



Part of Policy Brief Series for RECAP

Renewable Energy Certificate (REC) Market Demand Mapping in Malaysia

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Highlights

- **Manufacturing leads in REC adoption:** Driven by a commitment to sustainability and cost reduction, Malaysia's manufacturing sector shows strong REC uptake, particularly among companies like 3M, PepsiCo, and those participating in RE100 and SBTi.
- **Smelting sector lags in REC engagement:** Despite significant energy consumption, the smelting industry demonstrates a concerning lack of REC adoption, highlighting a need for targeted policies and incentives to encourage greater participation in renewable energy initiatives.
- **Non-manufacturing sector shows promising growth:** Driven by voluntary sustainability commitments, the non-manufacturing sector, particularly financial services, is emerging as a key driver of REC demand, signaling the potential for further expansion in this diverse sector.
- **Data processing sector presents a significant opportunity:** With Malaysia's growing data centre infrastructure and digital economy, promoting REC adoption among data processing companies, including both local and international players, is crucial for sustainable growth in this energy-intensive sector.
- **Regional variations require a harmonised approach:** Malaysia's regionalised REC market necessitates a unified national framework with consistent standards to ensure market cohesion, enhance accessibility, and drive broader REC demand across all sectors and regions.

1. Introduction

Malaysia's Renewable Energy Certificate (REC) market has undergone a transformative journey, reflecting the nation's commitment to achieving a 31% renewable energy (RE) share in its total installed electricity capacity by 2025. Prior to 2017, most REC transactions occurred directly between purchasers and project developers or independent power producers (IPPs) marking the market's nascent stage [1].

In 2017, Tenaga Nasional Berhad (TNB) launched the myGreen+ scheme and the Malaysian Green Attributes Tracking System (mGATS). By 2020, mGATS facilitated the first unbundled REC issuance, recording close to 500 GWh in transactions. In the first half of 2022, the introduction of fully bundled RECs under the Green Electricity Tariff (GET) programme achieved 4,000 GWh in subscriptions. By mid-2023, GET subscriptions reached 6,600 GWh, highlighting rising market demand and supporting mREC framework development [2]. Additionally, mGATS evolved to include trading and auction features, fostering collaborations to create new REC products.

Malaysia's unique geographical and administrative divisions—Peninsular Malaysia, Sabah, and Sarawak—result in varying REC market maturity across regions. The REC market in Peninsular Malaysia is driven by the GET programme and mREC mechanism, supported by the robust mGATS system. Sarawak's REC market, bolstered by its hydropower capacity, has gained traction, with its inaugural REC auction trading 268,800 RECs. Meanwhile, Sabah is in the early stages, aiming for over 50% renewable energy capacity by 2035, leveraging resources such as solar PV and hydropower [3].

Malaysia's robust market makes it well-positioned to lead the regional discussions in establishing regional REC framework such as the Development of Regional REC Conceptual Framework for Brunei Darussalam-Indonesia-Malaysia-the Philippines (BIMP) (RECAP) project. This initiative fosters cross-border collaboration, positioning Malaysia as a regional benchmark for robust REC market implementation.

In support of domestic REC market growth and regional integration, this policy brief categorises key REC participants and evaluates the status quo of REC issuance and redemption. Key sectors assessed include manufacturing, smelting, non-manufacturing, and data processing industries. Additionally, Malaysia's existing policies and regulations will be examined to identify both opportunities and challenges to attract REC procurement. These insights will provide an overview of Malaysia's REC market demand landscape to navigate the nation's REC market development strategies.

2. Identifying Key Stakeholders

This analysis aims to strategically map the demand landscape for Malaysia's REC market by examining three key stakeholder groups: oversight and implementation bodies, market participants, and government bodies. At the forefront are oversight bodies—including corporate sustainability initiatives like RE100 and the SBTi—which, together with regulatory frameworks such as the Carbon Disclosure Project (CDP) and the Greenhouse Gas Protocol (GHGP2), play an essential role in upholding market integrity and ensuring alignment with sustainability objectives. In the Malaysian context, the involvement of three primary state-owned electricity utilities – Tenaga Nasional Berhad, Sarawak Energy, and Sabah Electricity Sdn. Bhd., is pivotal for driving REC market expansion, highlighting the importance of its inclusion in this analysis.

Market participants consist of buyers (corporations, supply chains) and sellers (project developers, IPPs, utilities) who drive the demand and supply sides of the REC market, with brokers and traders facilitating these transactions. TNBX, the green subsidiary of TNB manages the utility's REC program along with Single Buyer as the upcoming i-Track Local Issuer.

The brief will focus on key energy-intensive sectors, including manufacturing, smelting, non-manufacturing, and data processing industries, and will assess these sectors' corporate commitments to initiatives like RE100 and SBTi, which measure RE sourcing and reductions in Scope 2 carbon emissions tied to electricity use.

Lastly, this brief examines the influence of government bodies—such as the Ministry of Energy Transition and Water Transformation (PETRA), the Energy Commission (Suruhanjaya Tenaga), the Ministry of Utilities and the Ministry of Energy and Environmental Sustainability (Sarawak), and the Energy Commission of Sabah (ECoS)—and their role in shaping the REC market through policy incentives and regulations.

3. Rationale for Selecting Key Sectors in Malaysia

Malaysia's manufacturing sector posited itself as the sector with the highest electricity consumption [4]. Given such huge share, the very sector's transition to RE energy will be instrumental in contributing to Malaysia's achieved RE target. Meanwhile, the non-manufacturing sector's energy consumption also relevant for assessment due to urbanisation and expanding economic activities, the service-oriented industries are on the rise, firming the presence of notable service companies in Malaysia [5]. It is the matter of how far both sectors have integrated RE into their energy use and one way of knowing it is by assessing its REC utilisation.

Besides the two sectors, smelting operations, known for their high electricity and thermal energy demands, reflect trends within the manufacturing sector as electricity consumption rises [6] precise figures for smelting may be elusive, Suruhanjaya Tenaga identifies it as one of the largest electricity consumers in the country [7].

The burgeoning data processing sector, driven by investments in areas like Cyberjaya and Iskandar, underscores Malaysia's digital economy growth, necessitating significant energy for cooling systems [8]. Collectively, these sectors are pivotal in shaping Malaysia's energy landscape, making them prime candidates for examining REC demand.

4. Case Studies in Key Sectors in Malaysia

For companies where no public records of REC procurement are available, it is recognised that they may still purchase RECs, albeit without publicly accessible documentation. Only companies with concrete and verifiable evidence of REC transactions are considered. Companies that mention REC purchases as part of future strategies are classified as having no recorded purchases. This policy brief primarily relies on company sustainability reports, and where these are unavailable, alternative sources such as press releases and news articles are consulted.

4.1. Manufacturing Sector

Malaysia functions as a vital hub for both national and multinational manufacturing companies across a broad spectrum of industries. The companies in Table 1 are uniformly situated in Peninsular Malaysia, the country's hub for manufacturing activities. This concentration of industries underscores the importance of understanding energy consumption patterns within the manufacturing sector as an effort to explore the sector's REC demand landscape.

Table 1 Companies List in Manufacturing Sector

Company	REC	RE100	SBTi	Category	Activity
3M	Yes	Yes	Yes	Manufacturing	Conglomerate with diverse manufacturing (adhesives, abrasives, laminates, etc.)
Danone	Yes	Yes	Yes	Food & Beverage	Food products (dairy, plant-based, specialized nutrition)
Hyundai Motor Company	Yes	Yes	No	Manufacturing	Automotive (cars and commercial vehicles)
Jinko Solar	No	Yes	No	Manufacturing	Solar panel manufacturing
Johnson and Johnson	Yes	Yes	No	Others	Pharmaceuticals, medical devices, consumer health
Lotte Chemical	Yes	Yes	No	Manufacturing	Petrochemicals and chemicals
Nissin	No	Yes	Yes	Food & Beverage	Instant noodles and food products
PepsiCo	Yes	Yes	Yes	Food & Beverage	Food and beverages (soft drinks, snacks)
Samsung Electronics	Yes	Yes	No	Manufacturing	Consumer electronics, semiconductors, home appliances
Unilever	Yes	Yes	Yes	Manufacturing	Consumer goods (food, beverages, personal care, cleaning products)
Ajinomoto	Yes	Yes	Yes	Food & Beverage	Food and biotechnology (seasonings, processed foods)
Applied Materials	Yes	Yes	Yes	Manufacturing	Semiconductor manufacturing equipment
Asus	Yes	Yes	No	Manufacturing	Computer hardware and electronics
Coca-Cola Europacific Partner	Yes	Yes	Yes	Food & Beverage	Non-alcoholic beverages
Heineken	Yes	Yes	Yes	Food & Beverage	Beer and cider brewing
HOYA Corporation	Yes	Yes	No	Other	Healthcare and information technology (medical devices, lenses)
HP Inc	Yes	Yes	No	Manufacturing	Printing and personal systems (computers, printers)
KAO Corporation	Yes	Yes	No	Food & Beverage	Consumer goods (personal care, cleaning products, some food)
Kellogg	Yes	No	Yes	Food & Beverage	Breakfast cereals and convenience foods

Company	REC	RE100	SBTi	Category	Activity
New Balance Athletics	Yes	Yes	No	Other	Sportswear and footwear
Intel Malaysia	Yes	Yes	No	Other	Semiconductor manufacturing
Nestlé Malaysia	Yes	Yes	No	Food & Beverage	Food and beverage (confectionery, dairy, coffee, pet food)
Canon	Yes	No	No	Manufacturing	Imaging and optical products (cameras, printers, etc.)

** The information presented is derived from the respective sustainability reports and related documentation of the listed companies.*

Multinational manufacturing companies are increasingly leveraging Renewable Energy Certificates (RECs) to meet their 100% renewable electricity targets under the RE100 commitment. Additionally, it can be acknowledged that the main driver of REC usage in this industry is due to mounting pressure to reduce emissions. This trend is particularly evident in sectors such as food and beverage, electronics, and consumer goods, with notable examples including Danone [9], Kellogg [10], and Nestlé Malaysia [11]. By avoiding emissions through clean electricity consumption authenticated by RECs, these companies are not only meeting their sustainability goals but also supporting the development of additional renewable energy projects.

To date, there are no publicly available data on national Malaysian manufacturing companies procuring RECs. Nonetheless, local companies are beginning to contribute to the increase of RE capacity. For example, Sime Darby Plantation, while not purchasing RECs, has been generating them through its solar farm developments [12]. This highlights the emerging role of local companies in bolstering RE projects and potentially using RECs to generate additional income from the trading.

Industries such as petrochemicals and automotive as of yet have no publicly available record of engaging with the REC market. To address this gap, it would be prudent to explore policy-driven or market-based interventions that incentivise REC offtake within these sectors. Encouraging such participation could bridge the divide and ensure that renewable energy usage becomes a standard practice across all industrial players.

4.2. Smelting Sector

Malaysia's smelting industry presents a striking contrast to its manufacturing sector, demonstrating a lagging commitment to green initiatives and REC utilisation. Despite being significant contributors to national electricity consumption, smelting companies show a notable absence of REC adoption as indicated in Table 2.

Table 2 Companies List in Smelting Sector

Company	REC	RE100	SBTi	Activity
Anyoli Sdn Bhd	Not specified	No	No	Copper Smelting
Aluminium Alloy Smelter Ind Sdn Bhd (AAS)	Not specified	No	No	Aluminium Smelting
OM Materials (Sarawak) Sdn Bhd	Not specified	No	No	Manganese Smelting

Company	REC	RE100	SBTi	Activity
Pahang Mineral Industrial Sdn Bhd	Not specified	No	No	Tin Smelting
Lynas Corporation Ltd	Not specified	No	No	Rare Earth Processing

The smelting industry relies heavily on stable power supplies to ensure uninterrupted operations, often depending on dedicated power plants for this essential service. Currently, the power remains largely sourced from natural gas. While this fuel source adequately meets the electricity requirements for aluminium smelting—an energy-efficient process compared to copper or nickel smelting—it has yet to facilitate a broader transition towards sustainable practices across the sector.

Due to the amount of power it consumed, positioning the smelting industry as a pivotal player in the nation's shift towards RE remains pertinent. It is anticipated that the demand for renewable energy will grow within this sector, thereby driving an increased appetite for RECs from smelters. Encouraging this shift not only aligns with national sustainability goals but also positions the smelting industry as a crucial contributor to Malaysia's energy transition.

4.3. Non-Manufacturing Sectors

Table 3 Companies List of Non-Manufacturing Sector

Company	REC	RE100	SBTi	Category	Activity
DBS Bank	Yes	Yes	No	Financial Services	Banking and financial services
Ingka Group (IKEA)	Yes	Yes	No	Retail	Furniture and home furnishings retail
PwC	Yes	Yes	Yes	Professional Services	Accounting and consulting services
Samsung SDI	Yes	Yes	No	Technology	Battery technology and energy solutions
Starbucks	Yes	Yes	Yes	Food & Beverages	Coffeehouse and beverage retail
Zoetis	Yes	Yes	No	Pharmaceuticals	Animal health (pharmaceuticals and vaccines)
AEON	Yes	Yes	Yes	Retail	Retail (general merchandise, supermarkets)
ANZ	Yes	Yes	No	Financial Services	Banking and financial services
H&M	Yes	Yes	Yes	Retail	Apparel and fashion retail
HSBC	Yes	Yes	No	Financial Services	Banking and financial services
KPMG	Yes	Yes	Yes	Professional Services	Accounting and consulting services
Maybank	Yes	No	No	Financial Services	Banking and financial services

Company	REC	RE100	SBTi	Category	Activity
CIMB Group	Yes	No	No	Financial Services	Banking and financial services
Petronas	Yes	No	No	Energy	Oil and gas
Telekom Malaysia	Yes	No	No	Technology	Telecommunications

** The information presented is derived from the respective sustainability reports and related documentation of the listed companies.*

The non-manufacturing industry encompasses multiple sectors, each driven by distinct factors influencing REC adoption. Financial services and retail sectors are leading the charge in utilising RECs, while professional services and pharmaceuticals show moderate levels of adoption.

Companies aligned with global sustainability initiatives, such as DBS Bank, CIMB Group, and Telekom Malaysia, leverage REC purchases to meet their renewable energy targets. Retail giants like Ingka Group (IKEA), AEON, and H&M, on the other hand, face mounting consumer pressure to adopt eco-friendly practices, further spurring REC demand.

Setting a noteworthy example, Telekom Malaysia has subscribed to the Green Electricity Tariff (GET) programme, actively procuring local RECs to support its sustainability goals. The GET programme simplifies REC adoption, yet many non-manufacturing companies have not embraced it. This underscores the need for advocacy to promote such programmes across the nation.

4.4. Data Processing Sector

The rapid growth of service industries in Malaysia is driving a parallel surge in demand for data processing and data centre infrastructure. These centres are essential to support modern service operations, given their capacity for data storage and management. In recent years, Malaysia has emerged as a promising hub for data centres within the ASEAN region. Significant investments are underway in key areas such as Cyberjaya, Johor, and the Iskandar region, which are close to Singapore's borders. This influx of investment highlights Malaysia's strategic positioning as a regional data centre hub.

To further cement its role in this sector, Malaysia has set ambitious targets for its data processing capabilities, aiming to develop a total data centre capacity of 951 MW. Currently, the country has 189 MW in operation, with an additional 224 MW under construction. This strategic commitment underscores Malaysia's vision to attract investment in energy-efficient infrastructure that aligns with the growing demand from regional service industries [13].

Table 4 Companies List of Data Processing Sector

Company	REC	RE100	SBTi	Category	Activity
Amazon Web Services (AWS)	Yes	No	No	Cloud Computing Providers	Compute, storage, databases, analytics, AI/ML, and more
Microsoft Azure	Yes	Yes	No	Cloud Computing Providers	Similar to AWS, with strong integration with Microsoft products and services
Google Cloud	Yes	Yes	No	Cloud Computing Providers	Data analytics, AI/ML, and open-source technologies

** The information presented is derived from the respective sustainability reports and related documentation of the listed companies*

This brief identifies three major data processing companies operating in Malaysia that have already procured RECs. Another potential driver of REC demand is the ongoing expansion of these companies within Malaysia. As previously highlighted, major data processing firms are establishing operations in the country. However, there is currently no recorded purchase of m-RECs by these companies. Despite this, the likelihood of these companies, along with prospective entrants, engaging with the REC market remains high. This presents a critical opportunity for Malaysia to capitalise on the momentum by creating incentives for data processing firms to procure m-RECs.

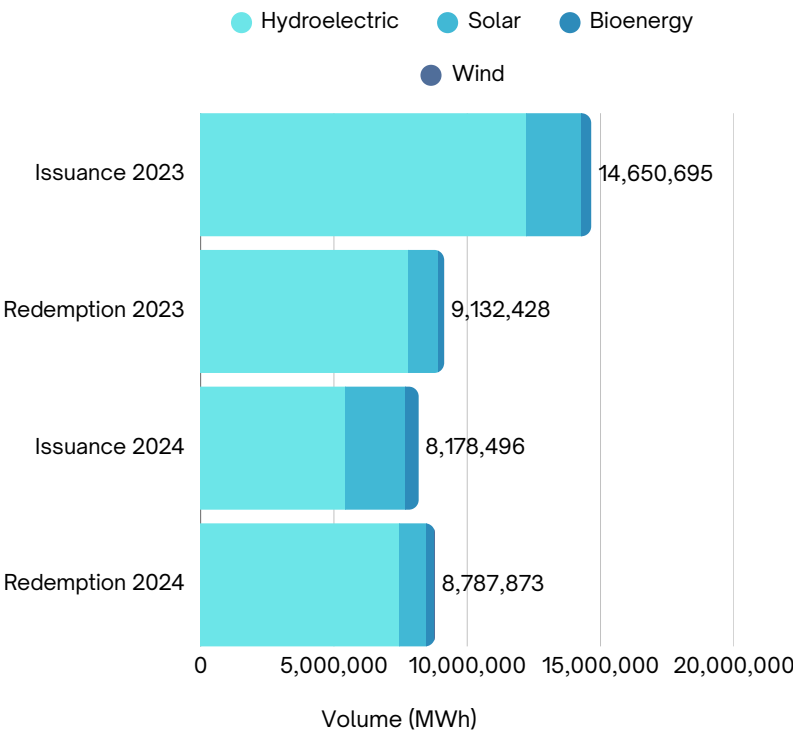
Furthermore, it is important to note that many other data processing companies remain unaccounted for in this assessment. This underscores a significant gap: while the sector’s outlook is promising, encouraging emerging local firms to engage with the REC market and adopt sustainable practices remains a formidable challenge.

As data centres continue to proliferate across Malaysia, fostering broader participation in RE commitments among smaller and newer players will be crucial to driving REC demand and ensuring a greener future for the country.

5. Status Quo of REC Demand

This analysis utilises I-REC Registry data, updated to October 2024, as Malaysia adopts the I-REC system [14]. The data is limited to REC products issued under the I-REC(E) framework, although Malaysia also issues its own REC variant, m-RECs. Despite this limitation, the global utilisation of I-REC ensures the data accurately reflects current REC demand trends.

Figure 1 REC Issuance and Redemption in Malaysia Recorded in I-REC Registry per October 2024



Both REC issuance and redemption show a downward trend from 2023 to 2024. Issuance dropped from 14.6 million MWh in 2023 to 8.1 million MWh in 2024, while redemption decreased from 9 million MWh to 8.8 million MWh. However, this decline is likely due to the 2024 data covering only up to October. With the year-end figures, REC issuance and redemption rates are expected to reflect growth for 2024.

In terms of technology, solar dominates REC issuance and redemption, reflecting Malaysia’s investment in solar projects driven by government incentives and declining costs. However, hydroelectric projects contribute the highest REC volumes, demonstrating their importance in large-scale renewable energy generation. The average gap between REC issuance (vintage) and redemption is 1 year and 7 months.

To sustain this momentum, Malaysia should strengthen its local REC market by encouraging companies to adopt mRECs, supported by programmes like the Green Electricity Tariff (GET). Furthermore, maximising initiatives like the New Enhanced Dispatch Arrangement (NEDA) and supporting emerging technologies such as wind and biomass would diversify the renewable energy mix and bolster REC issuance.

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6. Policy and Regulatory Landscape

Malaysia's REC market demand is profoundly influenced by its differentiated regional regulatory landscape and overarching national policy framework. The Feed-in-Tariff (FiT) programme, introduced in 2011 for Peninsular Malaysia and Labuan territory laid the foundation for renewable energy development by offering fixed tariffs to RE producers. This was further bolstered in 2016 by the Large-Scale Solar (LSS) programme and the Net Energy Metering (NEM) scheme, which promoted large-scale solar installations and enabled consumers to generate their own solar power. These initiatives increased REC liquidity through the increase of renewable energy generation which supplied RECs to the market.

Specific REC-focused policies have further spurred demand. Peninsular Malaysia's Green Electricity Tariff (GET) programme allows consumers to support RE generation through green electricity bundled with RECs directly, enhancing market accessibility. The Corporate Green Power Programme (CGPP) in 2022 incentivised corporations to meet sustainability targets via virtual power purchase agreements linked to RECs.

The Cross-Border Electricity Sales (CBES) initiative, launched in 2023, has expanded renewable energy trade beyond Malaysia's borders, supported by the establishment of the Energy Exchange Malaysia (ENEGEM) to facilitate cross-border green electricity sales. Building on this, the Corporate Renewable Energy Supply Scheme (CRESS), introduced in 2024, provides a regulatory framework enabling Renewable Energy Developers (RED) and Green Consumers to achieve Environmental, Social, and Governance (ESG) goals through Third Party Access (TPA), with RECs transferred under Bilateral Energy Supply Contracts and compliant with international standards [15].

Further advancing regional cooperation, the Johor-Singapore Special Economic Zone (JS-SEZ) aims to foster carbon reduction and renewable energy innovation, with plans to develop a REC framework for cross-border electricity trade. This vision has been bolstered by an agreement between Tenaga Nasional Berhad (TNB) Malaysia and Sembcorp Power Singapore to deliver 50 MW of green electricity to Singapore via the ENEGEM platform [16].

Underscoring Sarawak's commitment to RE, the Electricity (Amendment) Ordinance 2023, alongside the Electricity Rules 1999 and the Electricity (State Grid Code) Rules 2003, The electricity sector of Sarawak is also mainly characterised by hydropower, which is a significant contributor to Sarawak's REC supply with plants like Batang Ai, Bakun, and Murum, annually generating approximately 30 million RECs.

Despite notable progress, several areas require further development to fully realise Malaysia's REC market potential. Notably, shedding light on Sabah's current underdeveloped REC market due to infrastructural constraints. Still in its early establishment, Sabah's REC market remains underexplored. Regardless of its nascent stage, Sabah has outlined an overarching target of achieving over 50% RE capacity and over 30% RE energy by 2035. The implementation plan involves allocating a portion of RECs to RE developers to enhance tariff competitiveness and encourage further RE investments. The remaining RECs will be utilised for bundled tariff programs (GET) and to fund future RE development initiatives under the ECOS.

7. Ways Forward

In effort of enhancing Malaysia's REC market demand and promote the transition towards sustainable energy practices, a series of targeted recommendations are proposed.

Consideration of Diverse Regulatory Ecosystem: In acknowledgement of the unique circumstances amongst regions, the different REC stakeholders across Malaysia may starting to consider whether to retain the current diverse approach or establish a unified national REC framework with consistent standards, mutual recognition of RECs across Peninsular, Sarawak, and Sabah. Both options have different advantages and disadvantages with regards to pathways for market expansion.

Streamlining REC usage amongst key sectors: Within the CRESS, energy-intensive industries, like manufacturing and smelting, advocating them to opt for bundled RECs as viable way for RE transition is necessary. For less intensive but emerging industries, like non-manufacturing and data processing, emphasising RECs flexibility as instruments to achieve their sustainability target also deemed instrumental.

Pioneering Cross-Border Bundled REC Trade: With the presence of comprehensive policy and regulatory framework such as CRESS, Malaysia can trailblaze rigorous cross-border RECs trade associated with green power electricity trade, and ultimately sets the path for recognition of cross-border RECs in the region by global reporting standards.

Increasing ASEAN's Leverage in Global REC Market: With its steadfastly advancing REC market, Malaysia should collaborate with other AMS into expanding its REC trade through a unified regional REC market to enable better bargaining power on negotiation terms and more access to international buyers. This vision could be made possible through routine dialogues and joint initiatives amongst AMS.

Integrating RECs to Export Standards: Pertaining to transnational goods trade, Malaysia's REC market must abide by export standards, i.e. EU's Carbon Border Adjustment Mechanism (CBAM). Predominantly for goods originated from energy-intensive industries, opting to REC procurement as export strategy could prove Malaysia's compliance to carbon abatement efforts, exempting it from carbon costs while also leveraging its competitiveness in the international market.

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