

ESG RESEARCH

Singapore Real Estate Emissions ESG View



Source: Frasers Property Limited

Summary

From January to September 2024, global temperature exceeded 1.5°C above pre-industrial (or 1850-1900) levels which could trigger multiple climate tipping points. While global warming may still be brought below the 1.5°C threshold stated in the Paris Agreement, extreme climate events such as hurricanes, floods and droughts have already been occurring from January to October 2024.

To tackle global warming, the Building Construction Authority (“BCA”) raised the energy efficiency standard of its Green Mark certification ultimately as part of the Singapore Green Plan 2030. Given that buildings accounted for around 39.7% of global carbon emissions in 2022 and more than 20% of Singapore’s carbon emissions, an understanding of the Green Mark certification as well as of other green building certifications may allow investors to contribute to lowering emissions by providing a way to assess the energy (thus emissions) performance of Real Estate Investment Trusts (“REITs”) listed on SGX.

Under the updated Green Mark certification scheme (“GM: 2021”), buildings are awarded certifications based on their energy savings from 2005 levels: “Gold^{PLUS}” (50–55% savings) or “Platinum” (≥55% savings). Buildings (without major retrofits) seeking Green Mark re-certification may be evaluated instead under GM: 2021 In-Operation, where the minimum rating is “Gold” (40–50% savings). The Green Mark certification (both GM: 2021 and the previous version) is generally valid for three years.

Besides Singapore’s Green Mark, the U.S. Green Building Council (“USGBC”) also developed the Leadership in Energy and Environmental Design (“LEED”) certification. Under the current version of LEED (“LEED v4.1”) applicable for evaluating a building’s operations & maintenance, projects are scored based on criteria ranging from energy performance and water efficiency to indoor air quality. Projects are then awarded a certification based on the points earned (out of 100): “Certified” (40–49 points), “Silver” (50–59 points), “Gold” (60–79 points) or “Platinum” (80+ points). LEED v4.1 certification is generally valid for three years.

Another certification is the National Australian Built Environment Rating System (“NABERS”). NABERS certifies separately various aspects of a building’s sustainability performance such as energy savings (NABERS Energy) and water efficiency (NABERS Water). Buildings are rated on a six-star scale: “Poor” (1.0-star), “Below Average” (2.0-star), “Average” (3.0-star), “Good” (4.0-star), “Excellent” (5.0-star) and “Market Leading” (6.0-star). NABERS certification is generally valid for one year.

By evaluating the disclosed green building certifications of three selected SGX-listed retail REITs, we found that Frasers Centrepoint Trust (“FCT”) had the highest percentage of portfolio (of the three) with energy-related certification. Further analysis may be limited by the comparability of different certifications’ ratings and varying reporting periods. Nonetheless, an understanding of green building certifications may provide a starting point for assessing the emissions performance of SGX-listed REITs.

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CLIMATE CHANGE OUTLOOK

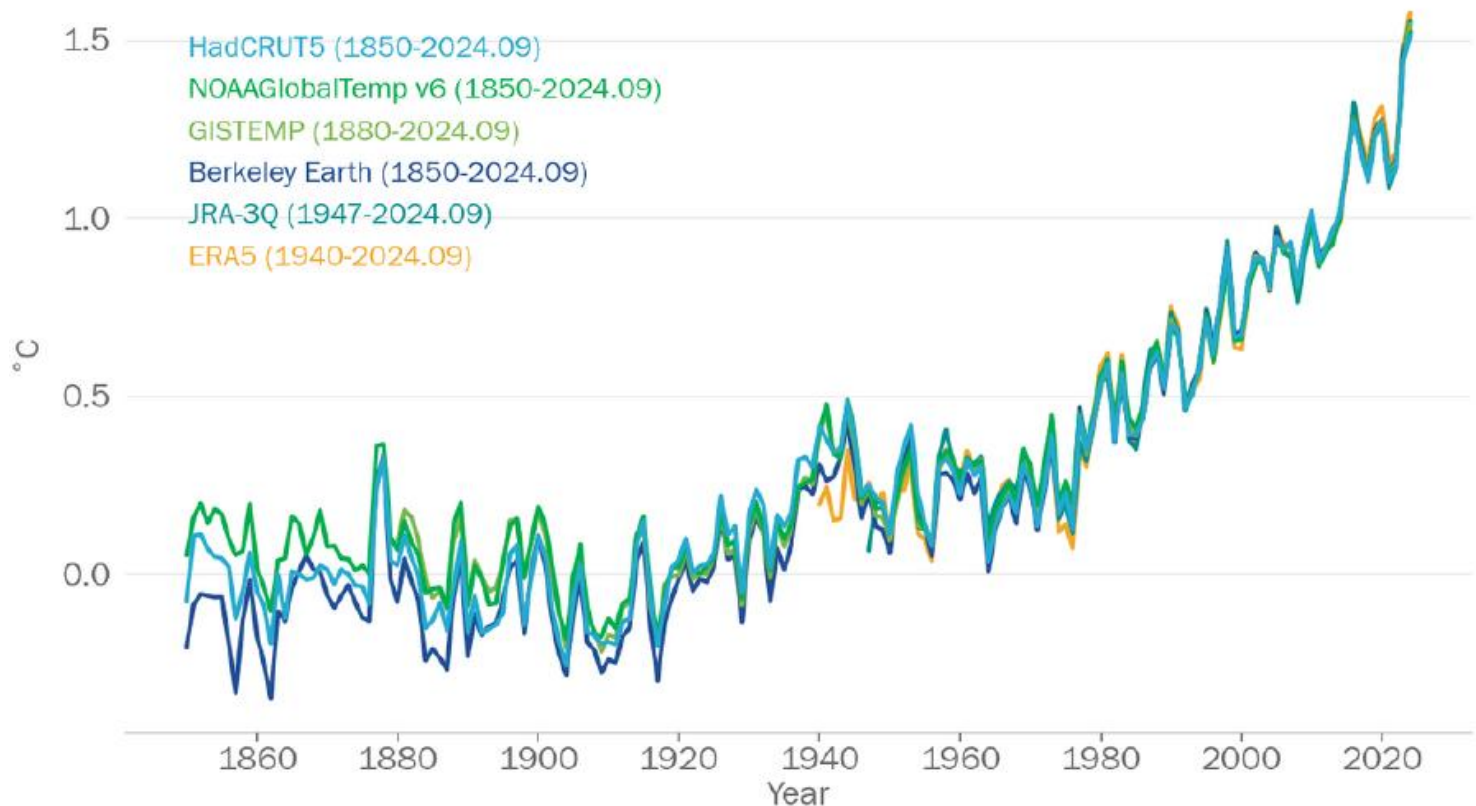
(I) REVIEW OF 2024

According to the World Meteorological Organization (“WMO”), the global temperature from January to September 2024 was $1.54 \pm 0.13^\circ\text{C}$ above the pre-industrial average” as shown in **Exhibit 1**.

WMO noted in November 2024 that the “Concentrations of the three key greenhouse gases in the atmosphere (WMO 2024a) – carbon dioxide, methane, and nitrous oxide – reached record high observed levels in 2023” and were expected to be “higher again in 2024”. WMO added that “a strong El Nino event boosted global temperature to record observed levels later in 2023 and through 2024” such that global mean temperature from June 2023 to September 2024 “exceeded anything recorded before 2023 and often by a wide margin”.

However, WMO reassured that the “ 1.5°C above pre-industrial levels” threshold stated in the Paris Agreement may still be within reach as global average temperature follows “considerable interannual variability, owing to natural climate variability (for example caused by El Niño and La Niña events, volcanic activity, and changes in ocean circulation)”. WMO added that the 1.5°C threshold “should be understood as an exceedance over an extended period, typically decades or longer”.

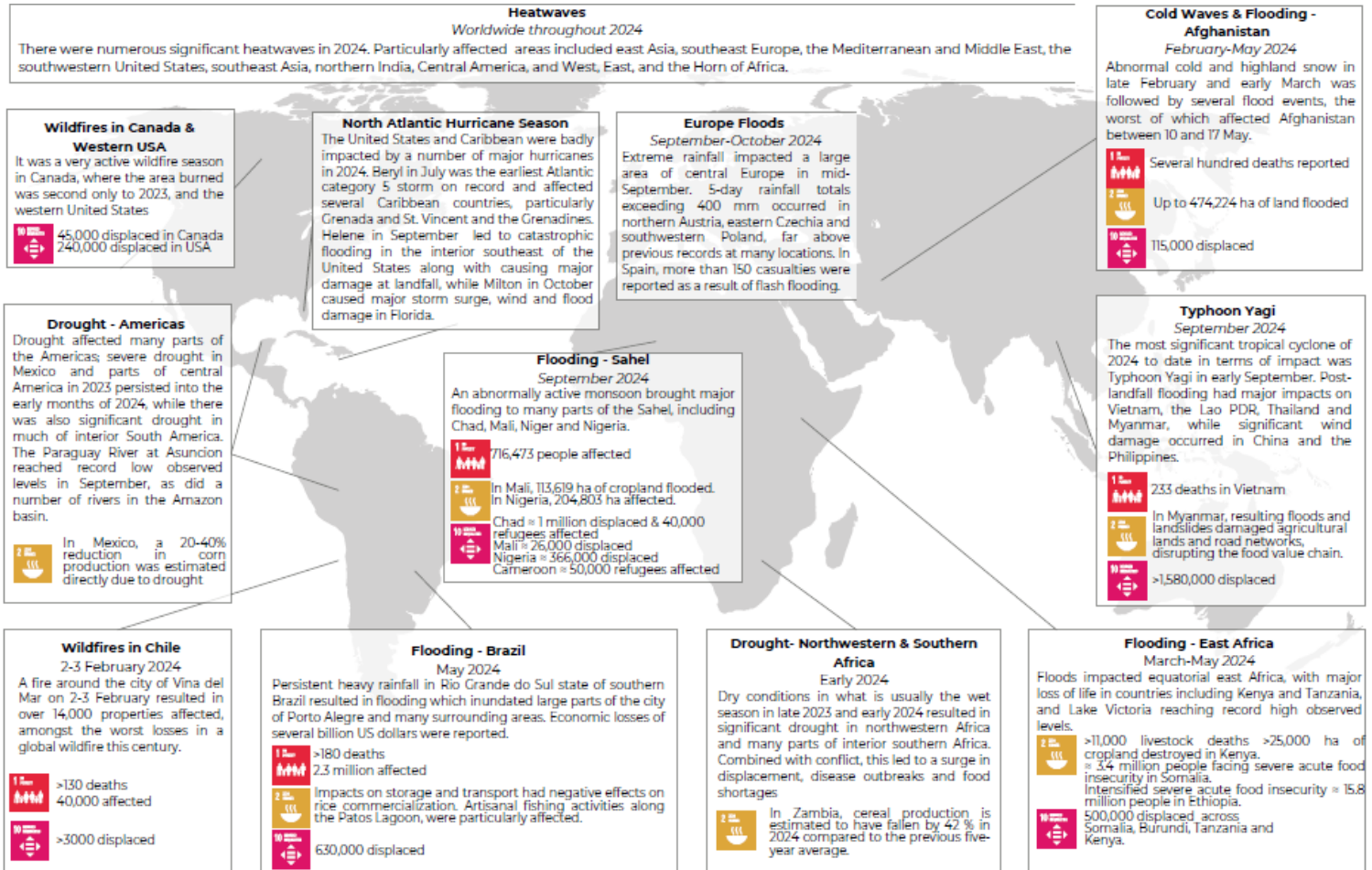
Exhibit 1: Annual Global Mean Temperature Anomalies (Compared to 1850–1900)



Source: WMO (published November 2024 according to the United Nations or “UN”)

Nonetheless, WMO noted that extreme climate events such as hurricanes, floods and droughts have already been occurring from January to October 2024 as shown in **Exhibit 2**.

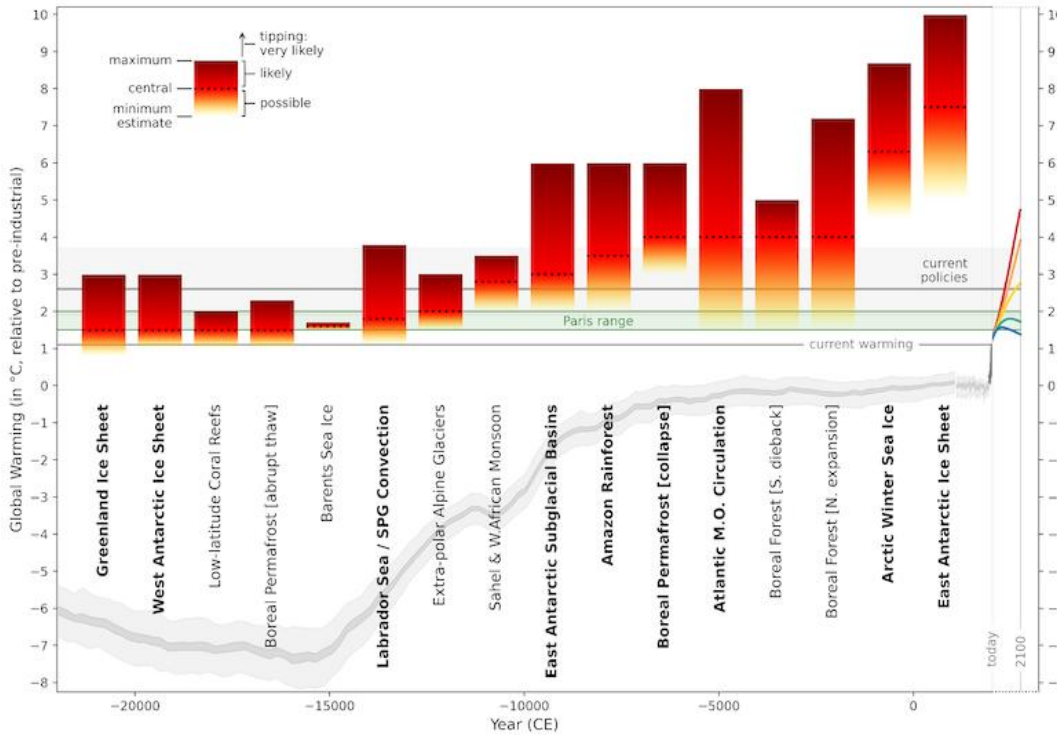
Exhibit 2: Selected Extreme Climate Events (January–October 2024)



Source: WMO (published in November 2024 according to the UN)

Armstrong McKay et al. (2022)¹ noted in September 2022 that the rise in global warming above 1.5°C “could trigger multiple climate tipping points”. The tipping points include the collapse of the Greenland & West Antarctic ice sheets, the die-off of low-latitude coral reefs and the abrupt thaw of the boreal permafrost as shown in **Exhibit 3**. Global warming projections for each of the Intergovernmental Panel on Climate Change (“IPCC”) scenarios, as coloured in **Exhibit 3**, are shown in **Exhibit 4**.

Exhibit 3: Climate Tipping Points



Note: Bolded tipping points are those that are considered as “global core”, or those that meet the criterion of contributing “significantly to the overall mode of operation of the Earth system (such that tipping them modifies the overall state of the whole system)”. Non-bolded “regional impact” tipping points are those that do not meet the criterion. The projected global warming paths correspond with IPCC scenarios: SSP1-1.9 (blue), SSP1-2.6 (green), SSP2-4.5 (yellow), SSP3-7.0 (orange) and SSP5-8.5 (red).
 Source: Armstrong McKay et al. (2022) (as cited by Carbon Brief in September 2022)

Exhibit 4: IPCC Scenarios and Respective Global Warming Projections

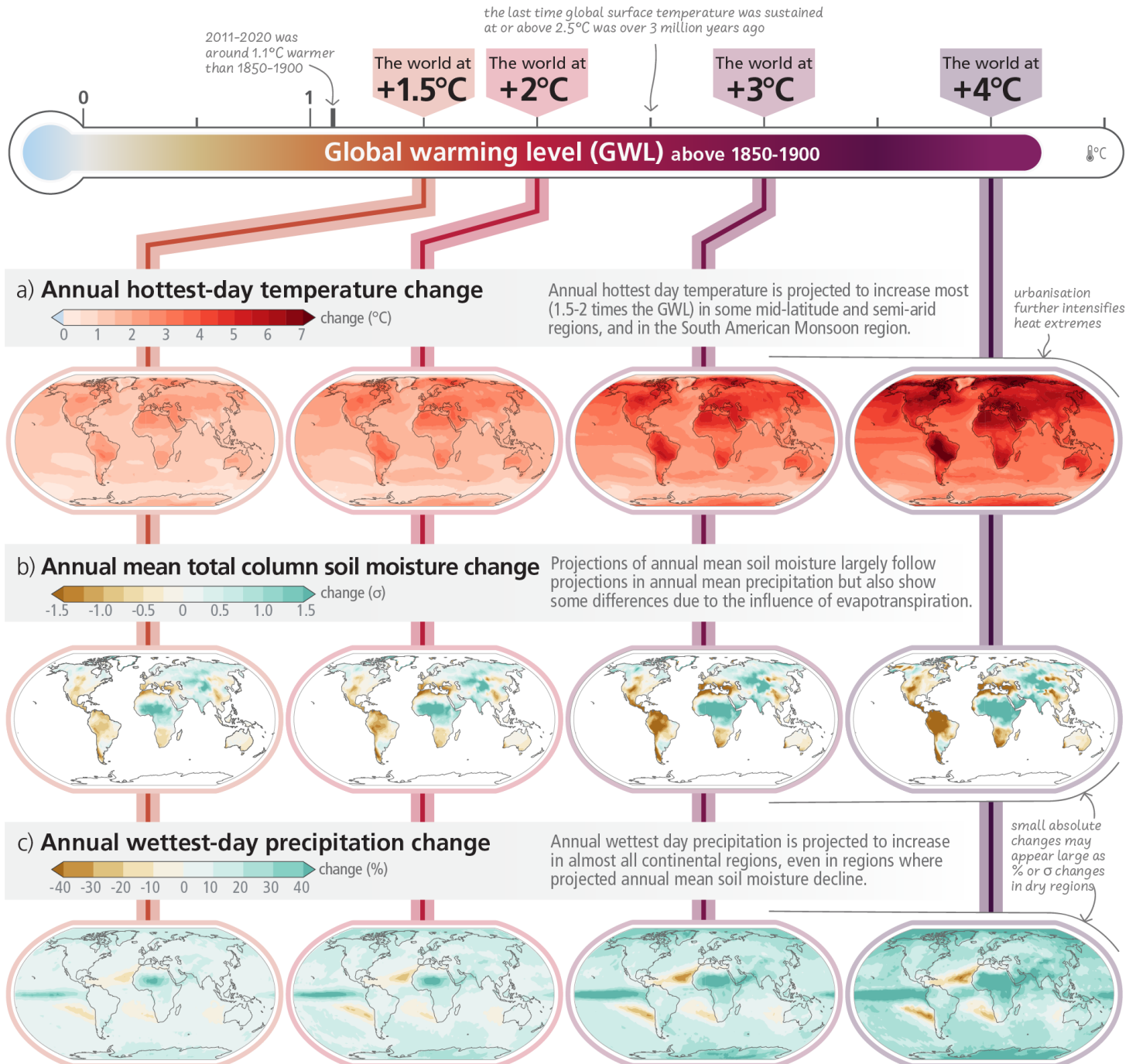
Scenario	Near term, 2021–2040		Mid-term, 2041–2060		Long term, 2081–2100	
	Best estimate (°C)	Very likely range (°C)	Best estimate (°C)	Very likely range (°C)	Best estimate (°C)	Very likely range (°C)
SSP1-1.9	1.5	1.2 to 1.7	1.6	1.2 to 2.0	1.4	1.0 to 1.8
SSP1-2.6	1.5	1.2 to 1.8	1.7	1.3 to 2.2	1.8	1.3 to 2.4
SSP2-4.5	1.5	1.2 to 1.8	2.0	1.6 to 2.5	2.7	2.1 to 3.5
SSP3-7.0	1.5	1.2 to 1.8	2.1	1.7 to 2.6	3.6	2.8 to 4.6
SSP5-8.5	1.6	1.3 to 1.9	2.4	1.9 to 3.0	4.4	3.3 to 5.7

Note: “Best estimate” refers to median while “Very likely” range refers to the 5-95 percentile range.
 Source: IPCC (published March 2023)

¹ Armstrong McKay, D. I. et al. (2022). Exceeding 1.5°C global warming could trigger multiple climate tipping points. Science, 377(6611). <https://doi.org/10.1126/science.abn7950>.

The IPCC noted in its Sixth Assessment Report’s Synthesis Report (published in March 2023) that “Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in 2011-2020”. IPCC also noted that “approximately 79% of global GHG emissions came from the sectors of energy, industry, transport, and buildings together” in 2019. IPCC added that with “every increment of global warming”, “regional changes in mean climate and extremes” would “become more widespread and pronounced” as shown in **Exhibit 5**.

Exhibit 5: Effects of Rising Global Warming Level

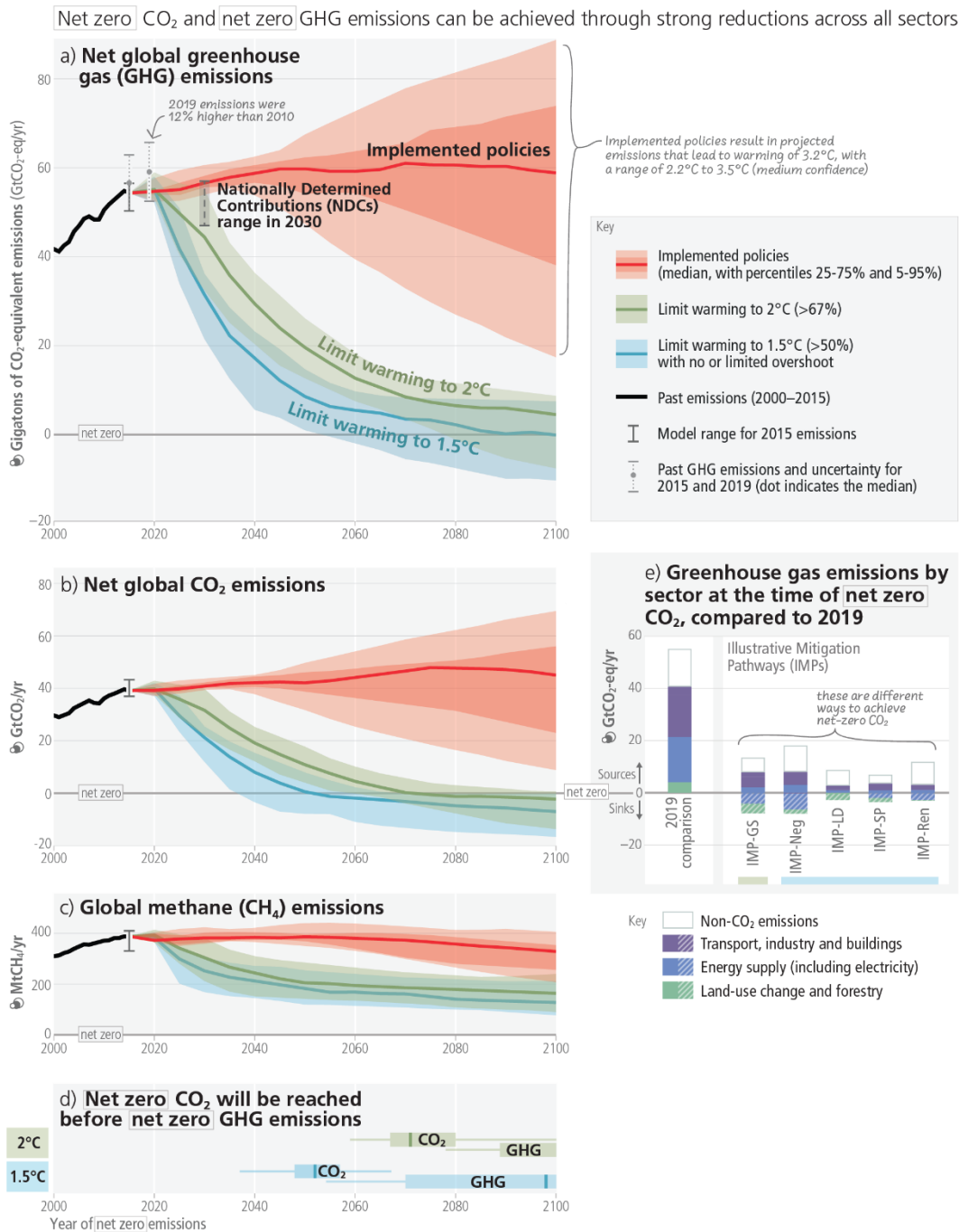


Source: IPCC (published March 2023)

IPCC noted too that limiting global warming to 1.5°C (with “no or limited overshoot”) or 2.0°C by 2100 would involve “rapid, deep and in most cases immediate greenhouse gas emission reductions” as well as achieving net-zero carbon dioxide (CO₂) emissions by around 2050 (as shown in panels a and b respectively in **Exhibit 6**).

However, “without a strengthening of policies” that “were implemented by the end of 2020”, IPCC projected that global temperature would rise by a median of 3.2°C or around 2.2–3.5°C (5–95 percentile range) above pre-industrial levels by 2100.

Exhibit 6: Pathways to Limiting Global Warming



Source: IPCC (published March 2023)

(II) PARIS AGREEMENT PROGRESS

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” (as stated in the Paris Agreement), countries have been “requested” to submit Nationally Determined Contributions (“NDCs”) pursuant to Article 4, paragraph 2 of the Paris Agreement to the UN Framework Convention on Climate Change (“UNFCCC”) secretariat “by 2020 and every five years thereafter (e.g. by 2020, 2025, 2030)” (as cited from the UNFCCC’s website).

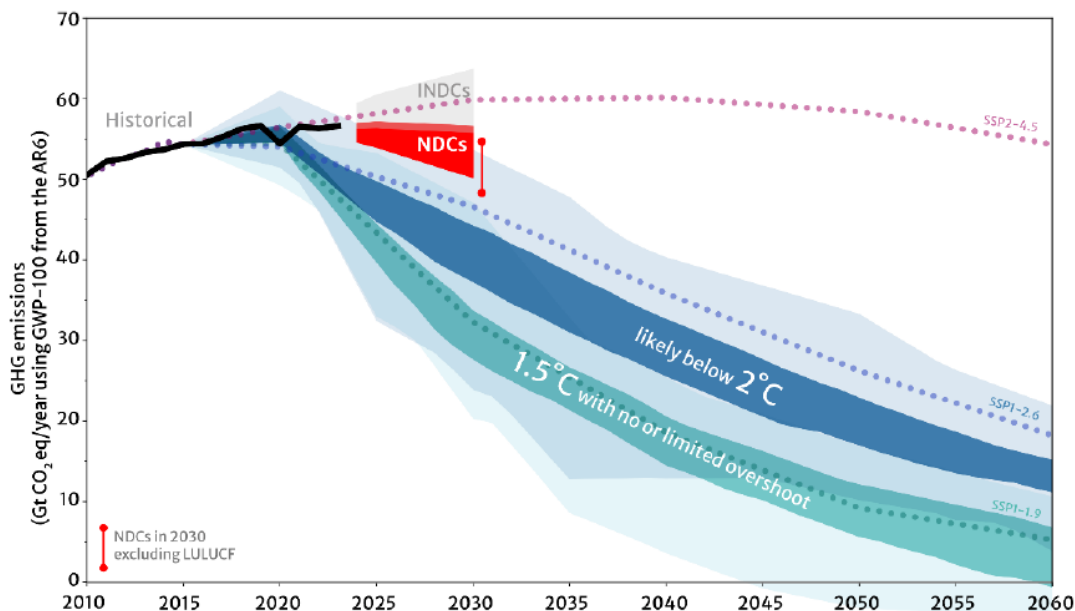
According to the Paris Agreement, the NDCs would reflect each country’s contribution to “the global response to climate change” (e.g., through “emission reduction targets” for developed countries or “mitigation efforts” by developing countries).

The UNFCCC noted in its 2024 NDC Synthesis Report (published in October 2024) that, based on the “168 latest available NDCs, representing 195 Parties to the Paris Agreement” as at 9 September 2024, the “best estimate of peak temperature in the twenty-first century (projected mostly for 2100 when temperature continues to rise) is in the range of 2.1–2.8 °C depending on the underlying assumptions” should all NDCs be fully implemented.

The UNFCCC added that the “best estimate” (i.e., median) rise in global temperature above pre-industrial levels is expected to be in the range of 2.4–2.8°C¹ should only unconditional elements be fulfilled, while the “best estimate” range would fall to 2.1–2.3°C² should all conditional elements also be fulfilled.

Noting that current NDCs remain inadequate in limiting global warming, the UN Climate Change Executive, Simon Stiell, asserted that the “next round” of NDCs to be submitted in 2025 “must deliver a dramatic step up in climate action and ambition”.

Exhibit 7: Projected Global GHG Emissions Based on NDCs as at 9 September 2024



Note: “INDCs” refer to Intended Nationally Determined Contributions as at 4 April 2016. “LULUCF” refers to Land Use, Land-Use Change and Forestry. Greenhouse Gas (“GHG”) emissions shown in this exhibit include LULUCF unless otherwise stated. IPCC scenarios (SSP1-1.9, SSP1-2.6 and SSP2-4.5) are included with the respective 5-95 percentile ranges for projected GHG emissions in light shading.

Source: UNFCCC (published October 2024)

¹ The UNFCCC noted that including “climate uncertainties”, the range widens to 1.7–4.1°C (5–95 percentile range).

² The UNFCCC noted that including “climate uncertainties”, the range widens to 1.5–3.4°C (5–95 percentile range).

(III) SINGAPORE'S CLIMATE EFFORTS

On 21 September 2016, the Singapore Government ratified the Paris Agreement and submitted Singapore's first NDC (or INDC). The Singapore Government noted in the INDC that Singapore intended to "reduce its Emissions Intensity by 36% from 2005 levels by 2030, and stabilise its emissions with the aim of peaking around 2030".

On 31 March 2020, the Singapore Government submitted an update for Singapore's first NDC in which it noted that Singapore intended to "peak emissions at 65 MtCO_{2e} around 2030" which would allow Singapore to "achieve a 36% reduction in Emissions Intensity (EI) from 2005 levels by 2030". On the same day, the Singapore Government also submitted its Long-Term Low-Emissions Development Strategy ("LEDS") in which it stated that Singapore aspired to "halve emissions from its peak to 33 MtCO_{2e} by 2050, with a view to achieving net-zero emissions as soon as viable in the second half of the century".

On 4 November 2022, the Singapore Government submitted the second update for Singapore's first NDC in which it raised Singapore's emission reduction target to "around 60 million tonnes of carbon dioxide equivalent (MtCO_{2e}) in 2030 after peaking its emissions earlier", although it noted that the target was "contingent on technological maturity and effective international cooperation". On the same day, the Singapore Government also submitted an Addendum to Singapore's LEDS in which it raised Singapore's long-term target to "net zero emissions by 2050".

The Singapore Government also noted in the second update that Singapore accounted "for only 0.1% of global emissions" and had "limited options to deploy renewable energy at scale". Regardless, it noted that Singapore was committed to "do its part in the global effort to address the global climate crisis and steward its resources for future generations".

Partly to fulfil its international climate commitments, the Singapore Government launched in February 2021 the Singapore Green Plan 2030 which "charts ambitious and concrete targets over the next 10 years" (according to the press release for the launch).

As part of the Singapore Green Plan 2030 (under the "Energy Reset" pillar), the Building Construction Authority ("BCA"), along with the Singapore Green Building Council ("SGBC"), launched in March 2021 the fourth edition of the Singapore Green Building Masterplan ("SGBMP") which aims to deliver "80-80-80 in 2030" as follows (and also summarised in **Exhibit 8**):

1. 80% of Singapore's buildings (by gross floor area or "GFA") to be "green" (as elaborated below) by 2030
2. 80% of new developments to be Super Low Energy ("SLE") buildings¹ from 2030
3. 80% improvement in Energy Efficiency ("EE" in **Exhibit 8**; from 2005 levels) for "best-in-class" green buildings² by 2030.

In the document detailing the fourth edition of SGBMP (updated in July 2022), BCA noted that it considers a building as "green" if it meets "minimum environmental sustainability standards (effective as of Apr 2008)" or attains BCA's Green Mark certification. BCA also noted in July 2024 that "close to 55% of Singapore's buildings have been greened" as at end-2022.

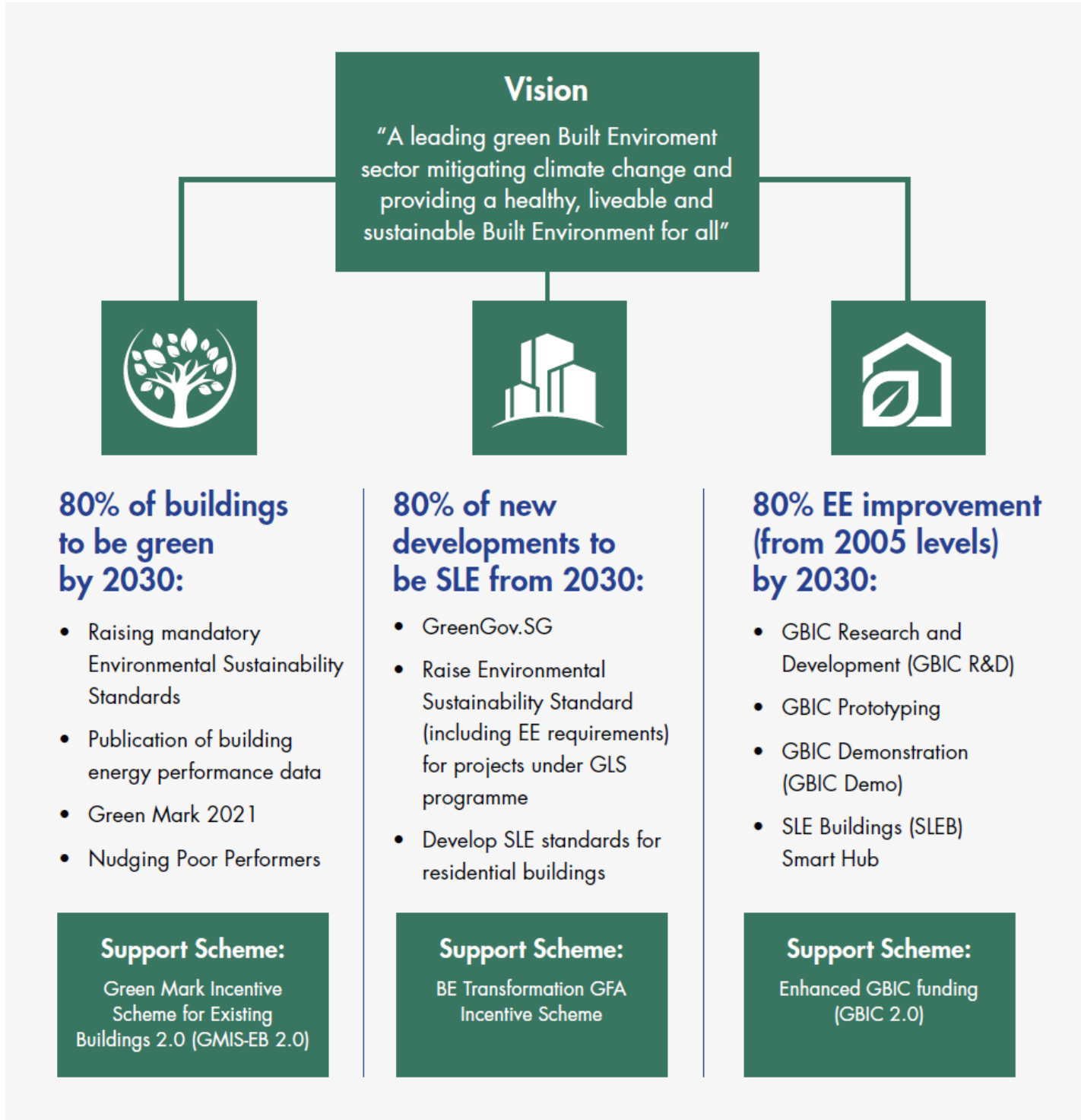
According to the International Energy Agency, global carbon emissions from "buildings, including embodied emissions from new construction", totalled around 39.7% in 2022 with non-residential buildings contributing about 10.1% (or around one-fourth of 39.7%). Various sources linked to the Singapore Government (e.g., BCA, SGBC and the Ministry of National Development) have also noted from around 2020 that buildings "account for over 20%" of Singapore's carbon emissions.

A basic understanding of the Green Mark certification, as well as of other green building certifications, may provide a useful way to assess the energy (thus emissions) performance of Real Estate Investment Trusts ("REITs") listed on SGX. Thus, we begin discussing green building certifications by providing an overview of the Green Mark certification in the next section.

¹ According to the latest SGBMP document (updated in July 2022), SLE buildings "refers to buildings that have achieved at least 60% improvement in energy efficiency compared to 2005 levels".

² BCA noted in July 2024 that the "best-in-class" buildings "are able to achieve over 70% improvement in energy efficiency over 2005 levels".

Exhibit 8: Singapore Green Building Masterplan (Fourth Edition)



Supported by Integrated FM and Aggregated FM (IFM & AFM) grant for buildings to operate and maintain optimal building performance, to improve buildings' energy efficiency and cultivate a sustainable Built Environment in Singapore.

Source: BCA (document updated July 2022)

GREEN BUILDING CERTIFICATIONS

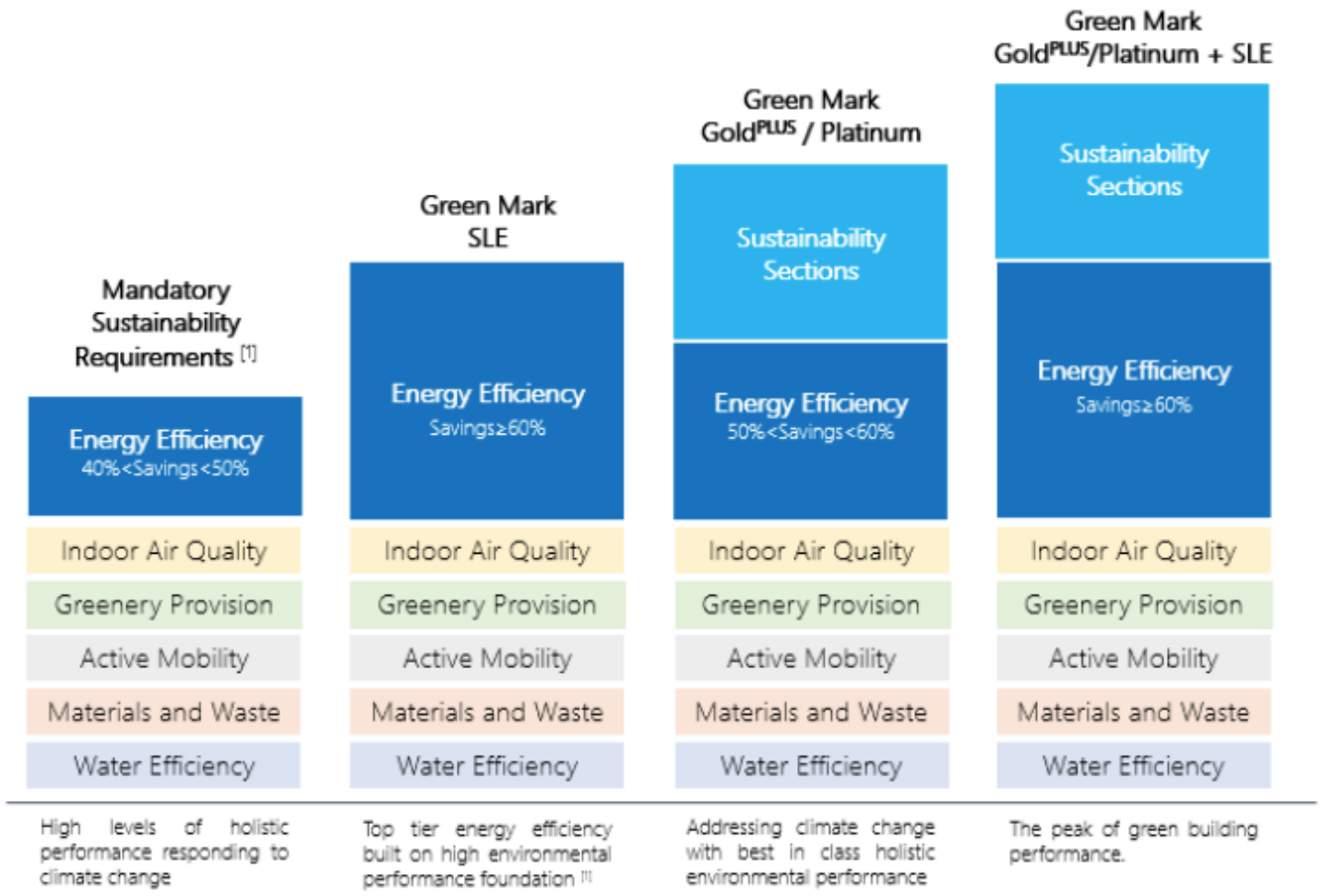
(I) GREEN MARK SCHEME

Launched in 2005, BCA noted in July 2024 that the Green Mark scheme “encouraged, enabled and engaged industry stakeholders in adopting new green buildings”. BCA pilot launched the updated scheme or BCA Green Mark 2021 (“GM: 2021”) in April 2021 as part of the latest SGBMP, and revised the document for GM: 2021 in October 2023.

Under GM: 2021 (second edition), BCA noted that the energy efficiency standard “has been calibrated and aggressively raised in tandem with the revised minimum environmental sustainability standards for both new and existing buildings”, whereby “new building developments and those undergoing major retrofitting and/or major energy use change” are required to “attain 50% and 40% energy savings compared to 2005 levels, respectively”.

BCA provided an overview of GM: 2021 (second edition) as shown in **Exhibit 9**.

Exhibit 9: BCA Green Mark 2021 (Second Edition) Overview



[1] Mandatory requirements are based on development control and building plan provisions for new buildings, for existing buildings under retrofit, the requirements would vary depending on the type and extent of the works being undertaken.

Note: “Savings” as compared to 2005 levels.
Source: BCA (document revised October 2023)

BCA added that project teams could “pursue either Green Mark Gold^{PLUS} or Platinum certification which are comprehensive certification that covers various aspects of sustainability, and/or Green Mark SLE certification which is focused solely on energy efficiency”.

Under the Green Mark SLE series (as noted from BCA’s website):

- “SLE” (or Super Low Energy) certifies that a “best-in-class performing Green Mark Building” managed to achieve $\geq 60\%$ energy savings over 2005 levels
- “ZE” (or Zero Energy) certifies that an SLE building supplied “all energy consumption, including plug load” from renewable sources (both on-site and off-site)
- “PE” (or Positive Energy) certifies that an SLE building supplied “115% of all energy consumption, including plug load” from renewable energy sources (on-site only).

BCA illustrated the various Green Mark and Green Mark SLE certifications available under GM: 2021 (second edition) as shown in **Exhibit 10**.

Exhibit 10: Green Mark and Green Mark SLE Certifications

GM Series	GM SLE Series
-	SLE, ZE, PE
Gold ^{PLUS}	Gold ^{PLUS} SLE/ZE/PE
Platinum	Platinum SLE/ZE/PE

Source: BCA (document revised October 2023)

While the full GM: 2021 certification applies for new buildings and existing buildings that are undergoing (or, perhaps, may have undergone since last Green Mark certification) any major retrofit, BCA noted that GM: 2021 In-Operation, a “simplified version” of GM: 2021, is applicable instead for “projects that have previously been assessed and fully certified under Green Mark that have demonstrated their holistic environmental performance” and are not undergoing (or, perhaps, may not have undergone since last Green Mark certification) any major retrofit.

BCA elaborated that retrofitting may involve but is not limited to:

- addition or replacement of chiller(s)
- addition or replacement of $\geq 50\%$ of all air-conditioning condenser units, or of $\geq 50\%$ of the current installed capacity
- additional GFA of $\geq 5,000 \text{ m}^2$
- projects subject to Environmental Sustainability Regulations

Under GM: 2021 In-Operation, the minimum energy savings (from 2005 levels) is 40% for a “Gold” rating. However, under the full GM: 2021, the “Gold” rating is removed, and the minimum energy savings is raised to 50% for a “Gold^{PLUS}” rating.

BCA illustrated the difference between the full GM: 2021 and GM: 2021 In-Operation certification in **Exhibit 11**.

BCA noted in its FAQs for a previous version of the Green Mark certification (updated May 2019) that the certification “is valid for 3 years from date of Temporary Occupation Permit or date of Letter of Green Mark Award issued by BCA, whichever is later”. BCA also noted in its GM: 2021 FAQs (for GM: 2021 second edition; published November 2024) that the “certification of non-residential building is only valid for 3 years” from the Temporary Occupation Permit date.

The attainment of the full GM: 2021 (inclusive or exclusive of SLE series) or GM: 2021 In-Operation certification would thus indicate a basal level of emissions performance (e.g., energy savings of $\geq 40\%$ from 2005 levels) of a given building.

Exhibit 11: Full GM: 2021 vs GM: 2021 In-Operation

	Energy Savings					Intelligence	Health & Well-being	Whole Life Carbon	Maintainability	Resilience
	>50%	$\geq 55\%$	$\geq 60\%$	ZE						
						<ul style="list-style-type: none"> • 15 points for each sustainability section • ≥ 10 points in a section to qualify for a badge for exemplary performance 				
A. Full GM: 2021 certification										
SLE (incl. ZE, PE)				✓	✓					N/A
Platinum SLE (incl. ZE, PE)				✓	✓					40 points
Gold ^{PLUS} SLE (incl. ZE, PE)				✓	✓					30 points
Platinum		✓								40 points
Gold ^{PLUS}	✓									30 points
B. GM: 2021 In-Operation										
	Energy Saving					Intelligence	Health & Well-being	Whole Life Carbon	Maintainability	Resilience
	$\geq 40\%$	$\geq 50\%$	$\geq 55\%$	$\geq 60\%$	ZE					
						Option to be assessed to qualify specific badges to demonstrate exemplary performance in operation				
SLE (incl. ZE, PE)				✓	✓					N/A
[Platinum/ Gold ^{PLUS}] SLE (incl. ZE, PE)				✓	✓					
Platinum			✓							
Gold ^{PLUS}		✓								
Gold	✓									
						<ul style="list-style-type: none"> • Water consumption • Energy and Water Improvement Plan • Cooling Towers Cycles of Concentration • Indoor environmental Quality (IAQ Audit, CO2 Controls, Luminance and Noise Level) • Occupancy Evaluation • Waste audits • Tenants/ Occupancy engagement 				

Notes:

1. Off-site REC procurement is only applicable for ZE projects meeting energy saving $\geq 60\%$ but not PE projects. REC's must be generated in Singapore through renewables deployed within Singapore. Please refer to Definition and Abbreviations section for SLE, ZE and PE.
2. GM: 2021 includes other sustainable requirement regulated by other agencies including BCA's Building Control (Environmental Sustainability) Regulations 2008 and Building Control (Environmental Sustainability Measures for Existing Buildings) Regulation 2013. Meeting these regulated requirements would have deemed meeting at least 50 GM points. Refer to Annex 1.
3. Building projects that are subject to the Government Land sales, it is mandatory to meet the Building Control (Environmental Sustainability) Regulations 2008 before Green Mark certification could be conferred.
4. Gold rating is only applicable to projects applying for GM: 2021 In Operation

Source: BCA (document revised October 2023)

(II) LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN

Besides Singapore, other countries have also introduced their green building certifications. One example is the U.S.'s Leadership in Energy and Environmental Design ("LEED"), which was developed by the U.S. Green Building Council ("USGBC").

Launched "as a pilot" in 1998 and "formally offered as a rating system" in 2000, USGBC added in November 2024 that there are over 197,000 LEED projects in 186 countries. USGBC mentioned in February 2024 that there "were more than 6,000 LEED commercial projects worldwide" in 2023, with China alone accounting for 1,563¹ projects which encompassed "more than 264 million square feet (24.5 million gross square meters)".

The USGBC noted on its website that to attain a LEED certification, a project "earns points by adhering to prerequisites and credits that address carbon, energy, water, waste, transportation, materials, health and indoor environmental quality". Thereafter, projects are awarded a certification that corresponds with the points earned (out of 100) as shown in **Exhibit 12**.

Exhibit 12: LEED Certifications



Platinum

80+ points earned



Gold

60-79 points earned



Silver

50-59 points earned



Certified

40-49 points earned

Source: USGBC

A LEED certification may not be indicative of energy efficiency. According to K. Clay, E. Severnini & X. Sun (2023)², "LEED-certified retrofits of federal buildings did not have statistically significant energy savings on average" as energy use tended to increase after the "year prior to certification", which may be a "performance period where data is collected for certification". K. Clay, E. Severnini & X. Sun (2023) also noted that "higher water scores" were "associated with lower energy efficiency post-certification" as "decision makers involved with retrofitting federal buildings face budget constraints, so greater expenditure on water reduction may lead to lower expenditure along other dimensions that impact energy usage".

However, K. Clay, E. Severnini & X. Sun (2023) added that "LEED buildings with higher energy scores had statistically significantly greater energy efficiency post certification" such that a "one standard deviation higher energy score is associated with 12.6% lower energy usage in all buildings and 13.9% lower usage in office buildings".

Based on the current version of LEED ("LEED v4.1"), certifications are provided not just for a building's operations & maintenance ("LEED v4.1 O+M") of a building but also for its building design & construction ("LEED v4.1 BD+C") and interior design & construction ("LEED v4.1 ID+C").

According to the guide for LEED v4.1 O+M, which certifies a building's operations & maintenance, the initial certification "is valid for three years from date of certification acceptance". The guide also noted that projects "need to provide data annually and must recertify every three years" to keep the certification active.

The scorecard for LEED v4.1 O+M: Existing Buildings is shown in **Exhibit 13**. Based on the guide, "Existing Buildings" is one of the two "rating system adaptations" of LEED v4.1 O+M (the other being "Interiors", which corresponds to "Existing tenant spaces that are contained within a portion of an existing building").

¹ The USGBC later noted in November 2024 that China had 1,583 projects in 2023 instead.

² Clay, K., Severnini, E., & Sun, X. (2023). Does LEED certification save energy? Evidence from retrofitted federal buildings. *Journal of Environmental Economics and Management*, 121, 102866. <https://doi.org/10.1016/j.jclepro.2024.144531>.

Exhibit 13: LEED v4.1 O+M: Existing Buildings Scorecard

LOCATION AND TRANSPORTATION		14
Prerequisite	Transportation Performance	14 (6 points required)
SUSTAINABLE SITES		4
Credit	Rainwater Management	1
Credit	Heat Island Reduction	1
Credit	Light Pollution Reduction	1
Credit	Site Management	1
WATER EFFICIENCY		15
Prerequisite	Water Performance	15 (6 points required)
ENERGY AND ATMOSPHERE		35
Prerequisite	Energy Efficiency Best Management Practices	Required
Prerequisite	Fundamental Refrigerant Management	Required
Prerequisite	Energy Performance	33 (13 pts required)
Credit	Enhanced Refrigerant Management	1
Credit	Grid Harmonization	1
MATERIALS AND RESOURCES		9
Prerequisite	Purchasing Policy	Required
Prerequisite	Facility Maintenance and Renovations Policy	Required
Prerequisite	Waste Performance	8 (0 pts required)
Credit	Purchasing	1
INDOOR ENVIRONMENTAL QUALITY		22
Prerequisite	Minimum Indoor Air Quality	Required
Prerequisite	Environmental Tobacco Smoke Control	Required
Prerequisite	Green Cleaning Policy	Required
Prerequisite	Indoor Environmental Quality Performance	20 (8 pts required)
Credit	Green Cleaning	1
Credit	Integrated Pest Management	1
INNOVATION		1
Credit	Innovation	1
TOTAL		100 Possible Points

Source: USGBC (document updated February 2024)

(III) NATIONAL AUSTRALIAN BUILT ENVIRONMENT RATING SYSTEM

Another example is Australia's National Australian Built Environment Rating System ("NABERS"), a national initiative managed by the NSW Government.

Launched as the Building Greenhouse Ratings in 1999 and renamed NABERS in 2008, NABERS expanded to New Zealand in 2012 and to the U.K. in 2020. NABERS feature a six-star rating scale as shown in **Exhibit 14**.

NABERS rates not just a building's energy savings (NABERS Energy) but also separately certifies other sustainability aspects such as its water efficiency (NABERS Water) and embodied carbon (or "emissions resulting from materials and construction work before the building is occupied" according to NABERS; through NABERS Embodied Carbon).

NABERS noted in February 2023 that its customers "have saved an average of 30-40% on their energy" in the "past ten years".

According to NABERS's FY2023–24 Annual Report, of the office buildings that attained a NABERS ENERGY "Whole/Base Building" certification, around 85% obtained ≥ 4.0 -star "with GreenPower"¹ rating while around 81% obtained ≥ 4.0 -star "without GreenPower" rating. Meanwhile, of the shopping centres that obtained a NABERS ENERGY certification, around 76% obtained ≥ 4.0 -star "without GreenPower" rating (the "with GreenPower" rating distribution was not provided).

In its FY2021–22 Annual Report, NABERS remarked that a NABERS ENERGY 5.0-star rated project (Midtown Centre, Brisbane) was "30% more energy efficient" than a "conventional building".

Based on NABERS's website, NABERS noted that its ratings "are valid for twelve months" to ensure that the rating "represents a building or workplace's current operational performance".

Exhibit 14: NABERS Rating Scale



Source: NABERS

¹ According to GreenPower's website, GreenPower is a "government managed program" that makes "100% renewable electricity available for households and businesses through most energy retailers in Australia". NABERS noted in September 2021 that the GreenPower program "is the only national, voluntary renewable energy accreditation program providing access to renewable energy for residential and business customers in Australia". NABERS added that a building may attain a higher NABERS Energy "with GreenPower" rating (as compared to a "without GreenPower" rating) if it buys GreenPower. The "without GreenPower" rating will remain unchanged regardless of whether a building buys GreenPower.

EMISSIONS PERFORMANCE REVIEW OF SELECTED SGX-LISTED RETAIL REITS

Having covered three green building certifications, we can now apply our basic understanding to briefly review the energy (thus emissions) performance of three selected SGX-listed retail REITs: Frasers Centrepoint Trust (“FCT”: SGX:J69U); Paragon REIT (“PARAGON”; SGX:SK6U) and Starhill Global REIT (“SGREIT”; SGX:P40U).

FCT has a market capitalisation of S\$3.9 billion as at 31 January 2025. According to its latest Annual Report (Financial Year or “FY” ended 30 September 2024), FCT is the largest suburban retail mall owner in Singapore with assets under management of “approximately \$7.1 billion” as at 30 September 2024. FCT noted that its portfolio “comprises nine retail malls and an office building located in the suburban regions of Singapore”. FCT also noted that its portfolio “is 100% BCA Green Mark-certified by GFA” as at 30 September 2024.

However, by including Tiong Bahru Plaza and Central Plaza as one property (as they form parts of the same mixed-use development), we note that the Green Mark certification for four out of nine properties may not be as indicative of the respective properties’ current energy efficiencies (thus emissions performance) as (1) they were not indicated as certified under GM: 2021; and (2) the effective date of GM: 2021 was 1 November 2021, such that the certifications were likely obtained and indicative of the respective buildings’ emissions performance before 1 November 2021. Given though that the Green Mark certification generally lasts for three years, investors may get to glean the respective buildings’ more recent emissions performance in the Sustainability Report for its FY2025 as FCT may need to re-certify the four properties in 2024 or 2025.

PARAGON has a market capitalisation of S\$2.5 billion as at 31 January 2025. According to its latest Annual Report (FY ended 31 December 2023), PARAGON focuses on “income-producing real estate which is used primarily for retail purposes in Asia Pacific, as well as real estate-related assets”, and its portfolio was “valued at S\$4.1 billion” as at 31 December 2023. PARAGON noted that it manages five properties in Singapore and Australia. PARAGON also noted that all its assets “have achieved green certification including the BCA and NABERS in line with country standards, where applicable” in 2023.

However, we note that (1) the Green Mark certifications of The Clementi Mall (NLA of 195,772 square feet or “sq ft”) and Paragon (the property; NLA of 718,254 sq ft) were renewed in 2021 and may thus not be indicative of the respective properties’ current emissions performance; and (2) the highest Green Mark certification PARAGON has obtained was “Gold” (which is the minimum Green Mark certification that FCT has obtained). Investors may get to glean the two properties’ more recent emission performance in the Sustainability Report for its FY2024 though as PARAGON may need to re-certify both properties in 2024¹.

SGREIT has a market capitalisation of S\$1.2 billion as at 31 January 2025. Based on its latest Annual Report (FY ended 30 June 2024), SGREIT invests “primarily in real estate used for retail and office purposes, both in Singapore and overseas” and its portfolio is “valued at about S\$2.8 billion” as at 30 June 2024. SGREIT noted that its portfolio comprises “nine properties in Singapore, Australia, Malaysia, Japan and China”. SGREIT also noted that 63% of its portfolio “by NLA or an equivalent of six out of nine properties has attained green certifications” as at 30 June 2024.

However, we note that (1) SGREIT did not indicate any current or planned green building certification for its third-largest property, The Starhill (NLA of 333,239 sq ft); (2) while David Jones Building (GLA of 259,098 sq ft) obtained a NABERS Water rating of 6.0-star, it does not have any green building certification that relates, in any way, to energy efficiency; (3) while Lot 10 Property (NLA of 254,163 sq ft) is on track to obtain Malaysia’s Green Building Index (“GBI”) – Certified certification, “Certified” is the lowest level on GBI’s rating scale; and (4) Plaza Arcade (GLA of 36,933 sq ft) has a NABERS Energy rating of only 2.5-star which would correspond to an energy performance of between “Below Average” and “Average”.

¹ We also note that PARAGON did not indicate any specific certification for The Rail Mall (NLA of 49,886 sq ft). However, to PARAGON’s credit, (1) the Green Mark requirement applies only to “building works” which involve a GFA of 5,000 m² (or around 53,820 sq ft) or more based on the Building Control (Environmental Sustainability) Regulations 2008 together with the Building Control (Environmental Sustainability) (Amendment) Regulations 2021; (2) The Rail Mall had the lowest square footage in PARAGON’s portfolio; and (3) PARAGON completed the divestment of The Rail Mall in August 2024.

Based on our review of three selected SGX-listed retail REITs, we thus observe that FCT has the highest percentage of portfolio (of the three) with disclosed energy-related certification¹. However, further analysis may be limited by the comparability of different certifications' ratings (e.g., Green Mark's vs NABERS's) and varying reporting periods (e.g., PARAGON's FY ends on 31 December while SGREIT's FY ends on 30 June). Nonetheless, an understanding of green building certifications may provide a starting point for assessing the emissions performance of not just retail REITs, but SGX-listed REITs in general as well.

The emissions performance of FCT, PARAGON and SGREIT (with market capitalisations in respective brackets) based on the last-disclosed green building certification(s) attained for each of their properties is shown in **Exhibit 15**.

Exhibit 15: Emissions Performance of Three Selected SGX-Listed Retail REITs (as at 31 January 2025)

S/N	Property	Square footage		Country	Certification(s)	Remark(s) on certification(s)
		Measure ⁽¹⁾	sq ft			
Frasers Centrepoint Trust (\$S\$3.9 billion as at 31 Jan '25; FY ended 30 Sept '24)						
1.	NEX	GFA	960,450	Singapore	Green Mark Gold	Likely under GM: 2021 In-Operation; corresp. to energy savings of 40-50% from 2005 level
2.	Causeway Point	GFA	629,167	Singapore	Green Mark Gold	Under GM: 2021 In-Operation; corresp. to energy savings of 40-50% from 2005 level
3.	Waterway Point	GFA	560,234	Singapore	Green Mark Gold ^{PLUS}	Not indicated by FCT as under GM: 2021; thus, may expire in 2024/2025
4.	Tiong Bahru Plaza + Central Plaza	GFA	519,202	Singapore	Green Mark Platinum	Not indicated by FCT as under GM: 2021; thus, may expire in 2024/2025
5.	Tampines 1	GFA	391,551	Singapore	Green Mark Gold ^{PLUS}	Not indicated by FCT as under GM: 2021; thus, may expire in 2024/2025
6.	Northpoint City North Wing	GFA	376,579	Singapore	Green Mark Gold	Under GM: 2021 In-Operation; corresp. to energy savings of 40-50% from 2005 level
7.	Century Square	GFA	327,226	Singapore	Green Mark Platinum	Under GM: 2021 In-Operation; corresp. to energy savings of ≥55% from 2005 level
8.	White Sands	GFA	240,371	Singapore	Green Mark Gold	Under GM: 2021 In-Operation; corresp. to energy savings of 40-50% from 2005 level
9.	Hougang Mall	GFA	232,782	Singapore	Green Mark Platinum	Not indicated by FCT as under GM: 2021; thus, may expire in 2024/2025
Paragon REIT (\$S\$2.5 billion as at 31 Jan '25; FY ended 31 Dec '23)						
1.	Westfield Marion Shopping Centre	GLA	1,484,562	Australia	NABERS Energy - 4.5 star; NABERS Water - 3.5 star	Re-certified in 2023; energy performance between "Good" and "Excellent" , water performance between "Average" and "Good"
2.	Figtree Grove Shopping Centre ⁽²⁾	GLA	236,823	Australia	NABERS Energy - 4.0 star; NABERS Water - 3.5 star	Re-certified in 2023; energy performance "Good" , water performance between "Average" and "Good"
3.	Paragon	NLA	718,254	Singapore	Green Mark Certified	Renewed in 2021; thus, may expire in 2024
4.	The Clementi Mall	NLA	195,772	Singapore	Green Mark Gold	Renewed in 2021; thus, may expire in 2024
5.	The Rail Mall ⁽³⁾	NLA	49,886	Singapore	n.a.	No certification (current or planned) indicated by PARAGON
Starhill Global REIT (\$S\$1.2 billion as at 31 Jan '25; FY ended 30 Jun '24)						
1.	Myer Centre Adelaide (Retail)	NLA	527,922	Australia	NABERS Energy Base Building - 3.5 star	Awarded in 2024; energy performance between "Average" and "Good" , SGREIT indicated they aim to improve NABERS Energy rating
3.	Myer Centre Adelaide (Terrace Towers)	NLA	97,959	Australia	NABERS Energy Base Building - 5.0 star	Awarded in 2023; energy performance "Excellent"
2.	David Jones Building	GLA	259,098	Australia	NABERS Water Base Building - 6.0 star	Awarded in 2023; energy certification not indicated by SGREIT, water performance "Market Leading"
4.	Plaza Arcade	GLA	36,933	Australia	NABERS Energy Base Building - 2.5 star; NABERS Water Base Building - 5.5 star	Awarded in 2023; energy performance between "Below Average" and "Average" , water performance between "Excellent" and "Market Leading"
5.	Ngee Ann City Property	NLA	394,579	Singapore	Green Mark Platinum	Awarded in 2022; hence, may be under GM: 2021 or GM: 2021 In-Operation which would corresp. to energy savings of ≥55% from 2005 level
6.	Wisma Atria Property ⁽⁴⁾	NLA	225,301	Singapore	n.a.	SGREIT indicated that they aim to obtain Green Mark Gold ^{PLUS} by FY 2025/26, which corresp. to energy savings of 50-55% from 2005 level
7.	The Starhill	NLA	333,289	Malaysia	n.a.	No certification (current or planned) indicated by SGREIT
8.	Lot 10 Property	NLA	254,163	Malaysia	GBI Provisional Certificate - Certified	Awarded in 2024; SGREIT indicated they "are on track to obtain the official GBI certificate in FY2025/26", which will corresp. to 50-65 (out of 100) pts
9.	China Property	GFA	100,854	China	LEED Gold	Awarded in 2023; corresp. to 60-79 (out of 100) pts but may not be indicative of energy efficiency
10.	Ebisu Fort	NLA	18,816	Japan	CASBEE Certification Rank S	Awarded in 2022; ranked "excellent" (highest rating) on CASBEE scale

Note: Bolded remarks are those that directly relate to energy efficiency (thus emissions performance).

n.a. = not available. ⁽¹⁾ By GFA, Gross Lettable Area ("GLA") or Net Lettable Area ("NLA"). Generally, in terms of square footage, GFA ≥ GLA ≥ NLA. Measures indicating higher sq ft (e.g., GFA instead of NLA) may more accurately reflect a property's potential emissions. Thus, we indicate square footage in the following preference order: GFA > GLA > NLA. ⁽²⁾ PARAGON announced in January 2025 that an "unrelated third party" exercised a call option to purchase Figtree Grove Shopping Centre. ⁽³⁾ PARAGON completed the divestment of The Rail Mall in August 2024. ⁽⁴⁾ SGREIT announced in October 2024 that it divested "approximately 7,653 square feet" of NLA of the office tower in Wisma Atria Property (pre-divestment square footage stated).

Source: FCT, PARAGON, SGREIT, SGX Stock Screener, GBI, Comprehensive Assessment System for Built Environment Efficiency ("CASBEE"), FPA

¹ While PARAGON may not be mandated to attain any green building certification for The Rail Mall (NLA of 49,886), we note that SGREIT attained green certifications for properties with lower square footage, Plaza Arcade (GLA of 36,933 sq ft) and Ebisu Fort (NLA of 18,816 sq ft), even if SGREIT may have been mandated to attain those certifications.

For comparison with FCT, PARAGON and SGREIT, we have also collated the valuation metrics of SGX-listed REITs with retail properties as shown in **Exhibit 16**.

Exhibit 16: Valuation Metrics of SGX-Listed REITs with Retail Properties

Company	Stock Symbol	Price as at 31 Jan '25	Market Cap (\$ million)	Diluted EPU (cents) ⁽¹⁾	P/E	DPU (cents) ⁽²⁾	Dividend Yield (%)	NAV per unit (dollars) ⁽³⁾	P/B
CapitalLand Integrated Commercial Trust	C38U	1.950	14,159.0	12.55	15.5 x	10.88	5.6%	2.13	0.9 x
Mapletree Pan Asia Commercial Trust	N2IU	1.210	6,421.9	8.49	14.3 x	8.36	6.9%	1.73	0.7 x
Frasers Centrepoint Trust ("FCT")	J69U	2.140	3,871.3	11.07	19.3 x	12.04	5.6%	2.29	0.9 x
Suntec REIT	T82U	1.190	3,491.4	3.85	30.9 x	6.19	5.2%	2.05	0.6 x
Paragon REIT ("PARAGON")	SK6U	0.885	2,512.5	8.99	9.8 x	4.92	5.6%	0.94	0.9 x
Lendlease Global Commercial REIT	JYEU	0.555	1,320.4	2.48	22.4 x	3.87	7.0%	0.76	0.7 x
Starhill Global REIT ("SGREIT")	P40U	0.510	1,157.4	2.91	17.5 x	3.65	7.2%	0.71	0.7 x
Average:	-	-	-	-	18.5 x	-	6.1%	-	0.8 x

⁽¹⁾ & ⁽²⁾ Trailing twelve-month data. ⁽³⁾ Most recent quarter.

Source: Various companies' Annual Reports & financial statements, FPA

CONCLUSION

From January to September 2024, global temperature exceeded 1.5°C above pre-industrial levels which could trigger multiple climate tipping points. While global temperature may still be brought below the 1.5°C threshold stated in the Paris Agreement, extreme climate events such as hurricanes, floods and droughts have already been occurring from January to October 2024. Human activities have been the main contributor to global warming through the emissions of GHGs, and most of the emissions in 2019 came from the energy, industry, transport, and buildings sectors collectively.

Limiting global warming to 1.5°C or 2.0°C would require stark, speedy cuts in GHG emissions as well as the achievement of net-zero carbon emissions by 2050. Yet, international climate commitments remain inadequate as global temperature is expected to rise to 2.1–2.8°C above pre-industrial levels based on the latest NDCs as at 9 September 2024.

To tackle global warming, the BCA updated its Green Mark certification ultimately as part of the Singapore Green Plan 2030. Given that buildings accounted for around 39.7% of global carbon emissions in 2022 and more than 20% of Singapore's carbon emissions, an understanding of the Green Mark certification as well as of other green building certifications may allow investors to contribute to lowering emissions by providing a way to assess the energy (thus emissions) performance of SGX-listed REITs.

Under GM: 2021, buildings are awarded certifications based on their energy savings (from 2005 levels): "Gold^{PLUS}" (50–55% savings) or "Platinum" ($\geq 55\%$ savings). A building may also be certified as SLE if it is recognised as a "best-in-class performing" building (as noted from BCA) that has achieved energy savings (from 2005 levels) of $\geq 60\%$. Buildings (without major retrofits) seeking Green Mark re-certification may be evaluated instead under GM: 2021 In-Operation, where the minimum rating is "Gold" (40–50% savings). A Green Mark certification (both GM:2021 and the previous version) is generally valid for three years.

Besides Singapore's GM: 2021, the USGBC also developed the LEED certification. Under LEED v4.1 O+M, the current version of LEED applicable for evaluating a building's operations & maintenance, projects are scored based on criteria ranging from energy performance and water efficiency to indoor air quality. Projects are then awarded a certification based on the points earned (out of 100): "Certified" (40–49 points), "Silver" (50–59 points), "Gold" (60–79 points) or "Platinum" (80+ points). LEED v4.1 certification is generally valid for three years.

Another certification is the NABERS, which certifies separately various aspects of a building's sustainability performance, e.g., energy savings (NABERS Energy), water efficiency (NABERS Water) and embodied carbon (NABERS Embodied Carbon). Buildings are rated on a six-star scale: "Poor" (1.0-star), "Below Average" (2.0-star), "Average" (3.0-star), "Good" (4.0-star), "Excellent" (5.0-star) and "Market Leading" (6.0-star). NABERS certification is generally valid for one year.

By evaluating the emissions performance of three selected SGX-listed retail REITs based on their disclosed green building certifications, we found that FCT had the highest percentage of portfolio with emissions-related certification as compared with PARAGON and SGREIT. However, further analysis may be limited by the comparability of different certifications' ratings and varying reporting periods. Nonetheless, an understanding of green building certifications may provide a starting point for assessing the emissions performance of not just retail REITs, but SGX-listed REITs in general as well.

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