain conditions. In response to the limited interconnection between national grids and contracts for trade of energy[37] and energy attributes in development between the relevant countries, the proposal for SEA to be considered to be a single market was ultimately withdrawn. However, RE100 will continue to study developments in key markets which could eventually give companies credible claims to use renewable electricity generated outside of those markets.

REC Market Boundaries based on the Singapore Standards (SS) 673

The Singapore Standards Council (SSC) and Enterprise Singapore launched the "Singapore Standard 673: Code of practice for Renewable Energy Certificates," a set of voluntary rules for the RECs ecosystem in Singapore. The standard was created due to the gap between the number of large local and multinational consumers and Singapore's finite land space. It serves as a **framework** to allow **Singaporean buyers of RECs** a **reference** to follow when it comes to **using RECs procurement for Scope 2 Net Zero fulfillment**. SS 673 is intended to facilitate consistency in the production, tracking, management, and usage of RECs for making renewable energy claims in Singapore. It is not a customer recognition programme like the RE100.

Due to the limited supply of RE in Singapore, the **SS 673 allows RECs buyers** to **use Southeast Asian RECs** to **match their electricity consumption**. In this way, while not meeting RE100 requirements, it enables RECs buyers to do their part to support RE project development in the neighboring countries. The acceptable market boundaries are those from the UN Geoscheme for Southeast Asia, which includes all ASEAN members and East Timor.

> "SS 673 is an alternative framework to the RE100 rules enabling Singapore companies to procure RECs and make sustainability claims. It acts as a practical way for Singapore companies to financially support the renewable energy industry in Southeast Asia, sending a clear market signal for more RE projects to be built in the region."
>
> Jen Wee Kang, REDEX

[37] Regional electricity trade in ASEAN - The road ahead to an integrated and greener electricity future (2023), PwC Singapore

4.2.2. RECs market landscape in SEA

All REC markets within SEA are currently voluntary, with the exception of the Philippines[38]. The Philippines has its own Philippine Renewable Energy Market (REM). It is intended to be a facility for mandated participants to comply with the Renewable Portfolio Standards (RPS) through trade of RECs. RPS is a market-based policy that mandates electricity suppliers to source an agreed portion of their energy supply from eligible RE resources, contributing to the growth of the RE industry in the country. Entities with specific RE generation facilities can also participate in REM voluntarily.

Some countries in SEA have established their own national regulations, instruments and issuers regarding RECs.

Malaysia has established its own national Malaysian RECs (mRECs), which are based on the International Renewable Energy Certificates (I-REC) standards and managed under their registry. So-called mRECs are not available to be traded but are meant to be redeemed/retired by end customers directly along with rights claimed to the renewable energy generated.

While Thailand does not have its own national REC credits or markets, they have made steps in establishing a local I-REC issuer: Electricity Generating Authority of Thailand (EGAT), while other countries such as Singapore, Indonesia, Vietnam, and Laos use the Green Certificate Company (GCC) as their I-REC issuer.

Singapore as discussed in the previous section, launched the SS 673 to provide a local framework for REC purchase.

More information on REC trading within SEA can be found on page 23.

4.2.3. Renewable energy potential in Southeast Asia

It has been suggested that SEA countries have the potential to meet their growing energy demand with renewables and cut 75% of their energy-related emissions by 2050[39]. Additionally, estimates suggest that reduced energy costs arising from the increased use of renewables could save up to USD 160 billion by 2050, while cost savings related to avoided health and wider negative environmental impacts could be as large as USD 1.5 trillion.

Southeast Asia also has potential in developing related manufacturing capacity: growing SEA solar photovoltaic cells, batteries, and electric two-wheeler industries has an estimated potential of USD 90 to 100 billion in revenue[40].

4.2.4. How are SEA companies procuring renewable energy?

As part of their SBTi commitments, it can be observed that companies from SEA have taken steps to procure renewable energy.

Within Singapore, Singtel[41] and City Developments Limited (CDL)[42] have followed the best practice of only purchasing local RECs within Singapore, where Singtel has stated that they will only purchase international RECs if other options are exhausted. Singtel has also signed a PPA to account for 13% of its data center energy consumption while CDL[43] has installed onsite photovoltaic panels powering parts of their operations. StarHub has also signed a virtual PPA in 2022 to secure renewable energy for the next 13 years[44]. They additionally purchase both local Singapore RECs and RECs generated from solar photovoltaics in Vietnam, however the international RECs have not been counted towards StarHub's Scope 2 reduction in their 2022 report[45].

In Indonesia, GoTo[46] was among the first companies to support the Indonesian government's efforts in accelerating the transition to renewable energy by purchasing RECs from Indonesia's state-owned utilities company. Additionally, some of their operations utilise solar panels to generate supplementary energy with more projects such as this to be added over time.

Ayala Land[47] has a number of properties in the Philippines which have signed power supply agreements and purchased RECs improve the ratio of renewable energy in their energy mix.

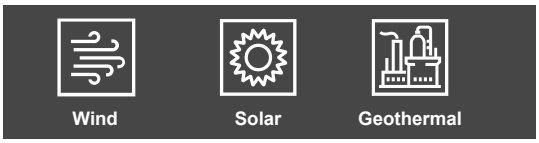
[38] Renewable Energy Certificates (RECs) in Six APEC Southeast Asia Economies (2023), Asia Pacific Energy Research Centre
[39] ASEAN Can Cover Two Thirds of Energy Demand with Renewables (2022), IRENA
[40] Renewable Energy Manufacturing in Southeast Asia Can Generate $90 Billion to $100 Billion in Sustainable Revenue by 2030 (2023), ADB
[41] Our purpose driven journey - Sustainability Report 2023 (2023), Singtel
[42] Zero in on Positive Impact - Integrated sustainability report 2023 (2023), CDL
[43] Accelerating renewable energy solutions (2022), CDL
[44] StarHub Named World's Most Sustainable Telco on 2023 Corporate Knights' Global 100 (2023), Starhub
[45] Sustainability Annual Report 2022 (2022), StarHub
[46] One Ecosystem One Purpose - 2022 Sustainability Report (2022), GoTo
[47] Enriching Communities For Generations - Integrated Report 2022 (2022), Ayala Land

4.3. Considering REC procurement

In the following paragraphs, we summarise potential considerations for corporates that wish to utilise RECs for part of their mitigation strategy.

Step R1: Understand the types of renewable energy projects to procure

There are several types of renewable energy sources such as wind, solar, geothermal, etc. Companies may procure from different types of projects, depending on availability, cost, and grid connectivity.



Factors such as potential risks (and thus if they are widely recognised) should also be considered when choosing a renewable energy source.

Hydro power

Concerns that large dams and reservoirs can cause significant damage to the environment and ecosystem surrounding them[48].

Nuclear

Concerns regarding health risks, accidents, and long-term impact due to radioactive nuclear waste[49].

Despite this, nuclear and hydropower does form a notable portion of low-carbon electricity generation and collectively provide three-quarters of global low-carbon generation[50]. Hydropower in particular is a significant source of energy within Southeast Asia[51].

Such impacts should be considered when selecting renewable energy sources for RECs.

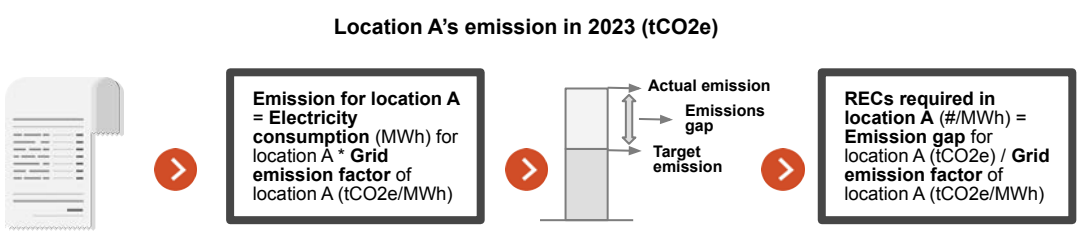
Step R2: Determine the quantity of renewable energy required

After the selection of the renewable energy type, the next question for companies to reflect on is how to determine the quantity of renewable energy to procure. The questions below help to set the basis to determine the quantity and nature of renewables:

- What is the desired outcome of the renewable energy procurement? To achieve Scope 2 emissions targets?
- For companies with operations in multiple locations, how much renewable energy is required in each location? Is there sufficient renewable energy potential / RECs available in that location and how much is the price for RECs and renewable energy procurement in different locations?
- How much electricity can be procured through direct renewable energy procurement and how much of the remaining electricity does the company wish to purchase RECs for?

For example, Singtel[52] has taken initiatives to increase deployment of onsite and offsite RE as well as REC purchases to progress towards their SBTi 1.5°C ambition. Considering the RE procurement potential in different operating locations (Singapore and Australia), Singtel adopted different strategies for the RE procurement in Singapore and Australia.
In Singapore, where local renewable energy supply and onsite renewable energy is limited, Singtel is looking to develop a portfolio of RECs and explore imported RE in the coming years. In Australia where the renewable energy potential is larger, Singtel is committed to have 100% of their electricity requirements in Australia backed by renewable energy sources by end 2025. In Singtel's RE procurement strategy, the priority is onsite RE followed by offsite RE and then use REC in Singapore or large-scale generation certificates (LGCs) in Australia for remaining Scope 2 emission gaps.

If RECs are being purchased to reduce market-based Scope 2 emissions (for more information on market-based reporting see page 26), companies are taking the following four steps:



Step A: Conduct a survey of the electricity consumption in MWh for the given year for different locations.

Step B: Apply a conversion of MWh into CO2 equivalents with the emission factor of the location where the REC is generated for the given year.

Step C: Calculate the difference between emission calculated under Step B and the target Scope 2 emissions.

Step D: A REC represents 1 MWh. The difference in Step C can be converted back to MWh using the emission factor used in Step B. The number found is the required amount of REC to reach the company's Scope 2 target.

RE100 and SBTi require RECs to be calculated for each location individual due to restriction of cross border REC purchase.

[48] Why aren't we looking at more hydropower? (2021), MIT
[49] The Nuclear Debate (2022), World Nuclear Association
[50] Nuclear Power in a Clean Energy System (2019), IEA
[51] Climate Impacts on South and Southeast Asian Hydropower (2021), IEA
[52] Our purpose driven journey: Sustainability Report 2023 (2023), Singtel

Step R3: Understand REC standards

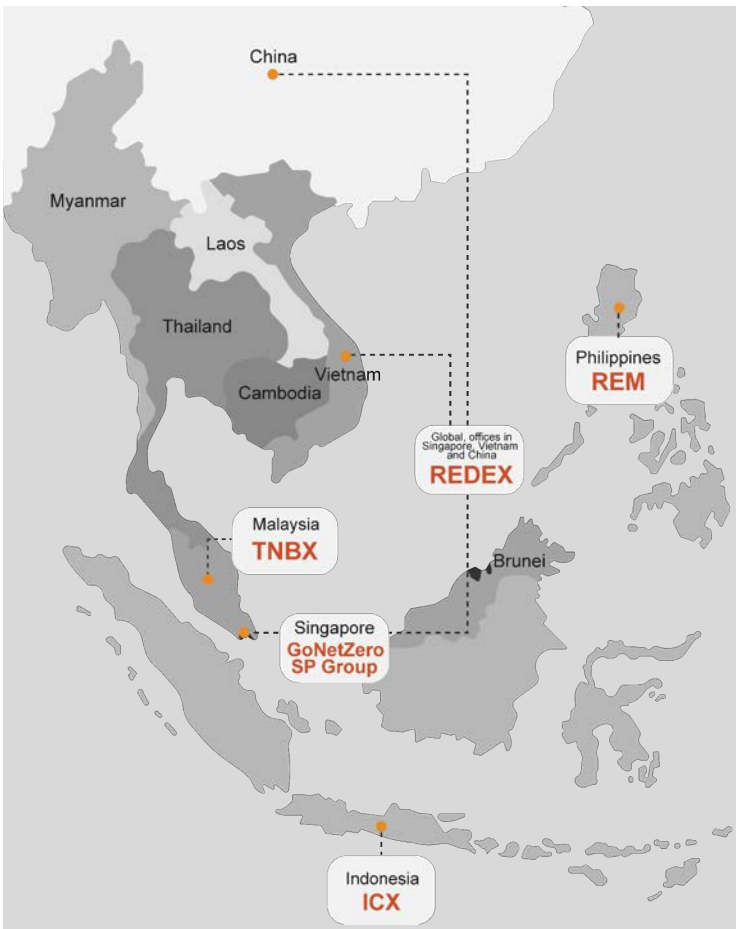
The two main registries in SEA for RECs are the I-REC and Tradable Instrument for Global Renewables (TIGR). I-REC was established in 1982 and is observed to be more widely used globally, while the TIGR was launched by Xpansiv (APX) in 2017.

While some buyers may prefer I-REC due to its volume, both registries are recognised by global initiatives and standards such as the RE100, GHG Protocol and the CDP.

Step R4: Choose the REC platform

Within SEA, there is a variety of local and international platforms available on which to trade RECs. These include but are not limited to:

Figure 4: Non-exhaustive map of REC platforms



- **GoNetZero** is a RECs platform based in Singapore set up by Sembcorp Industries.
- **Indonesia Climate Exchange (ICX)** is an Indonesian market that is a platform for RECs and other climate related markets
- **REDEX** offers services to manage RECs made for both buyers and sellers globally.
- **REM** is the Philippine Renewable Energy Market managed by the Philippine Renewable Energy Market System (PREMS).
- **SP Group REC Marketplace** is a RECs marketplace based in Singapore operated by SP Group.
- **TNBX** is a subsidiary of Tenaga Nasional Berhad (TNB) and is a Malaysian marketplace where mRECs are eligible to be purchased.

One challenge noted in the region is the lack of standardisation and transparency of REC market systems as different platforms use varying standards and registries within a single country.

Step R5: Purchase and retire RECs

RECs can only have one owner at any point in time and each has a unique serial number generated on the registry to identify and track it[53]. By purchasing and retiring a REC, the owner can claim the sole use of that green power. Purchased RECs are "retired" by or on behalf of the purchaser in a tracking system to avoid multiple ownership of a REC (this is done to avoid double counting, or claiming of the environmental benefit by more than one entity). For example, a wind project generates RECs that are issued to the project owner. When a REC is sold, the REC is transferred to the purchaser who may then choose to resell or retire the REC, the project owner may also be able to retire the REC for the purchaser. Before a REC is retired, it can be resold multiple times (with the exception of mRECs in Malaysia). Once a REC is retired, it cannot be sold or transferred again. To ensure this and avoid double-counting, many platforms have begun to implement blockchain technology[54].

According to the RE100 Technical criteria the company shall retire the certificates it purchases, or the certificates shall be retired by utilities or suppliers on behalf of the company. Retail products shall be certified, or sales shall otherwise be verified by a third party to ensure the accurate and exclusive delivery of certificates as well as an exclusive claim on the attributes. Where certificates are purchased directly and certification programmes are not used or available, exclusive claims must otherwise be verified.

Corporate buyers can claim use of default delivered renewable electricity if, and only if, an equivalent amount of RECs is retired by the utility/supplier. Corporate buyers wishing to claim use of renewable electricity must seek relevant information from their utility/supplier to justify their claims.

[53] Renewable Energy Certificates (2022), U.S. Department of Energy
[54] The blockchain and energy attribute tracking (2019), RECS International

Step R6: Disclose RECs

Table 5: Non exhaustive list of sustainability reporting standards with REC reporting requirements

Standard	Reporting RECs
GHG Protocol[55]	RECs and other renewable energy procurement methods can be used to reduce market-based Scope 2 emissions. However, both location- and market-based emissions should be reported*. Other details that should be disclosed include: • Data on emission factor hierarchy used for calculations. Regional or subnational emission factors should be prioritised. If these are unavailable, national production emission factors such as those from the International Energy Agency (IEA) can be used. • Energy generation features (e.g.: technology type, facility age or facility siting, the energy generation's relationship to supplier quotas, etc.) • Policy regarding whether RECs are treated as output, inventory or intangibles • GHG policies for accounting for their compliance obligation (if applicable) and any potential fines and penalties.
International Financial Reporting Standards (IFRS) S2[56]	Percentage of renewable energy in energy mix and their procurement methods must be disclosed. The standard requires location-based Scope 2 reporting, while market-based reporting is optional*.
Global Reporting Initiative (GRI) Standards[57]	Details of renewable energy fuel source such as the type of activity, business unit or facility and the located country where the renewable energy procurement is being claimed must be disclosed.
SS 673[58]	Disclose the origin of the REC or renewable energy procurement, the type of renewable energy, mode of renewable electricity procurement, and verification of claims. Standards highlight the best practice for users such as using RECs within the same market boundary in which they operate and consume electricity

* According to the GHG Protocol, the location-based method calculates emissions based on the emissions intensity of the local grid area where the electricity usage occurs while the market-based method calculates emissions based on electricity that corporates have purposefully chosen. Emission factors under the market-based method may be derived from the chosen electricity source(s) including those from renewable procurement methods such as RECs.

4.4. Ongoing discussions on RECs

The SBTi has opened a Call for Evidence on the Effectiveness of the Use of RECs in Corporate Climate Targets with the aim of helping the corporate climate action ecosystem understand whether different instruments can credibly drive decarbonisation and support corporate emissions reduction claims[59]. The future of RECs will likely be influenced by the outcome of the Call for Evidence. As such, news from the SBTi in regards to RECs should be closely monitored.

[55] Scope 2 Guidance (2015), GHG Protocol
[56] Disclosure Standard: Industry-based Guidance on implementing Climate-related Disclosures (2023), IFRS
[57] GRI 302: Energy 2016 (2018), GRI Standards
[58] Net Singapore Standard launch to support management and use of Renewable Energy Certificates (2021), Energy Market Authority Singapore
[59] The SBTi opens Call for Evidence on the effectiveness of Environmental Attribute Certificates in Climate Targets (2023), SBTi

5 Exploring carbon offsets

5

"Carbon offsets" and "carbon credits" are often used interchangeably, as the environmental impacts of purchasing high-quality carbon credits are synonymous with the environmental impacts of its carbon offset[60]. Broadly, to offset is to refer to the corporate action of reducing and avoiding emissions through funding carbon offset projects such as from the purchase of carbon credits. Carbon offset projects are developed to enable the offset action and can generate carbon credits. Carbon credits are the tradable instruments verified by governments or independent certification bodies which may be purchased, traded or claimed. One credit represents one tonne of carbon dioxide equivalent of GHG emissions reduced or removed.

5.1. Why purchase carbon offsets

Carbon offsets are often purchased to comply with national or regional requirements such as carbon taxes and emission trading systems. However, carbon offsets can also be used voluntarily as companies set their ambitions, for example, Net Zero.

Despite their potential to harness both nature-based and technology-based solutions, SEA carbon markets are generally less developed[61]. As discussed in the previous sections, financing carbon offset projects can help to enable the development of carbon markets.

Corporates may be impacted by compliance markets requirements in jurisdictions they operate in, or participate in the voluntary markets.

What does a compliance market mean?

Compliance markets result from national, regional, or international policy or regulatory requirements that require companies, and national and subnational governments to account for their GHG emissions by law[62]. At national and regional levels, compliance markets often include carbon pricing which is used to shift the burden of emissions onto those who are responsible for it. Globally, the two main carbon pricing instruments[63] are carbon taxes and ETS, sometimes referred to as cap-and-trade systems, which cap the total level of GHG emissions of defined sectors. This allows for industries with lower emissions to sell their extra allowances to larger emitters, creating supply and demand and establishes a market price for GHG emissions. This system does not have a determined price, however there is a higher confidence on outcome. On the other hand, carbon taxes are where the price of carbon is defined by a tax rate on GHG emissions. Unlike for an ETS, the emissions reduction outcome for carbon tax is not predefined.

At an international level, Article 6 of the Paris Agreement sets up a framework for cooperation between countries in implementing their nationally determined contributions (NDCs), for example through the transfer of Internationally Transferred Mitigation Outcomes (ITMOs) which can be used to link compliance markets across borders. By linking domestic ETSs with other, and allowing for high-quality offsets authorised under Article 6, countries can reach their climate targets at lower cost, enabling for higher ambition in their NDCs.

What does a voluntary market mean?

The global voluntary carbon market is defined as the voluntary purchase by corporates (or other non-state actors) of verified carbon credits to compensate for a company's emissions. Credits can be procured either over-the-counter (OTC) or through Exchanges (e.g. Climate Impact X (CIX)).

Article 6 and the potential convergence of the global voluntary market and international compliance market is discussed on page 36.

[60] What is a Carbon offset?, Carbon Offset Guide
[61] Road to net zero: State of the voluntary carbon market in Asia (2023), Climate Action Data Trust
[62] The VCS in compliance markets, Verra
[63] Carbon Pricing, The World Bank

5.2. Carbon offsetting options

The proceeds from carbon credits are used to finance carbon offset projects. These projects generating carbon credits are labelled as "additional". This indicates that these initiatives would not have materialised without the incentive and financial support from carbon credits.

Companies may use carbon credits to achieve their decarbonisation targets. From the perspective of a company, carbon credits can be used for residual emissions, or actions beyond Net Zero ambitions. For example, companies such as Google purchase carbon credits to meet their offset commitments. Instead of purchasing carbon credits, corporates are also getting increasingly involved in early stage investments of carbon offset projects. An alternative option may also be to fund carbon offset projects through direct investment from corporates.

The following sections will focus on carbon credits and provide information and a guide to their purchase and use, considering the complexity of this landscape.

5.3. Carbon offset projects in SEA

Southeast Asia has significant potential to develop carbon offset projects and be a supplier of carbon credits, given both the region's large spread of tropical rainforests and mangroves which are both natural carbon sinks[64]. There is also significant potential within technology-based solutions. According to Verra's project database, one of the most common types of projects within SEA in this regard are biogas cookstoves. These projects are aimed at repurposing greenhouse gases from landfills and other sources, using them to fuel cookstoves for rural locations.

"Southeast Asia has demonstrated it has potential for carbon removals, especially in nature-based solutions. There is also potential in the technology-based sector: the region has quite a lot of upside from biomass for biochar and bioenergy with carbon capture and storage (BECCS) and direct air capture has also been discussed a lot."

Alvin Lee
Puro.earth

[64] IPCC Sixth Assessment Report (2021), IPCC

5.4. Considering carbon credits

Step C1: Understand the characteristics of carbon credits to purchase

Before corporates decide to consider carbon credits, the first question they should ask is what they want to achieve from purchasing carbon credits. Is it for compliance requirements or to fulfill a voluntary ambition? Does it align with the corporate's own sustainability goals? In order to address these questions, it may be useful for corporates to understand the different characteristics of carbon credits available. This helps to identify how carbon credits can be used and how investments into carbon credits can align with sustainability goals and inform corporates around what impact they would like to, and can reasonably aspire to make. Beyond meeting the compliance requirements, this also allows corporates to articulate their sustainability vision more clearly, with the carbon credits purchased potentially contributing to their successful delivery.

As a result, more corporates are now demanding differentiated types of carbon credits which demonstrate co-benefits such as biodiversity conservation, jobs creation, etc. that are aligned with their own sustainability goals.

In addition to the information typically provided on credits by registries and trading platforms (for example, project type, emission reductions, crediting period, etc) corporates can now access detail around certified Sustainable Development Goals (SDG) impacts, etc. This allows users to select the type of credits they would like to purchase, in a more informed manner.

> "Integrity should not merely be a buzzword. Rather, companies in pursuit of integrity, should understand and adopt a defensible position in selecting projects and there needs to be an understanding on why the decision is made."
>
> Russell Quek, South Pole

General characteristics of carbon credits

Carbon credits can be classified generally in two different ways:

- Technology-based or nature-based
- Avoidance/reduction or removal/sequestration

Figure 5: Overview of carbon credit characteristics

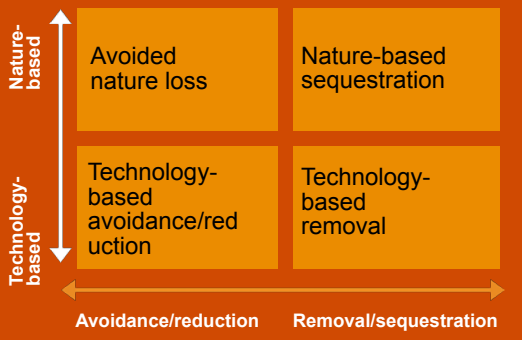


Table 6: Description of the characteristics of carbon credits[65]

	Description
Avoided nature loss	Limits the loss of nature such as forests and peatlands that store and sequester carbon. Projects often have high co-benefits for nature and society.
Technology-based avoidance/reduction	Reduces emissions from current sources which do not have the financial incentive or regulatory requirement to decarbonise. Projects often have co-benefits such as improving livelihoods
Nature- based sequestration	Uses nature to sequester more carbon in the biosphere, including reforestation and restoring soil, mangroves, and peatlands.
Technology-based removal	Removes and uses/stores CO2 from the atmosphere with the help of modern technology.

[65] Taskforce on Scaling Voluntary Carbon Markets (2021), ICVCM

For carbon credits to be considered "high quality", there are emerging standards to which market actors can refer.

Perhaps the most significant are the 10 Core Carbon Principles (CCPs) of the Integrity Council for the Voluntary Carbon Market (ICVCM). More details on these can be found in the box below.

The new CCPs aim to provide clarity around what integrity of supply in the voluntary carbon market should denote. The ICVCM, via its CCPs, is hoping to provide a common reference point around which the entire market can coalesce. In pursuit of greater market integrity.

At present, many carbon credits are certified through standards such as Verra's Verified Carbon Standard (VCS) or the Gold Standard. These specify requirements that projects delivering credits must adhere to in order to be listed on their registries (for more information on Verra and the Gold Standard, refer to page 33).

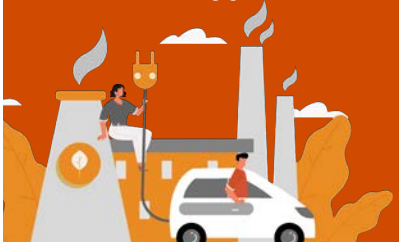
This remains a rapidly evolving and often challenging area to contend with, both for standard setters and the purchasers of credits alike.

For example, some industry commentators are of the view that the requirements of the CCPs may be too stringent, which could risk limiting the growth of supply in the voluntary carbon market[66]. For others, a lack of integrity in the market, perceived or real, could have a negative effect on the appetite of both suppliers and buyers of credits to engage with it.

Ensuring standards remain cognisant of the need for both integrity and flexibility in a rapidly developing space appears to be the objective of the wider voluntary carbon market ecosystem in the coming years.

The 10 CCPs, finalised by the ICVCM in 2023, represent a global benchmark for high-integrity carbon credits that set rigorous thresholds on disclosure and sustainability development. The principles are as follows[67]:

- **Effective governance:** effective program governance to ensure transparency, accountability, continuous improvement and overall quality of carbon credits
- **Tracking:** The use of a registry to uniquely identify, record and track to ensure credits are secure and unambiguous
- **Transparency:** Comprehensive and transparent information on all credited mitigation activities are provided and accessible
- **Robust independent third-party validation and verification**
- **Additionality:** the GHG emissions reduction or removal shall be additional (would not have occurred in the absence of the incentive created by the carbon credit)
- **Permanence:** GHG reductions or removals are permanent, or measures are in place where there is risk of reversal.
- **Robust quantification of emission reductions and removals:** Measurements are robustly quantified based on a conservative approach
- **No double counting:** Reduction or removals are only counted once towards achieving targets or goals
- **Sustainable development benefits and safeguards:** Social and environmental safeguards while having a positive sustainable development impact
- **Contribution towards Net Zero transition:** Avoid practices or technologies that are incompatible with achieving global Net Zero



A further explanation of the 10 CCPs can be found on the ICVCM website.

The associated Assessment Framework sets a robust and achievable framework aimed to raise standards across voluntary carbon markets to a consistent level of quality[68]. Programmes and categories which meet the criteria of the Assessment Framework are given the CCP label which is designed to build trust in the voluntary carbon market.

[66] Response from the Gold Standard Foundation to the Integrity Council for the Voluntary Carbon Market's Consultation on its draft Core Carbon Principles, Assessment Framework and Assessment Procedure - 27 September 2022 (2022), Gold Standard
[67] The Core Carbon Principles (2023), ICVCM
[68] Assessment Framework (2023), ICVCM

Within SEA, Singapore and Indonesia have set up domestic carbon pricing instruments. Indonesia has historically continued to be an exporter of credits and has recently set up limitations on their export, while Singapore is an importer of Article 6 aligned carbon credits. Some of the regulations regarding the current landscape are discussed below.

Carbon Credits in Singapore

Carbon credits are allowed be used to offset up to 5% of the cost of taxable emissions in Singapore[69]. The International Carbon Credits (ICC) Framework was introduced in 2021 to support the development of carbon markets by enabling the demand and supply of high-quality carbon credits to be matched. It will be aligned with Article 6 of the Paris Agreement, enabling Singapore to cooperate with other countries to support respective climate targets.

7 principles were developed:

1. Not double-counted
2. Additional
3. Real
4. Quantified and verified
5. Permanent
6. No net harm
7. No leakage

Further details and definitions can be found on the Ministry of Sustainability and the Environment (MSE) website.

Carbon Credits in Indonesia

Regulations in Indonesia have established that any carbon credits generated from its forestry sector will be claimed or recorded as part of Indonesia's Nationally Determined Contribution (NDC)[70]. The provision may also be applied to the voluntary market.

In regards to the power sector, coal-fired power plants will be subject to a cap-and-trade scheme while renewable power plants may generate carbon credits issued through the emissions offset scheme where they can be traded within the local framework or on the voluntary carbon market.

Carbon credits must demonstrate accuracy, credibility and transparency and will be reviewed by accredited verifiers and validators against qualifications set by the Ministry of Environment and Forestry (MoEF).

International carbon registries are also recognised as long as they are under an agreement on Mutual Recognition with the MoEF (with vintage past the year 2021). At present, regulations allow for verified Indonesian credits to be traded internationally, however, there have been discussions on limiting the exports of such credits as a possible concept.

[69] Singapore Sets Out Eligibility Criteria for International Carbon Credits Under the Carbon Tax Regime (2023), Ministry of Sustainability and the Environment
[70] Indonesia's Carbon Pricing: Understanding the Basic Regulatory Framework (2023), PwC Indonesia

Step C2: Determine the quantity of carbon credits required

A central question prospective buyers of carbon credits can ask themselves is: "how many credits do I need to meet my chosen objectives?". To help answer this, the following linked questions should be considered:

- Why are the credits being purchased? To comply with carbon regulations? To offset residuals? To support the carbon offset market? Or to send an internal price signal, incentivising further decarbonation efforts?
- What is the desired outcome of the carbon credit purchase[71]? To achieve carbon neutrality? To support renewable energy development?
- Projects, such as cookstoves, have direct impacts on rural communities. How would similar considerations of community impact affect the company's choice of carbon credits?

Assuming a company has measured its emissions, set targets, and completed or planned decarbonisation efforts within its business activities, the next step following consideration of the questions is to decide the time frame to work within[72].

When deciding the timeframe, companies may consider requirements for the next year, but additionally those for the next 3-5 years to build a multi-year portfolio. In order to do so, companies need to estimate the projected emissions to understand the quantity of carbon credits required for the next 3-5 years. Having multi-year portfolios tend to secure the best prices in a complex and ever-evolving market.

However, if levels of familiarity with the voluntary carbon market are low(er) - potentially the case for those companies that have just started their sustainability journey - it may be prudent to begin with spot purchases, considering the difficulty of estimating future emissions as well as feasibility of long term budgeting.

[71] Setting up a successful green energy procurement strategy (2023), DNV
[72] Definitive Buyer's Guide to Carbon Credits (2023), Thallo

Step C3: Understand verified carbon credits

There are a number of recognised verification entities in the market today, with some standards relevant to SEA include but are not limited to: Verra, Gold Standard, and Puro.earth. There are, however, other standards such as the American Carbon Registry (ACR), Climate Action Reserve (CAR) and others.

Table 7: Comparing the standards such as Verra, Gold Standard, and Puro.earth

	Gold Standard	Puro.earth	Verra
Notability	Focuses on the UN SDGs where project must provide lasting social, economic, and environmental benefits	Focuses on certifying carbon removal technology projects	The largest certifier, having certified approximately three quarters of all carbon credits
Availability	Globally	Globally	Globally

Gold Standard

The Gold Standard ensures that projects benefit their neighboring communities. It was developed with a focus on offset projects that provide lasting social, economic, and environmental benefits. For a project to be verified by the Gold Standard, it must demonstrate a clear, direct contribution to sustainable development, defined as making a demonstrable, positive impacts on at least three UN SDGs.

Puro.earth

Puro.earth's aim is to ensure that when carbon removal is most needed, the technology will exist at the necessary scale. Puro.earth covers a range of mechanisms and technologies such as directly removing carbon dioxide from the atmosphere, and indirectly utilising mechanisms applied to agriculture and forestry biomass residue which has already trapped carbon from the atmosphere.

Verra

The VCS is a carbon offset programme developed and run by Verra. It is broadly supported by the carbon offset industry (project developers, large offset buyers, verifiers, and projects consultants) and is active globally.

Climate Action Data (CAD) Trust

In December 2022, the IETA, the World Bank and the Government of Singapore announced the launch of CAD Trust to maximise transparency, minimise the risk of double counting and enhance the overall integrity of the carbon markets. CAD Trust is an open-source metadata system to share information about carbon credits and projects across digital platforms, easing future integration of multiple registry systems. It is now in the process of connecting various carbon credits registries. The aim is to provide free public access to its information in a harmonised and user-friendly format to allow private companies, non-governmental organisations (NGOs) and governments to use this for benchmarking, double counting risk checking and compliance reporting, etc.

Applying care and diligence

Carbon credits can play a **key part in the journey towards global Net Zero**. Their impact in supporting emission reductions and carbon removal projects will become more and more visible as companies and countries reach their limits in reducing emissions within their own operations and need to remove residual emissions.

However, this does not exempt the concept and system from scrutiny. There have been concerns over the use of carbon credits, with greenwashing claims made from various angles[73] as well as concerns regarding negative impacts on local communities.

As such, while the purchase of carbon credits is generally encouraged to aid progress towards global Net Zero, corporates should still apply their due diligence to ensure high quality carbon credits are being purchased. This can be done by thoroughly researching projects, what projects stand for, and what co-benefits projects can bring.

In the face of such scrutiny companies such as Unilever discuss in their Climate Transition Action Plan how they are choosing to only use offsets for residual emissions after 2039[74]. On the other hand, Google is continuing to purchase offsets but has taken measures to ensure only high-quality offsets are purchased through actions such a site visits and researching day-to-day operations to perform due diligence as mentioned in their Collaborations and Due Diligence paper[75].

Step C4: Decide on the carbon credits procurement methods

Depending on the needs of companies who would like to buy carbon credits, the two most common methods used are through traditional OTC trading and exchanges.

Buyers looking for carbon credits may still want to buy credits through traditional OTC trading which provides more details and insights about projects' co-benefits where aligned with the UN SDGs, community impacts and other attributes. This can be done with service providers (intermediaries) or directly with project developers.

With more exchanges established recently in the region, such as Climate Impact X, corporate buyers can also choose to procure via exchanges without intermediaries. Carbon exchanges are structured as a stock and commodity trading platforms. Using them can ease the process of procurement and offer better transparency, deeper liquidity and faster price discovery. They also allows corporate buyers to perform spot trading, and buy futures, options and derivatives of environmental commodities.

These exchanges now also allow trading of tokenised carbon which is a representation of a carbon credit that is stored on a blockchain. Tokenised credits retain the same information and characteristics of the carbon credit, including vintage, project type and all associated data. As of September 2023, 25.4 million credits had been tokenised, representing about 2% of current market supply. This tokenisation offers benefits such as increased verifiability, improved liquidity, and enhanced data reporting[76].

Buyers should learn and understand the different types of credits available before going into tokenised products. Purchases of tokenised carbon credits through crypto wallets, and the use of embedded application interfaces (APIs) to purchase carbon credits alongside online translation such as hotel and flight bookings are becoming a new norm.

When determining which voluntary credit procurement methods are most applicable, several qualities in particular should be considered and checked:

- The role of carbon offsets in a company's decarbonisation strategy
- The level of information disclosure (such as co-benefits, etc.) on the carbon credits displayed
- If corporates decide to buy via exchanges, the function, available products and user friendliness of the exchanges

[73] Greenwashing or a net zero necessity? Climate Scientists on carbon offsetting (2023), The Guardian
[74] Climate Transition Action Plan (2021), Unilever
[75] Google's Carbon Offsets: Collaboration and Due Diligence (2011), Google
[76] Tokenised Carbon 101 (2023), IETA

Step C5: Purchase and retire carbon credits

Retiring carbon credits refers to the process of taking a credit off the market forever, not to be traded or swapped again. Retirement is required for a carbon credit to be claimed to reduce emissions. This can usually be done on the trading platform or exchange.

Step C6: Disclose carbon credits

Table 8: Non exhaustive list of sustainability reporting standards with carbon credit reporting requirements

Standard	Reporting carbon credits
IFRS S2[77]	An entity should disclose its planned use of carbon credits. Details of the specific carbon credits used that should be disclosed include: • The extent to which, and how, any net GHG emissions targets rely on the use of carbon credits • Which third-party scheme(s) will verify or certify the carbon credits • The type of carbon credit, whether the project is nature or technology-based and whether the offset is achieved through carbon reduction or removal • Any additional factors necessary for users of general purpose financial reports to understand the credibility and integrity of the carbon credits. This can include assumptions regarding permanence or additionality Best practice also includes disclosing similar details about carbon credits that have already been used by the entity.
TCFD[78]	GHG emissions related information such as carbon credits used should be disclosed within the context of target setting and the use of carbon offsets to achieve said targets. In regards to transition risks, the impacts of regulation changes such as carbon pricing on the company, and therefore the use of carbon offsets, should be disclosed.
GRI Standards[79]	Emission offsets such as carbon credits should be disclosed separately from Scope 1, 2 and 3 GHG emissions. An explanation if offsets are used within the organisation's targets, including the type, amount, criteria or scheme of while the offsets are part.

[77] Climate-related Disclosures (2023), IFRS
[78] Guidance on Metrics, Targets, and Transition Plans (2021), TCFD
[79] GRI 305: Emissions 2016 (2018), GRI Standards

5.5. Ongoing discussions on carbon credits

The convergence of the voluntary and compliance market

The global voluntary market is expected to increasingly converge with the international compliance market due to the implementation of Article 6 of the Paris Agreement and its effects on stakeholders of the VCM. Article 6 allows countries to voluntarily cooperate in achieving their emission reduction targets set out in their NDCs[80]. This means that, under Article 6, countries can trade carbon credits to help other countries meet climate targets.

Within Article 6, Article 6.2 provides a framework where countries can work with each other to reach their climate targets and increase ambition through voluntary cooperation[78]. To ensure that there is no double counting when countries transfer carbon credits internationally, countries need to authorise the use of credits (ITMOs) towards NDCs and/or Other International Mitigation Purposes (OIMPs), and apply corresponding adjustments in their emissions balance. This is a fundamental difference as compare to previous approaches in the voluntary carbon market or the Clean Development Mechanism (CDM) set up under the Kyoto Protocol.

Due to the application of corresponding adjustments, host countries need to carefully consider what types of projects and cooperative approaches they are willing to engage and authorise to sell to other international buyers, as they cannot count those emissions reductions to meet their own NDC. Whilst several bilateral agreements and a number of projects have already been initiated under Article 6.2, negotiations continue at the international level to clarify remaining issues and build capacity among countries who wish to participate under the framework.

> The coming years will be pivotal in shaping the future direction of carbon markets as nations refine their climate strategies and Article 6 frameworks. Ultimately, we will see an increasing convergence between voluntary and compliance markets."
>
> Björn Fondén, IETA

Article 6.4 establishes a new crediting mechanism under the supervision of an internationally appointed United Nations Framework Convention on Climate Change (UNFCCC) "Article 6.4 Mechanism Supervisory Body", and is by many referred to as "CDM 2.0". The crediting mechanism, which is still to become operational, will have specific methodologies, standards, and verification processes which project developers must follow in order to issue credits. These credits, can in turn, depending on the authorisation status by the host country be used for voluntary purposes or to channel results-based climate finance (mitigation contribution units (MCUs)), as well as compliance purposes (Article 6.4 Emission Reductions (A6.4ERs), ITMOs).

With countries operationalising Article 6, there has been more discussion around the accounting practices where there is an overlap with the VCM. The Article 6 rulebook, agreed at COP26 in Glasgow, clarifies that there can be no double counting of units by the application of corresponding adjustments for authorised ITMOs used towards NDCs or OIMPs (such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) which is discussed further on the next page). In the VCM, carbon credits contribute to the emissions avoidance, reduction or removal in the host country, which can support that country in reaching its NDC, but unless authorised under Article 6.2 for NDC use, would not be counted towards the NDC in the country of the acquiring company.

There is an active discussion regarding the use of voluntary carbon credits under the framework of Article 6, and how companies can make claims depending on the authorisation status of credits. Whilst it is important to avoid double-counting and ensure integrity in the market, it remains clear that voluntary units, without a host country authorisation under Article 6, will continue to play an important part in the VCM to finance climate action.

[80] What you need to know about Article 6 of the Paris Agreement (2022), The World Bank

Global evolution of quality and price

Groups like the Integrity Council for Voluntary Markets (ICVCM), International Carbon Reduction and Offset Alliance (ICROA) and the Carbon Credit Quality Initiative (CCQI), as well as rating agencies like BeZero and Sylvera, are working on creating a standardised definition of high- and low-quality credits[81].

IETA believes that a single global carbon price would be economically efficient, but not politically feasible. Multiple carbon prices may also be necessary to provide the right signals to different sectors and activities. As such, the complexity of multiple carbon prices in different countries and sectors will need to be accepted as the norm. The lack of global prices should not be an excuse for inaction.

Demand projections

As the world moves towards Net Zero, removal projects could play an increasingly important role in carbon markets (currently only around 10% of credits are from removal projects).

The price of carbon credits could be expected to grow due to increasing demand from corporate and country buyers as they move towards their Net Zero targets. Another reason for the increase in price is the downturn in cheap supply, partially due to an increased need for high-quality carbon credits for countries to achieve their NDCs and higher scrutiny of credits in the voluntary market.

In 2022, companies bought just 155 million carbon credits on the voluntary market, down 4% from 2021 due to fears of reputational risk from purchasing low-quality credits[78]. This is a concerning trajectory for the market, however, many within the industry are hopeful that demand will return.

In a bid to introduce greater certainty around what high-integrity use of carbon credits amounts to, the Voluntary Carbon Markets Integrity Initiative (VCMI) was launched shortly after COP26. It serves as an international non-profit organisation with a mission to enable high-integrity voluntary carbon markets[82]. The VCMI's recently released Claims Code of Practice details how companies can ensure their use of voluntary carbon credits are credible and are aligned with the Paris Agreement. Again, the objective here remains on striking a balance between ensuring integrity in the market without setting prohibitively high barriers to entry for would-be purchasers of credits.

CORSIA is a global offsetting scheme where airlines and aircraft operators will offset any growth in emissions above 2020 levels[83]. It is currently in it's pilot phase however, demand from the aviation industry is expected to increase due to the mandatory offsetting which will be implemented in 2027[84].

It is evident that the carbon market is undergoing substantial change, involving not just the voluntary, but compliance market as well. Despite the uncertainty, there are also signs that both quality and demand for carbon credits will increase to match needs at national, international, and corporate levels.

[81] Five Need-to-Knows About the Future of the Voluntary Carbon Offset Markets (2023), BloombergNEF
[82] About, VCMI
[83] CORSIA explained, Aviation Benefits Beyond Borders
[84] What is CORSIA and how does it affect your airline? (2023), South Pole

6 Appendix

Appendix A. - Definitions

Appendix B. - Renewable energy procurement methods

Appendix C. - Further information on CBAM, CSRD and EUDR

Appendix D. - High level ecosystem map

A

Appendix A. - Definitions

Kyoto Protocol

The Kyoto Protocol operationalised the UNFCCC by committing 37 industrialised countries and economies to limit and reduce GHG emissions in accordance with individual targets[85]. One of the important elements of the Kyoto Protocol was the establishment of flexible market mechanisms such as International Emissions Trading.

An important element of the Kyoto Protocol was the establishment of flexible market mechanisms which are based on the trade of emissions permits. While countries must meet their targets primarily through national measures under the Protocol, they are offered additional means to meet their targets by way of market-based mechanisms:

- International Emissions Trading
- Clean Development Mechanism
- Joint implementation (JI)

For more information, refer to the Overview of the Kyoto Protocol by the United Nations Framework Convention on Climate Change webinar series

Paris Agreement

According the UNFCCC, the Paris Agreement is a legally binding international treaty on climate change adopted in 2016[86]. It's goal is to "hold the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels."

Implementation of the Agreement requires economic and social transformation, based on the best available science. Since 2020, countries have been submitting their NDCs. Each successive NDC is meant to reflect an increasing ambitions compared to the previous version.

For more information, refer to the Overview of the Paris Agreement by the United Nations Framework Convention on Climate Change webinar series

[85] What is the Kyoto Protocol? (2023), UNFCCC
[86] The Paris Agreement (2023), South Pole

B

Appendix B. - Renewable energy procurement methods according to the RE100 Technical Criteria[87]

B.1. Self-generation

Self-generation involves corporate buyers owning their own projects. 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 renewable electricity. This means corporate buyers can consume directly from their projects, retain the attributes, and claim use of renewable electricity or can sell energy to the grid, retain the attributes, and claim use of renewable electricity. The generation may be issued with EACs, which corporate buyers can use to claim use of renewable electricity. The generation may be required to receive EACs. If EACs are not issued, corporate buyers must have contracts that give them credible claims to support their claims to use of renewable electricity.

B.2. Physical PPA

A physical PPA is a contract between a corporate buyer and a generator for the supply of renewable electricity. It can characterise purchases from on-site projects owned by third parties, off-site projects to which there is a direct line, or off-site grid-connected projects and typically uses a long-term contract. Physical PPAs do not necessarily need to be bilateral between the corporate buyer and the generator. A bilateral PPA requires the corporate buyer to also take responsibility for the off-take of the power itself, including managing the moving and scheduling of the power to the corporate buyer's load, or into the wholesale power market (if the project is grid-connected). The corporate buyer may need to be licensed to be able to do this. Alternatively, a trilateral PPA can involve an additional party which is responsible for the off-take of the power from the project. This third party is often an electricity supplier.

A trilateral PPA may be advertised as a 'retail PPA', 'sleeved PPA', or a 'third-party PPA'. The generation may be issued with EACs, which corporate buyers can use to claim use of renewable electricity. If EACs are not issued, corporate buyers must have contracts that give them credible claims to support their claims to use of renewable electricity.

B.3. Virtual PPA

A virtual/financial PPA is a purely financial transaction in which a corporate buyer assumes market risk related to the sale of a generator's electricity and receives energy attributes. This can be done through a contract for difference, where the generator exchanges the risk of selling the project's generation to the wholesale market at a variable rate with a fixed-price cash flow agreed with the corporate buyer. The corporate buyer therefore off-takes market risk the generator would be exposed to by selling power at the fluctuating wholesale energy price, and in return is entitled to the energy attributes. Because a financial PPA is only a financial instrument, the corporate buyer must still separately procure electricity for its operations. It is therefore a form of unbundled procurement. A financial PPA can serve as a hedge for fluctuating electricity costs, and some corporate buyers may realise a financial benefit from using them. A financial PPA typically uses a long-term contract. The generation may be issued with EACs, which corporate buyers can use to claim use of renewable electricity. If EACs are not issued, corporate buyers must have contracts that give them credible claims (see Section Five: Credibility of claims) to support their claims to use of renewable electricity.

[87] RE100 Technical Criteria (2022), RE100

Renewable energy PPAs in SEA

In the context of renewable energy, the PPA signing framework had not been established in many SEA countries until recently. In Malaysia and the Philippines, signing a PPA requires participation in relevant programs[88]. In Indonesia, PPAs can only be signed with the national power company Perusahaan Listrik Negara (PLN),which is similar to green leasing. As of 2022, VPPAs are only applicable to rooftop solar in Thailand and Vietnam. It is worth mentioning that Vietnam is working with the United States Agency for International Development (USAID) on a pilot PPA that will run from 2022 to 2024[89]. If the pilot programme works well, it will be expanded into a national renewable energy scheme in 2025. This is currently the most comprehensive PPA programme among the five Southeast Asian countries.

In general, SEA countries employ similar renewable energy procurement methods, primarily using the unbundled I-REC; while the PPA systems are still being developed and piloted. However, due to the growing concerns over "greenwashing" in Europe and the U.S., I-RECs may be replaced by large power purchase programs in the future. According to Bloomberg NEF, a market research firm, the CPPAs signed in Asia have surged over the past two years. As environmental awareness rises, access to "real" renewable energy will be the top priority for international brands seeking to expand their operations and establish supply chain partnerships. Therefore, the development of Southeast Asia's renewable energy markets and mechanisms will be critical in shaping the international supply chain deployment for the next decade.

B.4. Contracts with suppliers

A project-specific contract with a supplier describes an arrangement whereby the supplier procures from specified projects on behalf of the corporate buyer. Often, the supplier holds a PPA. The contract may be advertised as a ‘green tariff’, has complete transparency regarding the energy attributes in the supply (meaning the corporate buyer always knows exactly which specific projects they are purchasing from through their electricity supplier), and typically uses a longer contract length. The generation may be issued with EACs, which corporate buyers can use to claim use of renewable electricity. The supplier may transfer the EACs to corporate buyers or otherwise redeem, retire, or cancel them on behalf of corporate buyers. If EACs are not issued, corporate buyers must have contracts that give them credible claims (see Section Five: Credibility of claims) to support their claims to use of renewable electricity.

A retail contract with a supplier describes an ‘off-the-shelf’ arrangement with an electricity supplier for the supply of renewable electricity. The corporate buyer usually pays a per-kilowatt hour premium through an additional line item on their monthly electricity bill for the renewable electricity. This contract may be advertised as a ‘green electricity product’, has less transparency regarding the energy attributes in the supply, and typically uses a shorter contract length. The supplier may vary the projects from which energy attributes are sourced throughout the contract. The generation may be issued with EACs, which corporate buyers can use to claim use of renewable electricity. The supplier may transfer the EACs to corporate buyers or otherwise redeem, retire, or cancel them on behalf of corporate buyers. If EACs are not issued, corporate buyers must have contracts that give them credible claims to support their claims to use of renewable electricity.

[88] USAID Vietnam Low Emission Energy Program (2019), USAID
[89] Renewable Energy in Southeast Asia and Global Carbon Market Trend: 2022 Recap & 2023 Outlook (2023), Reccessary

B.5. EACs and RECs

RECs are a type of EACs. EACs can be purchased alone, separate from the underlying generation they are issued to, and separate from corporate buyers' procurement of electricity for their operations. Corporate buyers can purchase EACs to pair with their consumption of purchased grid electricity. This permits a claim to having consumed electricity with the attributes conveyed by the EACs . The EACs must be issued to generation located in the same market for electricity as the electricity supply being decarbonized by the corporate buyer. A purchase of renewable electricity generated in one market cannot be equated to its consumption in a different market. EACs can be procured through short or long-term contracts, with varying degrees of project specificity. EACs are sometimes procured through brokers and trading platforms, making for transactions that are less complex than those in other procurement types. Unbundled EACs can only ever present an additional cost on top of corporate buyers' separate electricity purchases. This is a key point of distinction between long-term contracts for unbundled EACs and financial PPAs, which can sometimes realize a financial benefit.

C

Appendix C. - Further information on CBAM, CSRD and EUDR

CBAM is currently in its transitional period until 2026 and fully phased in to apply to 100% of Scope 1, 2 and 3 emissions by 2034.

The regulation replaces free allocation as the primary tool to protect trade exposed sectors against carbon leakage[90]. It requires EU importers to report GHG released during production, Scope 1 and 2, of specific products included aluminium,cement, iron, steel, fertiliser, hydrogen and electricity produced outside of the EU. Once CBAM enters into force in 2027, importers will need to acquire and surrender certificates corresponding to the GHG associated with imports from outside of the EU. CBAM related economic risks are difficult to measure. The extent to which a country is likely affected by CBAM depends, besides the EU ETS price and the stringency of CBAM, primarily on exporting countries' exposure, i.e. the volume of affected exports to the EU. Exposure alone, however, does not say much about possible economic risks.

For its impact on SEA, CBAM is estimated to possibly lead to annual forgone revenue of around USD830 million for exporters of steel, aluminium and plastics, equivalent to 0.6% of its annual GDP. Thailand and Indonesia could each potentially face annual revenue losses of around USD 500 million, 0.2% and 0.1% of their GDP respectively.

Other EU regulations include the EU Corporate Sustainability Reporting Directive (CSRD) and the EU Deforest Regulation (EUDR). The CSRD involves an increase of sustainability reporting and will only apply to non-EU companies that are connected to the EU market in ways such as ownership of a subsidiary in the EU[91]. The EUDR on the other hand, requires producers and companies trading into the EU specific agricultural and natural resource products to provide detailed evidence that the land goods were grown on had not been deforested past 2020.

Such regulations are challenging as the process of verifying land use rights and plantation registration certification, let alone gathering geolocation data, is protracted, complex and slow in many parts of Southeast Asia[92].

[90] Trading-off: Exploring the potential implications of the EU's new Carbon Border Adjustment Mechanism ofr Southeast Asian economies (2023), New Climate
[91] The impact of the EU's Corporate Sustainability Reporting Directive on businesses in Asia (2023), Linklaters
[92] EU deforestation-free rule 'highly challenging' for SE Asia smallholders, experts say (2023), Mongabay

D

Appendix D. - High level ecosystem map

High level ecosystem map – carbon credits

Supply → **Intermediaries** → **Purchase**

Project developers

Role:
Design / develop carbon offset projects (both nature-based and technology-based) in consultation with stakeholders, and potentially sell carbon credit to buyers

Standards and registries

Role:
- Set standards for carbon credit quality, certify, and issue credits, and track certified credit projects and credit issuance and retirement
- Each registry has a list of approved verifiers that verify the offset actions project developers carry out.
- Track and transfer the ownership of carbon credits between the original owners, financial intermediaries, and buyers

Carbon trading platforms

Role:
Marketplaces where verified carbon credits are listed, bought, and sold

Third-party auditors

Role:
Conduct third-party assessments to provide independent confirmation that projects are in line with a given standard.

Broker / retailers

Role:
- Offer a range of credits and services that reduce time taken to directly engage project developers
- Some companies provide a combination of project development and retailing

Buyers

Role:
- Purchase carbon credits to offset their own emissions, or emissions within their business activities. For example, companies regulated by cap-and-trade regulations, and buying credits of goodwill

High level ecosystem map – RECs

Supply → **Intermediaries** → **Purchase**

Generators

Role:
Generate electricity from renewable energy sources such as solar, wind, biomass, and geothermal power

Standards and registries

Role:
- Sets standards for renewable energy attribute tracking that can be easily implemented so that consumers in all regions can access internationally recognised, tradable and reliable RECs.
- Track and transfer RECs, and enable developers to generate, verify, and sell RECs

Issuer

Role:
Responsible for the registration of production device owners and their respective production devices in a country or region

REC trading platforms

Role:
Marketplaces where RECs are listed, bought, and sold

Buyers

Role:
To purchase RECs to fulfil sustainability commitments and decarbonise business activities

Contact us

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