SGLISTCOS
Association of Singapore Listed Companies

Guide on Renewable Energy Certificates

Coordinating Author

pwc

With thanks to the following organisations for their input:

Contents

Purpose of the Guide

The objective of this guide is to provide companies listed on the Singapore Exchange (SGX) with an introduction to renewable energy certificates (RECs). Addressing climate change has become a matter of urgency and companies are increasingly focused on taking action to manage their environmental impact. This guide introduces REC which is one of the tools companies can use to reduce their Scope 2 market-based emissions. In addition, the guide contains key areas of considerations surrounding the usage and selection of different RECs, as well as the accounting, reporting and assurance of it.

1. State of climate action

1.1. Drivers of decarbonisation

Climate change is a global issue, which requires cooperation from countries all around the world. The Paris Climate Agreement is a legally binding international treaty on climate change and was adopted in 2015 by 196 Parties at the United Nations Climate Change Conference of the Parties in Paris (COP21). The goal of the Paris Agreement is to limit global warming to well below 2°C above pre-industrial levels and pursuing efforts to limit it to under 1.5 °C. The Conference of the Parties in Glasgow (COP26) in November 2021 further aligned the goals, where the parties agreed to revisit and strengthen their current emissions targets. Decarbonisation refers to the process of reducing carbon intensity, lowering the amount of greenhouse gas produced by the burning of fossil fuels, and thereby limiting global warming caused by greenhouse gas emissions.

Singapore is also a party to the Paris Climate Agreement, and as part of the Long-Term Low-Emissions Development Strategy (LEDS), Singapore is committed to achieving net zero emissions by 2050. In its journey to achieve long-term net zero emissions, Singapore announced the Singapore Green Plan 2030 (Green Plan) in February 2021 which is a national sustainability movement that seeks to rally collective action to tackle climate change. The Green Plan charts concrete targets over the next 10 years, strengthening Singapore's commitments under the Paris Agreement, and positioning Singapore to achieve long-term net zero emissions. During the Budget 2022, it was also announced that carbon taxes will be progressively raised from the current S$5 per tonne of carbon dioxide equivalent (tCO_2e) of emissions to S$50-80 per tCO_2e of emissions by 2030.

Singapore companies have also begun to make net zero commitments. Under the GreenGov.SG initiative, the public sector has also committed to achieving net zero emissions around 2045. Companies in the private sector have also started to announce their short- and long-term emission targets.

1.2. Methods to decarbonise

Companies have begun to incorporate the following decarbonisation strategies:

1) Reduce use of carbon-intensive energy sources

About 95% of Singapore's current electricity is generated by natural gas fired-power plant. Singapore is looking at various sources of local and imported renewable energy to decarbonise the grid such as less carbon-intensive energy sources include solar, hydropower, and geothermal energy. Solar energy is the most promising renewable energy source[1] for electricity generation in Singapore due to the stable climate all year round with high temperature and sunny weather conditions. Singapore has thus invested in solar energy, and targets to meet 1.5 gigawatt peak (GWp) of solar energy deployment, which can meet around 2% of the 2025 projected electricity demands and generate enough electricity to meet the annual electricity needs of around 260,000 households. Individual companies have also begun to implement solar energy as part of their climate transition plans.

2) Optimise use of resources

Companies may also opt to reduce the amount of resources used in their operations, including fuels, electricity, and other resources. This could be done through measures such as developing new procedures which require less resources such as raw materials in production, improving insulation which would result in less power bring used, or switching to more energy efficient equipment.

[1] National Climate Change Secretariat (NCCS) https://www.nccs.gov.sg/singapores-climate-action/mitigation-efforts/power/

The move to more energy efficient equipment is supported by the Singapore government. Under the Singapore Green Plan 2030, all newly registered cars must be of cleaner-energy models from 2030. Electric buses are also targeted to make up half of the public bus fleet by 2030, and existing diesel buses will be replaced with cleaner energy buses by 2040. These measures would reduce the use of carbon-intensive vehicles on a large scale in the transport sector.

3) Reduce Scope 2 market-based emissions with renewable energy certificates (RECs)

RECs are tradable market instruments that prove that energy was created from renewable sources and support renewable energy generation. Purchasing RECs would allow a company to claim a reduction in its Scope 2 market-based emissions, due to the certificate representing unit of renewable energy (1 REC= 1 MWh), which would have zero emissions associated with it.

An analysis of the top 100 listed companies on the SGX by market capitalisation shows that 24% of these companies disclose the use of RECs in their sustainability reports, i.e., a low proportion of the companies is currently using RECs.

4) Offset unavoidable emissions with carbon credits

Carbon credits are a different type of tradable market instruments that represent an equivalent mitigation of 1 tCO_2e and can be claimed by companies for various purposes. In Singapore, companies may use high quality international carbon credits to offset up to 5% of their taxable emissions from 2024.

However, it has been argued that when a company purchases carbon credits, it may not result in a reduction in the amount of greenhouse gas emissions. There is currently considerable debate on the pros and cons of using carbon credits as a way to get to Net Zero. This is a separate topic from the use of RECs and is outside the scope of this paper.

PwC's "Enabling a Net Zero world"[2] report provides key considerations for corporates looking to operationalise the potential use of renewable energy procurement methods and carbon offsets for corporate decarbonisation purposes. SGX has also published a whitepaper on "Credible Decarbonisation and Transition for Corporates in Asia"[3], stating the steps that corporates can take to follow a carbon mitigation hierarchy.

[2] Enabling a Net Zero world https://www.pwc.com/sg/en/publications/enabling-a-net-zero-world.html
[3] Credible Decarbonisation and Transition for Corporates in Asia https://api2.sgx.com/sites/default/files/2021-06/Decarbonisation%20Report%20%282021%29.pdf

2. Introduction to RECs

2.1. What are RECs?

RECs are a type of Energy Attribute Certificate that represent the environmental attributes of the generation of one megawatt-hour (MWh) of electricity that is generated and delivered to the electricity grid from a renewable energy (RE) resource.

In most national grids, electricity from renewable and non-renewable sources are transmitted through the same wires, resulting in customers being unable to receive and consume electricity obtained only from renewable sources. RECs can be used to verify the consumption of electricity obtained from renewable sources, so that consumers can reduce their carbon emission from the consumption of electricity originating from non-renewable sources.

Therefore, RECs play a significant role in accounting, tracking and attributing ownership to the production of renewable energy. In the absence of RECs, establishing credible assertions would be challenging due to the fungible nature of electricity.

RECs encapsulate critical data, including the origin of the energy, the date of its generation, and the environmental advantages it represents. RECs include various data attributes including certificate data, renewable fuel type, certificate vintage, eligibility for certification or emissions rate of the renewable resources.

2.2. Why use RECs?

RECs provide a tangible and feasible mechanism to counterbalance the carbon emissions associated with electricity consumption. Through purchasing RECs equivalent to their energy usage, companies can effectively mitigate their Scope 2 market-based emissions.

Key benefits of purchasing RECs include:

1) Use of internationally recognised legal instruments to attain decarbonisation goals

The main objective of using RECs is to reduce Scope 2 market-based emissions. Scope 2 emissions refer to the indirect greenhouse gas emissions that result from an organisation's consumption of purchased energy such as electricity, heat, or steam. There are 2 methods for an entity to calculate their Scope 2 emissions – the location-based approach and the market-based approach. Please find more discussion about why RECs can only be used to reduce Scope 2 market-based emissions in Section 6.2.

The purchased RECs indicates that an associated amount of clean energy has been introduced into the grid, and consumed by the users, thereby reducing the emissions that would have otherwise been associated with conventional energy production and consumption. In this manner, the use of RECs provides a measurable way to counterbalance a company's indirect emissions but also drives demand for RE projects, promoting sustainable practices on a broader scale.

2) Flexibility, Accessibility and Traceability

Furthermore, RECs extend the opportunity of embracing clean energy to companies of all scales and industries. Not all businesses or assets possess the means for on-site RE initiatives, but RECs enable access through wider participation in the green energy movement and actively contribute to decarbonisation.

In addition, geographical boundaries or electrical transmission limitations are not applicable to RECs. For instance, a consolidated REC purchase may be used as part of a plan for companies with facilities spread across several energy grids to achieve their overall clean energy objectives. Companies with regional operations that are based out of

Singapore, for example, may purchase RECs that were generated in other countries in Southeast Asia (e.g., Vietnam, Malaysia, or Indonesia), to mitigate their brown energy consumption and meet their clean energy objectives. However, it is important to note that international RECs may not be recognised for emissions reduction in different jurisdictions in associations such as RE100. Please refer to Section 5 for further discussions on this topic.

RECs also play a significant role in improving the traceability of RE generation and consumption. Each REC represents a specific and verifiable amount of electricity generated from a RE source. This enables transparency in energy supply chains and allows companies to accurately make emission reduction claims and track energy usage.[4]

3) Cost-Effective Transition

By purchasing RECs, companies can avoid the need to alter existing power contracts to acquire green power. For instance, a company can continue receiving power from their existing sources, while simultaneously reducing the company's carbon footprint by purchasing RECs. With RECs, companies can seek an alternative path that overcome various financial and operational complexities when it comes to green power procurement. This approach creates a mix of economic prudence and environmental responsibility, catalysing the transition to cleaner energy sources. As such, RECs play an important role in advancing the RE market by signalling demand for increased clean energy generation.

4) Demonstrate commitment to decarbonisation

By incorporating RECs into companies' energy sourcing strategy, companies showcase a tangible commitment to reducing their carbon footprint and supporting RE generation. Through RECs, companies can resonate positively with stakeholders who value environmental responsibility. Furthermore, the utilisation of RECs may align the company with values held by consumers, investors and employees who prioritise sustainable choices.

[4] Carbon Offset Guide https://www.offsetguide.org/understanding-carbon-offsets/other-instruments-for-claiming-emission-reductions/renewable-energy/1387-2/

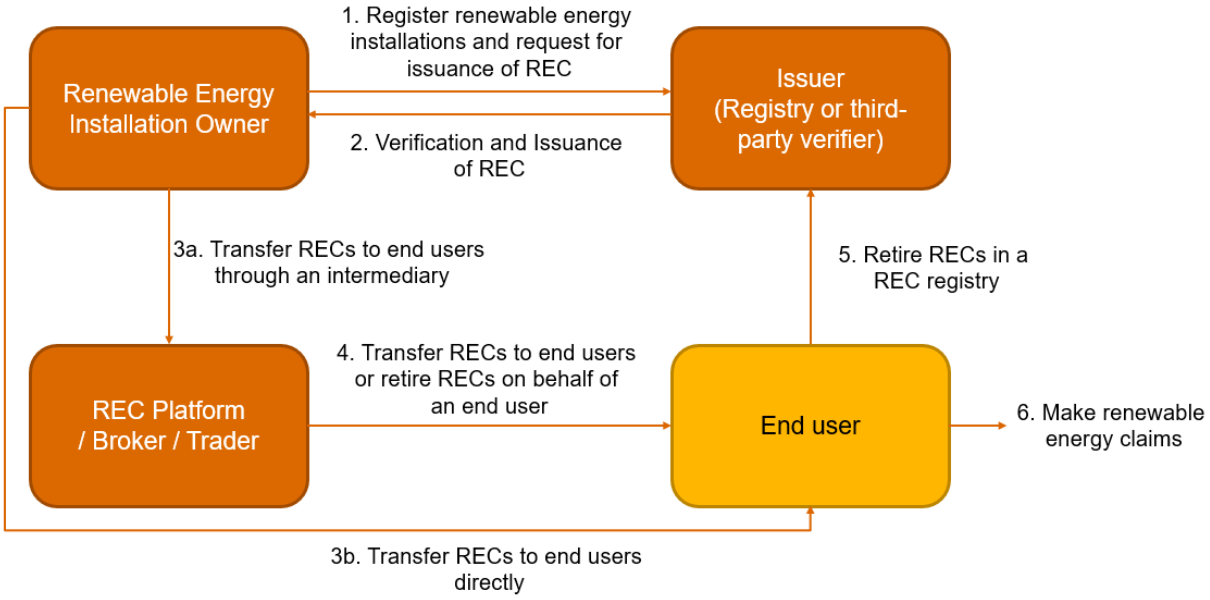
3. How to use RECs

3.1. Overview of REC system

RECs are issued by registries or locally appointed entities that register, verify, track, and manage the trade. The two main international REC registries recognised in Singapore are the International REC Standard Foundation ("I-REC") and Tradable Instruments for Global Renewables ("TIGR"). International REC registries may not always be involved in the trading of RECs, and instead appoint local entities to do so. For example, I-REC appointed Singapore Power group for this purpose.

I-REC Standard and TIGR are international EAC systems that have a set of rules, regulations, and best practices for a standardised tracking system. In addition to these, some developed countries adopted their own national standards to govern domestic certificate tracking systems. To facilitate consistency for the transaction and management of RECs, Singapore has launched the *Singapore Standard (SS) 673:2021, Code of practice for renewable energy certificates*. SS 673 is intended to provide a clear framework to improve the integrity of measurement, reporting, and verification (MRV) requirements for the issuance and management of RECs. It covers guidelines across the lifecycle of RECs – from production, tracking, management, to the usage of the certificates for renewable energy claims in Singapore.[5]

The REC Transaction Process



Step 1 and 2: Verification and issuance of RECs

For issuance of RECs, the RE projects must be validated and registered on the registry. Validation would include auditing the attributes declared by the registrant, as well as production data and submitted meter readings prior to certificate issuance. RECs are issued once production data is validated.

[5] Singapore Standards (SS) 673: 2021 https://scic.sg/images/New-singapore-standard-launch-to-support-management-and-use-of-renewable-energy-certificates.pdf

Step 3 and 4: Transfer RECs to end users

The renewable energy installation owner may transfer RECs to end users through an intermediary such as a REC platform, trader or broker, or directly. The method used may be dependent on various factors, including any regulatory restrictions.

REC Platforms

REC platforms act as an integrated marketplace or a trading platform for buyers and sellers to trade electricity and mitigate their electricity consumption with RECs. REC platforms can be either a pure-play REC marketplace or an open trading platform. A pure-play REC marketplace focuses solely on the buying and selling of RECs, facilitating the trade of RECs. Open trading platforms typically offer a broader range of energy products and services, including the option to buy and retire RECs alongside the typical trading that a marketplace provides.

In Singapore, REC platforms typically help with the procurement, issuance, redemption, and certification of RECs for their corporate and household customers. Main REC trading platforms in Singapore are the SP REC Platform, Sembcorp's GoNetZero Platform, T-REC.ai, and Energy Market Company (EMC)'s Power Select. Some of these platforms are pure-play REC marketplaces while others also sell electricity and RE products. For example, Power Select is a one-stop marketplace for electricity and RECs, offering both I- REC and TIGR accredited RECs from both local and overseas suppliers. Sembcorp's GoNetZero Platform offers a marketplace and portfolio management platform for RECs and carbon credits, as well as emission measurement, tracking, reporting and energy asset management.

Other methods

RECs can also be purchased through brokers and traders, or directly from RE projects through Power Purchase Agreements (PPAs). More information relating to PPAs and the financial accounting considerations around physical and virtual PPAs can be found in Section 6.1.

Step 5 and 6: Retiring RECs and making RE claims

For users to make RE claims, they would need to retire the RECs. Users can make RE consumption claims by stating attributes such as the origin, type of RE, mode of renewable electricity procurement and verification of claims.[2]

For example, the United Overseas Bank Limited (UOB) disclosed the following in their Sustainability Report 2022:

"*We purchased and redeemed a total of 133,300 solar and wind RECs from mainland China, Hong Kong, Indonesia, Malaysia, Thailand, and Vietnam to address 100% of our electricity consumption in all our key markets. All the purchased RECs are certified by the International Renewable Energy Certificate (I-REC) or Tradable Instrument for Global Renewables (TIGR) standards*".

Prudential PLC has also disclosed their use of RECs in Malaysia in their Sustainability Report 2022:

"We have procured renewable energy in Malaysia through green procurement strategies, utilising the Green Energy Tariff (GET) and International Renewable Energy Certificates (I-RECs) programmes. The impact of these actions is reflected in a reduction for Scope 2 market-based emissions when compared with location-based emissions."

"In 2022, we procured renewable energy for the first time, focusing on our Malaysia operations as it has our largest operational footprint. 31 per cent of our total electricity consumption, equivalent to 2,160 tCO2e, for Malaysia in 2022 was covered through green procurement strategies, utilising the GET and I-RECs programmes. We are aware of the concern that these schemes do not fully guarantee additional renewable energy supply reaching the market and have only selected programmes where the impact is transparent to us."

3.2. Types of RECs

Bundled vs. Unbundled

RECs can be sourced bundled or unbundled, where a bundled REC comes with the delivery of electricity and an unbundled REC is simply the purchase of the REC certificate. A bundled REC transaction may be obtained through a direct PPA, in which all the RECs associated with the RE purchased are passed on to the buyer.

One key benefit of purchasing bundled RECs is hedging. Such contracts would allow companies to minimise risk of fluctuations in energy markets as it would contribute to stable energy costs for the duration of the PPA. On the other hand, unbundled RECs make RE accessible for companies, as they provide flexibility where companies are able to explore different providers.

Case Study: Google's use of bundled RECs to achieve 100% RE

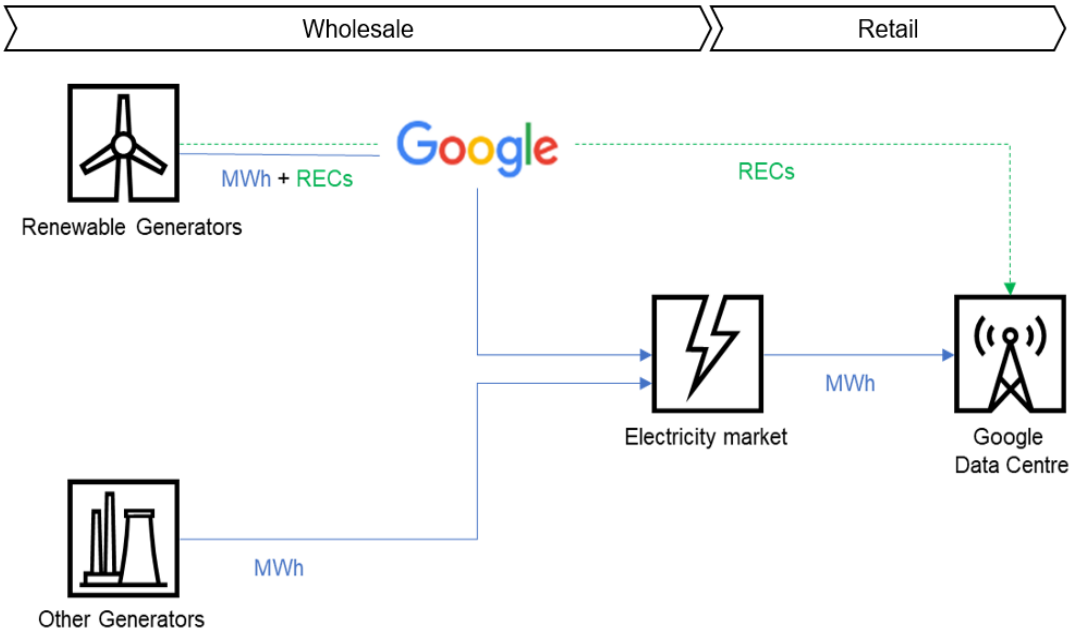
Google reported that the company has achieved 100% RE since 2017.[6] Google employed four primary purchasing tactics, namely:[7]

1) **Purchase renewable energy directly –** In deregulated wholesale and retail power markets, Google purchases RE directly, through PPAs with project developers on grids where Google operates data centres, as well as a separate balancing agreement with a competitive power market entity that helps deliver PPAs across the grid.

2) **Offsetting renewable PPAs –** In geographies where Google is unable to utilise RE directly due to regulatory restrictions, they may purchase bundled RECs from the renewable generators through PPAs. They would then sell the RE to the grid and keep the related RECs.

   As illustrated in the diagram below, Google purchases bundled RECs directly from the renewable generators (e.g., a wind or solar farm), and resells the RE into the regulated electricity market. Google Data Centre subsequently purchases electricity from the regulated electricity market for their operations. The RECs purchased from the PPAs would subsequently be retired and applied to this consumption of electricity. This method allows the company to rapidly procure RE in areas with restrictive retail regulations.

[6] Article by Google – Five years of 100% renewable energy – and a look ahead to a 24/7 carbon-free futurehttps://cloud.google.com/blog/topics/sustainability/5-years-of-100-percent-renewable-energy
[7] Paper by Google – Achieving Our 100% Renewable Energy Purchasing Goal and Going Beyond https://www.google.com/green/pdf/achieving-100-renewable-energy-purchasing-goal.pdf



3) **Utility renewable energy tariffs –** In areas where retail markets are not open to competitive suppliers and there is no auction-based wholesale market, Google worked together with their utility provider where the utility provider procures renewable energy on Google's behalf, for sale and delivery to the company. This is known as a renewable energy tariff.

4) **Grid-mix renewable content –** The utility's grid mix may contain energy from renewable resources that were not otherwise purchased by specific consumers. This is considered as part of the residual mix of the grid. For each MWh of retail electricity that Google consumes at its data centre, they count the portion that comes from residual renewables on the grid towards their 100% RE goal.

When purchasing RE, Google applies three key criteria in selecting projects.

1) **Additionality:** Purchasing energy from not yet constructed generation activities that will be built above and beyond what is required by existing energy regulations.

2) **Physical energy bundled with its "renewable certification":** Purchasing both the physical electricity and its corresponding "bundled" REC. By purchasing physical energy bundled with REC, Google provides all or nearly all of a project's cash flow over time.

3) **Proximity:** Selecting RE projects that will operate on the same grids as Google's data centres. In Singapore, Google signed a multi-year energy deal with Sembcorp Industries to source renewable power for Google Singapore's operations. The deal involves surplus energy generated from the rooftop solar installations of close to 500 Housing Board blocks.[8] The deal is part of Google's goal for its data centres to run entirely on carbon-free electricity by 2030.

[8] Article by The Straits Times – Sembcorp to supply Google Singapore with renewable energy from HDB rooftop solar panels https://www.straitstimes.com/business/companies-markets/sembcorp-to-supply-google-singapore-with-renewable-energy-from-hdb

Renewable energy source: Certification standards and reporting frameworks have their own list of technologies that they recognise as RE resources. For example, RE100, which is a global initiative of influential businesses committed to 100% renewable energy, considers the following energy resources as renewable: wind, solar, geothermal, sustainably sourced biomass (including biogas), and sustainable hydropower. RE100 recommends using standards such as the *International Organisation for Standardisation (ISO) 13065:2015, Sustainability criteria for bioenergy,* to secure sustainability claims associated with the use of biomass and hydropower.[9] RECs from different technologies may command different prices due to buyers' preferences for specific technologies for reasons such as marketing and brand value.[10]

3.3. Evaluating quality of RECs

As RECs are used by grid consumers to substantiate claims to renewable energy, it is important that the RECs meet certain quality criteria to make for a credible RE usage claim. For example, quality of RECs can depend on accuracy of generation and attribute information, how generation is matched to usage temporally and geographically, and the systems that are in place to ensure that there is no double counting of generation and double claiming between users.

There are several factors that can affect the impact and reliability of RECs, mainly:

- **Geography and market –** Although RECs can be purchased across geographical boundaries, REC purchases where the consumption and production are within the same market are considered to be more reliable because the generation and consumption of electricity occurred on the same grid.[11] In addition, when RECs are traded between systems, issues around credibility in reporting, loss of information and transparency can arise. As Singapore is a country with limited availability for local RECs, it may result in difficulties in ensuring that the consumption and production of RE is located within the same market. However, recent developments in ASEAN could improve the quality of RECs purchased from other ASEAN countries. Please refer to Section 5 for more information.

- **Vintage limitation –** For a credible REC, the vintage must be "reasonably close" to the reporting year of the electricity consumption to which it is applied. However, vintage limitations may vary between markets. Companies can refer to certification standards, claim verification and recognition programs, and/or Greenhouse Gas (GHG) inventory reporting systems to ensure that the vintage of generation is not too far from consumption date.

- **Attribute aggregation –** While RECs include various data attributes such as the renewable energy source, certificate vintage etc., they may be issued by tracking systems without the ability to record all the attributes of the electricity production as the attributes of the production could be disaggregated into multiple certificates. This means that the tracking system may potentially allow for multiple RECs to be issued for the same megawatt-hour (MWh) of renewable energy, which may create confusion for end-users and reduce reliability of the tracking system. Certificates with full-attribute aggregation, containing all the social, environmental and energy attributes is considered as good practice, and will result in more credible REC claims.

[9] RE100 Technical Criteria (published 12 December 2022) https://www.there100.org/sites/re100/files/2022-12/Dec%2012%20-%20RE100%20technical%20criteria%20%2B%20appendices.pdf
[10] World Resources Institute – Bottom Line on Renewable Energy Certificates https://www.wri.org/research/bottom-line-renewable-energy-certificates
[11] RECS International secretariat – Maximising the reliability and impact of buying renewables: guidance for market participants https://recs.org/app/uploads/2020/09/guidance-for-market-participants.pdf

- **Third party verification –** Purchasing RECs that are certified by an independent third party can ensure the credibility of the REC. International registries that are used in Singapore have rules and procedures in place to ensure the quality of RECs. The TIGR registry has procedures such as comprehensive tracking of national and subnational Feed in Tariffs (FiT), carbon credit issuance, and other environmental claims to avoid double issuance of RECs.[12] The I-REC Standard adheres to the I-REC Code for all actors in the I-REC system to guarantee the quality of the I-REC System and avoid issues such as double attribute or certificate counting.

[12] Tradable Instruments for Global Renewables (TIGRs) – The Standards for Tracking Corporate Renewable Energy Purchases http://apx.com/wp-content/uploads/2018/01/TIGRS-Advantage.pdf

4. Key challenges of using RECs

There are certain challenges associated with purchasing RECs, primarily concerning environmental integrity and maturity of regional market infrastructure. Key challenges include:

1) Limitation of REC in addressing decarbonisation goals

As a best practice, RECs should only be used to address Scope 2 market-based emissions, which are indirect greenhouse gas emissions from consumption of purchased electricity. Thus, it will not address companies' Scope 1 and Scope 3 GHG emissions. Instruments like carbon offsets, on the other hand, may be used to offset Scope 1, 2 and 3 GHG emissions.

2) Buying RECs may not result in reduced use of brown energy, or the production of new green energy

Buying RECs may not displace the use of brown energy or lead to production of new RE projects. This is also known as "additionality".

When a company purchases unbundled REC (i.e., REC that is acquired without its underlying energy), it increases the cost to the company and may encourage the company to reduce its usage of brown energy or switch to cleaner sources of energy. However, some have argued that companies may see this simply as a method to mitigate their brown energy and may not reduce their usage of brown energy.[13]

The additional demand on green energy stemming from the sales of RECs is expected to result in production of new RE. However, it is not clear how much of this incremental revenue may be reinvested to new RE projects, and result in new RE capacities.

3) Standardisation and transparency of REC market systems

In developed economies, there are several different tracking systems and energy attributes which are not always standardised. This poses a challenge to the trading of RECs between different markets.

Within a single country, there may also be different platforms referencing to different standards and registries. There may result in concerns over the validity and the risk of double counting of RECs. Outside of Singapore, the market infrastructure to validate the validity and quality of RECs is still underdeveloped. This has led to lower demand and pricing in Southeast Asia.

REC markets may also lack transparency, with limited accessible information on recent REC transactions. Key information such as REC details, trade volumes and pricing are typically kept to or controlled by the brokers.

4) Demand-supply imbalance

Buyers of RECs may prefer to purchase locally produced RECs. This could be due to various reasons, including RE100 members having the requirement to comply with the initiative's requirements, or simply to support local companies.

However, certain geographies may have limited RE resource or scalable projects as compared to the demand, resulting in higher prices. In Singapore, there is a limited supply of local RECs, driving higher prices as compared to other countries in the region.

---

[13] S&P Global – Problematic corporate purchases of clean energy credits threaten net zero goals https://www.spglobal.com/esg/insights/problematic-corporate-purchases-of-clean-energy-credits-threaten-net-zero-goals

5. Recent developments in the renewable energy claims and its impact on RECs

RE100 is a global corporate renewable energy initiative bringing together hundreds of large and ambitious businesses committed to 100% renewable electricity. While participation in the group is voluntary, some companies may seek to be part of the group, depending on their decarbonisation plans.

However, it may be challenging currently, to achieve full RE100 compliance due to a lack of local renewable projects. To be RE100 compliant, companies are required to meet the market boundary criteria, in which RECs must be utilised within the same market boundary as it is consumed.

For RE100 to recognise procurement of renewable electricity across a market boundary, there are certain conditions, namely: (1) physical cross-border transmission of electricity, (2) consistent accounting of energy attributes in the markets of origin and destination, and (3) mutually recognised instruments and contracts.[14]

Many countries lack sufficient renewable projects to meet local demand for RECs. For example, Singapore has a limited supply of local RECs, largely driven by land constraints that suppress the scalability and production of RE in Singapore.

It is important to note that under the SS 673 which was adopted in Singapore, RECs produced by RE installations in another jurisdiction, but contractually supplying electricity generated from such installations via a physical interconnection to the Singapore power grid would be considered as RECs produced in the same market boundary in which the company operates and consumes electricity.[2] This means that such RECs would meet the best practice guidance for users under SS 673, though it remains to be seen whether RE100 would consider this to be within its definition of market boundary.

Regional integration initiatives could drive cross-border REC trade in the near future in ASEAN countries. There is significant potential for development of cross-border electricity trade, and eventually development of a regional electricity market. Cross-border transmission is not new to ASEAN, with at least 27 cross-border transmission links currently exist between ASEAN countries.[15] While this is the first step in meeting RE100 guidance, by allowing physical transmission of electricity across borders, the remaining conditions would still have to be addressed by regional governments.

[14] RE100 Frequently Asked Questions (FAQs): Technical (last updated 18 August 2023) https://www.there100.org/sites/re100/files/2023-08/RE100%20FAQs%20-%20Aug%202023.pdf

[15] PwC – Regional electricity trade in ASEAN: The road ahead to an integrated and greener electricity future https://www.pwc.com/sg/en/publications/assets/page/regional-electricity-trade-in-asean.pdf

Current initiatives	• The following initiatives were developed to facilitate energy transition in ASEAN: 1. ASEAN Plan of Action on Energy Cooperation (APAEC) Phase II – which lays out strategies on setting up more cohesive energy pathways in the region. 2. ASEAN Interconnection Masterplan Study (AIMS) III – ongoing study that aims to realise a multilateral power trading agreement to meet regional renewable energy targets. 3. Implementation of the Lao-Thailand-Malaysia-Singapore Power Integration Project (LTMS PIP), the region's first multilateral electricity trade initiative, which commenced in June 2022.
Future developments	• ASEAN power grid – an initiative that aims to develop a fully-integrated ASEAN grid system

6. Accounting for purchased RECs

6.1. Financial Reporting

Purchased RECs are typically accounted for as intangible assets in accordance with *International Accounting Standards (IAS) 38, Intangible Assets*, although they may fall within the scope of *IAS 2, Inventories*, where the definition of 'inventory' is met. Where the RECs are held for resale or consumed in the process of production of inventories (e.g., as an input cost in the manufacturing of a product), they are more likely to meet the definition of 'inventory'. RECs accounted for under IAS 2 or IAS 38 will be recorded at cost on initial recognition.

When the RECs are used by the entity (i.e., cancelled), they are derecognised and recognised as a cost of purchased electricity – or another appropriate financial statement line item, depending on the policies adopted for the entity's income statement presentation in accordance with *IAS 1, Presentation of Financial Statements*.

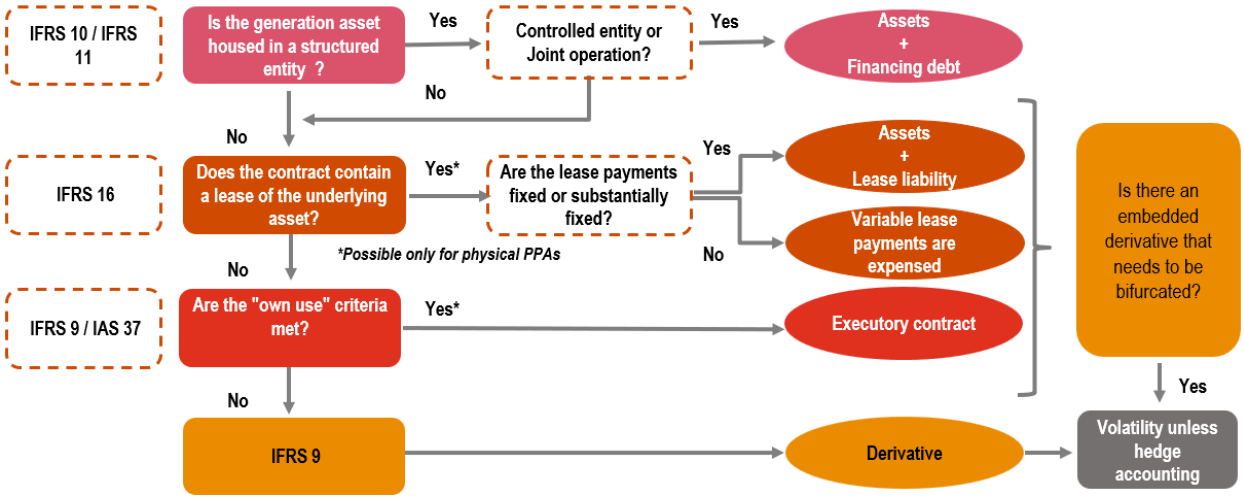
The accounting for RECs might involve complexity, depending on the specific facts and circumstances. There could be complexities surrounding the accounting for RECs which are purchased in a contract bundled with other products or services.

For example, when RECs are bundled in a power purchase agreement (PPA), it is important to understand the terms and conditions of the contractual agreement and differentiate whether the arrangement constitutes a physical or virtual PPA. A physical PPA agreement would result in the entity obtaining the RE, as well as the RECs associated with the RE. On the other hand, in a virtual PPA agreement, the entity would only receive the RECs, and there is no physical delivery of the electricity. Instead, the entity net settles the difference between brown energy and green energy prices through an electricity swap.

To account for a PPA, an entity considers the type of arrangement to determine the applicable standard(s), and whether:

- it gives rises to consolidation (International Financial Reporting Standards (IFRS) 10), or if it could be considered an associate (IAS 28), or joint arrangement (IFRS 11) or service concession arrangements (IFRS Interpretations Committee (IFRIC) 12); or
- it contains a lease (IFRS 16); or
- it does not meet the 'own use' criteria (IFRS 9); or
- it meets the 'own use' criteria (IAS 37).

Please refer to the flowchart below:



A key consideration would be whether the contract can be net settled in cash, which would require additional analysis on an entity's practice on how such contracts are settled. This would lead to the conclusion on whether the contract is a derivative or contains an embedded derivative. A net settleable PPA that meets the definition of a derivative and does not meet the conditions for 'own use', will be recorded as a derivative at fair value through profit or loss (FVTPL) in accordance with IFRS 9.

Contracts to purchase electricity may also contain a lease which should be accounted under IFRS 16. While customers typically purchase only a percentage of the output of power produced, an assessment of all the contractual terms is required to assess whether substantially all of the economic output of the asset is purchased (e.g., if the RECs and power purchased constitute substantially all of the fair value output of the facility). The latter may indicate that there is a lease component.

6.2. Sustainability Reporting

For the purposes of sustainability reporting, companies may be able to reduce their Scope 2 emissions through the use of RECs. In accordance with the Greenhouse Gas Protocol (GHG Protocol), there are 2 methods to calculate an entity's GHG emissions – location-based and market-based. A location-based method reflects the average emissions intensity of grids on which energy consumption occurs, while the market-based approach derives emission factors from contractual instruments, reflecting the choices that companies have made in terms of their electricity consumption.

Under the location-based method, companies compute their Scope 2 emissions based on their total electricity consumption multiplied by the emission factor. Emission factors relate to the amount of GHG emitted by a business to a set amount of activity performed by the business, which are either custom values (i.e., where the exact impact is known), or default value emission factors (i.e., averages based on the data sets available). As this information would

not include any consideration of contractual instruments purchased by the companies, they would not be able to account for their purchased RECs in their Scope 2 emissions calculations using this method. In Singapore, a common source of grid emission factors is the Energy Market Authority[16].

The market-based method accounts for the market from which the electricity was purchased from. This would take into account the actual sources of energy purchased. Reduction in Scope 2 emissions under this method could be obtained through contractual agreements with suppliers for green energy, or instruments such as RECs. Under the GHG Protocol and RE100, companies will be able to account for locally sourced RECs in their Scope 2 emissions. However, if the RECs are purchased from electricity markets that the company does not have access to, they may not be able to utilise the RECs. For example, Singapore does not currently participate in the electricity market in Vietnam, and we do not have access to their electricity. If a Singapore company purchases RECs generated from projects in Vietnam, they would only be able to account for it with respect to the Scope 2 emissions generated from their Vietnam operations, and not for their operations in other countries. However, SS 673 provides an exemption for this, where if the RE installation is located in Southeast Asia, the RECs may be accounted for in the company's Scope 2 emissions.

The IFRS Sustainability Disclosure Standard, IFRS S2 (Climate-related Disclosures) released by the International Sustainability Standards Board (ISSB) requires companies to disclose their Scope 2 emissions using the location-based method and provide information about contractual instruments such as RECs if such instruments exist and information about them informs users' understanding of an entity's Scope 2 greenhouse gas emissions (IFRS S2 Paragraph B30). As explained in the basis for conclusions on IFRS S2, paragraph BC105 to BC109, in order for companies to help users understand any contractual instruments that the entity has entered into for the sale and purchase of energy, information about an entity's market-based Scope 2 greenhouse gas emissions might be included as part of this disclosure.

[16] Energy Market Authority – Singapore Energy Statistics 2023: https://www.ema.gov.sg/resources/singapore-energy-statistics/chapter2

7. Reporting of RECs

Apart from the upcoming IFRS S2 requirements discussed above, there are no current requirements for users to report their use of RECs to any regulatory authorities in Singapore. However, companies may choose to voluntarily disclose their use of RECs as it will allow them to make claims that the energy they use comes from a renewable source. These renewable energy claims can be in the form of public disclosures such as announcements, media releases, company websites, annual reports and/or sustainability reports.

For example, DBS Group Holdings Ltd disclosed the following information in relation to the purchase of RECs in their Sustainability Report 2022:

"Despite our comprehensive efforts in reducing consumption, generating, and purchasing renewable energy as part of our four-lever approach, there remained gross carbon emissions in our operations, which we compensated for through the purchase of RECs and carbon credits.

On RECs: We purchased a total of 48,900 MWh of RECs to compensate for all 100% of grid electricity consumption across our core markets outside of Singapore."

Another example would be Singapore Telecommunications Limited's disclosure of their utilisation of RECs in their Sustainability Report 2023. They included the use of RECs in their renewable energy strategy and approach and have also included their purchased RECs and Large-scale Generation Certificates (LGCs) as an Environmental Performance Indicator.

"In Singapore, onsite renewable electricity generation is limited due to space constraints. Hence, we continue to back our electricity consumption with a portfolio of local RECs. We retired 20,450 Singapore RECs during the year, bringing Singtel renewable energy proportion for the year to 8.34%. In Australia, we retired 35,000 number of LGCs and have committed to achieving 100% of our electricity to be backed by renewable energy sources by end-2025."

Environment	***Singtel***			***Optus***			***Singtel Group***		
	2023	*2022*	*2021*	*2023*	*2022*	*2021*	*2023*	*2022*	*2021*
Purchased Renewable Energy Certificates/Large-scale Generation Certificates (MWh)	*20,450*	*2,000*	*1,000*	*35,000*	*42,000*	*0*	*55,450*	*44,000*	*1,000*

In Singapore, the launch of SS 673 Code of practice for renewable energy certificates, serves as a guideline for Singapore companies in making renewable energy consumption claims. SS 673 recommends the following parameters and principles when making claim statements:

- **Exclusive beneficiary of claim** – state the unique individual or entity which is consuming the specified volume of renewable electricity;
- **Origin of renewable energy** – convey the location of origin of the renewable energy, where applicable;
- **Type of renewable energy consumed** – convey the type of renewable energy source that electricity is derived from;
- **Mode of renewable electricity procurement** – state the mode of purchase, whether via direct purchasing, retail electricity contracts or transfer of ownership of renewable electricity and/or all of its generation attributes either through retirement of RECs or a series of contracts;

- **Volume of renewable energy consumed** – provide indicative figures on the volume of renewable electricity consumed;

- **Location or boundaries of consumption** – state the location or boundaries of the consumption covered by the renewable electricity contract or REC purchase; and

- **Reporting year for which claim is made** – state the period of consumption covered by the renewable energy contract or REC purchase.

SS 673 also highlights the best practice for users to make renewable energy claims, such as using RECs produced in the same market boundary in which they operate and consume electricity.[2]

In addition, companies which voluntarily joined RE100 global initiative will have an annual reporting commitment to having a minimum amount of information made public in the RE100 annual disclosure report. Based on the RE100 annual disclosure report 2022[17] published in January 2023, a total of 334 members reported their consumption of renewable electricity and progress towards their RE100 targets.

The information that will be published in the RE100 annual disclosure report include[18]:

- The member's **name**;

- The name of the **country or area** the member is **headquartered in**;

- The **year** the member **joined RE100**;

- The **target year** for the member's **RE100 target**;

- Details of any **interim targets** the member has set (if any);

- The member's **share of renewable electricity** that meets the RE100 technical criteria for the reporting period; and

- The member's use of **impactful procurement methods** (**only if** the member chose to report such information to RE100).

[17] RE100 annual disclosure report 2022 https://www.there100.org/sites/re100/files/2023-01/CDP_RE100_Report_2023%20%282%29.pdf
[18] RE100 Reporting Guidance 2023 https://www.there100.org/sites/re100/files/2023-06/RE100%20reporting%20guidance%202023.pdf

8. Assurance of RECs

With the purchase of RECs and the subsequent reporting of RECs, a company should also consider obtaining assurance over their disclosures on the use of the RECs. Based on the PwC Global Investor Survey 2022[19], investors see sustainability as a priority for companies, and this calls for financial discipline and greater transparency. The reliability of reported information is crucial to investors, with a large majority (87%) suspecting that corporate disclosures contain some greenwashing. External assurance would boost investor's confidence, with 75% saying that their confidence would receive the biggest boost if an independent reasonable assurance opinion was obtained.

To prepare for external assurance of their RECs disclosures, companies should consider the following factors:

1) Ensure that there is sufficient and reliable information about the RECs

The quality of RECs may vary significantly, due to issues such as credibility in reporting, loss of information and transparency. Companies should ensure that the RECs are of high quality, and that there is sufficient, reliable information provided about them. This could include information such as the geography and market of the RECs, the vintage of the RECs, the attribute aggregation of the RECs, as well as whether any third-party verification was obtained on the purchased RECs. Please refer to section 3.3 for more information on evaluating the quality of RECs.

2) Be prepared to provide appropriate documentation

The use of RECs would typically result in figures and statistics regarding electricity consumption and attribute procurement to be released. For assurance to be obtained, companies would need to ensure that there is appropriate supporting documentation in place for review. This would include external documents such as the certificate purchased, as well as internal documents such as approval documents for the purchase and use of the RECs, internal computations for the accounting of RECs etc.

3) Controls and processes over RECs should be robust

Similar to financial reporting, companies would need to ensure that their controls and processes over RECs are robust. This would include controls over the selection, evaluation, and purchase of the RECs, as well as the subsequent reporting and disclosure of the RECs. Given this is a relatively nascent space, controls relating to RECs may not be as developed and robust as other areas of operations and reporting within the organisation. Companies can start with having their processes reviewed by the internal audit function, before undertaking external assurance as their practices mature.

[19] PwC Global Investor Survey 2022 https://www.pwc.com/gx/en/issues/esg/global-investor-survey-2022.html