Singapore Credit Outlook 2023

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- **2022 proved to be a challenging year for global credit markets. Despite this, the SGD credit market remained largely resilient, with issuance volumes coming somewhat close to the nine-year high set last year. Issuance volumes were largely supported by higher credit quality issues, mainly from financial institutions and government-linked issuers while there was also a clear preference for shorter tenors.**
- **While the worst has been deemed to be over (with y/y inflation growth rates tapering due to the higher base effect) and as calls for peak inflation solidify, we remain mindful that corporate credit profiles could face pressure in 2023 and credit spreads widen on the possibility of the lagged effects of restrictive monetary policy. At the same time, a reduction in investments from a weaker growth outlook could pressure issuance volumes, with issuers opting to wait until the end of 2023/start of 2024 in hopes of a Fed pivot. In our view, there are a range of possible scenarios that could play out in the year ahead, all of which will result in rates remaining higher.**
- **Given a possible tale of two halves in 2023, we continue to focus on a six-month horizon and recommend investors do the same by staying short on duration. While rates uncertainty looks to be diminishing on a relative basis, the range of possible scenarios and variability in outcomes means that we continue to prefer staying in shorter-dated bullets in the crossover space where credit risk is more manageable. Shorter duration tenors and cross over names continue to offer better risk-return dynamics in our view. For corporate perpetuals and bank capital instruments, recent non-calls of corporate perpetuals and price and sentiment sensitivity of bank capital instruments is likely to keep non-call risk and structural considerations in investors' minds.**
- **We think Financial Institutions contain adequate safety features to mitigate serious injury in 1H2023 against the synchronised economic downturn in 2023, weakening consumer confidence and still elevated systemic leverage that may lead to rising asset quality issues and lower credit demand. This will present difficult driving conditions and challenges alongside ongoing and evolving influences for Financial Institutions including cyber and fraud risks, sustainability issues including climate risks, rising costs and higher regulatory influence. The inflationary environment is likely to re-invigorate digitalisation efforts that were an emphasis pre-pandemic and before the focus on sustainability. All the above will likely raise overall operating costs although Financial Institutions are well-versed at looking in the rear-view mirror to manage costs given the thin return on equity. Against these influences that are skewed to the downside, we think banks will continue to drive smoothly albeit with the foot closer to the brake then the accelerator.**
- **After a welcomed respite from the pandemic reopening (especially for Hospitality REITs and Retail REITs) in 2H2022, we expect the challenge from the higher rate interest rate environment to be acutely felt by Singapore listed REITs going into 1H2023. From a credit perspective, reported aggregate leverage are likely to increase from possible revaluation losses, though in our view it is more likely to be a "mark-to-market" loss as we expect REITs under our coverage to be more inclined to hold onto assets rather than be forced sellers. REITs are likely to see their interest coverage ratio thin as debt comes due in 2023.**
- **Following strong growth in 2021 and 2022, we expect private residential property prices to grow by a more muted 3-5% in 2023, due to surge in interest rates and a weaker macroeconomic backdrop. That said, supply remains significantly constrained and demand remains firm, supported by Singaporean buyers who are increasingly wealthy and aspirational. The firm industry outlook is a plus for developers which can move units and sell at higher prices.**
- **We have attempted to evaluate issuers' sensitivity to sustainability issues and risks through a Sustainability Sensitivity Score ("SSS"). Our aim is to highlight the key sustainability risks and hence sensitivities for the issuers we cover rather than how well issuers actually mitigate them. Sustainability in our view remains a developing field and will continue to be influenced by improving disclosures, the impacts of actions by issuers, governments, and society, and ongoing shifts in the environment (both physical and regulatory) itself. We have also sought to cover the key sustainability influences on industries that are material to the Singapore corporate credit market, either due to the amount of SGD bond issuers present in the market or due to their high emissions profile.**

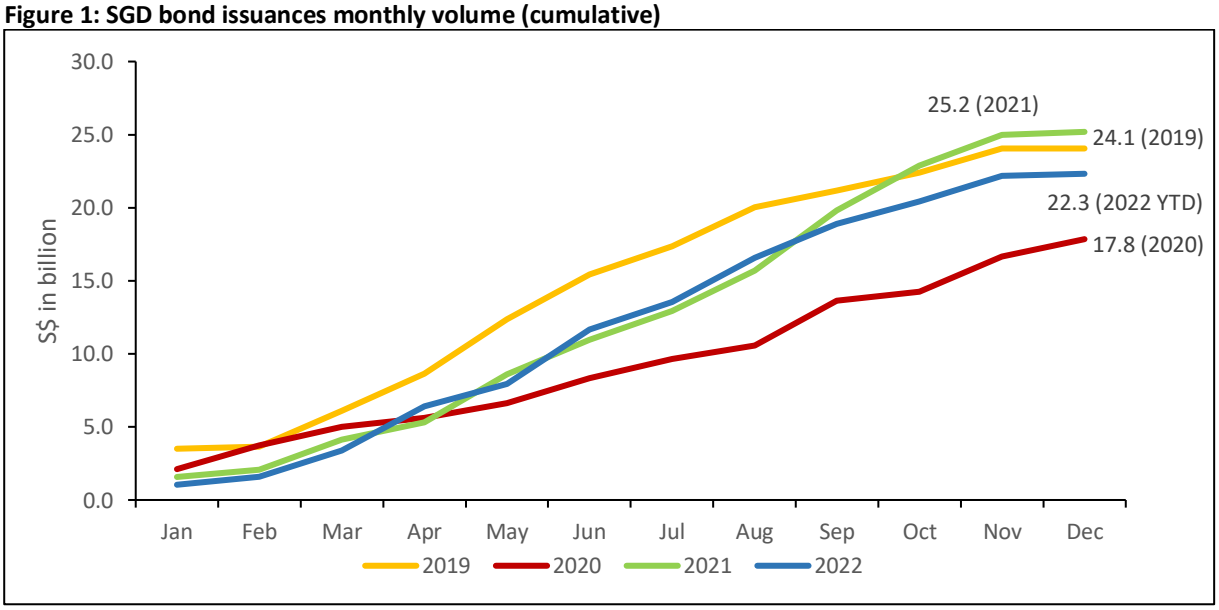
Contents

2022 Singapore Corporate Bond Market Review

Resilient issuance volumes y/y amidst global slowdowns

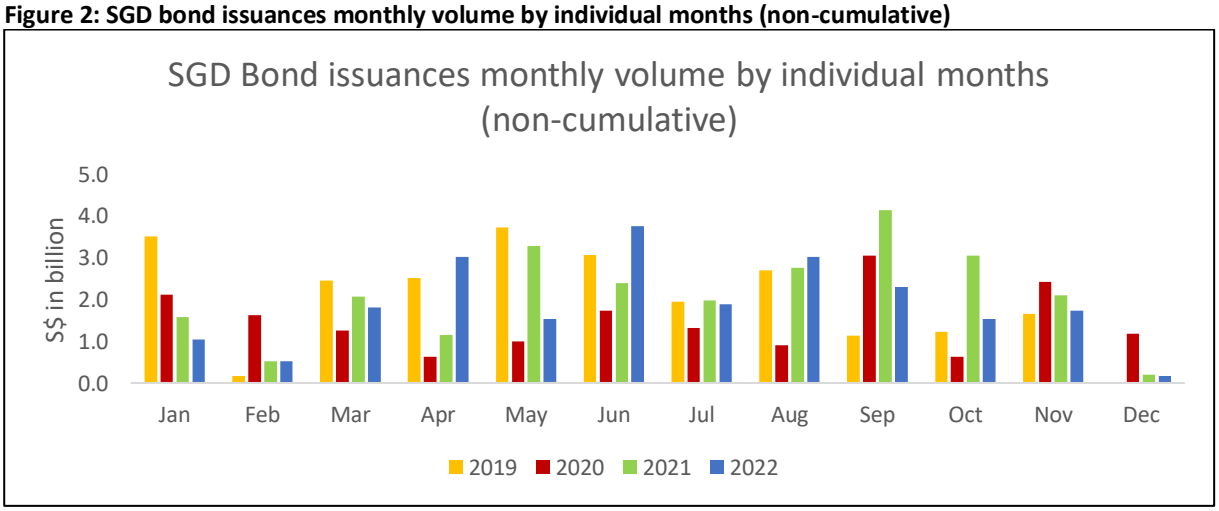
2022 proved to be a challenging year economically around the globe, plagued by decades high inflation stemming from residual supply chain disruptions and shockwaves in the energy markets arising from the ongoing Russia-Ukraine conflict. These led to the majority of central banks turning largely hawkish, raising policy interest rates, and expediting quantitative tightening plans that were originally in place to deal with the flush liquidity arising from the pandemic stimulus. Consequently, business activity slowed slightly towards the end of the year, measured by declining quarterly gross domestic product readings and unemployment rates creeping upwards. Despite so, the SGD credit market remained largely resilient, with issuance volumes totalling SGD22.3bn across 94 issues (as at 30 December) and coming somewhat close to the nine-year record high set last year at SGD25.2bn, falling ~12% short y/y. Fundamentally, issuance volumes in 2022 were largely supported by higher credit quality issues, mainly from financial institutions and government-linked issuers (includes statutory boards and Singapore's publicly-funded universities, excluding the sovereign), while there was also a clear preference for shorter tenors in the 1-5yr tenor basket as issuers seek to possibly avoid locking in higher funding costs for prolonged periods while fulfilling existing refinancing needs. In an unprecedented turn of events, in 2022 alone we saw a total of six non-financial corporate perpetuals not calling on their first call dates, surpassing the total of five non calls that had occurred since the first non-call of the ARTSP 4.65%-PERP two and a half years ago. Further reasons for these non-calls in 2022 in our view are discussed further below in ***"Non-financial corporate perpetuals – chameleon changes colour in 2H2022".***

Figure 1: SGD bond issuances monthly volume (cumulative)



Source: Bloomberg, OCBC Credit Research

Figure 2: SGD bond issuances monthly volume by individual months (non-cumulative)



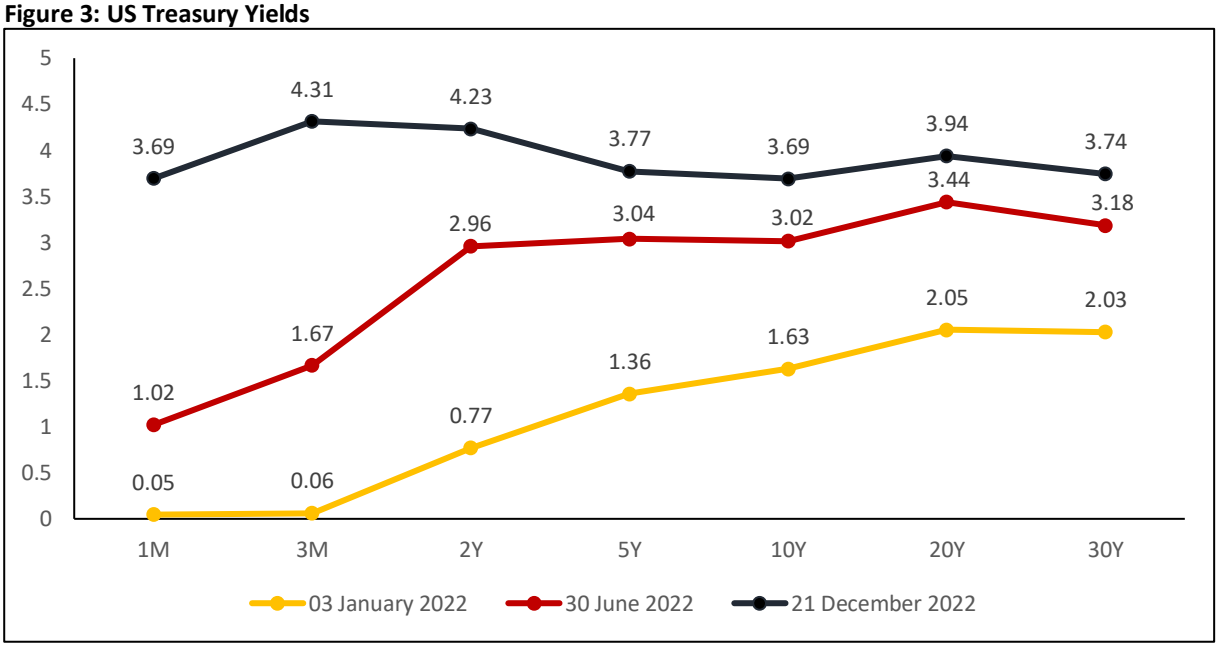
Source: Bloomberg, OCBC Credit Research

As mentioned in our Singapore Mid-Year Credit Outlook 2022 published at the end of June, markets were grappling with increasing fears of stagflation against the backdrop of 40-year record high inflation witnessed in May and an expected fall in economic growth in the US in 2H2022. Subsequently, Consumer Price Index ("CPI") figures for June came in at a staggering 9.1% y/y and showed the fastest pace of inflation since November 1981. In view of these, major Central Banks around the world (barring Japan, assuming Bank of Japan's latest policy tweak is not an exit of its easy policy as they claimed) have adopted increasingly hawkish stances, with the US Federal Reserve ("Fed") commencing on its interest rate hiking cycle earlier in March 2022, hiking for the first time since December 2018 and raising policy rates by 25bps at March's Federal Reserve Open Market Committee ("FOMC") meeting. Since then, policy rates have increased by another 400bps to reach the 4.25%-4.50% range as at the end of December's FOMC meeting, with markets witnessing the Fed's most aggressive monetary tightening policy in terms of both hiking speed and intensity since it began using overnight fund rates as its principal policy tool in 1990, with the highlight being the four consecutive 75bps rate hikes between June to November 2022. UST yields have also consequently priced in the shift to tighter monetary policy, leading to a bear flattening across the curve over the year **(Figure 3)**. The inversion between the UST 2Y yield and UST 10Y yield, a closely watched recession indicator reflecting the negative market sentiment surrounding economic prospects for the near future, has remained so as at time of writing and at one point in December widened to spreads last seen in the early 1980s when the US economy was pushed into a deep recession.

While the worst has been deemed to be over with y/y inflation growth rates tapering due to the higher base effect and as calls for peak inflation solidify, partly due to easing supply chain disruptions, decreasing consumer spending as well as lower energy prices, US Federal Reserve ("Fed") Chairman Jerome Powell has indicated that the Fed will continue delivering more interest rate hikes moving into next year. In particular, the Fed remains worrisome over inflation being entrenched at still elevated levels amidst a robust labour market and continued wage pressures. Majority of Fed members are leaning towards raising rates to a level between 5.00% and 5.25% range and holding them through till 2024, as evidenced in the latest summary of economic projections at December's FOMC which is consistent with the "higher for longer" consensus that has been increasingly telegraphed amongst Fed speakers after the Fed's annual economic symposium earlier in August 2022. The latest outlook comes despite overtightening concerns which had started to surface earlier in October and further solidified in the second half of November as several parts of the economy continued to show signs of cooling. The same Fed that dropped the term "transitory" on inflation rates now runs the risk of overtightening as worries arise that lagging economic impacts from the Fed's aggressive hiking thus far has yet to be fully felt and, coupled with more subsequent rate hikes, could push the economy into a Fed-induced recession. The increasingly bearish outlook categorised by the lack of any dovish pivots till the end of next year at least and an increasing willingness to tolerate economic pain should increase concerns over recession and the Fed's ability to engineer a "soft landing", with the higher pain threshold most likely translating to unemployment rates ticking upwards in 2023 amidst slowdowns in other parts of the US economy.

The Singapore economy and bond market were not immune to these macroeconomic headwinds, with the Singapore Overnight Rate Average ("SORA") yields mirroring the volatility and upward shift in UST yields. Over this remaining piece, we will further dive into the macroeconomic events that drove the markets, as well as the performance of the Singapore primary credit market over the year-to-date ("YTD", 1 January 2022 to 30 December 2022). We also present the YTD performance of our model portfolio in later sections.

Figure 3: US Treasury Yields



Source: Bloomberg, OCBC Credit Research

Financial Institutions overtake Government-linked issuers

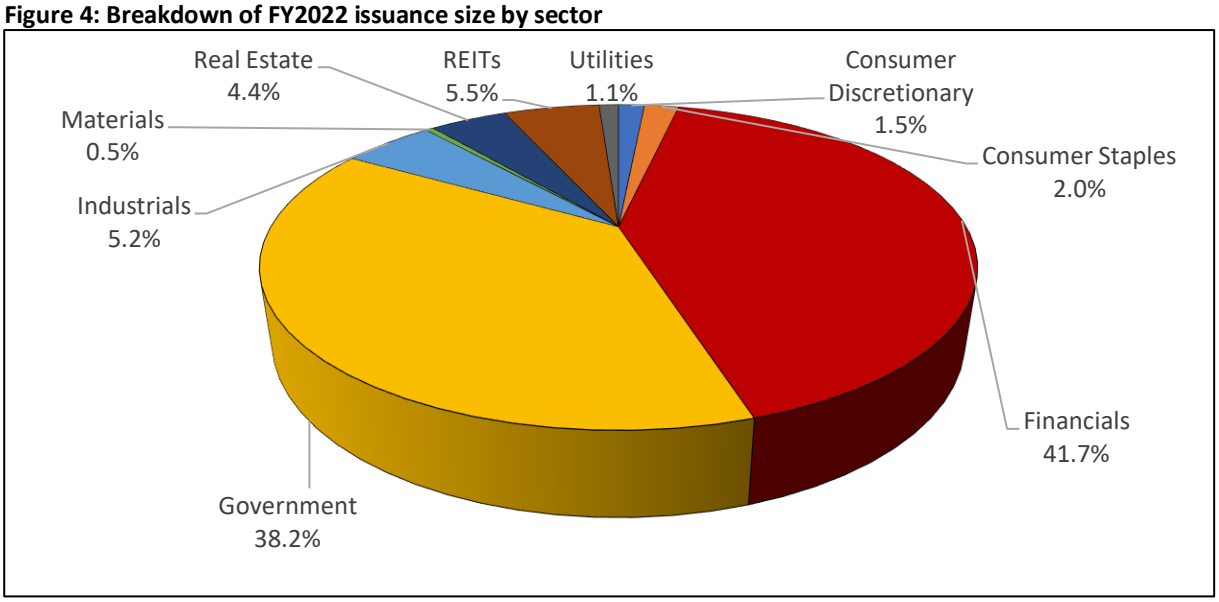
The largest contributor to total issuance volumes was the Financial Institutions sector, pricing a total of ~SGD9.3bn across 51 issues. This represented a ~16% y/y increase after 2021's lacklustre SGD issuance volumes in the Financial Institution sector. Issuance volumes were rather evenly spread throughout the year, with ~SGD4.8bn priced in 1H2022 and the remaining ~SGD4.5bn priced in 2H2022. The largest issuance in 1H2022 was from HSBC Holdings PLC ("HSBC") which priced a SGD900mn Tier 2 10NC5 at 5.25% in late June while the largest issuance in 2H2022 was from Australia & New Zealand Banking Group Ltd ("ANZ") which priced a SGD600mn 10.25NC5.25 Tier 2 paper at 4.5% in late August. Similar to 1H2022, the significantly higher volumes priced in the Financial Institutions sector were primarily driven by a larger number of Financial Institution issuers coming to the market in FY2022, rather than exceptionally large credit issuances from specific issuers, with 20 issuers in 2H2022 pricing 31 issues.

Aside from Credit Suisse Group AG ("CS"), which saw a rise in the cost of its credit default swaps in October that was exacerbated by a social media frenzy arising from its weakened credit profile, Financial Institution fundamentals have remained stable, with the credit profiles of these issuers mostly remaining resilient on the back of past actions to improve bank fundamentals, strong market positions, diversified business offerings as well as solidly capitalized balance sheets acting as a shock absorber against the volatility. Amidst the rising interest rates environment, Singapore's local banks also saw record quarterly net profit figures in their latest quarter ended September 2022 boosted mainly by higher net interest incomes. Amongst them, United Overseas Bank Ltd ("UOB") tapped the SGD credit markets earlier in 1H2022, pricing a total of SGD400mn. Separately, reasons behind the flurry of new Financial Institutions issues in our view could be due to expectations of funding costs going higher, building of capital buffers against possible valuation losses on financial instruments, the relative lack of supply of SGD bank capital instruments in the past 1-2 years and that it is relatively cheaper to issue in SGD against other currencies based on recent reset spreads.

Government-linked sector issuers came in as the second largest contributor to total issuance volumes in FY2022. FY2022 saw issuers in this sector pricing ~SGD8.5bn across 14 issues, contributing to ~38% of total SGD issuances. Within the government-linked sector, the Housing and Development Board of Singapore ("HDB") priced the greatest number of issues, with issues totalling ~SGD7.1bn across seven issues and contributed to HDB's largest annual issuance volume thus far, surpassing 2013's issuance volume of SGD6.2bn. HDB also priced its inaugural green bond issuance earlier in March 2022, pricing a 5-year SGD1bn senior unsecured green bond at 1.845% before subsequently pricing another two green bonds totalling SGD2.3bn in 2H2022, one in July and another in October. The increase in funding costs was notable through the issuance in July, when HDB priced its second green bond issuance through a 5-year SGD1.1bn senior unsecured green bond at 2.94%. In addition to HDB, another interesting issuer in this space was Singapore Management University ("SMU"), which priced a SGD150mn 5-year senior unsecured bond at 2.85% in late May that was most likely privately placed. SMU's new bond continues a trend where university issuances are no longer concentrated on those issued by the National University of Singapore. In 2H2021, the National Technological University priced a SGD650mn 15-year sustainability-linked bond in a landmark deal.

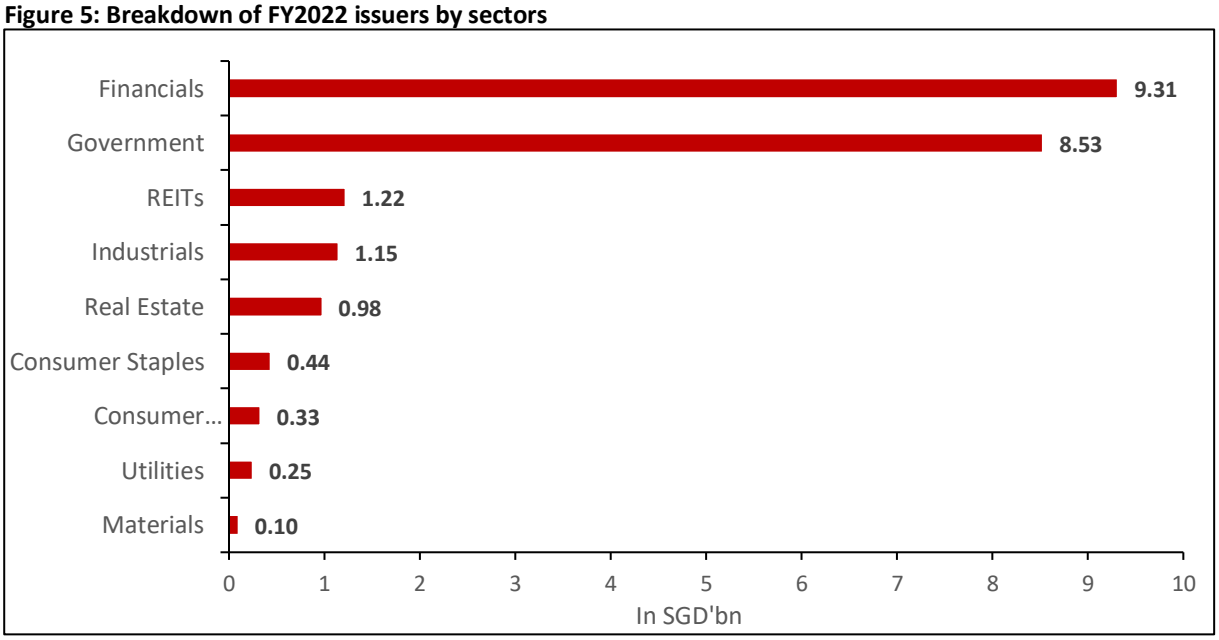
On the other hand, issuance momentum slowed down significantly in the S-REITs space, particularly in 2H2022 with just one issue priced in October through Ascott REIT's 3.5-year SGD165mn senior unsecured bond at 5%. In 1H2022, issuance momentum had already slowed down in the S-REITs space, with SGD1.1bn priced across eight issues in 1H2022, down by ~36% y/y (1H2021: SGD1.7bn) and 19% h/h (2H2021: SGD1.3bn). The largest REIT issuance in 1H2022 was by CapitaLand Ascendas REIT, which priced a SGD208mn 7-year senior unsecured green bond at 3.468%, in line with its green finance framework, where proceeds were used for refinancing revolving credit facilities. Emblematic of the larger trend of rising Green, Social, Sustainability and Sustainability-linked ("GSSSL") issuances in the SGD space, it is notable that the largest issuance in the S-REITs sector in FY2022 was also a GSSSL bond, like the case for government-linked issuers. All in, S-REITs issuance volumes stood at ~SGD1.22bn, falling ~60% y/y as REITs issuers stayed conservative and were possibly keen to avoid refinancing amidst elevated interest rates.

Figure 4: Breakdown of FY2022 issuance size by sector



Source: Bloomberg, OCBC Credit Research

Figure 5: Breakdown of FY2022 issuers by sectors



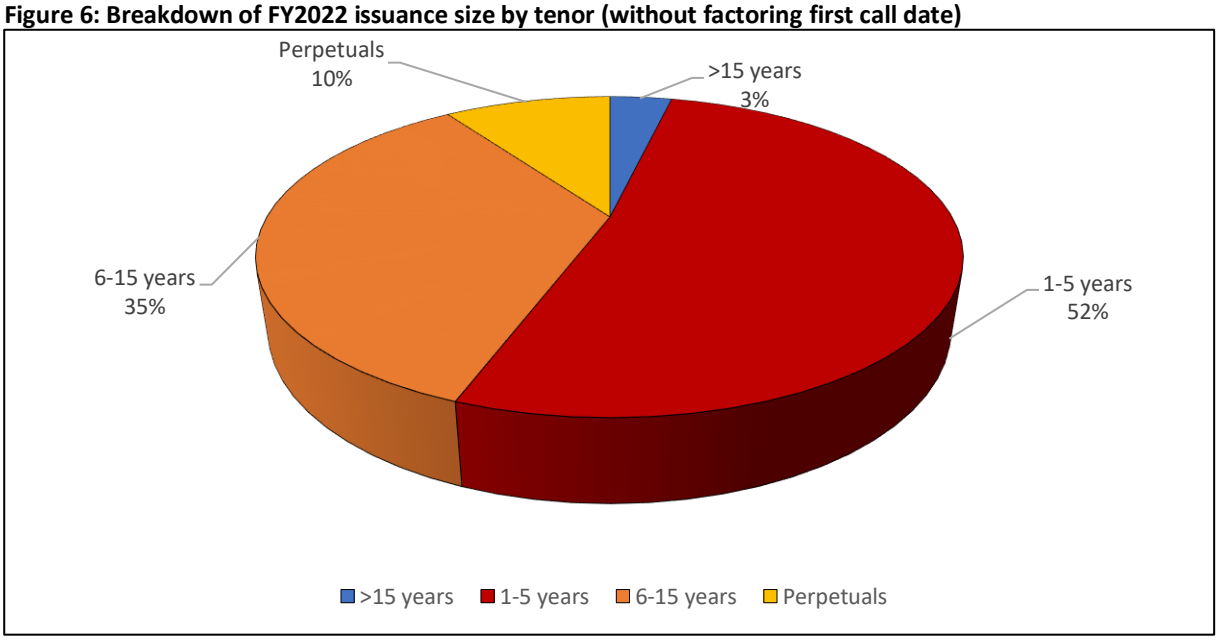
Source: Bloomberg, OCBC Credit Research

Kicking the can down the road

In 2022, issuance volumes were largely contained within the shorter-to-belly end of the curve. Not factoring the first call date for perpetuals that were issued, ~52% of FY2022's new issuances amounting to ~SGD11.6bn were shorter-dated bonds with maturities ranging between 1 to 5 years **(Figure 6).** Factoring in the first call date for perpetuals (and Tier 2 bank capital instruments) that were issued, this percentage goes up to 78% **(Figure 7)**, amounting to ~SGD17.4bn and unsurprising given that all seven corporate perpetuals issued this year had their next and first call date within the next 4 to 5 years on average. This is largely in line with our view mentioned in the Mid-Year 2022 Credit Outlook believing that perpetuals that are able to get priced would need to come with a call date (with reset date) that is in the short-to-belly tenor and at terms that economically incentivises a call and adequately compensates for duration risk. However, we expected more perpetuals to be priced in 2H2022 and in FY2022, there were only SGD2.15bn of new perpetual issuances across banks and corporates, with only one perpetual priced by Société Générale SA ("SOCGEN") in 2H2022, bringing issue volumes to almost half that of the SGD4.2bn over the same time last year.

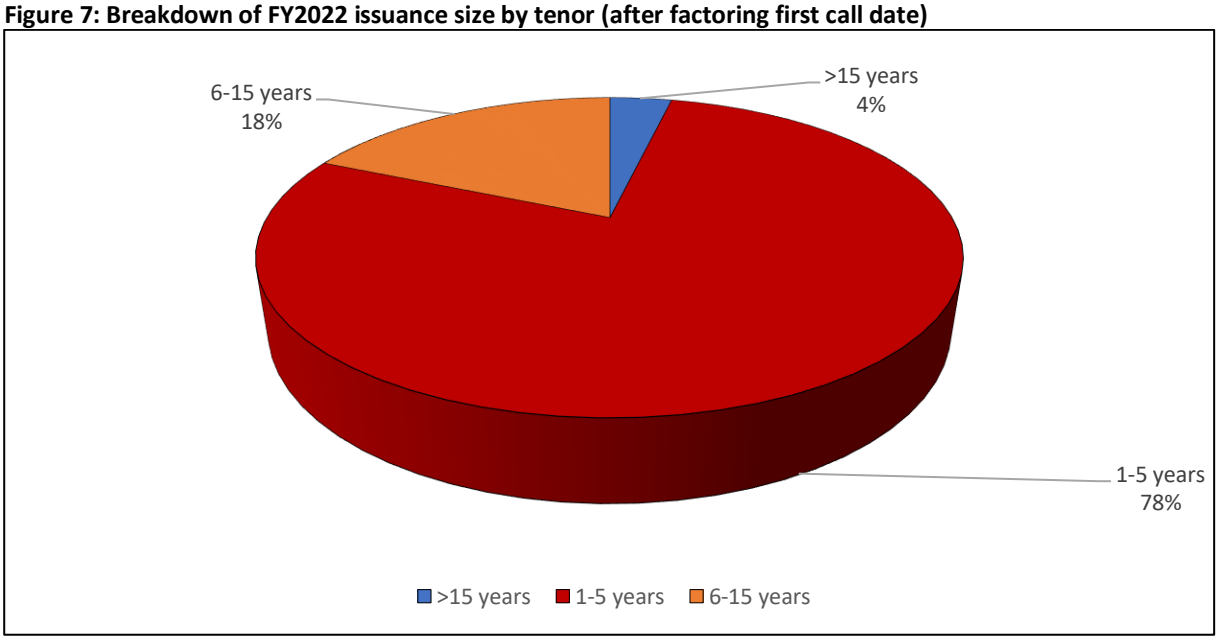
At the beginning of 2022, we expected bullet bond issuances to be concentrated to the short-to-belly part of the curve and this had played out through 2022. In contrast to 2021, the 1H2022 tenor composition is more similar to that in 1H2020, where volumes were largely concentrated in the shorter-to-belly end of the curve as well, though for different reasons. The uncertainty with COVID-19 in 1H2020 then discouraged investors to visit the longer end of the curve while in 1H2022 this was driven by heightened duration risk and the flat yield curve. As the yield curve continued to bear flatten over the year, the trend observed in 1H2022 of issuances being concentrated in the short to belly end of the curve continued to pan out even more aggressively, with just three issues out of the 51 issues within the SGD credit market in 2H2022 priced in the longer end of the curve. We believe this could be due to the short-to-belly end of the curve being able to satisfy both issuers and investors where investors want to decrease their duration risk at the part of the curve where credit spreads were also wide. At the same time, issuers get to lock in rates for a longer period versus short-dated bonds while seeking to possibly avoid locking in higher funding costs for prolonged periods while fulfilling existing refinancing needs.

Figure 6: Breakdown of FY2022 issuance size by tenor (without factoring first call date)



Source: Bloomberg, OCBC Credit Research

Figure 7: Breakdown of FY2022 issuance size by tenor (after factoring first call date)

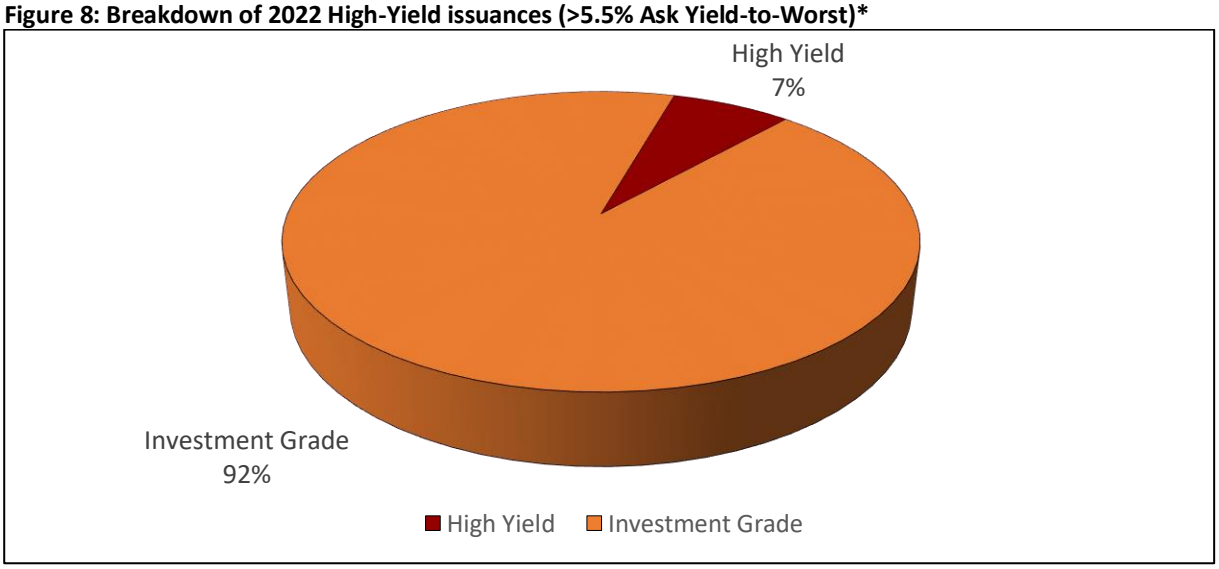


Source: Bloomberg, OCBC Credit Research

Investment Grade issuances dominate the majority of the market

In view of the higher interest rates environment currently with the SGD 5Y SORA trading 172bps higher to 2.99% over 2022 YTD (31 December 2021: 1.27%), we have revised our definition of High Yield in the largely unrated SGD space as papers with ask yield-to-worst of higher than 5.5% (2021: coupon higher than 3.5%). Under this revised definition, the proportion of high-yielding papers for FY2022 now stand at just 7%, significantly lower than that in FY2021 and FY2020 which saw ~19% and ~20% respectively. Though this may be partly due to the higher 5.5% cut-off definition for high-yield papers, a larger driver in our view is the composition of the high yield market in SGD which is concentrated on subordinated issuances (including perpetuals issued by higher grade banks and corporates), with only a handful of bullet bonds issued by high yield issuers, what we term as true high yield. This was due to fundamental and technical headwinds for true high yield issuers including impending recession concerns and the rising rate environment which had the double impact of raising base rates and credit spreads. These made funding costs for true high yield issuers prohibitive.

Figure 8: Breakdown of 2022 High-Yield issuances (>5.5% Ask Yield-to-Worst)*



Source: Bloomberg, OCBC Credit Research
*Excluding ENCISS's 7.5% 32s', CITNAT 0% 23s', EIBKOR 2.953% 23s', EBIUH 3.35% 24s', CM 0% 23s', KDB 3.05% 24s', MQGAU 3.6% 24s', EBIUH 4.1% 24s', HIGHWY 5% 24s'

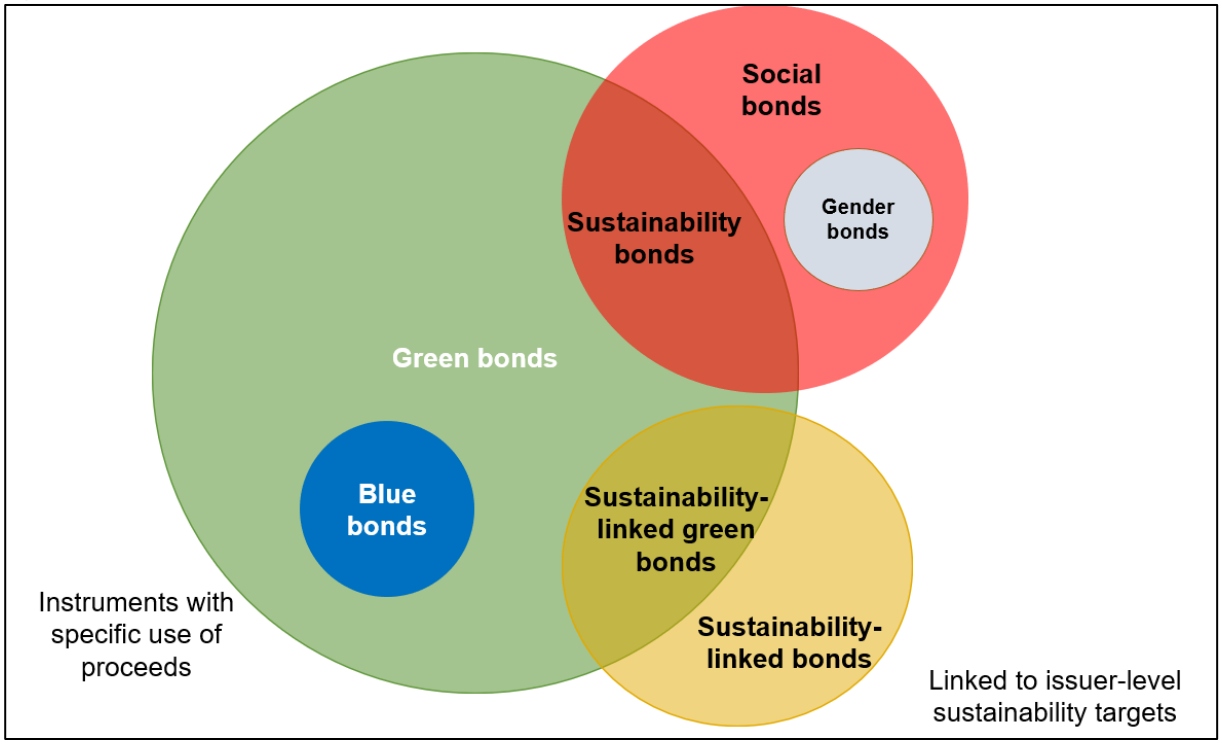
More scrutiny on GSSSL amidst a year of many firsts

GSSSL and more: For ease of identification of the various bonds, at OCBC Credit Research, we are opting to use the following stand-out icons to label these GSSSL instruments specifically going forward.

Icon	Type of bonds	Definition
	Green bond	Proceeds from these bonds are specifically allocated to financing new and existing projects or activities with positive environmental impacts.
	Social bond	To qualify as a social bond, the proceeds must be used to finance or refinance social projects or activities that achieve positive social outcomes and/or address a social issue.
	Sustainability bond	Sustainability bonds are issues where proceeds are used to finance or re-finance a combination of green and social projects or activities.
	Sustainability-linked bond	These bonds are structurally linked to the issuer's achievement of climate or broader United Nations Sustainable Development Goals ("UN SDG") targets. Sustainable performance target ("SPT")'s that are not met could result in a decrease or increase in the instrument's coupon rate.
	Gender bond	A type of social bond where proceeds are used to support the specific purpose of raising awareness on gender inequality and women empowerment.
	Blue bond	A type of green bond where proceeds are used on projects or strategies leading to a healthy and productive ocean and marine life environment.

Source: OCBC Credit Research

Figure 9: Classification of GSSSL bonds



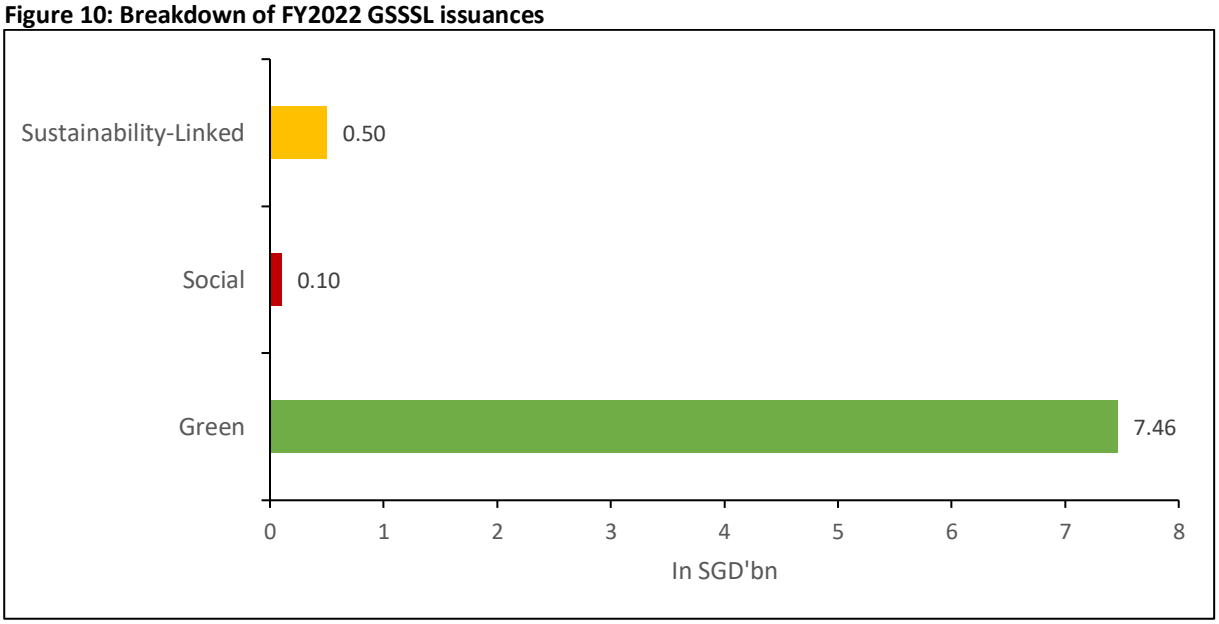
Source: OCBC Credit Research
Note: As far as we are aware, there have not been any SGD blue, sustainability-linked green bond, or gender bonds (also known as orange bonds) yet.

GSSSL issuance volume soars in 2022: In line with our expectations mentioned in our Singapore Mid-Year Credit Outlook 2022 on the notable opportunities emerging within the SGD GSSSL bond space, 2022 marked an exciting year for the SGD GSSSL bond space led by a flurry of inaugural green bond issuances mainly from Government-linked sector issuers as well as the Singapore government, as Singapore stepped up its efforts in the sustainable finance space. As a recap, the Singapore government published the Singapore Green Bond Framework in June 2022, which is a governance framework for sovereign green bond issuances under the Significant Infrastructure Government Loan Act

2021 ("SINGA"). The framework detailed the intended use of proceeds from green bonds, the governance structure to evaluate and select eligible projects, operational approach in managing the green bond proceeds and commitment to post-issuance allocation and impact reporting. The Singapore government will be issuing up to SGD35bn of green bonds by 2030, with these issuances also known as Green SGS (Infrastructure) bonds and will finance nationally significant infrastructure which meet the green criteria under the Framework. Separately, Frasers Property Ltd ("FPL") also priced Singapore's inaugural corporate green retail bond offering which was well received. While the total number of GSSSL credit issues was relatively the same at 11 in 2022 against 10 in 2021 according to Bloomberg, the total amount issued in 2022 was ~65% higher at ~SGD8.1bn against ~SGD4.9bn in FY2021 **(Figure 10)**, largely due to the existence of the large green bonds issued by government linked issuers including HDB, Public Utilities Board ("PUB") as well as the Government itself with a SGD2.4bn green bond issued in August. Notable green bond issues within this space include:

- **In March,** HDB priced its inaugural green bond issuance through a 5-year SGD1bn senior unsecured green bond at 1.845% for financing or refinancing eligible green projects in line with HDB's green finance framework. The issue supports the government's move to intensify sustainable development in Singapore, with HDB'S chief executive officer Tan Meng Dui commending "the commitment to make every HDB town not only liveable, but also green and sustainable."
- **In August,** Singapore issued its inaugural green bond, pricing a SGD2.4bn 50-year senior unsecured green bond at 3.04%, tightening from its IPT of 3.15% area. The bond was priced across two tranches, with SGD2.35bn placed with institutional and accredited investors and SGD50mn offered to individual retail investors. Interestingly, individual retail investors had a subdued response to Singapore's inaugural sovereign green bond offering as compared to their institutional and accredited counterparts, with total bids of SGD53mn recorded for the SGD50mn public tranche. This suggested only a 1.06x cover of the retail issuance amount which was less than half of the 2.26x cover observed for the remaining SGD2.35bn tranche that was marketed earlier to institutional and accredited investors. The public offer drew in 1,749 applications with retail investors likely considering the long 50-year tenor along with relatively less flexibility in redemption when compared with Singapore Savings Bonds that are similarly issued by the MAS. Proceeds from the sale of the green bonds will be used to finance projects with environmental benefits, including the Jurong Region and Cross Island MRT lines. The issue also represents one of the longest tenor bonds in the SGD space, following in the footsteps of Temasek Financial I Ltd.'s SGD1.5bn 2.8% 50-year bond priced in 2021.
- **Similarly in August**, PUB, a statutory board under the Ministry of Sustainability and the Environment in charge of ensuring sustainable and efficient water supply in Singapore, issued its inaugural green bond as well. PUB priced a SGD800mn 30-year senior unsecured green bond at 3.433%, in line with its final guidance of 3.433%. These green bonds are the first issuances under a new SGD10bn multi-currency medium-term note ("MTN") programme by PUB, with potential projects for financing including the Tuas Water Reclamation Plant as well as floating solar photovoltaic projects at Tengeh Reservoir and potentially Lower Seletar as well as Pandan Reservoir.
- **In September,** FPL priced SGD350mn of 5Y green bonds under the public offer following the placement of the institutional tranche, which lifts the total issuance size to SGD500mn after upsizing from an initial offering of SGD420mn as demand for its earlier public offer was oversubscribed at ~1.48x. The total valid applications for both the institutional tranche and public offering eventually totalled SGD689.3mn, representing a ~1.64x subscription rate based on its initial offering. The issuance also marked Singapore's inaugural corporate green retail bond offering, with net proceeds to be used to finance or refinance eligible projects under FPL's green finance framework. Per Loo Choo Leong, group chief financial officer of FPL, the combination of Frasers Group's strong name recognition as well as the 5-year tenor of the green bond was likely to have made the offering attractive for investors.

Figure 10: Breakdown of FY2022 GSSSL issuances



Source: Bloomberg, OCBC Credit Research

Moving forward: Within the corporate issuer space, we think it will not just be green bonds and green perpetuals, but also social, sustainability, and sustainability-linked credit instruments that will be issued in the future. We expect GSSSL issuances to become more mainstream going forward, with issuers signalling their sustainability credentials and taking their sustainability commitments more seriously as we inch towards 2030 and beyond. Singapore's full green taxonomy is targeted to be rolled out this year which should make it easier for financial institutions (including investors) to direct their funds into more sustainable activities. With demand for GSSSL expected to rise, this may in turn spur issuers to raise issues in the form of GSSSL. Outside of corporates, we expect the government and statutory boards (eg: HDB) to be active issuers of green issuances.

Credit Outlook for 2023 – Darkest before Dawn

Challenging conditions could persist for fundamentals and issuance: 2022 marked one of the most challenging years for markets with key events including the Russia-Ukraine conflict (resulting in food, oil and gas cost pressures), global central banks tightening in response to decades high inflation (US policy rates increasing by 425bps since the start of the year) and, up until recently, China's zero covid policy. Against this, 2H2022 panned out largely in-line with most of the key themes we presented in our Singapore Mid-Year 2022 Credit Outlook publication which called for slowing economic growth, higher borrowing costs and prolonged geopolitical risks.

While the worst has been deemed to be over (with y/y inflation growth rates tapering due to the higher base effect) and as calls for peak inflation solidify, partly due to easing supply chain disruptions, decreasing consumer spending as well as lower energy prices, we remain mindful that corporate credit profiles could face pressure in 2023. Earnings remained largely resilient in 2022, held up by the tight labour market, supportive pricing, and excessive savings from the pandemic. Moving forward however, there is the possibility of the lagged effects of restrictive monetary policy, evaporating consumer savings and elevated geopolitical risks leading to more visible margin compression. The weaker growth expectations for the global economy and realisation of such negative sentiments in 1H2023 earnings could lead to credit spread widening should corporate earnings falter and impact debt financing ability.

At the same time, a reduction in investments from a weaker growth outlook could also delay issuers' need to come to the market and pressure issuance volumes, with issuers opting to wait out towards the end of 2023/start of 2024 in hopes of a Fed pivot that could lead to marginally lower borrowing costs again. As we enter 2023, we appear to be approaching the end of the most aggressive hiking cycle in decades and moving towards stabilisation of global borrowing rates, albeit at elevated levels compared to the last few decades and with continued bias towards rates rising in 1H2023. This is happening at a time of looming uncertainty over how things progress from here and with the spectre of Covid-19 rising again as China reopens.

The most well-telegraphed recession (or not): For many months now, markets have been keen to price in a dovish Fed pivot sometime in 2023 and has each time been turned back by either (1) the lack of concrete data to signal that there is a sustained return of inflation to central bank comfort zones, or (2) hawkish guidance from Fed officials. Moving into 2023, the hunt for such a policy turn continues as concerns over lagged effects of monetary tightening weigh on sentiment with the increasing number of Fed officials that have been warning of overtightening. This is a consequence of the understandably and largely united hawkish stand through 2H2022 that was essential in nipping inflation expectations in the bud as central bankers were keen to avoid the grave mistakes of the 1970s. Then, the self-fulfilling inflation prophecy was allowed to run its course until it was too late and had to be brought down through extreme measures and consequently large economic pain. As a result, we might be witnessing one of the most well-telegraphed recessions ever should it materialise.

In our view, these are the range of possible scenarios that could play out in the year ahead:

- **Greater near-term pain:** While there have been visible signs that inflation has peaked and the additional 100bps of rate hike needed to reach the 5% terminal rate are expected to be spread out in 1Q2023's policy meetings, there are still possible headwinds that could alter such a path leading to Fed frontloading the hikes in the earlier meeting within 1Q2023, tightening the US economy into recession. In this scenario, an earlier peak could also mean an earlier pivot towards easing with rising unemployment and weaker business activity pushing inflation lower at a quicker pace. Other near-term headwinds could include worsening financial conditions from Europe should the energy crisis worsen or escalation in the Russia-Ukraine conflict as well as China's reopening taking a turn for the worse.
- **Hikes resume after pause:** Taking on a more moderate view in the near term, we assume that no unexpected new risks arise from what has already surfaced, and the Fed follows the path that they have telegraphed. Following which, as per market's hopes, the Fed pauses its rate hike cycle. A pause essentially represents the pinning of hopes that the monetary policy tightening thus far will be sufficient to bring inflation down towards a sustained downtrend. Depending on incoming data, we could possibly see another round of synchronised tightening should inflation continue to be untamed through the lens of the Fed, with the consequences of such a scenario leading to an outright and painful recession in late 2023 or early 2024.
- **Soft landing:** In a more optimistic outlook, where disinflation occurs without a severe recession and the labour market deteriorates gradually, the US central bank could begin to normalise rates in late 2023 and go

back against its "higher for longer" stance as worries of overtightening and inflation struggles subside. Such an outcome, while somewhat unrealistic, cannot be outright ruled out as well.

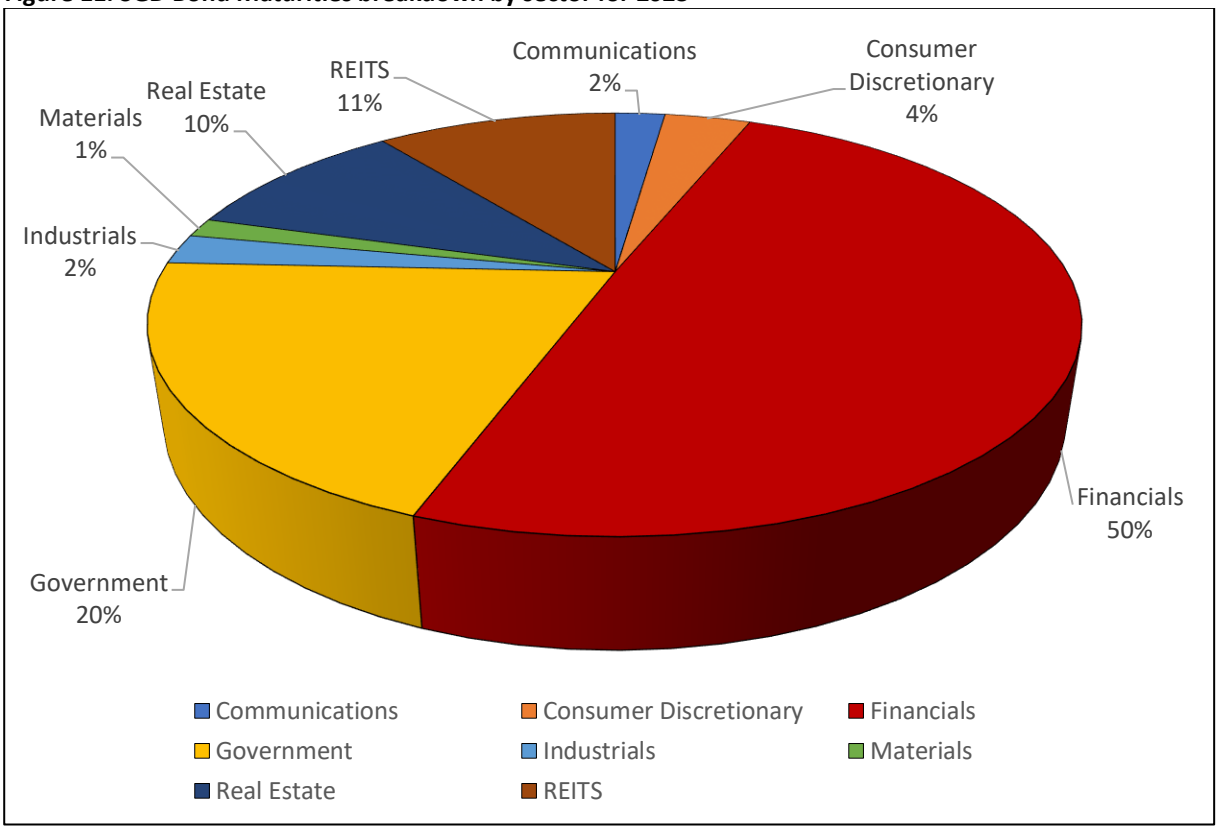
2023 Singapore Bond Market Maturity and Supply Outlook

Based on Bloomberg data, approximately SGD20.5bn of SGD bonds are expected to mature or become callable in 2023 (excluding Certificate of Deposits, amounts smaller than SGD50mn, convertible notes/bonds, defaulted issuers and MAS or Singapore Treasury and government bonds), with most of such issuances coming from the financial sector (50%), government-linked issuers (20%) and REITs (11%) (Figure 11). The three largest issuances maturing in 2023 all come from the government sector and specifically from HDB, with HDB's SGD1bn 2.5% 7-year bond due in January, HDB's SGD700mn 1.91% 7-year bond due in August as well as HDB's SGD700mn 2.42% 5-year bond due in July.

On the corporate perpetuals front, the largest perpetuals with next call dates in 2023 are HSBC Holding PLC's SGD750mn 5.0% Additional Tier 1 bank capital instrument in September and Mapletree Investment Pte Ltd's ("MAPL") SGD700mn 3.5%-PERP in May. In line with our expectations mentioned in the Singapore Mid-Year 2022 Credit Outlook, we saw an increasing number of issuers deciding not to call their corporate perpetuals at first call including StarHub Ltd, Mapletree Treasury Services Ltd (issuing entity for the MAPL curve), GuocoLand Ltd and Frasers Property Ltd. In all (?) cases of non-calls in 2H2022, the perpetual distribution rate reset date did not coincide with call date and current macroeconomic conditions and the elevated interest rate environment created an economic incentive for these issuers to opt not call and avoid refinancing with a perpetual at a higher cost.

For bank capital instruments, technical developments were the same, however financial institution bank capital instruments continued to call on their first call dates (and we expect them to continue doing so) with financial institutions likely keen to continue tapping on the flush liquidity they have enjoyed in the past years while avoiding any call dates could signal to investors a lack of liquidity, even if the reality is not so. Markets only need to look to the South Korean perpetual mini rout earlier in November 2022 that also spread to a handful of non-Korean financial institution issuers. Chiefly, Heungkuk Life Insurance Co, a South Korean insurer, announced to delay its early repayment before subsequently reversing its decision. Despite the event being a largely one-off incident in recent memory, it served as a wakeup call to both financial institutions on the adverse effects on sentiment and funding costs of such convention-defying moves in the perpetual space as well as to market participants on the possibility of a wave of companies, financial institutions included, that could possibly follow the actions of corporate perpetual issuers as economic reasons triumph expectations.

Figure 11: SGD Bond Maturities breakdown by sector for 2023



Translating the above points and macroeconomic outlooks into consequences for the Singapore corporate credit market, we expect 2023 issuance volumes to remain robust.

- The amount of SGD bonds maturing or becoming callable in 2023 remains elevated. While 2022 bond maturities were not all refinanced in the Singapore credit market due to both fundamental and technical considerations (in particular for high yield issuers) with higher base rates and wider credit spreads, we expect government investment programs that are increasingly angled towards sustainability to support issuance volumes in 2023 as net zero plans progress and climate concerns rise. In recent years, we have seen the Housing Development Board and the National Environment Agency ("NEA") becoming among the largest green bond issuers in the SGD market, aside from the sovereign.
- The Singapore credit market also remains a safe haven for investors based on the credit quality of issuers and the resilient performance of issuances in 2022 against the challenging backdrop (refer to ***"Tracking Returns in the SGD credit market"***). We do not expect significant defaults in the Singapore credit market in 2023 although certain issuers are still vulnerable including those focusing on the construction sector as well as those within travel, hospitality, and retail where a full recovery from the pandemic is yet to happen. In addition, the performance of SGD corporate credit and bank capital instruments in the secondary space continue to benefit from the relatively high participation of private banks that are more focused on yield rather than spreads as opposed the Asiadollar market that is more focused on credit spreads. This is why during periods of rising rates, SGD credit spreads can compress and hence outperform on a relative basis.
- We may also see a possible backloading of issuances towards the end of 2023 when visibility in rates become more certain. The majority of the scenarios listed above would result in rates either staying higher for longer or pivoting earlier than expected (which are two diverging outcomes for investors). However, from a supply perspective, we expect 2H2023 to pan out to be a period with higher level of issuance versus 2H2022, barring any drastic widening in credit spreads and assuming that issuers that can afford to wait out would be incentivised to do so. In the scenario where rates stay higher for longer, issuers would have little choice but to accept that this is the new normal and adapt. In the scenario where rates pivot earlier than expected, issuers are likelier to see this as opportune to lock in lower cost of funding.

Conclusion - Keeping It Short

Given a possible tale of two halves in 2023, we continue to focus on a six-month horizon and recommend investors do the same by staying short on duration. While rates uncertainty looks to be diminishing on a relative basis, the range of possible scenarios highlighted above still presents some variability in outcomes hence we continue to prefer staying in shorter-dated bullets in the crossover space where credit risk is more manageable.

1. Shorter duration tenors continue to offer the best returns per our SGD credit market tracker. In addition, with the low likelihood of defaults, we expect most issuers to repay and short dated bonds to pull to par, with funds redeemed to be deployed into higher issuances in 2H2023.
2. The crossover space also continues to offer a better risk-return dynamic in our view and per our SGD credit market tracker. That said, given the possible laggard effects of higher rates and a better than even chance of credit spreads widening, investors should continue to focus on bottoms-up analysis. While high yield issuers in 2022 were able to meet bond maturities with either cash, refinancing in the bank loan market or through tender offers (Centurion Corporation Limited, Tuan Sing Holdings Limited), such exercises remained highly selective.
3. We expect better rates certainty in 2H2023 and opportunities to add duration risk against manageable credit risk in the SGD credit space.

With regards to corporate perpetuals and bank capital instruments, the non-calls of corporate perpetuals and the price and sentiment sensitivity of bank capital instruments to the prospect of non-calls in 2022 (particularly since 2H2022) as well as the upward bias to interest rates in 1H2023 is likely to keep non-call risk at the front of investors' minds. To this end, we continue to advocate a focus on structural risk in corporate perpetuals. For bank capital instruments, the focus on structural risk is less so although we remain mindful of heightened non-call risk above distribution risk and write-down risk. That said, there remains selective value in SGD bank capital instruments given the solid underlying fundamentals and regulated nature of the issuers. We are broadly overweight those with higher reset spreads including recently issued Tier 2s as well as near term AT1s where call risk is mitigated by solid capital positions.

Overall from a technical perspective, the downside appears limited from here on while from a fundamental perspective, the upside looks limited. As such, whilst the bias is for credit spreads to widen, we expect widening to be slight and for the SGD credit market to remain a happy hunting ground for investors. As we enter 2023, we continue to be ever grateful for our readers' support and feedback and hope you find our publications useful in the rest of the year ahead. We hope you and your close ones stay healthy in mind and body.

With appreciation, OCBC Credit Research

Non-financial corporate perpetuals – chameleon changes colour in 2H2022

Historically, it had been more common for Singapore non-financial corporate issuers to call their perpetuals at first call, despite having no legal obligation to do so. This includes even issuers encountering credit stress, when economic wisdom would have suggested that it was better for the issuers to retain the perpetuals in their capital structure. We think this indicated that issuers were more concerned about reputation risks. For example, issuers may have held the view that not calling at first call would result in negative implications to access to funding.

However, since the non-call of the ARTSP 4.68%-PERP 2.5 years ago (subsequently reset to 3.07% distribution rate), we have seen a shift when it comes to first call dates. Even among higher grade issuers where market access to primary markets was still available, several issuers have opted not to raise replacement capital. Secondary market prices suggest that investors have priced in the possibility of non-call at first call, with prices falling through 2H2022 with widened bid-ask prices for a number of these issues.

Table 1: Non-financial Corporate Perpetuals with Recent First Call Dates that Did Not Call

Issuer	Perpetual	First call date	Called at first call (Yes/No)
CapitaLand Ascott Trust ("ART")	**ARTSP 3.07%-PERP**	**30-Jun-2020**	**No**
Stated reasons for non-call: • The REIT Manager seeks to diversify the sources of funding to optimise capital structure. • Took into account longer term interest of ART and the macroeconomic environment. • COVID led to softer demand for accommodation, adopting prudent stance to preserve cash flow and liquidity. • Drawing down debt to redeem the perpetuals will increase the ART's leverage and reduce debt headroom available for acquisition opportunities during a market recovery plus the ART's property valuations could come under pressure on the back of softer operating performance. • Current market conditions are not favourable for the issuance of perpetual securities. OCBC Credit Research commentary: • Perpetual reset date coincided with call date, distribution rate stepped down to 3.07% versus the 4.68% originally (cost savings of ~161bps), in light of the low interest rate environment in June 2020. • Overtime though, the equation for ART in our view had become more about continued cost savings given the strong recovery in travel and hospitality. The issuer has the right to call every six months while the next reset date is in 2025. • We think management is looking to maintain the flexibility to decide at every six months.			
Wing Tai Properties Ltd ("WTP")	**WINGTP 4.35%-PERP**	**24-Aug-2020**	**No**
Stated reasons for non-call: • Not provided. OCBC Credit Research commentary: • The first reset date did not match the first call date. First reset date only occurs in August 2027. The perpetual distribution rate stayed at 4.35%. • There is little incentive for the management to call the perpetual given the first reset date occurs only in August 2027. Moreover, tight COVID restrictions were imposed by the Hong Kong government in August 2020 including (1) restaurants operating at 50% dining capacity and curfew by 6pm, (2) closure of entertainment premises and (3) suspension of inbound visitors. • Mounting fears and uncertainties around the world including Hong Kong during that period. It would be unwise and impractical for WTP to call the bond given the factors above. • We do not think this perpetual will be called anytime soon, as the 2027 bond, WINGTA 4.1 05/25/27, issued by its parent, Wing Tai Holdings, yielding at ~5.0%. It implies at least a 65bps cost savings to not call the perpetual and not to mention the perpetual premium of at least additional 100bps over the corporate bonds. •			
First Real Estate Investment Trust ("FIRT")	**FIRTSP 4.9817%-PERP**	**08-Jul-2021**	**No**
Stated reasons for non-call: • The REIT Manager seeks to diversify the sources of funding to optimise capital structure. • Took into account longer term interest of FIRT and the macroeconomic environment, where factors include: • Given the uncertain environment, the REIT manage is adopting a prudent stance to preserve cashflow and liquidity. • Drawing down debt to redeem the perpetuals will increase FIRT's leverage and reduce debt headroom available for acquisition opportunities and asset enhancement initiatives during a market recovery. • Current market conditions are not favourable for First REIT for the issuance of perpetual securities at a lower yield than the reset distribution rate. OCBC Credit Research commentary: • Perpetual reset date coincided with call date, distribution rate stepped down to 4.9817% versus the 5.68% originally (cost savings of ~70bps), in light of the low interest rate environment in July 2021. • In our view FIRT would have found it difficult to assess primary markets at that point without external guarantees. FIRT had only completed the restructuring of master leases and recapitalisation exercise in 1H2021. Prior to the recapitalisation, FIRT was at risk of defaulting.			
Lippo Malls Indonesia Retail Trust ("LMRT")	**LMRTSP 6.4751%-PERP**	**27-Sep-2021**	**No**

Stated reasons for non-call:
- The decision was arrived at after having considered the long-term interests of LMRT and the current macroeconomic environment, where factors include:
- Given the uncertainties of the prevailing operating environment, it is a better strategic option to preserve cashflow and liquidity.
- Assuming new debt for the purposes of the redemption of the perpetual securities will increase LMIRT leverage and reduce the debt headroom available for acquisition opportunities and asset enhancement initiatives during a market recovery.
- Current market conditions are not favourable for LMIRT for the issuance of perpetual securities at a lower yield than the reset distribution rate.

OCBC Credit Research commentary:
- Perpetual reset date coincided with call date, distribution rate stepped down to 6.4751% versus the 7.0% originally (cost savings of ~52bps), in light of the low interest rate environment in September 2021.
- In our view LMRT would have found it difficult to assess primary markets at that point without external guarantees given the pandemic's negative impact to LMRT's rental outlook.

Soilbuild Business Space REIT ("SBREIT")	**SBREIT 4.645%-PERP**	**27-Sep-2021**	**No**

Stated reasons for non-call:
- The decision was arrived at after having considered the long-term interests of SBREIT and the current macroeconomic environment, where factors include:
- Diversification of sources of funding.
- Given the uncertain economic environment, the SBREIT Manager is adopting a prudent stance to preserve cashflow and liquidity.
- Current market conditions are not favourable for SBREIT for the issuance of perpetual securities.

OCBC Credit Research commentary:
- Perpetual reset date coincided with call date, distribution rate stepped down to 4.645% versus the 6.0% originally (cost savings of ~136bps).

StarHub Ltd ("StarHub")	**STHSP 3.95%-PERP**	**16-Jun-2022**	**No**

Stated reasons for non-call:
- StarHub has carefully assessed the various options with the long-term interest of StarHub in mind further taking into consideration the current macroeconomic environment, where factors include:
- Diversification of sources of funding and prudent management of StarHub's capital structure.
- Current market conditions are not favourable for the issuance of perpetual securities at a lower yield than the distribution rate of the securities.
- StarHub continues to maintain flexibility with the option to exercise its right to redeem the securities on subsequent call dates when market conditions normalise.

OCBC Credit Research commentary:
- Perpetual distribution rate reset date does not coincide with call date, distribution rate remained at 3.95%. The first reset date only falls on June 2027.
- StarHub enjoys cost savings by not replacing the perpetual.

ESR-LOGOS REIT ("ELOG")	**EREIT 6.632%-PERP**	**03-Nov-2022**	**No**

Stated reasons for non-call:
- The decision was arrived at after having considered the long-term interests of ELOG, and the current macroeconomic and interest rate environments.
- Given the current interest rate environment and capital market conditions, it is not in the interest of ELOG to issue new perpetual securities to redeem the Perpetual Securities from a cost perspective.
- While ELOG has ample committed debt facilities that can be drawn to redeem the perpetual securities, this will increase ELOG's leverage and reduce the debt headroom available for acquisition opportunities, asset enhancement initiatives and/or redevelopment opportunities during a market recovery.

OCBC Credit Research commentary:
- Perpetual reset date coincided with call date, distribution rate stepped up to 6.632% from only 4.6%.
- The perpetual call date occurred at a time when interest rates were rising fast, and the market lack new issues.
- Whilst secondary prices suggest that the issuer was able to raise replacement perpetuals at reasonable cost vis-à-vis reset distribution rates, the lack of broadly distributed primary issuances meant that the new issue premium (including risk premium to compensate for rates volatility) was highly uncertain.

Mapletree Investments Pte Ltd	**MAPLSP 3.95%-PERP**	**12-Nov-2022**	**No**

Stated reasons for non-call:
- General statement that the non-call was in view of the current macroeconomic conditions and interest rate environment.

OCBC Credit Research commentary:
- Perpetual distribution rate reset date did not coincide with call date, distribution rate remained at 3.95%. The first reset date only falls in November 2027.
- Benchmark rates suggested sizeable cost savings for MAPL by not calling on the first call date.

Lippo Malls Indonesia Retail Trust ("LMRT")	**LMRTSP 8.096%-PERP**	**19-Dec-2022**	**No**

Stated reasons for non-call:
- As part of active capital management, the LMRT REIT Manager seeks to diversify the sources of funding to optimise LMRT capital structure. In arriving at the decision, the REIT Manager has considered the long-term interests of LMRT and the current macroeconomic environment, where factors include:
- Given the uncertain macroeconomic environment, the REIT Manager is adopting a conservative approach to preserve cashflow and liquidity.

- Assuming new debt for the purpose of the redemption of the perpetuals will increase LMRT leverage and reduce the debt headroom available for the development of LMRT's existing assets during the uncertain macroeconomic outlook.
- Current market conditions are not favourable for LMIR Trust for the issuance of perpetual securities at a lower yield than the reset distribution rate.

OCBC Credit Research commentary:

- Perpetual reset date coincided with call date, distribution rate stepped up to 8.096% from only 6.6%.
- In our view LMRT would have found it difficult to assess primary markets without external guarantees, given the protracted recovery at LMRT's underlying properties. LMRT is facing a tight adjusted interest coverage ratio, which suggest an elevated risk of non-payment of perpetual distribution over a 12-month outlook. The issuer's USD bonds are also trading at stressed levels.

Frasers Property Ltd ("FPL")	**FPLSP 4.38%-PERP**	**17-Jan-2023**	**Have announced will not call on first call date**

Stated reasons for non-call:

- In arriving at the decision not to redeem the perpetual securities on the first call date, the longer-term interests of the issuer and the current macroeconomic and interest rate environments were taken into consideration, including:
- Diversification of sources of funding.
- Current market conditions for the issuance of similar yielding perpetual securities.

OCBC Credit Research commentary:

- Perpetual distribution rate reset date does not coincide with call date, distribution rate would remain at 4.38%. The first reset date only falls on January 2028. FPL enjoys cost savings by not replacing the perpetual.
- Redeemed its FPLSP 3.95%-PERP in October 2022 which was structured with reset.

GuocoLand Ltd ("GUOL")	**GUOLSP 4.6%-PERP**	**23-Jan-2023**	**Have announced will not call on first call date**

Stated reasons for non-call:

- General statement that the non-call was in view of the current interest rate environment.
- Maintains flexibility to exercise the call on any distribution payment date.

OCBC Credit Research commentary:

- Perpetual distribution rate reset date does not coincide with call date, distribution rate would remain at 4.6%. The first reset date only falls in January 2025. GUOL enjoys cost savings by not replacing the perpetual.

Source: Company, Bloomberg, OCBC Credit Research

Issuers who had opted not to call their perpetuals would likely find difficulty in raising a new perpetual, until the existing perpetuals are redeemed, in our view. A non-call effectively tilts the perpetual into an "equity-like" instrument with no maturity, albeit without equity upside that comes with business growth. This is comparable to preferred stock, in our view.

Prices of perpetuals have reacted downwards when a non-call happens. That said, based on our observation, these have not been priced at yield-to-perpetuity ("YTP"), despite the non-calls. We think this is due to (1) Divergent views among investors over the new redemption date (perpetuals tend to be callable by the issuer every six months after the first call date) and (2) Lack of a secondary market for such perceptual means that headline prices may not reflect an actual transactable price.

With ask prices of non-financial corporate perpetual having fallen 7-9 ppts since the beginning of the year for higher grade issuers, this has translated to a YTP of 5.5-6.5% which can be comparable to equity dividend yields. Additionally, in a rising interest rate environment, investors are also partly buffered by higher distribution rate as perpetual that does not get called are likely to be reset upwards (assuming there is an applicable reset rate) versus 2020-2021. In light of the non-calls in 2H2022, we expect new supply in the SGD primary market for corporate perpetuals to be highly limited in 1H2023 and see an elevated risk of non-call for corporate perpetuals facing first call dates in 1H2023. We continue to maintain a Neutral call on corporate perpetuals and advocate an issue-by-issue selection process.

Table 2: Non-financial Corporate Perpetuals with First Call Dates in 2022 that Called

Issuer	Perpetual	First call date
Mapletree Investments Pte Ltd	MAPLSP 4.5%-PERP	19-Jan-2022
Singapore Post Ltd	SPOST 4.25%-PERP	2-March-2022
ARA Asset Management Ltd	ARASP 5.2%-PERP	04-May-2022*
Hotel Properties Ltd	HPLSP 4.65%-PERP	5-May-2022
Wing Tai Holdings Ltd	WINGTA 4.08%-PERP	28-June-2022
Olam Group Ltd	OLGPSP 5.5%-PERP	11-July-2022
Frasers Property Ltd	FPLSP 3.95%-PERP	05-Oct-2022

Source: Company, Bloomberg, OCBC Credit Research ** Early redemption 04-May-2022 due to occurrence of Change of Control*

Table 3: Non-financial Corporate Perpetuals with First Call Dates in 1H2023

Issuer	Perpetual	First call date	Risk of Non-call at First call
Frasers Property Ltd	FPLSP 4.38%-PERP	17-Jan-2023	Non-call confirmed
GuocoLand Ltd	GUOLSP 4.6%-PERP	23-Jan-2023	Non-call confirmed
ARA LOGOS Logistics Trust	ALLTSP 5.5%-PERP	1-Feb-2023	Medium
ARA Asset Management Ltd	ARASP 5.65%-PERP	14-Mar-2023	High
Mapletree Logistics Trust	MLTSP 3.65%-PERP	28-Mar-2023	High

Source: Company, Bloomberg, OCBC Credit Research

Sensitivity to Sustainability On The Rise

It was at the beginning of 2021 that we attempted to better understand the quality of issuers' disclosures and actions to see how aware and prepared the issuer is for ESG risks. This was done primarily by looking at each issuer's disclosures. Since then, we have also sought to improve our awareness and preparedness in understanding key sustainability influences and drivers on credit profiles of the issuers we cover and the industries they operate in. This was done by referencing the Sustainability Accounting Standards Board ("SASB") standards and using the knowledge gained through the European Federation of Financial Analysts Societies ("EFFAS") Certified ESG Analyst program.

To this end, we have attempted to evaluate issuers' sensitivity to sustainability issues and risks in the appendix to our outlook through a Sustainability Sensitivity Score ("SSS") that we assess as either Low, Medium, or High and that primarily relates to the duration of each issuers' issuances. Our aim is to highlight the key sustainability risks and hence sensitivities for the issuers we cover rather than how well issuers actually mitigate them. Sustainability in our view remains a developing field and will continue to be influenced by improving disclosures, the impacts of actions by issuers, governments, and society, and ongoing shifts in the environment (both physical and regulatory) itself. The content is neither exhaustive nor complete and we expect that our views will be refined and improved over time as we (and the market) become more familiar the concept of sustainability.

Our approach is top-down through identifying the sector in which the issuer operates in. This is because sustainability influences and megatrends are typically consistent within industries. We then look at the issuer's key ESG policies, strategy, and targets as well as recent developments in executing its strategy. Finally, corporate governance and disclosure quality are highlighted as key indicators in supporting the final SSS. Although the vast majority of the scores are assessed as 'Medium,' the reasons behind them vary. That said, the scores generally reflect the mostly adequate actions taken by issuers to date and that sustainability risks have a longer-term impact.

As for the industries themselves, we have also sought to cover the key sustainability influences on industries that are material to the Singapore corporate credit market, either due to the amount of SGD bond issuers present in the market (REITs, property developers, financial institutions) or due to their high emissions profile (airlines, power). These views are contained in the following special interest pieces.

Charting the flight path to a greener future: Airlines

Assisted by Meg Wee

Overview

At the 77th International Air Transport Association ("IATA") Annual General Meeting in October 2021, a resolution was passed by IATA member airlines committing them to achieve net-zero carbon emissions by 2050. This resolution aligns with the objectives of the 2015 Paris Climate Agreement to limit global warming to 1.5°C.

Commercial aviation is critical to global trade and economic and social development, estimated to have supported USD 3.6 trillion in world economy activity in 2018 (~4.1% of global GDP).[1] Aviation remains a strong growth industry, with the IATA expecting overall traveller numbers to reach 4 billion in 2024, exceeding pre-COVID-19 levels (103% of the 2019 total).

Although aviation has been successful at decoupling emissions growth from actual growth thus far, with air traffic increasing at an average of 5% annually while CO_2 growth is lower at 3%, much work needs to be done. Air travel currently produces ~3% of global CO_2 emissions and is one of the fastest-growing sources of greenhouse gases. Aviation CO_2 emissions doubled between 1990 and 2019 to over 900 million metric tons.[2] In 2019, the sector consumed nearly 100 billion gallons of jet fuel (~8% of global oil demand), costing nearly $190 billion, or ~25% of airline operating expenditures.[3]

Airlines also produce ~12% of transport emissions – a percentage likely to increase as other modes of transport switch to alternative power sources (e.g., electricity) faster than currently appears possible for anything but the shortest flights. Post-pandemic forecasts also expect global commercial aviation CO_2 emissions to increase at least 1.8 times to 1.6 billion metric tons or higher by 2050, before any benefits from Sustainable Aviation Fuel ("SAF") and/or carbon offsets are factored in. This translates to 160 billion gallons of jet fuel demand (over 10 mmbl/d of oil demand). Even under more aggressive new technology scenarios, industry forecasts still have aviation emissions growing to 1.1 to 1.4 billion metrics tons by 2050.

Given the importance of aviation, it is crucial to pursue concrete actions that would make flying more sustainable rather than reduce the number of flights, allowing the sector to develop towards a path of long-term sustainability, balancing both growth and environmental needs.

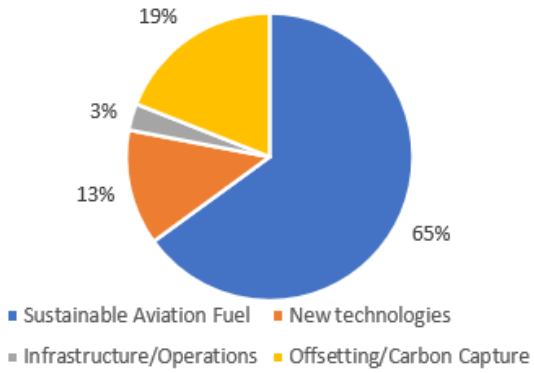
Net Zero by 2050

According to IATA, it is estimated that demand for individual air passenger journeys in 2050 could exceed 10 billion, with approximately 21.2 gigatons of CO_2 of carbon emissions expected to be produced over the 2021 – 2050 period. Achieving net zero by 2050 will require a combination of maximum elimination of emissions at the source, offsetting, and carbon capture technologies. The key elements of the emissions reduction strategy include:

- SAF, sourced from feedstocks that do not degrade the environment or compete with food or water;
- Investment in new aircraft technology, including radical new aerodynamic and alternative propulsion (electronic or hydrogen) solutions;
- Continued improvement in infrastructure and operational efficiency, with a particular focus on improved air traffic management; and
- The use of approved offsets including carbon capture and storage technology.

[1] Aviation Beyond Borders: Global Fact Sheet (September 2020), https://aviationbenefits.org/media/167144/abbb20_factsheet_global.pdf
[2] Aviation Beyond Borders: Tracking Aviation Efficiency (February 2021) https://aviationbenefits.org/media/167475/fact-sheet_3_tracking-aviation-efficiency-v3.pdf
[3] International Air Transport Association (IATA): Industry Statistics Factsheet (October 2021), https://www.iata.org/en/iata-repository/publications/economic-reports/airline-industry-economic-performance---october-2021---data-tables/

Figure 12: Contribution to achieving Net Zero Carbon in 2050



Source: IATA

The resolution demands that all industry stakeholders commit to addressing the environmental impact of their policies, products, and activities with concrete actions and clear timelines, including:

- Fuel-producing companies bringing large scale, cost-competitive SAF to the market;
- Governments and air navigation service providers ("ANSPs") eliminating inefficiencies in air traffic management and airspace infrastructure;
- Aircraft and engine manufacturers producing more efficient airframe and propulsion technologies; and
- Airport operators providing the needed infrastructure to supply SAF, at cost, and in a cost-effective manner.

Table 4: SAF production timeline

Year	Milestone
2025	With appropriate government policy support, SAF production is expected to reach 7.9 billion litres (2% of total fuel requirement)
2030	SAF production is 23 billion litres (5.2% of total fuel requirement). ANSPs have fully implemented the ICAO Aviation System Block Upgrades and regional programs such as the Single European Sky
2035	SAF production is 91 billion litres (17% of total fuel requirement). Electric and/or hydrogen aircraft for the regional market (50-100 seats, 30-90 min flights) become available
2040	SAF production is 229 billion litres (39% of total fuel requirement). Hydrogen aircraft for the short-haul market (100-150 seats, 45-120 min flights) become available.
2045	SAF production is 346 billion litres (54% of total fuel requirement).
2050	SAF production hits 449 billion litres (65% of total fuel requirement).

Source: IATA

The combination of measures needed to achieve net zero emissions for aviation by 2050 will evolve based on the most cost-efficient technology available over the course of the commitment.

Key Strategies

Sustainable Aviation Fuel (SAF)

Jet fuel is the primary pollutant from aviation, accounting for over 90% of most airlines' value chain emissions.[4] As such, SAF production and use are critical to the aviation sector. As compared to other subsets of the transportation sector, energy alternatives in the form of electricity and hydrogen will not be viable for commercial aviation use in the near-term. Hence, the sector will rely heavily on the use of high-energy-dense liquid fuels, with SAF being the only viable means of meeting net-zero-emission targets.

Derived from non-fossil carbon feedstocks, such as used cooking oil, green and municipal waste, and non-food crops, SAF boasts lower life-cycle emissions than conventional jet fuel. The global SAF market is expected to grow from USD216mn in 2021 to USD14.7bn by 2030, at a CAGR of 59.91% during the forecast period 2022-2030. More than 370,000 commercial flights have used SAF since 2016, with more than 40 airlines and 13 major airports using and supplying SAF. Key players operating in the global sustainable aviation fuel market include Neste Oyj, Gevo Inc., SKYNRG, Eni SPA, and SG Preston Company.

[4] Based on the average of 19 airline CDP disclosures (2018)

Table 5: List of companies producing SAF (HEFA-SPK fuels) as of 2019

Company	Location	Capacity (L/yr)
Neste	Rotterdam	1.3 billion
	Singapore	1.3 billion
	Porvoo, Finland	385 million
	Porvoo 2, Finland	385 million
ENI	Venice and Gela, Italy	1 billion
Diamond Green Diesel	Norco, Louisiana	1 billion
UPM	Lappeenranta, Finland	120 million
World Energy (AltAir)	Paramount, California	150 million
Renewable Energy Group	Geismar, Louisiana	284 million

Source: International Renewable Energy Agency (IRENA)

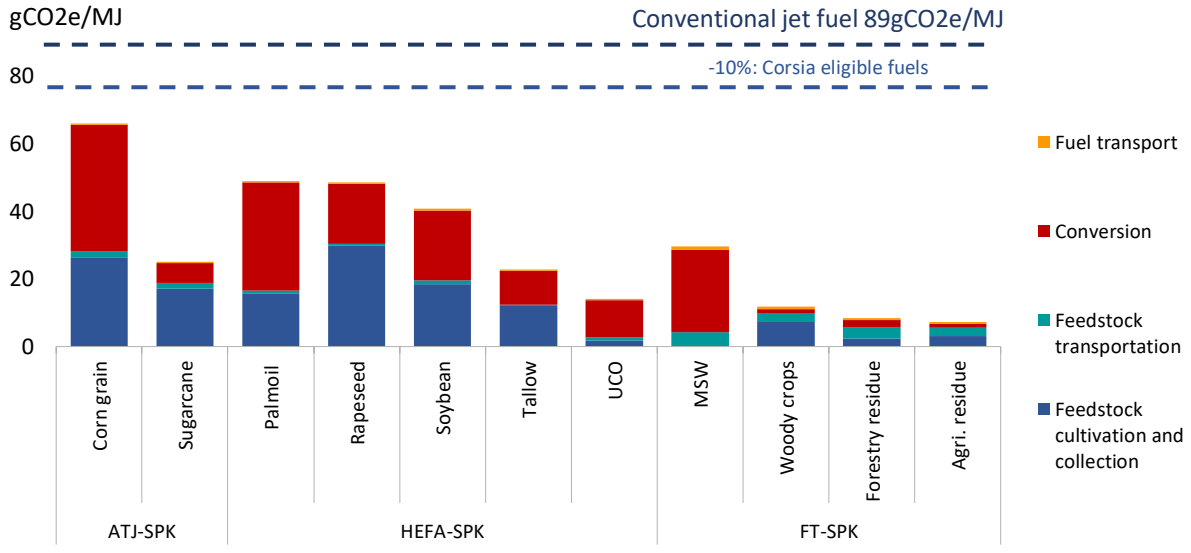
Table 6: Key SAF production pathways

Fuel	Typical Feedstocks	Blend Level	Opportunity description	% LCA GHG reduction vs. fossil jet
Hydroprocessed Esters and Fatty Acids Synthetic Paraffinic Kerosene (HEFA-SPK)	Vegetable oils, waste fats, oils & greases	50%	Safe, proven, scalable and mature technology, with potential to cover 5-10% of total jet fuel demand	73%-84%
Fischer-Tropsch Synthetic Paraffinic Kerosene (FT-SPK)	Lignocellulosic crops, residues & wastes	50%	Potential in the mid-term, however, significant techno-economic uncertainty. High availability of cheap feedstock, but fragmented collection	95%-94%
Alcohol to Jet Synthetic Paraffinic Kerosene (ATJ-SPK)	Starchy & sugary crops, lignocellulosic crops, residues & wastes, industrial flue gases	50%		

Source: World Economic Forum

Depending on the carbon source, SAFs can produce a large range of greenhouse gases over their lifetime, including growing/collecting the carbon sources, synthesizing the fuels, and combusting them in an engine, and these three alternative fuels have differing impacts on the environment. Alternatively, new "generations" of SAF include synthetic fuels (PtL) made from renewable electricity, water and captured CO_2.

Figure 13: Lifecycle emissions of different feedstock and technologies



Source: BloombergNEF, ICAO

The FT-SPK segment led the market with a market share of 27.13% and market revenue of USD58.6mn in 2021 due to the rising number of fuel varieties with different feedstock compositions. However, the HEFA-SPK segment is estimated to dominate the market as the leading alternative replacement for conventional jet fuel by 2030. While biofuels are the only SAF option today, PtL is projected to enter the market at a large scale in the late-2020s and become cheaper in the mid-2030s, with its market share depending on how quickly the levelized cost of electricity falls over the next 15 years.

Although SAF meets all quality and performance requirements of conventional fossil fuels, it costs three to five times more, which has made carriers slow to warm up to SAF. For instance, the average worldwide price of jet fuel is about USD4.15 per gallon, according to the IATA, as opposed to the U.S. average price of SAF, which is about USD8.67 per gallon. This has, in turn, resulted in very low SAF production, with less than 0.1% of jet fuel estimated to be currently used by commercial airlines being SAF.

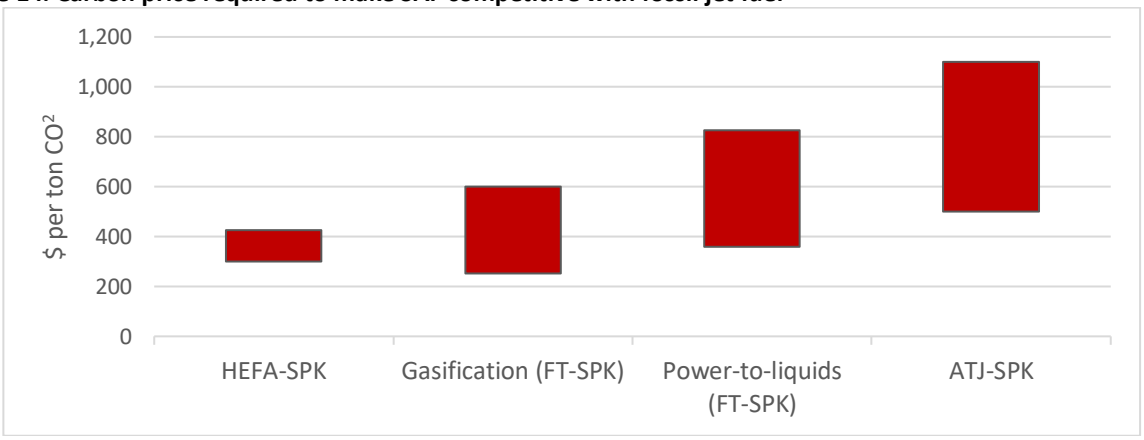
Table 7: Aviation Fuel Prices (US National Average)5

Type of fuel	JetA	100LL	SAF
Price/gallon (USD)	7.04	7.10	8.84

Source: Global Air

According to BloombergNEF, the lowest theoretical carbon price that would bring conventional jet fuel in line with each of the main SAF pathways was for gasification of Fischer Tropsch (a chemical process), at USD252 per ton of CO^2. By comparison, the European Union Emissions Trading System (EU ETS) carbon price averaged EUR24.80 per ton in 2020 (~USD28 per ton CO^2), with estimates projecting that the EU ETS price could rise to over EUR100 per ton CO^2 by 2030.

Figure 14: Carbon price required to make SAF competitive with fossil jet fuel



Source: BloombergNEF

Additionally, some SAFs do not offer very many, if any, greenhouse gas savings at all. For instance, according to NGO Transport & Environment, the estimated CO_2 footprint of palm oil is three times that of conventional fossil diesels. Depending on the carbon source, SAFs can produce a large range of greenhouse gases over their lifetime, including growing/collecting the carbon sources, synthesizing the fuels, and combusting them in an engine. When comparing these fuels' carbon footprints by analyzing the life-cycle carbon intensity, it was found that ATJ-SPK fuels tend to have higher emissions. On the other hand, biofuels made from wastes and by-products tend to have lower greenhouse gas emissions than crop-based ones.

To enable the massive scale-up that will be required to achieve net-zero by 2050, stakeholders must invest in about 300 to 400 new fuel production plants and associated upstream infrastructure. Given that it typically takes at least five years to build a new SAF plant and get it to full operation, stakeholders will need to plan new SAF plants within the next two to three years. Increased policy measures are hence necessary to achieve such climate goals.

Table 8: Main SAF-related policies

Region	Before-2021	2022
US	• 2017: Incentives for the supply of SAF in the RFS2 (Renewable Fuel Standard 2) • 2019: Incentives for alternative jet fuels began in California's Low Carbon Fuel Standard ("LCFS").	• Aug: Tax credit of USD1.25-USD1.75 per gallon of SAF determined in the Inflation Reduction Act • Sep: SAF Grand Challenge Roadmap released
EU	• 2018: Preferential treatment for SAF under the EU Renewable Energy Directive ("EU RED II")	• Jun: Adopted a general approach in aviation as part of Fit for 55 and decided to impose SAF blending above standards on fuel suppliers
UK	• 2015: Incentives for SAF in Renewable Fuel Certificates under the UK Renewable Fuel Transfer Obligation ("RTFO")	• Jul: Jet Zero Strategy released (1) Mandate that 10% of jet fuel be SAF by 2030 (2) Advanced SAF projects can apply for GBP165mn Advanced Fuels Funds

[5] Average fuel prices on October 17, 2022, for National Business Aviation Association's regions. The price of airplane and jet fuel is averaged over 3,207 Fixed-Base Operators (FBOs) reporting aircraft fuel prices over the past 30 days.

China	• 2018: Announced non-participation in the pilot phase of the CORSIA	• Sep: Released "2022 China Civil Aviation Green Development Policy and Action", targeting a cumulative use of 50,000 tons of SAF by 2025.

Source: ICAO

Singapore is well-positioned to become an established, regional petrochemical hub that can offer a conducive environment for developing and introducing sustainable aviation products. For instance, Neste, the world's largest producer of SAF, is expanding its production capacity in Singapore in 2023. It aims to be able to roll out as much as 1 million metric tons of SAF per annum at its facility, making Singapore Neste's main SAF production site globally. Shell also has plans to build a 550,000-ton a year biofuels plant in Singapore, which would supply SAF to air travel hubs including Changi Airport and Hong Kong Airport. Changi Airport also has an ongoing collaboration with Exxon Mobil, creating a pilot program providing sustainable aviation fuel for Singapore Airlines and Scoot flights from Changi Airport from July 2022.

Investment into Aircraft Technologies

Jet fuel has a major impact on airline profitability, representing an estimated one-quarter of direct operating costs. Every kilogram of kerosene produces 3.15 kilograms of CO_2. Airlines therefore have an intrinsic motivation for adopting more fuel-efficient flying, taxiing and airport operations.

This can be mainly done through the replacement of older aircraft with newer, more fuel-efficient designs. Each new generation of aircraft is roughly 15%-20% more fuel efficient. Key technologies include the use of more fuel-efficient engines, improved aerodynamics, lightweight materials, plus advanced systems, and integrated design. Historically, fleet upgrading has led to modern aircrafts producing 80% less CO_2 per seat than the first jets in the 1950s. Replacing the current commercial aircraft fleet with the most fuel-efficient aircraft in service today would also reduce fuel consumption by about 20%.

The IATA estimates that around 16,000 commercial passenger and cargo planes have been retired worldwide in the past 35 years. Meanwhile, every year up to 700 jets are getting closer to the end of their lifespan. According to the IATA, the global pandemic has prompted airlines worldwide to bring forward early retirement programs of older and less efficient planes, especially wide-body passenger aircraft. But the aircraft decommissioning process must be properly managed to prevent environmental and flight safety-related risks, according to the IATA.

Increased technological innovations can also increase fuel efficiency. For instance, Lufthansa Technick and BASF jointly developed AeroSHARK - a riblet film that mimics the skin of a shark and reduces skin friction drag. Lufthansa Cargo and Swiss International have recently applied AeroSHARK to their B777F and B777-300ER aircraft and believe that the technology can reduce fuel consumption by 1.1% compared to aircraft that do not use the technology. Since August 2022, SIA has also been rolling out SITA's OptiClimb technology across its Airbus A350 fleet and utilizing the tail-specific machine learning-driven system to cut up to 5% of fuel usage during climb out (15,000 tons per year). The technology employs a mix of 4D weather forecasting to recommend ideal climb speeds before departure and previous flight data to predict fuel burn across a wide range of flight scenarios to optimize fuel utilization after take-off. According to company estimates, the technology has the potential to optimize up to ~5 million tons of CO_2 emissions each year if all carriers were to make the switch.

Collectively, airlines typically reduce their GHG intensity by 1.5 to 2.0% per annum over the mid to long term via these strategies. Accelerated action, likely supported by government regulation and incentives, can support about 2.5% per annum reductions over the long-term. Faster reductions - as high as 8% over one year -- have been seen for smaller airlines pursuing aggressive fleet renewal strategies.

In the long term, hydrogen and battery-electric aircraft can make global aviation more efficient, starting in the late 2030s.

According to a report published by McKinsey, hydrogen aircrafts could enter the market in the 2030s and scale up through 2050, when they could potentially account for roughly a third of aviation's energy demand and market share. This can be achieved through direct combustion via a hydrogen turbine or via a fuel cell. Given that hydrogen emits no CO_2 during combustion and allows for significant reduction of other elements that drive global warming, such as soot, nitrogen oxides, and high-altitude water vapor, this could result in greater potential greenhouse savings. By redesigning airframes and storage technology, hydrogen aircraft could unlock longer ranges beyond its current limit of 2,500 kilometers.

However, liquified hydrogen would require four times the volume of kerosene, so its use would reduce space for customers or cargo. Additionally, significant, and safe hydrogen refueling infrastructure has yet to be developed at airports. Hence, although smaller aircraft powered with hydrogen could become feasible in the next decade, significant aircraft-technology development would be required, and infrastructure constraints would need to be overcome for aircraft with more than approximately 100 passengers.

On the other hand, assuming technological breakthroughs, battery-electric aircraft could potentially power regional flights by 2050. However, given the lower energy density of batteries compared to fuels, aircraft would need to carry more than 50 kilograms of battery weight to replace one kilogram of kerosene with today's technology. Carrying that battery weight for an entire flight would require more energy than burning off traditional jet fuel, thus creating a penalty for longer flights. Hence, electric propulsion could start with hybrid- or turboelectric flying, enabling further improvements in fuel efficiency as jet engines become smaller and lighter, using less fuel. For example, Ampaire, a Los Angeles–based start-up, is working with Mokulele Airlines, an inter-island carrier in Hawaii, on hybrid-electric flights for aircraft with around ten passengers.

Improvements in Infrastructural and Operational Efficiency

Fuel efficiency can also be achieved through the improvement of operations to carry more payload per flight. Payload can be increased by better filling a given capacity (e.g., flying with fewer empty seats) or by expanding capacity (e.g., swapping out premium seating in favor of economy seats). Until the pandemic, the aviation industry saw a trend of continuous improvement in efficiency, with the passenger load factor reaching a record average of over 82% in 2019 per the IATA. Operational efficiencies have also resulted in a 55% improvement in fuel burn per passenger km since 1990, and typically reduce the fuel intensity of airlines by an additional 0.5% per year.

Although the IATA considers improving operational efficiencies to be only around 3% of the required contribution to meeting the net-zero carbon emissions by 2050 goals, Aviation Benefits Beyond Border's Waypoint 2050 research found that operational and infrastructure improvements could contribute at least 10% towards the same goal. Regardless, this strategy presents a simple and cost-effective way for carriers to meet short and medium-term goals, especially until low carbon fuels like SAFs can be fully scaled up and become cost competitive with fossil jet fuel.

Offsets/Carbon Capture

The Carbon Offsetting and Reduction Scheme for International Aviation ("CORSIA") is the world's first global scheme to offset the growth in international aviation CO_2 after 2020. It aims to stabilize aviation's net CO_2 emissions, alongside the pursuit of other emissions reduction measures and to mitigate around ~2.5 billion tons of CO_2 between 2021-2035, which equates to an annual average of 165 million tons of CO_2. CORSIA helps aviation towards its midterm goal of carbon-neutral growth and allows aircraft operators to claim emissions reductions from the use of SAF, provided they deliver at least 10% in greenhouse gas savings and are not made from biomass obtained from land with high carbon stock.

Offsets currently permitted are those from the American Carbon Registry ("ACR"), Architecture for REDD+ Transactions ("ART"), the UN Clean Development Mechanism, China's GHG Voluntary Emission Reduction Program, the Climate Action Reserve ("CAR"), the Gold Standard and the Verified Carbon Standard ("VCS"). Only credits that were generated for offsetting activities that occurred between 2016 and 2020 will be permitted for use in the pilot phase.

Table 9: Overview of CORSIA

Stage	Pilot Phase	First Phase	Second Phase			
	2021-23	2024-26	2027-29	2030-32	2033-35	2036 onwards
Monitoring CO_2 emissions	Mandatory for all ICAO members					
Obligation to reduce CO_2 emissions	Voluntary participation by ICAO member countries (193 nation-states as of October 2022)		Mandatory for all ICAO members to participate, except for some exempted countries			
Method of prorating the excess	Offset the industry-wide exceedance from the standard value by the participating countries			Factoring in individual companies (over 20%)	Factoring in individual companies (over 70%)	Factoring in individual companies (100%)

Source: ICAO

High-quality offsets that remove additional carbon from the atmosphere are extremely rare. Credits based on avoiding emissions made up 96% of all contracts issued in 2020, mostly by seeking to prevent trees from being cut down or

supporting renewable energy projects. Additionally, Brussels-based NGO Transport & Environment (T&E) claims that with CORSIA, only 0.4% of operating costs for a transatlantic flight will be taken up by purchasing carbon credits. In contrast to the EU's ETS scheme, 7% of transatlantic flight operating costs would be covered by carbon credits if the scheme were to be applied to non-EEA flights.

As of 28 September 2022, members of the 193-nation International Civil Aviation Organization ("ICAO") are under pressure to reach consensus to change the baseline of the UN aviation agency's landmark CORSIA and are weighing an industry backed goal of net zero emissions by 2050. This will be up for review in 2025, as speakers broadly agreed that the current level of ambition was not stringent enough to be compliant with a Paris Agreement warming trajectory.

There have been greater moves to develop Singapore as a green financing and carbon trading center. Climate Impact X ("CIX"), jointly established by DBS Group Holdings Ltd, Singapore Exchange, Standard Chartered PLC, and Temasek Holdings (Private)Ltd in 2021, is a global exchange and marketplace for high quality carbon credits. The launch of CIX's Project Marketplace, a platform that will allow firms to discover, compare and purchase carbon credits from various projects around the world, will allow businesses of all sizes to gain access to the voluntary carbon market.

Customer and Investor Trends

Consumers are becoming increasingly conscious of the environmental impact of air travel. In a McKinsey survey in 2021, around 54% of respondents said aviation should "definitely become carbon neutral" in the future, and more than 30% of respondents have paid to offset their CO2 emissions from air travel. Additionally, almost 40% of travelers globally are willing to pay at least 2% more for carbon-neutral tickets, and 36% plan to fly less to reduce their climate impact.

However, such trends differ in each market and demographic. The survey found that passengers in the UK, US, and Saudi Arabia, for example, were more likely to feel "flygskam," (shame about flying) while those in Spain, Poland, and Australia felt significantly less guilty about flying. Evidently, consumers from certain markets may reward airlines that meet rising demands for environmental sustainability more than others.

Investors are also becoming increasingly concerned about the effects of climate risk on airline valuations, with climate-related financial disclosures becoming more common. The frequency of climate-related discussions in European earnings calls with investors increased nearly sevenfold since 2017, according to HSBC data. At the same time, because of increasing consumer pressure, institutions and governments are also announcing policies on CO2 or SAF. In 2018, Norway mandated that 0.5% of aviation fuel in the country must be sustainable by 2020, growing to 30% by 2030. It also decreed for all short-haul flights to be 100%electric by 2040. Additionally, Canada implemented a carbon tax of 30 Canadian dollars (~USD21) per metric ton of CO2 in most of its regions, based on the amount of loaded fuel for domestic travel.

In November 2021, Australian airline Qantas Airways Ltd ("Qantas") launched a new "green tier" within its loyalty program, designed to "encourage, and recognize the airline's 13 million frequent flyers for doing things like offsetting their flights, staying in eco-hotels, walking to work, and installing solar panels at home". Qantas expects to see 100,000 of the airline's 13 million Frequent Flyer members achieve this membership within the first year. Overall, Qantas has also found that 11% of its travelers tick the carbon offset box when booking their flight, for which they earn 10 Qantas Points per dollar, with the airline matching those contributions on a dollar-for-dollar basis.

Collaboration with other Industries

Corporate customers also increasingly turn to airlines for ways to reduce scope-3 emissions incurred from their employees' business travel. As part of its 2030 SAF goals, Bank of America has in place a partnership with several organizations to support its SAF efforts, and in February 2022, was the first global financial institution to set a SAF usage and capital deployment goal. This involves a three-year agreement supporting the purchase of one million gallons of SAF annually for 2021-2023. To date, this is the largest publicly announced SAF agreement by volume between an airline and corporate customer for reducing emissions for employee travel.

Australia and New Zealand Banking Group ltd also has in place a partnership with Qantas, as part of its commitment to fund and facilitate low carbon and sustainable solutions. For instance, the duo has a collaboration with INPEX, one of Japan's largest energy companies, in Western Australia's Wheatbelt region to integrate native reforestation and carbon farming with the production of biomass for renewable biofuels. This large-scale integrated forestation and

carbon farming program that will generate offsets to help meet the airline's emissions targets and provide a source of renewable biofuels production.

Decarbonising the power sector towards a low-carbon future

Assisted by Phoon Ruei

Overview

With the power sector accounting for around 40% of total emissions in Singapore according to the Energy Market Authority ("EMA"), reducing carbon emissions in the power industry is crucial if Singapore wants to reach its 2050 net zero carbon climate goal. Transitioning towards a more sustainable future for the power sector will likely include an increase in energy production efficiency, the rise in solar power use and the importing of clean energy through regional power grids as some of the immediate trends in power generation. Future trends may include hydrogen power, carbon capture technology and nuclear power. There may also be possible risks during this transition period including the risk of stranded assets.

Industry overview

Singapore's power industry can be divided into three segments: generation, distribution, and transmission, and retailing of electricity.

Electricity is generated by power plants run by power generation companies. The seven main generation companies, or gencos, in Singapore include: Tuas Power, Senoko Energy, YTL PowerSeraya, Keppel Merlimau Cogen (jointly owned by Keppel Infrastructure Trust as well as Keppel Corporation Ltd ("KEP," indirectly via KEP' subsidiary)), Sembcorp Cogen (owned by Sembcorp Industries Ltd ("SCI")), PacificLight Power, and Sunseap.

Power distribution and transmission in Singapore is largely managed by Singapore Power Limited or SP Group and its subsidiaries ("SP Group"). SP Group is 100% owned by Temasek, an investment holding company that is in turn 100% owned by the Singapore government. SP PowerGas is the sole licensed gas transport and system operator. As the owner of all of Singapore's gas pipelines, they deliver gas to users through its gas pipe network. As the holder of the Transmission License and owner of Singapore's electricity transmission and distribution network, SP PowerAssets Ltd is the lone provider of electricity transmission and distribution services in Singapore. The electricity network is also managed and operated by another of SP Group's subsidiaries, SP PowerGrid.

In Singapore's electricity retail market, SP Services of SP Group sells electricity directly to non-contestable consumers while electricity retailers sell to contestable consumers. With the liberalisation of the Electricity Retail Market in 2018, one would expect an increase in competition. However, given the economies of scale and financial resilience required of retailers to ensure their ability to provide services over a long term, the market has developed in a way where the main players left in the market are the retail arms of power generation companies. Some retailers left in the market include: Geneco (by Seraya Energy Pte Ltd), Keppel Electric Pte Ltd, Sembcorp Power Pte Ltd, Senoko Energy Supply Pte Ltd, and Tuas Power Supply Pte Ltd.

Sustainability trends

Immediate trends

Over the last 50 years, Singapore has moved from oil to natural gas as its main source of power generation. Currently, around 95% of Singapore's electricity is generated from natural gas (EMA, 2022), which is already considered to be one of the cleanest forms of fossil fuels. Additionally, recent years have also seen a rise in the use of solar energy. Even with a large majority of Singapore's electricity generated from a relatively clean form of fossil fuel, and a falling Grid Emission Factor ("GEF"), which measures average CO_2 emissions emitted per MWh of electricity generated, the power sector still remains one of the major sources of carbon emissions.

With Singapore's vulnerability to the consequences of climate change, it comes as no surprise that Singapore has such a strong vested interest in tackling climate change. Nowhere is this interest more evident than in Singapore's participation in the United Nations Framework Convention on Climate Change. In 2009, under the Copenhagen Accord, Singapore pledged to reduce emissions by 16% from business-as-usual levels by 2020. In 2015 under the Paris Agreement, Singapore further pledged to reduce Emission Intensity ("EI"), the amount of greenhouse gasses emitted per dollar GDP, by 36% from 2005 levels by 2030 and stabilise greenhouse gas emissions, aiming to peak around 2030. In October 2022, Singapore announced that it would achieve net zero emissions by 2050, in line with the Glasgow Climate Pact signed at COP26 in November 2021.

In line with Singapore's climate goals, the Carbon Pricing Act ("CPA") and its accompanying regulations were introduced on 1st Jan 2019. Under the CPA, reportable facilities will have to pay a carbon tax from 1st Jan 2019 onwards for reckonable GHG emissions. The carbon tax is currently set at a rate of SGD5/tCO_2e from 2019 to 2023. The carbon tax rate is expected to be raised to SGD25/tCO_2e in 2024 and 2025, SGD45/tCO_2e in 2026 and 2027, with a view to reach SGD50-80/tCO_2e by 2030. Due to their status as reportable facilities under the definitions set out in the CPA, power generation companies and electricity retailers, the backbone of Singapore's power industry will have to bear these rising carbon taxes in the years to come, especially if they are unable to pass down the full cost to consumers. As such, with this rising pressure to reduce carbon emissions on the part of power generation companies, we can expect that the power industry will begin to pivot away from its current methods of electricity production towards low-carbon power generation methods and alternatives.

Energy production efficiency

Given the pressure that power companies face to reduce their carbon emissions, it may seem like low-carbon alternatives such as hydrogen, ammonia, and even nuclear should be the next step. However, there are gaps and uncertainties in the immediate adoption of some of these alternatives such as a lack of infrastructure, technological readiness, commercial viability, and security of supply of raw materials. With the industries of these low-carbon alternatives still in their infancy, natural gas is still needed, at least in the near future, to ensure a reliable supply of electricity as Singapore transitions to cleaner sources of renewable energy. In the meantime, we can expect a trend of power generation companies improving the efficiency and sustainability of their gas-fired power generation.

Over the next five years, power plants that supply over one quarter of Singapore's total power generation capacity are expected to reach the end of their life span (Straits Times, 2022). Given the likelihood that Singapore will continue to remain reliant on natural gas as an energy source for now, investing in newer and more efficient advanced Combined Cycle Gas Turbines ("CCGTs") is crucial to Singapore's goals of reducing carbon emissions and improving generation efficiency, especially in the near term.

We are already seeing the EMA supporting the improvement of the overall generation efficiency of existing CCGTs, launching an Energy Efficiency Grant Call for Power Generation Companies ("Genco EE Grant Call") in 2018 and a subsequent round of grant call in 2021 (EMA, 2022). This grant call reimburses power generation companies up to 50% of the qualifying costs including equipment, materials and consumables, technical software, and professional services to improve overall generation efficiency and achieve carbon abatement.

In 2020, the EMA awarded four gencos a total of SGD23 million through the Genco Energy Efficiency Grant to take on energy efficiency projects to reduce their carbon emissions. It is expected that the completed projects would achieve carbon abatement of more than 30,000 tonnes per year, which is roughly equivalent to removing around 9,200 cars off roads annually. Additionally, in 2021, PacificLight Power was one of the recipients of the Genco Energy Efficiency Grant and was able to contract Siemens Energy to implement the latter's Advanced Turbine Efficiency Package ("ATEP") to its power plant. Siemens Energy claims that their ATEP is able to deliver higher operational efficiency and significantly reduce carbon emissions equal to around 18,100 tonnes of CO_2 a year, which would cement PacificLight Power's 800MW Jurong Island plant's status as one of the most efficient gas plants in Asia. Additionally, PacificLight Power also signed a long-term service agreement with Siemens Energy which would increase the operational life span of the plant through upgrades. PacificLight Power's CEO, Yu Tat Ming, claims that the ATEP, coupled with various other energy efficiency improvements that the company has implemented, is expected to reduce their annual carbon emissions by over 40,000 tonnes per year, which is roughly equivalent to supplying over 20,000 Singaporean households with carbon-neutral electricity. These upgrades were slated to be completed in 2023 and 2024.

While improving the efficiency of current gas plants contributes to the reduction of Singapore's carbon emissions in the short term, this trend has some limitations, one of which is that improvements in technology to bring about lower carbon emissions are not available for all of Singapore's current sources of energy. The Tembusu Multi-Utilities Complex ("TMUC") is the first and only coal-burning utility plant in Singapore and its supply makes up around 1% of Singapore's power generation capacity. The plant only employs a mix of both low ash and low sulphur coal (clean coal) and biomass to account for environmental concerns, but when compared to gas plants, the plant's method of power generation is significantly more carbon intensive, producing twice as much carbon dioxide to natural gas. While it is technically possible to reduce carbon emissions of the plant by switching to 100% biomass and phasing coal out completely, the lack of domestic biomass resources as well as the lower calorific value of biomass compared to coal makes phasing out of coal in the short term impractical and costly (CNA, 2021). While technology has the potential to help decrease Singapore's carbon emissions in relation to its gas plants as the nation pivots toward low-carbon alternatives, we have to acknowledge that the same improvements in energy efficiency are simply not feasible for all

sources of power, particularly coal. It is doubtful if the improvement of energy production efficiency alone is sufficient to achieve carbon emissions reductions that is in line with the overall national target, especially when we also consider that the energy production efficiency of gas plants may eventually plateau.

Rising risk of existing plants becoming stranded assets

As much as technology is able to improve the efficiency of Singapore's energy production, we also need to acknowledge that this trend is merely a transition stage. With the two-fold pressure of rising energy demands and the rigid timeframe to reach climate goals, the transition away from natural gas toward low-carbon alternatives introduces one key risk, which is the risk of current gas and fossil fuel centric energy production assets becoming stranded assets. Singapore's stance on gradually phasing out the use of fossil fuels as a source of power and aiming to achieve net zero emissions by 2050, signals to us that the next 10-20 years may entail massive overhauls in the power sector with large shifts away from the use of natural gas toward renewables. Consequently, we could expect that Singapore will inevitably have to switch off its younger gas plants before they reach the end of their lifespan. With significant funds and resources diverted to improving the energy efficiency of these plants presently, the power sector is faced with the potential risk of having a significant proportion of its assets and the additional improvements invested in these assets becoming obsolete.

Solar power

Often touted as the most promising source of renewable energy in Singapore, it is no surprise that solar power has seen a meteoric rise here over the last few years. From 2015 to 2020, the installed capacity of grid-connected solar PV systems or the maximum amount of electricity able to be produced grew significantly from 59.3 MWp (megawatt peak) to 443.6 MWp. By 2030, Singapore plans to expand solar PV production to 2 GW, which is over six times that of the current installed capacity, making up around 3% of Singapore's total electricity demand in 2030 (EMA, 2022). These goals are backed up by a significant push in the development and deployment of solar power projects from not only the Singapore government but companies as well.

Singapore clean energy genco, Sunseap (now 91% owned by Euronext-listed EDP Renewables), managed to secure an SGD85mn green loan from DBS Group Holdings Ltd ("DBS") and United Overseas Bank Ltd ("UOB"), with each bank providing half of the loan for its SolarNova 4 project. This loan is not the first time either bank has provided green financing to the company. The project is the largest clean energy project in Singapore's history, and is estimated to generate more than 90,000 MWh, which is roughly equivalent to supplying power to 20,400 4-room HDB flats, potentially offsetting more than 68,583 tonnes of carbon emissions per year (Sunseap, 2022). The loan uses Sunseap's green financing framework and is in line with the International Capital Market Association's Green Bond Principles 2018, the Loan Market Association's Green Loan Principles 2018, and ASEAN Green Bond Standards 2018.

With the rise in green financing supported by the banks as well as the government through various schemes such as the Enterprise Financing Scheme-Green ("EFS-Green"), we will continue to see a rise in sustainable projects, which would include an increase in solar PV projects like the SolarNova 4. The availability of funding as well as grant eligibility for companies is a significant step forward when it comes to the large-scale development and deployment of solar PV systems due to the high upfront costs associated with solar projects. Most of the solar PV installation projects planned for 2019 to 2030 are under government efforts under the SolarNova project led by the Housing Development Board ("HDB") and the Economic Development Board ("EDB"), with the goal of achieving economies of scale and accelerating the growth of Singapore's solar industry.

Addressing technological constraints of solar: Land scarcity

Another contributor to the rise of solar power in Singapore would be advancements in technology that address previously held concerns regarding the wide-scale adoption of solar power such as land scarcity and solar energy storage. While most PV solar panels in Singapore currently are largely out of sight, usually placed on rooftops, the utilisation of vertical spaces for solar PV installations has become increasingly prevalent. With less land mass required to house solar panels, solar power is becoming increasingly feasible here in Singapore. For example, the newly opened PSA terminal at Tuas port is integrated with photovoltaics, with vertical solar panels cladding the building's façade. The building was awarded the Green Mark Award (Platinum) and categorised by Singapore's Building and Construction Authority as a 'Super Low Energy Building.' The Tuas Maintenance Base Admin Building in particular is estimated to use 58% less energy compared to other small-sized buildings annually due to its various energy-saving and energy-efficient features. It will also be one of the first net-zero energy buildings in Singapore due to its solar panel clad exterior and roof solar panels. Additionally, another way Singapore has overcome land constraints with respect to solar projects is by deploying solar PV panels over water bodies to create floating solar farms. Consisting of 122,000 solar panels and spanning 45 hectares, the 60 MWp floating solar farm on Tengeh Reservoir opened in 2021 and is

one of the largest floating solar farms globally with the potential to offset over 4,000 tonnes of carbon dioxide annually. With advancements in solar technology, we can expect that solar power will be increasingly integrated into Singapore's cityscape.

Addressing technological constraints of solar: Storage

The storage of solar energy is another complication in the large-scale adoption of solar power in Singapore. Unlike traditional fossil fuels, solar energy is a lot less predictable in terms of production. Seasonal fluctuations or even hour to hour changes in the weather or even cloud cover can affect energy production, and not to mention that solar energy can only be produced in the day. Resultantly, energy storage and its associated costs are long considered to be the pitfalls of solar power. However, with game-changing technology in Energy Storage Systems ("ESS"), Singapore is one step closer to not only addressing the issue of solar intermittency but also to enhancing power grid resilience to manage the mismatch between power supply and demand. Recently, SCI was awarded an expression of interest ("EOI") issued by the EMA to build 200Mwh of battery storage systems on Jurong Island and is expecting to complete the battery energy storage system ("BESS") towards the end of 2022. The energy storage system has the potential to serve different functions over the two phases of its lifespan. The EOI details that in the first two years of its lifespan, the battery storage system is expected to provide spinning reserves to free up CCGT for power demand and supply management as Singapore continues to be reliant on natural gas as a source of power during the transition towards renewable energy. Thereafter it is also expected be used to mitigate solar intermittency and ensure grid reliability by providing frequency regulation for the remaining of its lifespan (EMA, 2022). Advancements in ESS technology is key to addressing solar intermittency and crucial for the long-term success of large-scale adoption of solar power in Singapore. With the EMA promoting the development of ESS through various incentives like the EOI, the Accelerating Energy Storage for Singapore (ACCESS) programme, and the Energy Storage Grant Call, we can expect EES and consequently solar power adoption to increase over the next few years.

Promising source of renewable energy but comes with waste

As bright as the future of a solar powered Singapore may seem, the ramping up of solar energy deployment to meet Singapore's climate goals is not without a downside. The co-founder and chief executive of EtaVolt, a solar tech firm, Dr Stanley Wang estimates that within the next two years, an estimated 5,000 tonnes of photovoltaic waste may be generated. High quality solar panels typically have a lifespan of around 20 to 25 years. However, beyond the 10-year mark, they generally are around 10% to 15% less efficient. As such, solar panels are expected to be deployed now to be replaced within seven to ten years or even shorter if they are damaged (Straits Times, 2022). Solar panel waste is particularly concerning not only because it is difficult to recycle, given that the glass of most PV modules is tainted with problematic impurities such as plastics, lead and cadmium, but also because solar panels contain toxic materials that bleed out as they break down. The combination of solar panels' short lifespan, its delicate nature, the difficulty in recycling PV modules, and the toxic waste they leave behind creates a perfect storm to introduce a slew of new environmental problems (Forbes, 2022). With the world potentially facing up to 78 million tonnes of photovoltaic waste by 2050, there is a dire need for improvements in solar panel recycling technology and the recycling process to avoid the swapping out of one climate crisis for another due to the rising trend of solar power.

Regional power grids

With no hydro resources, low wind speeds and mean tidal range, and limited land capacity, many traditional renewable options such as hydro power, wind power and geothermal energy are less viable in Singapore. However, there is still a way for Singapore to be able to access these cleaner forms of energy to stay in line with its national climate goals - Regional power grids. Singapore recently began importing renewable energy through the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP) for the first time and will continue to do so over the next two years. The LTMS-PIP currently imports up to 100MW of hydropower from Lao PDR to Singapore, which is roughly equivalent to 1.5% of Singapore's 2020 peak electricity demand (Straits Times, 2022). The purchase agreement between local electricity retailer and licensed importer Keppel Electric Pte Ltd (wholly owned subsidiary of KEP), and Lao's state-owned Electricite du Laos (EDL) marks the first multilateral cross-border electricity trade between four ASEAN countries. The integration project has the potential to further facilitate the development of a regional energy market and acts as a stepping stone towards the broader goal of an ASEAN power grid ("APG"), allowing for multilateral electricity trading in the region beyond neighbouring countries.

Beyond the LTMS-PIP, Singapore's effort to expand access to renewable energy in the region also includes conducting two rounds of Request for Proposal (RFP), RFP1 and RFP2, to import up to four gigawatts (GW) of renewable energy by 2035. Solar, wind, hydro, and geothermal power from countries in the region such as Indonesia, Laos, Malaysia, and Thailand are estimated to supply up to 30% of Singapore's projected electricity needs in 2035 (EMA, 2022). Under

the second round of RFP (RFP2), the potential importers are required to demonstrate their ability to supply and manage the carbon output of their power generation, ensuring that emissions do not exceed 0.15 tCO_2e/MWh per year within five years of operations. To put this reduction in carbon emissions into perspective, Singapore's current average emission intensity is around 0.4080 tCO2e/MWh. Additionally, over the last two years, the EMA has been working with various partners aside from KEP on trials to import electricity, which helps EMA in the assessment and refinement of the frameworks and processes of importing electricity, ensuring that Singapore is ready to ramp up the importing of energy on a larger scale. Singapore may import power from Australia in the future via an undersea cable. As of November 2022, an Australian solar energy infrastructure company called Sun Cable has submitted a proposal for discussion with EMA (CNA, 2022).

The recent efforts in establishing frameworks for the importing of clean energy signals to us that we can expect regional power grids to play a larger role in Singapore's future of renewable energy. Moreover, with gencos like Keppel Electric Pte Ltd, YTL PowerSeraya Pte Ltd, and PacificLight Power Pte Ltd assuming the role of importers of energy from regional power grids, we can also expect that Singapore gencos will continue to expand and develop their infrastructure to better prepare for the ramping up of clean energy imports.

One of the distinguishing features of tapping into regional power grids as a source of clean energy is that the importing of energy is cost effective from Singapore's perspective. Regional power grids allow countries that have a surplus of renewable energy to trade with countries that lack the resources. With limited land mass and a lack of natural resources putting a cap on Singapore's ability to generate enough energy from renewable sources to meet its energy demand, Singapore is a prime example of a country that would benefit greatly from regional power grids. Given that increasing the carbon efficiency of natural gas plants is only expected to reduce carbon emissions by 10% (MTI, 2022) at best and that even if Singapore were to maximise all available spaces for solar deployment, Singapore would not be able to meet its energy demand, only relying on local sources of clean energy to meet climate goals could result in a strain to energy supply, inadvertently driving energy prices up. With the ability to import clean energy, Singapore would be able to tap on the abundance of clean energy from renewable energy powerhouse neighbours.

Regional power grids can potentially provide energy consistency and reliability

Regional power grids also have the potential to provide Singapore with energy consistency and reliability that simply cannot be achieved by only relying on local sources of clean energy. Given Singapore's resources, the only feasible local source of renewable energy is solar energy and considering both solar power's proclivity to be unreliable and less effective under certain weather conditions such as overcast and high temperatures and that solar energy systems only operate during the day, a lack of diversification in Singapore's clean energy sources introduces variability and systematic risk to energy supply. Importing energy however allows for Singapore to tap into the different advantages each country has in their renewable sources and technologies. Within the South-east Asia region itself, countries such as Laos, Indonesia and Vietnam generate a large proportion of their energy from various sources such as hydropower, geothermal energy, and wind power. Having access to a diverse mix of clean energy sources and consequently energy imports is crucial in ensuring that energy supply is kept consistent and reliable as Singapore transitions towards low-carbon energy sources.

……however, exposes Singapore to supply shocks

It should be noted that relying on cross-border trade for energy could expose Singapore to supply shocks in the case where export bans are put into place. In October 2021, Malaysia announced that they were barring exports of renewable energy to Singapore citing the need to develop its local renewable energy industry in order to meet their domestic sustainability targets (Straits Times, 2022). At that point in time, the EMA was weeks away from finalising plans of a two-year trial agreement to import 100 megawatts of low carbon electricity from Malaysia. This sudden ban in exports of renewable energy illustrates how reliance on imports to meet renewable energy supply exposes Singapore to the risks of supply shocks stemming from export bans from key trading partners and illustrates the limitations of regional power grids in Singapore's future of renewable energy. This could drive Singapore to export more than what is necessary to ensure a reserve of energy supply to avoid supply shocks.

Long-term trends

Singapore's current efforts in reducing carbon emissions are insufficient to meet its long-term goals of achieving net zero emissions by 2050. With the power industry focusing on a switch towards low carbon alternatives and with 2050 still some time ahead, we can expect that the switch to low-carbon energy sources will only happen in the medium-to-longer term. However, Singapore has started to explore the use of new low-carbon sources of energy, particularly in hydrogen power, carbon capture technology, and nuclear power. We expect a higher level of development in these areas in the coming years.

Hydrogen power

Hydrogen power involves the use of hydrogen or hydrogen compounds to generate electricity, while only producing water as a by-product. Since the process does not emit any CO_2, hydrogen power is expected to be pivotal in the decarbonization of power. Like oil or gas, hydrogen can be piped and transported, but it has a higher energy density meaning than it contains approximately three times more energy compared to oil and gas. About 70 million tonnes of hydrogen are produced each year, largely used in oil refining, and making ammonia fertiliser. While the process of generating electricity using hydrogen is carbon free, the carbon emissions of producing hydrogen largely depend on the type of production used.

The main types of hydrogen are green, blue, and grey hydrogen. Green hydrogen is produced through the electrolysis of water using renewable energy, without producing any harmful greenhouse gases and is therefore a carbon-free process.

Currently, green hydrogen only makes up a small proportion of overall hydrogen. As a whole, hydrogen production is generally still a carbon generating process. Blue hydrogen is produced from natural gas by steam reforming, where natural gas and heated water are combined to produce steam, with carbon dioxide as a by-product. The carbon dioxide is then trapped and stored. While blue hydrogen is considered to be 'low-carbon hydrogen', the process of producing blue hydrogen is still carbon emitting. Grey hydrogen is essentially produced in the same way as blue hydrogen, but the carbon is not trapped and stored during the process. Blue and grey hydrogen make up 95 percent of all hydrogen produced today.

Since hydrogen power does not emit carbon when generating electricity, many regard it as the 'ultimate clean fuel.' Coupled with the fact that it is more efficient than many other energy sources, it is a promising method of energy production as Singapore seeks to reach net-zero emissions by 2050. Singapore has already begun directing its resources toward hydrogen fuel. In early-2020, with the support of the National Research Foundation ("NRF") and the Maritime and Port Authority of Singapore ("MPA"), five Singapore and two Japanese companies signed a signed a memorandum of understanding ("MoU") agreeing to develop new ways to use hydrogen as an energy source (Straits Times, 2022). The five Singapore companies are PSA Corporation, Jurong Port, City Gas, SCI, Singapore LNG Corporation, and the two Japanese companies are Chiyoda Corporation and Mitsubishi Corporation. The five Singapore companies will focus on evaluating and developing a business case for the feasibility of hydrogen imports and use in Singapore. Additionally, publicly funded researchers will also be working with the companies to study how technologies can be further developed for the large-scale use of hydrogen as an energy source.

Beyond research, Singapore has also begun investments in hydrogen power infrastructure. By the first half of 2026, Singapore is expected to have its first hydrogen-ready power plant ready. The Keppel Sakra Cogen Plant is slated to be built on Jurong Island and is expected to produce up to 600Mw of electricity, which is approximately 9% of Singapore's 2020 peak electricity demand and can be run completely on hydrogen in the future (Straits Times, 2022). Though the KEP-owned CCGT power plant can be run entirely on hydrogen, it is expected to run on natural gas for now, and possibly on 30% hydrogen in the future. The ability to adjust the proportion of hydrogen used in current methods of energy production underscores the ease at which hydrogen can be easily incorporated into current energy production processes.

Hydrogen is efficient but green hydrogen is expensive

The general consensus is that one of the biggest threats to the success of large-scale adoption of hydrogen power is the current lack of infrastructure and high costs of manufacturing green hydrogen. While hydrogen can be imported through pipelines, it can only be done over short distances, and while it is possible for hydrogen to be converted into a liquid chemical carrier and then be transported, more research needs to be done to extract the hydrogen from the carrier (Eco-Business, 2022). Additionally, given Singapore's lack of local green hydrogen production, importing green hydrogen will yet again expose Singapore to supply shocks from export bans similar to regional power grids. Attempting to produce green hydrogen locally will again call into question Singapore's ability to produce energy from renewable sources, keeping in mind that green hydrogen is produced from renewable sources only. Singapore's ability to scale up its supply of green hydrogen is hindered by the limitations in hydrogen transportation technology and lack of domestic renewable sources of energy required to produce green hydrogen. Singapore's lack of green hydrogen supply chain infrastructure is the bottleneck in the large-scale adoption of hydrogen power.

The future of hydrogen fuel is particularly encouraging given that it can be easily incorporated into the current methods of energy production. The ability to gradually increase the use of hydrogen as an energy source without the need for a complete overhaul of infrastructure limits the risks of stranded assets, and also allows for a smooth shift

towards zero-carbon sources of energy in line with Singapore's transition timeline. Though promising, the hydrogen power industry is still in its infancy. With a steady and reliable source of green hydrogen not yet established, a lack of hydrogen power generation infrastructure, and limited research and technology in the transporting and handling of hydrogen, it is likely that we will only see hydrogen power play a larger role in Singapore's clean energy supply further into the future. The future of hydrogen power in Singapore is reliant on the developments of the green hydrogen supply chain.

Carbon capture technology

Other than reducing the amount of carbon emitted during the power generating process, another way of reducing carbon emissions in line with Singapore's longer term climate goals is through carbon capture technology. There are two main uses of carbon capture technology in the reduction of carbon emissions, Carbon Capture and Storage ("CCS") and Carbon Capture, Utilisation and Storage ("CCUS"). Both processes start with carbon dioxide being separated from other gasses emitted during the energy generation process, then compressed to be transported. In CCS, the carbon dioxide is transported to a storage site where it is finally pumped underground to be permanently stored where geologically suitable. In CCUS, the carbon dioxide is transported to be re-used in industrial processes. CCS and CCUS are unique when compared to the other methods of carbon emission reduction we have explored in that they have the potential to remove carbon from the atmosphere and generate 'negative emissions' on a large scale.

Largely still in the R&D phase

By 2030, Singapore is targeting to realise up to 2 million tonnes of carbon capture potential, but the general consensus is that the processes and technology of CCS and CCUS are still in the beginning stages of development (NCCS, 2022). In Singapore, discussion around both CCS and CCUS are limited to feasibility studies and research projects, far removed from any concrete investment plans thus far. This indicates that the reduction in overall carbon emissions due to CCS and CCUS technology is more likely to be realised further into the future. Nevertheless, Singapore has increased its efforts in the development of carbon capture technology through conducting various feasibly studies and funding research and development of carbon capture technology in 2022. For example, KEP, Air Liquide, Chevron and PetroChina signed an MoU in September 2022 to evaluate and advance the development of large-scale CCUS solutions and integrated infrastructure in Singapore.

According to the study 'Carbon Capture, Utilisation, and Storage: Decarbonisation Pathways for Singapore's Energy and Chemicals Sectors,' which was jointly commissioned by the National Climate Change Secretariat (NCCS) and the EDB, one potential hurdle for Singapore when it comes to CCS would be the lack of sub-surface carbon dioxide sequestration options, meaning that Singapore lacks suitable underground storage sites to store compressed carbon. Consequently, Singapore will eventually have to turn to neighbouring ASEAN countries like Indonesia, Vietnam, and Thailand to export carbon dioxide for sequestration. When considering the export of carbon dioxide, it is important to keep in mind that cross-border transport of carbon dioxide can be expensive, and that for the export of carbon dioxide for sequestration to be cost-effective, there needs to be a secure supply of carbon dioxide. The under-utilisation of transport and storage assets can easily drive-up costs and threaten the commercially viability of CCS deployment. As such, the cost-effectiveness of CCS will largely be dependent on the secure supply of carbon dioxide. Additionally, the transport of carbon dioxide is a complex process, and more research needs to be done on safe and effective modes of carbon dioxide transport. The study also documents similar issues of cost-effectiveness in CCU technologies. Most CCU technology projects with substantial abatement potential require large amounts of hydrogen and ammonia and the availability and costs of these low-carbon commodities in the future are largely uncertain. Additionally, the study also determined that there needs to be significant cost reductions and technological developments of current CCU technologies before it can be commercially viable. From the feasibility study, it is clear that the large-scale deployment of CCS and CCU technologies is not commercially viable for now, and will not be for some time, and that the largest barriers that CCS and CCU technologies face are the high up-front costs, cost-ineffectiveness, and limitations in research and development.

There have yet to be any concrete steps taken in the development and deployment of CCS and CCUS technology, and not without good reason. The unestablished supply chain of low-carbon commodities such as hydrogen and ammonia that are required for most CCS and CCUS processes, the limited amount of research that has been done on CCS and CCUS technology, and cost ineffectiveness of current technologies prevent the large-scale adoption and deployment of CCS and CCUS. As Singapore transitions towards net-zero carbon emissions, the role of CCS and CCUS technology will be contingent on the success of current research projects in the long term.

Nuclear power

Once thought unsuitable for Singapore due to safety and reliability concerns, nuclear energy in more recent times has been identified as another potential source of clean energy that Singapore can tap on. Nuclear power plants heat up water to produce steam. The steam is then used to spin the blades of turbines which in turn produce energy. The water is heated up in a process called nuclear fission, which is a reaction where atoms, usually uranium atoms, are split apart to form smaller atoms which releases energy. Nuclear plants then cool the steam back into water, which can be reused to produce steam.

Nuclear power plants do not produce greenhouse gases during the energy generation process, making nuclear power a potential source of energy moving forward as Singapore transitions toward net-zero carbon emissions. Additionally, nuclear plants are able to generate large amounts of energy consistently for months at a time without interruption, operating at a much higher capacity factor (measures the percentage of time a power plant produces electricity) than most renewable energy sources and fossil fuels. In the United States in 2021, nuclear power's capacity factor ranked the highest among all energy sources, at 92.7% (U.S. Energy Information Administration, 2022), meaning that nuclear power plants were able to produce electricity 92.7% of the time. Other sources of alternative energy lagged behind, with geothermal power, hydro power, and solar power at 71%, 37.1%, and 24.6% capacity factors, respectively. Even when compared to fossil fuels, with coal and natural gas combined cycle at 49.3% and 54.4% (U.S. Energy Information Administration, 2022) capacity factors respectively, nuclear power was the most reliable source of energy. Furthermore, given the extreme density of nuclear fuel, nuclear energy has a smaller land footprint when compared to other sources of clean energy, being able to generate the same amount of power as solar facilities with 31 times less land, and wind farms with 173 times less land (NEI, 2022). The reliable source of clean energy and the small land mass required of nuclear power makes it a viable choice of clean energy for land and resource scare Singapore.

Recently, a report commissioned by the EMA highlighted nuclear power could make up to 10% of Singapore's energy mix by 2050. Over the years, there have been significant advancements in nuclear technology and safety to make the energy process safer and more reliable. According to the World Nuclear Association and United Nations Environment Programme, an individual is exposed to more radiation during an x-ray than being in close proximity to a nuclear power plant. Studies also have shown that death rates from the production of nuclear energy are somewhat comparable to modern renewables like solar power, wind power, and hydropower and are much lower than that of fossil fuels (Nanyang Technological University, 2022). Moreover, the number of accidents in nuclear plants have been low and steadily declining (World Nuclear Association, 2022). The total death estimates, both direct and indirect, as a result of nuclear energy is 0.07 deaths per terawatt-hour, which is significantly lower than the four deaths per terawatt-hour that natural gas has. (Our World in Data, 2022).

Much like CCS and CCUS technology, nuclear power, in Singapore at least, is still in the research and development phase. Back in 2014, Singapore launched a programme for research and education in nuclear safety, science, and engineering, setting aside a total of SGD63 million for the programme. Singapore's Energy 2050 Committee also projected that by late 2030s, commercial small modular reactor designs and units will be developed abroad and made available worldwide. These developments could allow Singapore to deem nuclear power as a viable source of energy and begin developing domestic generation capacity by the 2040s. (EMA, 2022)

Negative public perception of nuclear power

One of the largest hurdles that nuclear power faces in Singapore is the issue of negative public perception. While statistics have shown that nuclear power has become one of the safest forms of energy production in recent years, there is still a generally negative sentiment towards nuclear energy in Singapore which is likely a result of the 2011 Fukushima incident as well the Chernobyl incident in 1986 given the severity and long-lasting negative implications. Additionally, nuclear waste is a major environmental concern along with concerns over potential for misuse and impact on national security. It is worth noting that many sustainability and green bond frameworks currently explicitly exclude nuclear power generation from the use of proceeds, a reflection that this energy source is perceived as controversial by countries and investors. A study done by NTU Singapore's Wee Kim Wee School of Communication and Information found that more than half of the survey respondents were against the idea of nuclear energy (NTU,2022). The study found that safety was the key concern affecting the public's support towards nuclear power, and that the construction of a nuclear power plant with enhanced safety and reduced production of radioactive waste could garner greater support from the public (NTU, 2022). The success of nuclear power usage in Singapore is partly contingent on the support of the general public. Hence, alongside developments in nuclear power technology, there should also be an effort to change the negative perception that the general public has pertaining to nuclear power.

Nuclear power's high-capacity factor and small land footprint required makes it a potentially consistent and reliable source of clean energy for Singapore. However, limitations in nuclear power technology as well as the need for further feasibility studies to be done makes it likely that we will not see Singapore adopt nuclear power until 2040s, if at all. It should be highlighted that nuclear power does not share the limitations of many clean energy alternatives such as the need to constantly import raw materials, large amount of land mass required, and the issue of intermittent energy production.

Risks and considerations

Stranded asset risks are no longer theoretical

Beyond looking forward into Singapore's clean energy, it is also important to look at what the major changes in the power industry leaves in its wake. Throughout this piece, the idea of stranded assets was brought up as it is one of the largest potential threats the world faces in its transition to clean energy. A stranded asset is an asset that has suffered from an unanticipated or premature write down, devaluation or a conversion to liabilities. With rapid changes in the power industry due to growing environmental concerns, it is observed that many power-generating assets are beginning to or have already begun suffering unanticipated or premature write downs, devaluations, or a conversion to liabilities.

As the world phases out coal as a power source, we are seeing in real time a large number of coal plants becoming stranded assets. For decades, coal infrastructure was seen as a relatively safe investment, with banks putting up trillions of dollars to finance new fossil-fuel assets. However, in more recent times, this trend has reversed. The costs to finance new fossil-fuel assets, particularly coal projects are rising with some banks announcing policies to stop funding coal plants completely while certain insurers are reducing their insurance underwriting exposure to coal plants. The combination of the pressure to sell off coal assets (before values decline further) and the higher cost of funding for high-carbon projects has resulted in companies divesting from coal assets. While at first glance it may seem that the divestment from coal assets is a step forward in the fight against climate change, we have to consider how the breakneck pace at which companies are selling off their coal assets have unintended consequences to the environment.

As larger and more reputable companies bow to the pressure of investors to divest from their coal assets, these assets usually do not end up properly wound down. Instead they are usually bought by unlisted companies that may not have the same environmental priorities.

The risks of stranded assets are not limited to coal plants. While most current examples of stranded assets are of coal plants, it is reasonable to expect that other fossil fuel plants or even inefficient solar panels will become stranded assets in the future. Considering that most of Singapore's gas plants are relatively new, the oncoming pivot towards low-carbon energy sources may result in heightened risk of stranded assets in Singapore where these newer plants are not used for their designed lifespan.

Case study: SCI – Committed to turning from brown to green with consequences

Recently, SCI transferred its Sembcorp Energy India Limited ("SEIL") unit to Tanweer Infrastructure Pte Ltd at USD1.47 billion where the transaction was structured as a divestment. SEIL is one India's largest power producers, operating two coal-fired plants, generating a total of 2,640 MW of power, supply power to nearly 2.5 million households. SEIL has not announced any plans to wind down the coal plants and will likely continue its 12-year agreement commencing in 2023 to supply 625 MW of power to power distribution companies in India. Many equity investors have lauded SCI for the sale of the unit, calling it a step in the right direction, with SCI's share price soaring to a 4.5-year high of SGD3.50 per share after the transfer of the assets. However, the transaction has received negative attention from the sustainability bond market where the company had been an active issuer of green and sustainability-linked bonds. It remains to be seen if the company will be able to continue accessing the green, social, sustainability and sustainability-linked corporate credit market. While on paper, SCI has managed to turn its portfolio from 'brown to green', the divestment in the unit ultimately allowed the company to offload carbon emitting assets to other owners instead of properly winding down or transforming the asset for a new use. SCI's portfolio may be greener, but the coal plant will continue to produce greenhouse gases. This case study begs the question – Is it enough for companies to simply off load their high carbon assets, and in turn the environmental responsibility, to others? Furthermore, with the sale being funded by a deferred payment note, this essentially allowed SCI to shift the physical carbon emitting asset to a financial asset, earning a greener balance sheet only on a technicality. This transfer is an example of how the developing sustainability-linked bond market could incentivise distortions in the way companies choose to manage their high-emitting assets. A bigger question and perhaps the main one from recent events is that the arbitrage between public

versus unlisted companies remains an unresolved issue in many countries globally. Until such time governments decide to make it mandatory for all owners to wind down their highly emitting facilities overtime or enforce the proper pricing of carbon emissions, the arbitrage is likely to continue given that this business is still profitable otherwise.

Case study: Enel – Decommissioning and transforming plants into new uses but not all exits were green

As the world transitions to clean energy, the ideal scenario is that companies will be able to either transform their fossil-fuel assets into clean energy assets using technology or ensure that their fossil-fuel assets are properly wound down, and there are some companies that have taken efforts to do so. Italian electricity company Enel Spa ("Enel"), one of the largest owners of coal plants in Europe, is an example of a company that has begun pivoting away from fossil-fuel plants, embracing sustainable sources of energy. In September 2022, with the disconnection of the Bocamina II coal plant, Enel became the first company to exit from coal completely in Chile, with plans to exit coal worldwide completely before 2025 (S&P Global Commodity Insight, 2022). Additionally, Enel has also committed itself to the transformation of coal plants for new uses, such as creating renewable energy hubs. In Spain, Enel has plans to transform the Andorra thermal power plant into Europe's largest solar power plant, with additional wind power and battery storage onsite (Enel, 2022). Enel's efforts to create a more sustainable portfolio through not only the decommissioning of their coal plants but also the transformation of former plants into green assets represents the ideal path that power generation companies can take moving forward. However, given the tight timeline, it is unsurprising that not all of Enel's efforts to exit from coal have been as responsibly managed from an environmental perspective.

Enel has also divested some of its coal plants instead. In June 2022, Enel sold its stake in their 327MW gas plant, the Central Geradora Termeletrica Fortaleza facility, to Brazilian energy company Eneva SA. With this sale, Enel officially became 100% renewable in Brazil. Additionally, in October 2022, Enel finalized the sale of its stake in PJSC Enel Russia to PJSC Lukoil and the Closed Combined Mutual Investment Fund "Gazprombank-Frezia", successfully disposing all of its Russian power generation assets that consisted of approximately 5.6 GW of fossil fuel capacity. The buyers have yet to announce any plans to decommission the power plants and are likely going to continue operating these fossil fuel plants. If even a company like Enel, that has a proven track record of successfully decommissioning and transforming their fossil fuel assets, struggles to avoid offloading the responsibility of winding down their fossil fuel through divestment, we can expect that many energy companies will choose divestment as the primary method of removing fossil fuel assets from their portfolio. As pressure mounts for companies to clean up their portfolios in a short amount of time, we can expect more companies to choose divestment over sustainable decommissioning or transformation of fossil fuel assets.

Greening of Singapore REITs Portfolios

Assisted by Teo Tze Yen Danelle

Guidelines have been published that covers asset managers: Sustainability matters concerning asset managers (including Singapore real estate investment trusts ("S-REITs")) have become increasingly important, with schemes and guidelines steering asset managers towards proper management and implementation of environmental risks in their investment decisions, disclosure, and reporting, in the race to net zero. In Singapore, the Monetary Authority of Singapore ("MAS") has rolled out guidelines covering all regulated financial institutions, including banks, insurers, and asset managers to mitigate their environmental risks. The guidelines require asset managers (including REITs), who has authority over the investment of the funds/mandates they are managing, to take the necessary steps to manage environmental risks. Through this guideline, MAS hopes that asset managers can help the economy transition to become more environmentally sustainable through the strategic channelling of funds to green activities. The guideline takes into consideration the different areas that may be affected by environmental risks such as the impact of physical risk to value of assets, volatility on investment portfolios and reputational risks to asset managers.

Greening of existing buildings to higher standards is mostly left to market forces for now: The '80-80-80 in 2030' goal under Singapore's Green Building Masterplan is just one of the many green initiatives pushed out by the Singapore Government. Whilst S-REITs as a sector is regulated by financial regulators, green building requirements are regulated by the Building and Construction Authorities ("BCA"). As far as we are aware, the building legislation is targeted at new buildings as well as those that undergo major retrofitting. Exemptions apply for certain types of existing buildings. In our view, whether a S-REIT embarks on efforts to green the properties they already own such as by installing smart sensors to be more energy efficient and whether to obtain green certifications is left to REIT Manager's discretion. Among chief considerations by REIT Manager is whether there is market demand by tenants for higher standards of green buildings against the cost-benefit analysis.

S-REITs have incepted some green practices: We have summarised sustainability developments of the 21 S-REITs that we track in the following table. These S-REITs have SGD-denominated bond and/or perpetuals outstanding. By market cap, these 21 S-REITs make up ~75% of the total S-REIT market. We observe that broadly, S-REITs we track are already present in the green, social, sustainability, sustainability-linked ("GSSSL") debt market (especially the GSSSL bank loan market), which suggests that more S-REIT issuers may tap the GSSSL corporate credit market in time. Sustainability councils/steering committees (comprising of senior management team of REITs) which reports to the Board of Director of the REIT Manager is also common among the REITs we track. Many S-REITs already own green buildings and are in process of further greening their properties, although only a handful have green leases. Green leases, which are not mandatory in Singapore, are leasing agreements between landlord and tenant with pre-agreed environmental objectives on the management, improvement, or occupation of the buildings.

Table 10: Summary of 21 S-REITs sustainable efforts

Main Property Type	Total Asset Size (SGD' million)	Disclosure Standards	Existence of GSSSL Financing	Existence of Green Buildings	Existence of Green Leases	Presence of Formalised Sustainable Committee
CapitaLand Integrated Commercial Trust Sponsor(s): CapitaLand Investment Ltd Commentary on green buildings: Majority of our Singapore portfolio's leases contain green clauses and green fit-out guides are given to all our tenants for their reference when fitting out their spaces. The minimum target certification for our new developments in Singapore is BCA Green Mark GoldPLUS. Committed to actively renew and maintain our green certifications and achieve minimum BCA Green Mark certification for all properties. The trust has also set a target to green all its existing properties outside Singapore by 2030						
Commercial (office)	24,686 (30 June 2022)	IIRC, GRI, GRESB UNSGD (3, 7, 8, 9, 11, 12, 13, 17), GHG Protocol	Yes	Yes	Yes	Yes
Keppel REIT Sponsor(s): Keppel Land Limited (which is in turned wholly owned by Keppel Corporation Ltd) Commentary on green buildings: We apply a green lens to integrate ESG considerations into every aspect of the value chain, covering acquisition, development, asset enhancement, leasing, property, and capital management. We also aim to obtain green certifications for all our properties by 2023.						
Commercial (office)	8,676 (30 June 2022)	GRI, TCFD, GRESB, UNSDG (3, 6, 7, 8, 9, 11, 12, 13, 16), GHG Protocol	Yes	Yes	Yes	Yes
Suntec REIT Sponsor(s): ESR Group Commentary on green buildings: The Manager is focused on achieving sustainable profitability, and balances risks and returns across its property portfolio, with strong corporate governance, accountability, and transparency. The Manager also strives to achieve and maintain green building certifications and ratings for its properties.						
Commercial (office) Commercial (retail)	11,704 (30 June 2022)	GRI, GRESB, GHG Protocol	Yes	Yes	No	Yes
Frasers Centrepoint Trust Sponsor(s): Frasers Property Limited Commentary on green buildings: We do so by integrating sustainability standards into our portfolio management process and seeking ways to improve the ESG performance of our portfolio. We made progress towards our goal in certifying 80% of our existing buildings by 2024 with a minimum, BCA Green Mark Gold certification. We have met this goal ahead of the targeted timeline, having achieved certifications for 94% of our portfolio by gross floor area. To reduce our Scope 1, 2 and 3 greenhouse gas emissions progressively by 2035, aligned to Science Based Targets. To achieve net-zero carbon emissions by 2050.						
Commercial (retail)	5,941 (30 September 2022)	GRI, GRESB, TCFD, UNSDG (3, 6, 7, 8, 9, 10 ,11, 13, 17)	Yes	Yes	No (in development)	Yes
Lippo Malls Indonesia Retail Trust Sponsor(s): PT Lippo Karawaci Tbk Commentary on green buildings: To promote resource efficiency, LMIR Trust plans to achieve green certifications for its properties. It is currently working with an external consultant to perform a pre-assessment for Green Mark Certification for two of its malls – Lippo Mall Puri and Sun Plaza.						
Commercial (retail)	2,014 (30 September 2022)	GRI, UNSDG (3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 16)), GHG Protocol	No	No	No	Yes
Mapletree Pan Asia Commercial Trust (formerly known as Mapletree Commercial Trust ("MCT")) Sponsor(s): Mapletree Investments Pte Ltd Note: The REIT has not published a sustainability report since combining with Mapletree North Asia Commercial Trust ("MNACT") as such sustainability report for both MCT and MNACT is used for this section. Commentary on green buildings: Under the targets set, the Manager aims to further elevate MCT's spaces through the latest building technology as well as obtaining and maintaining green building certification schemes.						
Commercial (office) Commercial (retail)	17,150 (30 September 2022)	GRI, TCFD, GRESB, UNSDG (3, 5, 7, 8, 9, 10,11, 12, 13, 17), GHG Protocol	Yes	Yes	No	Yes

Starhill Global REIT
Sponsor(s): YTL Corporation Berhad
Commentary on green buildings: To demonstrate our commitment to our sustainability drive, we have set a target to achieve Green Building Certifications for at least 50% of our portfolio by Net Lettable Area (NLA) from a current 21% by 2030 by applying for green certifications for Myer Centre Adelaide (Retail) and Lot 10.

Commercial (retail)	2,997 (30 June 2022)	GRI, SASB, TCFD, UNSDG (4, 6, 7, 8, 13, 16), GHG Protocol	No	Yes	No	No, the Board of Director of REIT Manager determines SGREIT's most material ESG issues

CapitaLand China Trust
Sponsor(s): CapitaLand Investment Limited
Commentary on green buildings: CLCT has commenced working plans to achieve green certifications for its portfolio by 2030.

Commercial (retail)	5,478 (30 June 2022)	GRI, TCFD, GRESB, IIRC, UNSDG (3, 7, 8, 9, 11, 12, 13, 17), GHG Protocol	Yes	Yes	Sponsor has green leases in SG. Worldwide including CLCT-managed properties in China in development)	Yes

Paragon REIT (formerly known as SPH REIT)
Sponsor(s): Singapore Press Holdings Limited
Commentary on green buildings: We commit towards addressing the ongoing climate issue through efficient use of resources within our business operations where possible.

Commercial (retail)	4,275 (31 August 2022)	GRI, UNSDG (4, 5, 7, 8, 10, 12, 16)	No	Yes	No	Yes

Lendlease Global Commercial REIT
Sponsor(s): Lendlease Corporation Limited
Commentary on green buildings: LREIT has ambitions to cut greenhouse gas ("GHG") emissions across its portfolio, in line with Lendlease's Mission Zero targets – to achieve Net Zero carbon (Scope 1 & 2) by 2025 and Absolute Zero (including Scope 3) by 2040. Net Zero carbon (Scope 1 & 2) met in August 2022. Green building certification is a key indicator of LREIT's commitment to resource efficiency and environmental sustainability.

Commercial (office), Commercial (retail)	3,702 (30 June 2022)	GRI, TCFD, GRESB, GHG Protocol	Yes	Yes	Yes	Yes

CapitaLand Ascendas REIT
Sponsor(s): CapitaLand Investment Limited
Commentary on green buildings: To achieve a minimum green rating for all its existing (owned and managed) properties worldwide by 2030. Green certifications for new acquisitions and developments would also have to meet the minimum green rating of Green Mark GoldPLUS in Singapore, while overseas properties would need to obtain certification by a green rating system administered by a national government ministry/agency, or a Green Building Council recognised by the World Green Building Council ("WGBC").

Industrial	17,925 (30 June 2022)	GRI, GRESB, IIRC, SASB, TCFD, UNSDG (3, 7, 8, 9, 11, 12, 13, 17), GHG Protocol	Yes	Yes	Yes	Yes

Mapletree Industrial Trust
Sponsor(s): Mapletree Investments Pte Ltd
Commentary on green buildings: In Singapore, the Manager and the Property Manager strive to integrate sustainability into the development, design, and operations of MINT's properties, which is aligned with the Singapore Green Plan 2030 for greener infrastructure and buildings.

Industrial	8,770 (30 September 2022)	GRI, GRESB, TCFD, UNSDG (3, 5, 7, 8, 9, 10, 11, 12, 13, 17), GHG Protocol	Yes	Yes	No (in development)	Yes

Mapletree Logistics Trust
Sponsor(s): Mapletree Investments Pte Ltd
Commentary on green buildings: Achieve carbon neutrality for Scope 1 and 2 emissions by 2030. This includes action plans to increase green building certifications for both new and existing properties and expand solar energy generating capacity across MLT's portfolio.

Industrial	13,537 (30 September 2022)	GRI, TCFD, UNSDG (3, 5, 7, 8, 9, 10, 11, 12, 13, 17), GHG Protocol	Yes	Yes	No (in development)	Yes
AIMS APAC REIT Sponsor(s): AIMS Financial Group Commentary on green buildings: We are in a position of influence and responsibility to effectively support the Singapore Government's sustainable development framework and are committed to our own sustainable development journey of creating economic and social value while simultaneously reducing our environmental footprint. We will continue to strive for formal Green Mark certifications for our relevant existing portfolio assets.						
Industrial	2,363 (30 September 2022)	GRI, UNSDG (3, 7, 8, 9, 11)	No	Yes	No	Yes
Frasers Logistics and Commercial Trust Sponsor(s): Frasers Property Limited Commentary on green buildings: FLCT is committed to making sound investment decisions to improve the social and environmental performance of our properties, in order to meet climate objectives and investors' evolving expectations. We are on track to achieve net zero carbon emissions across our portfolio by 2030.						
Industrial	7,410 (30 September 2022)	GRI, GRESB, TCFD, UNSDG (3, 6, 7, 8, 9, 10, 11, 13, 17)	Yes	Yes	Yes	Yes
ESR LOGOS REIT Sponsor(s): ESR Cayman Limited Commentary on green buildings: Across our portfolio, we have developed both environmental and green procurement policies for our portfolio and are committed to achieve green building certifications for all buildings that undergo asset enhancement initiatives.						
Industrial	5,487 (30 June 2022)	GRI, GRESB, UNSDG (3, 5, 7, 8, 13)	No	Yes	No	Yes
Cromwell European REIT Sponsor(s): Cromwell Property Group Commentary on green buildings: The Manager is proactively increasing the number of globally recognised green building certifications.						
Commercial (office), Industrial	EUR2,664mn (30 September 2022)	GRI, GRESB, UNSDG (4, 7, 8, 9, 10, 11, 13, 16, 17)	Yes	Yes	Yes	Yes
CapitaLand Ascott Trust Sponsor(s): The Ascott Limited (in turn wholly owned by CapitaLand Investment Limited) Commentary on green buildings: Target to green all properties in ART's portfolio by 2030. ART's sustainability-linked bond has sustainability performance targets that are linked to greening the properties in its portfolio.						
Hospitality	7,633 (30 June 2022)	GRI, GRESB, IIRC, TCFD, SASB, UNSDG (3, 7, 8, 9, 11, 12, 13, 17), GHG Protocol	Yes	Yes	Yes	Yes
Frasers Hospitality Trust Sponsor(s): Frasers Property Limited Commentary on green buildings: We aim to achieve green certifications for at least 80% of the portfolio by 2024.						
Hospitality	2,086 (30 September 2022)	GRI, GRESB, UNSDG (3, 6, 7, 8, 9, 10, 12, 13, 17)	No (in development)	Yes	No	Yes
First REIT Sponsor(s): OUE Lippo Healthcare Limited (in turn ~70%-owned by OUE Limited) Commentary on green buildings: Pivot to megatrends such as ESG.						
Hospitality	1,298 (30 June 2022)	GRI, TCFD, UNSDG (1, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16)	Yes	No	No	Yes

OUE Commercial Trust Sponsor(s): OUE Lippo Healthcare Limited (in turn ~70%-owned by OUE Ltd) Commentary on green buildings: The Manager is committed to improving the energy efficiency of OUE C-REIT's portfolio to align with Singapore's low carbon emissions strategy, as well as exploring renewable energy options to support the global effort to transform into a net-zero economy.						
Commercial (office)	5,845 (30 June 2022)	GRI, TCFD, GRESB, UNSDG (3, 5, 6, 7, 8, 9, 12, 13, 16), GHG Protocol	Yes	Yes	Yes	Yes

Source: Public disclosures of the REITs including annual reports, sustainability reports, investor presentations and financials
Note: GSSSL refers to green, social, sustainability and sustainability-linked loans and corporate credit instruments

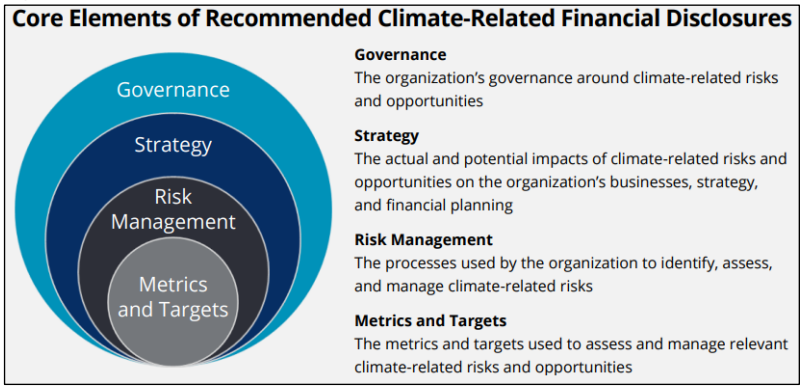
Data collection and data disclosure work-in-progress: Sustainability remains a disconnected sector with many discrepancies in data collection and data disclosure. According to a report from Deloitte, a professional services firm, Environmental, Social and Governance ("ESG") data management face a few major challenges such as inconsistent ESG performance standards, impediments in ESG data sharing, the lack of coordination and incentives. Despite the presence of voluntary standards and benchmarks (e.g. BREEAM, GRESB) applicable to the real estate sector, ESG data is not shared to the various stakeholders in the ecosystem due to the lack of a public platform or fear of competitive advantage. Moreover, very specific energy consumption data may be challenging to collect for certain jurisdictions with restrictions of privacy regulation and where consumers are wary about data protection and privacy. The real estate sector needs coordination to push for collective sharing of ESG data to meet their ESG targets and optimise asset operations.

To help streamline ESG reporting, MAS has rolled out a couple of incentives such as the ESGenome in September and ESG Impact Hub in October 2022, which are pilot programs under Project Greenprint launched in December 2020 to leverage on technology to promote a green finance ecosystem. MAS has partnered with the Singapore Exchange ("SGX") to jointly launch ESGenome, an online portal for SGX-listed companies to report their ESG data in a structured and efficient manner as well as for investors to gain access to these data. This Software-as-a-Service ("SaaS") solution makes it easier for companies to deliver what investors want, in an environment with many different reporting standards and frameworks. More recently, the ESG Impact Hub which links ESG FinTech start-ups and solution providers to financial institutions can promote the use of technology to deliver more accurate measurement, reporting and verification of sustainability data.

GRESB as a key assessment used by S-REITs: GRESB, based in the Netherlands provides validated ESG performance data and peer benchmarks, used by investors, real asset managers and operators as well as industry consultants and service providers globally. GRESB's data and benchmarks covers the infrastructure sector as well, though in the Singapore context it is used most frequently in the real estate sector including by S-REITs. GRESB offers different products and reports including detailed real estate assessments. Per GRESB, the assessments are guided by what investors and the industry consider to be material issues in the sustainability performance of investments and are aligned with international reporting frameworks. GRESB is industry-led with members comprising real estate developers, owners, and managers as well as investors who are also users of the data generated.

And aiding the industry to speed up reporting: GRESB also helps companies and reporting entities to determine their Task Force on Climate-related Financial Disclosures ("TCFD") alignment score, which is the aggregate of equally weighted scores of each of the 11 recommended disclosures of the TCFD. Each recommended disclosure is scored from zero to ten points and adds up to a maximum of 110 points. Per GRESB, the TCFD Alignment Level indicates the entity's effort to address their climate-related risks in line with the processes outlined by the TCFD. Any entity that is reporting to any of the three GRESB assessments are eligible to obtain their TCFD Alignment Report using data that is already provided through the GRESB assessments. TCFD has 11 recommendations which can be sectored into governance, strategy, risk management, and metrics and targets. While the roll out of the TCFD was initially voluntary, regulators are progressively making climate-reporting a requirement. In Singapore, the SGX has set out a roadmap for issuers to provide climate-related disclosures based on recommendations of the TCFD. Climate reporting will be mandatory for issuers in the financial, agriculture, food and forest products, and energy industries from 2023, followed by the materials and buildings, and transportation industries must do the same from 2024.

Figure 15: TCFD disclosure recommendations



Source: TCFD

Early shades of a green REIT market: While the S-REIT market has a number of REITs that emphasises sustainability practices and owning green buildings, "green REIT" is a fairly new term in the S-REIT market. The first green REIT ETF focusing on investments in the Asia-Pacific region was listed on November 2021. The UOB APAC Green REIT ETF is the first ETF globally to use GRESB Environment Scores. Created by United Overseas Bank ("UOB") Asset Management, SGX and GRESB, the fund tracks the iEdgeUOB APAC Yield Focus Green REIT index which selects 50 high-yielding REITs listed in the Asia-Pacific region who score comparatively better on GRESB assessments and also fulfil certain liquidity criteria. As of November 2022, 78% of the index's portfolio is invested into Japan and Australia collectively, with only ~15% invested in S-REITs. Comparatively, the US, Australia and Japan have a more mature REITs industry as shown in the table below and these markets have made progress in becoming greener. We understand that participants of the S-REIT industry are exploring ways to develop a green REIT market to maintain the S-REIT's competitiveness versus global peers. Per data from the European Public Real Estate Association ("EPRA"), by market capitalisation S-REITs is the third largest REIT market in the Asia-Pacific region, where S-REITs collectively make up ~3% of the global REIT market.

Table 11: Comparison of top three largest REIT market globally

	United States	Japan	Australia
REITs Market Share	US dominates the global REIT market, representing 65.5% total market capitalisation as of September 2021 per data from the EPRA	Japan has the second largest global market capitalisation of REITs at 6.8% per EPRA	Australia has the third largest global market capitalisation of REITs at 5.0% per EPRA
REITs Market Value	170 REITs trade on the New York Stock Exchange, with a market capitalisation of ~USD1.1 trillion as of November 2022 per NAREIT data	61 REITs with a market capitalisation of ~USD118 billion as of 22 December 2022	49 REITs with a market value of ~USD92 billion as of 22 December 2022
First REIT listed	1961	2001	1971
First green bond in the REIT market	2014	2018	2017
Number of REIT green bonds outstanding as at 13 December 2022	53	101	3
General commentary on green bonds	USD27.2 billion of green credit instruments was raised between 1 January 2022 to 13 December 2022 (2021: USD44.2 billion) by US credit issuers, denominated in USD Green bonds represent 12.3% or USD7.2 billion of capital raised by US REITs in 3Q2021 compared to 11.1% or USD8.1 billion in 2020 according to NAREIT	JPY713.9 billion of green credit instruments was issued between 1 January 2022 to 13 December 2022 (2021: JPY757.5 billion) in the JPY credit market	AUD4.4 billion of green credit instruments was issued between 1 January 2022 to 13 December 2022 (2021: AUD5.1 billion) in the AUD credit market

Certification systems	Leadership in Energy and Environmental Design ("LEED"), Energy Star	DBJ Green Building Certification, CASBEE (Comprehensive Assessment System for Built Environment Efficiency), BELS (Building-Housing Energy-efficiency Labelling System) in the former category	Green Star, National Australian Built Environment Rating System("NABERS")
TCFD Score	Americas' TCFD Alignment Scores Governance: 56.9% in 2022 up from 52.8% Strategy score: 59% in 2022 up from 54% in 2021 Risk Management: 52.9% in 2022 up from 44.5% in 2021 Metrics & Targets: 65.7% in 2022 up from 64.8% in 2021	Asia's TCFD Alignment Scores Governance: 66.3% in 2022 up from 61.4% Strategy score: 59.0% in 2022 up from 42.8% in 2021 Risk Management: 42.9% in 2022 up from 33.1% in 2021 Metrics & Targets: 78.4% in 2022 up from 75% in 2021	Oceania's TCFD Alignment Scores Governance: 72.7% in 2022 up from 67.6% Strategy score: 80.9% in 2022 up from 78.2% in 2021 Risk Management: 71.1% in 2022 up from 64.1% in 2021 Metrics & Targets: 78.8% in 2022 up from 75.8% in 2021
GRESB Real Estate Benchmark (2022)	Americas has an average score of 72	Asia has an average score of 78	Oceania holds the highest regional average score of 81
Green buildings	Only 25% of US REITs have portfolios where at least 25% of properties are green as of October 2021	Per JLL analysis, J-REITs account for the highest percentage of green building certificates per year (by applicant type), acquiring 50% of the total green certificates on average from 2018 – 2021	More than 12 million square meters or 350 buildings are Green Star certified
ESG Disclosure	All of the largest 100 REITs by equity market cap are reporting ESG efforts publicly (company websites, annual reports, proxy statements, and/or stand-alone sustainability reports)	Tokyo Stock Exchange ("TSE") added voluntary disclosure materials including ESG information to the materials under "TSE Listed Company Information Service"	All commercial offices over 1,000 sqm that wants to advertise for leasing or selling purposes must disclose their NABERS energy rating
Regulatory Framework	• US Securities and Exchange Commission ("SEC") for all US public companies to report on their climate-related issues in 2022	• DBJ Green Building Certification by Development Bank of Japan in 2011 • MOE provide subsidies for fees to be paid by potential issuers of green bonds • Green Bond Guidelines published in 2017 • Ministry of the Environment (MOE) launched the Green Bond Issuance Promotion Platform in 2018	• Australian Securities and Investments Commission ("ASIC") published Information Sheet 271 ("INFO 271") • National Australia Bank launched lower variable rates for eligible home loan customers on homes that meet energy efficient criteria • Green Bond Principles in 2018
Largest REITs (by market cap as at 22 December 2022)	• Prologis Inc • American Tower Corp • Equinix Inc	• Nippon Building Fund Inc • Nippon Prologis REIT Inc • Japan Real Estate Investment Corporation	• Goodman Group • Scentre Group Limited • Vicinity Ltd
Green ETF, Indexes, and funds	• Dow Jones U.S. Select ESG REIT Index • Vert Global Sustainable Real Estate Fund • Invesco MSCI Green Building ETF	• Nikkei ESG-REIT Index • iShares Japan Green REIT ETF • Global X Green J-REIT ETF	• VanEck Australian Property ETF • SPDR® Dow Jones Global Real Estate ESG Fun • VanEck FTSE International Property (Hedged) ETF

Source: OCBC Credit Research estimates, Deloitte, World Economic Forum, Australia Financial Review, S&P Global, Statista, Bloomberg, Nareit, Japan Times, IPE Real Assets, JPX, CBRE, GRESB, Daiwa House REIT, Australia Trade Commission, Commercial Property Executive, International Capital Market Association, Hunton Andrews Kurth, JLL, IFLR, Visual Capitalist, J-REIT.jp, The Property Tribune, Vert Asset Management, Livewire, Yahoo Finance, Bloomberg, Tyndall Asset Management, ASX, Japan Metropolitan Fund Investment Corporation, Japan REIT

A need for S-REITs to green their portfolio to remain competitive in capital markets: Based on our calculation as of 3 November 2022 using Bloomberg data, we find that by equity market value, sponsors own 32% of the 21 S-REITs that we track, while another 21% was owned by institutional investors. As institutional holdings make up a significant portion of S-REITs, it is crucial for S-REITs to consider greening their portfolio to remain attractive to investors who are leaning towards green and sustainable investments. This is especially so as institutional capital tend to be global, if not regional and that an investor who invests in Singapore can move their funds easily across multiple capital markets.

The United Nations Principles for Responsible Investment ("UNPRI") was set up in 2006 by a group of institutional investors who had come together to develop the Principles for Responsible Investment ("PRI") under the invitation of the then UN Secretary-General. Today, representatives of the UN maintain board seats on the PRI while other directors comprise asset owners, asset managers and a service provider. The UNPRI has set out six principles to encourage signatories to engage in long-term, responsible investment that brings value to the environment and society. Responsible investment is defined by the PRI as a strategy and practice to incorporate ESG factors in investment decisions and active ownership. As of 31 March 2022 the PRI has 4,902 signatories from over 90 countries, representing more than USD120 trillion assets. Signatories' assets under management ("AUM") are not required to be solely managed as sustainable investment funds. That said, in our view, it signals a commitment by signatories to incorporate ESG considerations into their investment processes across all types of funds. We have summarised a list of the top 20 institutional investors in S-REITs as well as their sustainability commitment to the UNPRI. These 20 investors collectively represent ~72% of the total institutional holding of the S-REITs we track and ~15% of all investor holdings based on our estimates.

Table 12: Top 20 Institutional Investors in S-REITS

Asset Manager	Brief Description
BlackRock Inc	• USD7.96 trillion AUM • Signatory to UNPRI since 2008
Vanguard Group Inc/The	• USD8.1 trillion AUM • Signatory to UNPRI since 2014
Dimensional Fund Advisors LP	• USD540 billion AUM • Signatory to UNPRI since 2012
Norges Bank	• USD1.36 trillion AUM • Signatory to UNPRI since 2006
Schroders PLC	• GBP752.4 billion AUM (~USD922.0 billion) • Signatory to UNPRI since 2007
State Street Corp	• USD3.3 trillion AUM • Signatory to UNPRI since 2012
Bank of New York Mellon	• USD1.8 trillion AUM • Signatory to UNPRI since 2013
DBS Group Holdings Ltd	• SGD291 billion AUM (~USD215 billion), refers to total AUM at wealth management arm • Not a signatory to UNPRI
Manulife Financial Corp	• USD1.1 trillion AUM • Signatory to UNPRI since 2015
FMR LLC	• USD3.6 trillion AUM, only including discretionary AUM • Signatory to UNPRI since 2017
Oversea-Chinese Banking Corp Ltd (including Great Eastern Holdings Ltd)	• SGD250 billion AUM (~USD185 billion), refers to total AUM at wealth management arm • Not a signatory to UNPRI
Sumitomo Mitsui Trust Holdings Inc	• USD572 billion AUM • Signatory to UNPRI since 2006
CIMB Group Holdings Bhd	• MYR93.2 billion AUM (~USD21 billion) • Not a Signatory to UNPRI
JPMorgan Chase & Co	• USD2.6 trillion AUM • Signatory to UNPRI since 2007
PGGM Vermogensbeheer BV	• EUR231 billion AUM (~USD245 billion) • Signatory to UNPRI since 2008
Deutsche Bank AG	• EUR833 billion AUM (~USD884 billion), excluding AUM at wealth management arm • DWS is a signatory to UNPRI since 2008

GAM Holding AG	• CHF74.6 billion AUM (~USD80.5 billion) • Signatory to UNPRI since 2014
UBS AG	• USD3.7 trillion AUM, including AUM at wealth management arm • Signatory to UNPRI since 2009
Government Pension Investment Fund	• JPY192 trillion AUM (~USD1.40 trillion) • Signatory to UNPRI since 2015
SCB Asset Management Co Ltd	• THB1.6 trillion AUM (~USD46 billion) • Not a Signatory to UNPRI

Source: Pensions & Investments, Statista, UNPRI, Citywire, Caproasia, disclosures of financial institutions mentioned above

Individual investors work-in-progress: While we expect this to be a more gradual process, individual investors may also start tilting their investments towards more sustainable substitutes overtime. Already, we observe financial institutions such as private banks prioritising sustainability efforts. While such financial institutions may not have full discretion over how their customers invest, they are able to influence customer's investment behaviour and hence capital flows. For example, through the creation of sustainability-oriented financial products and investor education. Based on our analysis, we estimate that ~44% of S-REITs' equity (by market value) are owned by individual investors. The remaining other ~4% investors include management team of sponsors as well as the REIT managers.

Some sample of green buildings beyond residential property: Although Singapore does not yet have a vibrant green REIT market, a top-down emphasis by the government on sustainability, increasing demand by end-users and increasing demand for more sustainable investment alternatives suggest that S-REITs will continue to direct capital to green buildings and retrofitting as well as introduce greener operating measures and expand their presence in the GSSSL funding market. A few of the green developments and relevant policies are listed below.

Table 13: Green buildings development in Singapore

	Recent green asset enhancement initiatives and development projects	Examples of Completed Green Buildings	Relevant Regulations
Offices	• Keppel Towers Redevelopment	• Keppel Bay Tower • Asia Square Tower 2 • Capitaspring	• BCA Green Mark Scheme (2005) • Green Building Masterplan (2006) • Super Low Energy Building programme (2018) • Singapore Green Plan 2030 (2021) • Singapore Hotel Sustainability Roadmap (applicable to Hotels only) (2022)
Retail	• i12 Katong	• Bugis+ • 313 Somerset • City Square Mall • Jewel Changi	
Industrial	• Punggol Digital District (PDD) • Sungei Kadut Eco-District (SKED)	• 119 Neythal Road • 15A Tuas Avenue 18	
Hotels	• Pan Pacific Orchard • Parkroyal Collection Marina Bay	• Parkroyal Collection Pickering • Oasia Hotel Downtown	
Data Centres	• Digital Loyang II • EquinixSG	• Global Switch Tai Seng • SG5	• Green ICT Programme (2009) • Singapore Standard 564 (SS564) (2011) • Green Data Centre Technology Roadmap (2014) • Green Data Centre Innovation Programme (GDCIP) (2015) • BCA-IMDA Green Mark for Data Centres (2019)

Source: JLL, Visit Singapore, Infocomm Media Development Authority, Building and Construction Authority, Singapore Standards Eshop

Navigating sustainability in the Singapore Property Development Sector

Assisted by Lee Yan Lin Nicole

An Overview

Property is a major contributor to emissions: Buildings and construction sector accounted for 39% of carbon dioxide emissions globally in 2018, according to the International Energy Agency, mainly due to building materials and energy generated to power buildings. Due to the sector's outsized impact, regulators, investors, tenants and even homebuyers have begun to react, which results in a shifting landscape for the property development sector.

Stakeholders are taking actions, including regulators, …: Regulations globally have been increasingly updated to align the property sector with the 2050 net zero global emissions goal. In Singapore, the Singapore Green Building Masterplan was introduced as part of the Singapore Green Plan 2030, with "80-80-80" key targets to be achieved by 2030. These include (1) greening 80% of buildings (by gross floor area), (2) attaining Super Low Energy (SLE) rating for 80% of new developments and (3) improving energy efficiency for best-in-class green buildings by 80% (over 2005 levels). According to Building and Construction Authority ("BCA"), 49% of Singapore's buildings have been greened as of Dec 2021, which is still a distance from the stated targets. In any case, all new buildings and major retrofitting of existing buildings with more than 5,000 sqm of gross floor area have to adhere to a minimum environmental sustainability standard.

… issuers, lenders, and investors, …: Low-Carbon Buildings accounted for 30% of the use of proceeds of green investment in 2021 according to Climate Bonds Market Intelligence. Relevant green projects include construction of new buildings that meets energy efficient targets and enhancements to existing buildings to improve energy efficiency. While issuances have dipped this year, impacted by the rising interest rate environment, we believe there is significant room for green bond issuances to grow given its increasing focus.

… as well as tenants and homebuyers: According to CBRE's 2021 Global Investor Intentions Survey, 60% of respondents have included ESG considerations as part of their investment strategies and we think this may grow with ESG being an increasing focus. Meanwhile, tenants and homebuyers are willing to pay a premium for rental or purchase of green units. According to JLL, green certified offices in Singapore can fetch a rental premium of 4% to 9%.

Beyond environmental considerations are the social aspects…: Aside from environment, we observe that property developers increasingly emphasize social aspects. Beyond health and safety, and building communities, companies are embracing diversity. More than 70% of millennials prefer working in a company with a strong sustainability agenda, according to a Fast Company survey as reported by JLL. This agenda may include employee diversity and inclusion. Empowered with organisational purpose, we believe that companies (including property developers) will be better positioned against their counterparts.

… as well as the governance aspects: On the governance front, the Code of Corporate Governance applies to SGX-listed companies. There will be more requirements for listed real estate companies to disclose with climate-related disclosures becoming mandatory from FY2024. On average, listed real estate companies and developers score higher than most industries, including utilities, health care, industrials, consumer staples according to Singapore Governance and Transparency Index ("SGTI") 2022. That said, the range of outcomes are wide, with the larger developers scoring better.

Companies increasingly compelled to act: We believe that companies will increasingly adopt sustainability practices. At the minimum, companies will have to meet regulatory requirements including mandatory reporting for listed companies. Finance is also a tool which may compel companies to act as financiers set stricter levels of emission targets. With society becoming more aware, sustainability practices should be adopted to maintain competitive advantage and stay relevant with todays and tomorrow's employees, homeowners, and tenants.

Adhering to BCA Green Mark

BCA as the leading authority in setting green building standards: In Singapore, the Green Mark certification scheme launched by BCA provides sustainability guidelines for property developers. The ratings are aimed to recognise going beyond mandatory regulation standards, which includes higher standards on energy efficiency, indoor air quality, greenery provision, active mobility considerations, materials and waste management and water efficiency. The

certification process involves BCA assessing and verifying the buildings based on a given set of criteria. Over time, BCA has progressively set higher standards, with the latest updated Green Mark 2021 scheme ("GM:2021") raising the requirements for energy efficiency standards. A Super Low Energy ("SLE") category was also added, which ranks higher than the categories of Platinum, Gold^{Plus} and Gold.

Regulatory ratings downgrade risks in the horizon: According to Colliers, following the updates under GM:2021, 73% of the large office buildings could see a downgrade in ratings, with nearly two-thirds of the office buildings potentially failing to qualify for any rating (while Colliers mentioned that previously more than 60% achieved Platinum rating which was the highest level of certification).

Economics of transitioning: Beyond certification and branding purposes, transitioning towards sustainability can be economical. To assist, BCA has issued various grants to property developers, which target to lower the upfront costs of energy efficiency retrofits and encourage building owners to reduce emissions through retrofitting. BCA has also undertaken a consultancy study of the life cycle costing analysis of Green Mark versus non-Green Mark projects, which found net positive savings due to energy savings outweighing upfront investment costs. That said, this study was likely done prior to the latest revised GM:2021, which has more stringent requirements. In another study conducted by Dodge Construction Network in 2021, for Singapore green renovations/retrofits result in reduction of operating costs in the first 12 months by 10.7% (2-6Y cost reduction = 16.3%) while that for new green buildings result in reduction of 10.8% in costs in the first 12 months (2-6Y cost reduction = 14.6%).

Figure 16: Green Mark Residential Buildings

GM Certification	*Green Cost Premium (%)[6]*	*Simple Pay Back (yrs)*	*NPV per GFA (median $/m²)*
Gold	0.23-1.71	Not applicable for residential projects, with savings enjoyed by households	39
Gold^{PLUS}	0.64-3.76		54
Platinum	0.79-4.15		140

Source: BCA

Figure 17: Green Mark Non-Residential Buildings

GM Certification	*Green Cost Premium (%)*	*Simple Pay Back (yrs)*	*NPV per GFA (median $/m²)*
Gold	0.12-1.89	0.81 – 2.45	48
Gold^{PLUS}	0.70-1.87	1.89 – 3.56	117
Platinum	1.00-4.40	2.30 – 5.80	225

Source: BCA

Green buildings command green premium

Residential sales premium: In a Frost & Sullivan study commissioned by BCA in 2016, 54% of homeowners were willing to pay 3% to 4% more for a Green Mark building. More than 90% of homeowners agree that green buildings provide utilities cost savings, reduced impact to the environment and/or health benefits. While it is difficult for us to further conclude that such willingness would translate into actual purchases at higher prices, the willingness to pay a premium should increase amidst higher electricity prices.

Tenants willing to pay more for green buildings: According to the same Frost & Sullivan survey, office tenants are willing to pay an average of 3.5% more for leasing an office in a Green Mark certified building. Similar to homeowners, office tenants perceive benefits through cost savings from utilities, health benefits for employees, higher productivity and increase in job applications. In addition, we understand that certain tenants (including multinational companies) desire a Green Mark certified building which helps their sustainability credentials. According to CapitaLand Investment Ltd, institutional tenants have begun to avoid buildings that do not meet their minimum green standards. This may result in demand for green buildings outstripping supply. According to JLL, in Hong Kong where only 29% of Grade A offices are green certified, the rental premium for LEED Platinum buildings is 28%, in comparison to 4% to

[6] Difference between conventional and green building design features

9% in Singapore where 90% of Grade A offices are green certified. Outside of Asia, in the UK, there are similar findings of rental premium for green buildings. According to a study by Knight Frank in 2021, prime Central London office rents with BREEAM certifications enjoy rental premiums ranging from 3.7% (Very GOOD certification) to 4.7% (Excellent certification) to 12.3% (Outstanding certification).

Green Financing Solutions

Growth of green financing: Real estate green financing is becoming mainstream in Singapore. This involves developers taking up green loans, sustainability linked loans ("SLL"), issuing green and/or sustainability bonds, with the use of proceeds slated for green/sustainable/sustainability-linked projects. Examples of significant borrowers/issuance include Frasers Property Ltd (SGD9.11bn total financing from FY2018 to FY2022), City Developments Ltd (more than SGD3bn as of 31 Dec 2021) and GuocoLand Ltd (SGD730mn from a project green loan). The size of the green financing market is already sizeable, with one local bank having already achieved SGD34bn of loans in its sustainable finance portfolio as of 2021, ahead of its target of reaching SGD25bn sustainable finance portfolio by 2025.

Alignment with sustainability to improve access to financing: In general, financial institutions and certain investors are already active in sustainable finance. Several local and certain foreign banks have introduced green and sustainability-linked loans to support the financing of low-carbon economy including renewable energy as well as transition financing. Three local banks have joined the Net-Zero Banking Alliance targeting reduced emissions by 2030 and much further reduction by 2050 for several sectors including real estate. Many banks have also become signatories to Equator Principles which require the bank to identify, assess and manage environmental and social risks when financing projects. We think real estate companies who are reliant on funding in time to come may in turn be compelled to comply with the required sustainability practices, or they may face reduced funding opportunities.

Differentiated pricing for being sustainable? Global credit rating agencies have begun to differentiate credits with corporates scoring higher in ESG potentially enjoying higher credit ratings, which in turn should improve the cost of funding. In the SGD bond market, although we have yet to observe greenium (e.g. advantageous pricing to the issuer for green issuances), the market has been developing and maturing. There are about SGD11bn green, sustainability, social and sustainability-linked ("GSSSL") bonds outstanding in the SGD market, of which developer and housing related entities (Frasers Property Ltd, Housing & Development Board) account for SGD4.1bn of the issuances.

Figure 18: Sustainability financing in the SGD bond market

Organisation	Amount (SGD million)	Type of financing	Issue date
Frasers Property Ltd	300	Sustainability bond	Sep-21
Housing & Development Board	1,000	Green bond	Mar-22
Housing & Development Board	1,100	Green bond	Jul-22
Frasers Property Ltd	500	Green bond	Sep-22
Housing & Development Board	1,200	Green bond	Oct-22

Source: Company, OCBC

Regulatory landscape to favour further growth of sustainability finance: Regulators are also supporting the rollout of sustainability finance. The government announced through Singapore Budget 2022 that up to SGD35bn of green bonds would be issued by the government and statutory boards by 2030. The Singapore Green Bond Framework which will be used as a reference for such issuance was structured to be in alignment with the core components and key recommendations of the International Capital Market Association ("ICMA") Green Bond Principles 2021 and ASEAN Green Bond Standards 2018. According to Ministry of Finance, proceeds will be used in eight categories of projects including green buildings. Issuances by the government will support Singapore's decarbonisation efforts and deepen the green financing market by serving as a reference for the corporate green bond market and deepen market liquidity for green bonds by attracting issuers, capital, and investors. Separately, the Green and Sustainability-Linked Loans Grant Scheme was launched by Monetary Authority of Singapore ("MAS") to defray expenses for validation of green loan credentials. The loans must be aligned with internationally recognised standards.

Selected strategies adopted by real estate companies

To tackle their carbon footprint, real estate companies have several approaches, including retrofitting buildings and improving energy efficiency, on-site renewables and carbon offsets and renewable energy certificates.

Retrofitting buildings and improving energy efficiency: We believe retrofitting is a quick win for aged buildings, with positive net present value and short-term payback, according to findings from URA described in the earlier part of this section. Such retrofits may include replacing aged chiller systems with modern ones which are energy efficient, usage of energy-efficient light bulbs, installations which filter out heat. Retrofitting can also provide other benefits such as lengthening the lifespan of the building and value, as well as producing a more conducive environment for the tenants. In addition, investments in technology to increase energy efficiency can yield 8-15% operational return on investments, according to CapitaLand Investment Ltd ("CLI"). Based on our attendance at CLI's investor day, we think this could involve the use of sensors to monitor and optimise temperatures and energy usage on a real-time basis.

On-site renewables: With steep declines in the cost of production in solar energy and soaring prices of electricity, on-site renewables such as rooftop solar panels can partly or more than fully offset energy usage. For example, Keppel Infrastructure @ Changi building was awarded the Green Mark Platinum Positive Energy certification, with the building fitted with 4,000 sqm of solar panels producing more than double the energy it consumes. NZEB@SDE, which is a purpose-built zero energy building commissioned by National University of Singapore, is designed to consume only as much energy as it produces, with 1,200 solar panels installed. While these are examples of positive or zero energy buildings, in practice we think it is a challenge for higher density buildings to reach net-zero energy with just on-site renewables. Afterall, these buildings are the exceptions but not the norm. According to Solar Energy Research Institute of Singapore, Singapore's potential to deploy 8.6 Gigawatt-peak of solar energy by 2050 would only satisfy 10% of the projected energy demand. For off-site renewables (e.g. solar and wind farms), options within Singapore are limited currently.

Carbon offsets and renewable energy certificates ("REC"): For carbon emissions that cannot be reduced (e.g. retrofitting buildings, use of technology) or replaced (e.g. on-site and off-site renewables), renewable energy certificates and carbon offsets can be purchased. Examples include CapitaLand purchasing REC from Ascendas REIT which has installed solar panels on its industrial properties, as well as City Developments Ltd ("CDL") purchasing REC on SP Group's blockchain platform for its electricity consumed at its headquarters and part of its commercial buildings operations to offset 734 tonnes of carbon emissions. CDL has also purchased high-quality carbon credits to offset its emissions through Climate Impact X (a global carbon credit exchange). The credits are expected to offset 6% to 7% of CDL's emissions over 3 years (based on Scope 1, Scope 2, and Scope 3 emissions from CDL's operations in Singapore in 2019).

Sustainability-related disclosures

Increasing disclosure requirements amidst gaps: Concurrent to the developments on environment/emissions front, disclosure requirements and expectations of companies including property developers have increased. According to International Organization of Securities Commissions ("IOSCO"), investor demand for sustainability-related information is currently not being met by companies' sustainability-related disclosures. Existing gaps include incomplete, inconsistent, and incomparable sustainability-related disclosures by companies. In turn, this leads to potential risks of information that can be misleading to investors.

Singapore Exchange ("SGX") to step up disclosures by listed companies: The SGX already requires sustainability reports to be issued for SGX-listed companies. This includes the disclosures on material ESG factors, policies, practices, performance, and targets in relation to the material ESG factors. Further to this, climate-related reporting based on Task Force on Climate-related Financial Disclosures ("TCFD") from FY2024 for the real estate industry will be required, along with disclosures on board diversity. The SGX does not prescribe the specific sustainability framework to use though listed companies have to explain its choice for the framework.

Relevant frameworks to provide transparency and standardisation: Specific to the real estate industry will be the Global Real Estate Sustainability Benchmark ("GRESB"), which is an industry-led organisation that provides standardised and validated ESG data to financial markets. Other frameworks, which are mentioned by the UN Sustainable Stock Exchange initiative, includes the following 6 sustainability frameworks: Global Reporting Initiative ("GRI"), Sustainability Accounting Standards Board ("SASB"), International Integrated Reporting Council ("IIRC"), TCFD, CDP Global ("CDP") and Climate Disclosure Standards Board ("CDSB"). With the adoption of one or more of such frameworks, a standardised approach should mitigate concerns on greenwashing while potentially providing financially material sustainability factors which helps to inform investors on the relevant risks and opportunities.

The Amplifying Influence of Sustainability for Financial Institutions

Financial Institutions have arguably a privileged position in the economy as both the provider of capital and protector of financial system stability. It does not do this alone however, more often than not working together with the government and financial sector regulators to fulfil both commercial and social objectives. This was evident during the COVID-19 pandemic when Financial Institutions were in the centre of the pandemic in 2020 – on one hand the recipient of liquidity support and regulatory forbearance from governments; and on the other hand being a provider of liquidity support to the economy struggling under the weight of lockdowns and a sharp (albeit brief) withdrawal of liquidity from other funding markets. These influences acted to preserve the fundamental credit profile of Financial Institutions throughout the past two to three years.

Conversely however, when Financial Institutions work against the government and financial sector regulators (likely due to commercial objectives conflicting with implied social ones), then Financial Institutions invariably feel the regulatory and reputational consequences. This was seen in the aftermath of the Global Financial Crisis with the tightening of bank capital regulations globally and also more recently in Australia where the findings of the **Royal Commission** into Misconduct in the **Banking**, Superannuation and Financial Services Industry uncovered multiple instances of bad behaviour. The findings resulted in a transformation of the industry culture to one where customers' needs are put before profits although this change came at a cost through fines, customer remediation charges, capital add-ons, and elevated expenditure on risk and compliance.

Financial Institutions' critical service, high systemic importance and resultant strong regulatory oversight highlights the pervasive influence of Financial Institutions on society. It is therefore no surprise then that their influence on sustainability is also pervasive or that environmental, social and governance considerations in turn also heavily influence the activities of Financial Institutions. As we covered in our Singapore Credit Outlook 2022, we highlighted that sustainability related regulations were growing in both quality and quantity towards the Financial Institutions sector due to the compounding influence that Financial Institutions have on sustainability and environmental, social and governance ("ESG") issues given their role as a facilitator for the broader economy. The influence of environmental concerns is beyond their own footprint and operations to the activities that Financial Institutions choose to fund. Social issues influence Financial Institutions given their functional and financial capacity to address problems with social inequality through the essential services they provide. Finally, governance is relevant for Financial Institutions given their systemic importance as a steward in the world of finance, highly regulated nature, and their sensitivity to sentiment and public confidence.

Despite the breadth of influences however, the overall sensitivity of Financial Institutions to sustainability is moderate in our view as the quality of each of these influences' offsets the collective quantum.

Influence ON the Environment Starts Now

Environmental considerations for Financial Institutions seem simple at first glance – their scope 1 and scope 2 emissions are not as complex as can be for other industries such as power and airlines that we have covered. However, it is the exposure to scope 3 emissions that are of most interest for regulators and sustainability experts – those emissions that Financial Institutions indirectly affect in its value chain through the course of doing business. According to CDP Worldwide, Financial Institutions greenhouse gas emissions that come from lending, underwriting and investment activities are on average more than 700 times higher than their direct emissions.

Just as Financial Institutions became an anchor in the storm of the global pandemic, so are they positioning to be the leader in the world's transition to a low-carbon future. Given the relative size of contributions to their carbon footprint, the actions of Financial Institutions towards their financed emissions (ie scope 3) will be more material than actions towards mitigating scope 1 and 2 emissions for their net zero commitments and sustainability ambitions. Financial Institutions' influence on scope 3 emissions looks to be twofold – firstly in the disclosure of the quantum of their financing of emissions generating activities and their steps to reduce this (i.e. limiting negative environmental impacts); and secondly their activities to assist in the transition to a low carbon global economy (i.e. enhancing positive environmental impacts). Two key initiatives seek to improve the progress of these activities.

The Net Zero Banking Alliance ("NZBA")

Launched in April 2021, the NZBA is an industry-led, United Nations-convened alliance of global banks that represent about 41% of global banking assets. The Alliance was launched by 43 Founding Members and has now grown to 125 banks from 41 countries with members recognising the vital role of banks in the global transition to net-zero emissions

and are committed to achieving net-zero emissions across their lending and investment portfolios by 2050. All banks that are members of the Alliance have signed a **Commitment Statement** that they will:

- **Transition** the operational and attributable GHG emissions from their lending and investment portfolios to align with pathways to net-zero by 2050 or sooner.
- **Within 18 months** of joining, set 2030 targets (or sooner) and a 2050 target, with intermediary targets to be set every 5 years from 2030 onwards.
- **Banks' first 2030 targets** will focus on priority sectors where the bank can have the most significant impact, ie. the most GHG-intensive sectors within their portfolios, with further sector targets to be set within 36 months.
- **Annually publish** absolute emissions and emissions intensity in line with best practice and within a year of setting targets, disclose progress against a board-level reviewed transition strategy setting out proposed actions and climate-related sectoral policies.
- **Take a robust approach** to the role of offsets in transition plans[7].

The Commitment Statement is supported by accompanying **guidelines for climate target setting** as follows:

1. Banks shall set and publicly disclose long-term and intermediate targets to support meeting the temperature goals of the Paris Agreement.
2. Banks shall establish an emissions baseline and annually measure and report the emissions profile of their lending portfolios and investment activities.
3. Banks shall use widely accepted science-based decarbonisation scenarios to set both long-term and intermediate targets that are aligned with the temperature goals of the Paris Agreement.
4. Banks shall regularly review targets to ensure consistency with current climate science[8].

As per the FAQs on the United Nations Environment Programme ("UNEP") website, the Alliance is aiming "to drive collective, aligned and credible progress toward achieving net zero emissions by 2050" through action, transparency, and accountability. The Alliance and UNEP hope to achieve this through a consistent platform with common standards/interpretations on net zero that also provides a forum for co-operation and knowledge sharing amongst Alliance members.

On 9 November 2022, the NZBA published its first progress report that aggregated progress towards the setting of **intermediate 2030 targets by members of the Alliance** with **over 60 members publishing targets – this comprised** the majority (90%) of the initial 43 banks that were due to publish targets by the end of October 2022 and 19 additional members that have set their 2030 targets well in advance of their 18-month deadline. Members' decarbonisation efforts and targets are focused on the highly emitting sectors of power generation, oil & gas, and coal. While progress appears promising with the Alliance nearly tripling in size in around 18 months, the report emphasised the significant amount of work still needing to be done including the setting of additional decarbonisation targets for all of the nine priority or climate-intensive sectors specified in the Guidelines (agriculture, aluminium, cement, coal, commercial and residential real estate, iron and steel, oil and gas, power generation, and transport). So far, intermediate targets are focused on the three highest emitting sectors. We think membership of the NZBA is a credit positive as it signifies a willingness to assist the transition whilst the disclosure of targets will highlight the capacity of the relevant Financial Institution to meet their net zero obligations.

Sustainable Finance Disclosure Regulation

While the NZBA indicates the desire of Financial Institutions to contribute to global net zero commitments through actions, another important aspect is the accurate monitoring, reporting and disclosure of these actions. As we also previously covered in the Singapore Credit Outlook 2022 under ***"Disclosures in Sustainable Finance – Addressing Words that Speak Louder than Actions"***, the need for improvements in the quality and consistency in disclosure continues to grow as sustainable finance and ESG investing grows as well. Amongst the various regulations and mechanisms that have come out of Europe since 2015 (including the Financial Stability Board's Taskforce for Climate-Related Financial Disclosures ("TCFD") to improve the effectiveness of climate-related disclosures) in 2017 and the European Union's ("EU") Action Plan on Sustainable Finance that was adopted in March 2018 and sought to drive capital towards sustainable financing) was Sustainable Finance Disclosure Regulation ("SFDR") that discourages

[7] Source: https://www.unepfi.org/net-zero-banking/commitment/
[8] Source: https://www.unepfi.org/net-zero-banking/commitment/

greenwashing and promotes responsible and sustainable investments. First introduced in 2019 and coming into effect on 10 March 2021, SFDR was initiated by the High-Level Expert Group on sustainable finance ("HLEG") that was established in 2016 and is made up of 20 senior experts from civil society, the finance sector, academia, and observers from European and international institutions. Its broad mandate was to deploy sustainability concepts throughout the European financial system by advising the European Commission on how to improve the flow of public and private capital to sustainable investments and maintain financial system stability against environmental risks.

The SFDR establishes mandatory disclosure obligations for asset managers and other financial market players and is designed by the European Commission to work with Taxonomy Regulation and other regulations as part of the abovementioned EU Action Plan on Sustainable Finance. This obligation is expected to improve the quality and transparency of information for sustainable funds investment by disclosing how ESG/sustainability factors and risks are integrated in the investment process for ESG related products at both the entity and product levels. Another obligation for asset managers and financial market participants is the need to disclose their analysis of 50 key sustainability factors and how their investments address potential adverse impacts from these factors.

Using these two parameters, SFDR will assist in the classification of funds into three broad categories – including funds that have no sustainability focus, funds that are supportive of key sustainability agendas (environment, social and governance considerations) and funds that are focused on sustainable investments. Disclosure of the parameters will make asset managers also accountable for the labels they provide to their funds. Implementation will be done in phases depending on the type of information to be disclosed – level 1 disclosures (entity level disclosures for asset managers and other financial market players on policies that identify and address sustainability impacts and risks in its investment decision making process) came to effect on 10 March 2021, while level 2 ones (additional entity but also product level disclosures that include a Principal Adverse Impact ("PAI") statement) will come into effect on 8 July 2022. PAIs seek to quantify the potential negative sustainability impact from the investment being offered across the 50 key sustainability factors mentioned above. Level 3 disclosures which integrate SFDR with EU Taxonomy Regulation is expected to come into effect on 1 January 2023. While SFDR applies to financial market participants based in the EU or those outside the EU that market to EU clients, SFDR likely provides a template for the implementation of other sustainable disclosure measures globally. We expect the impetus for this to grow, particularly as the urgency surrounding key sustainable issues such as climate risk rise.

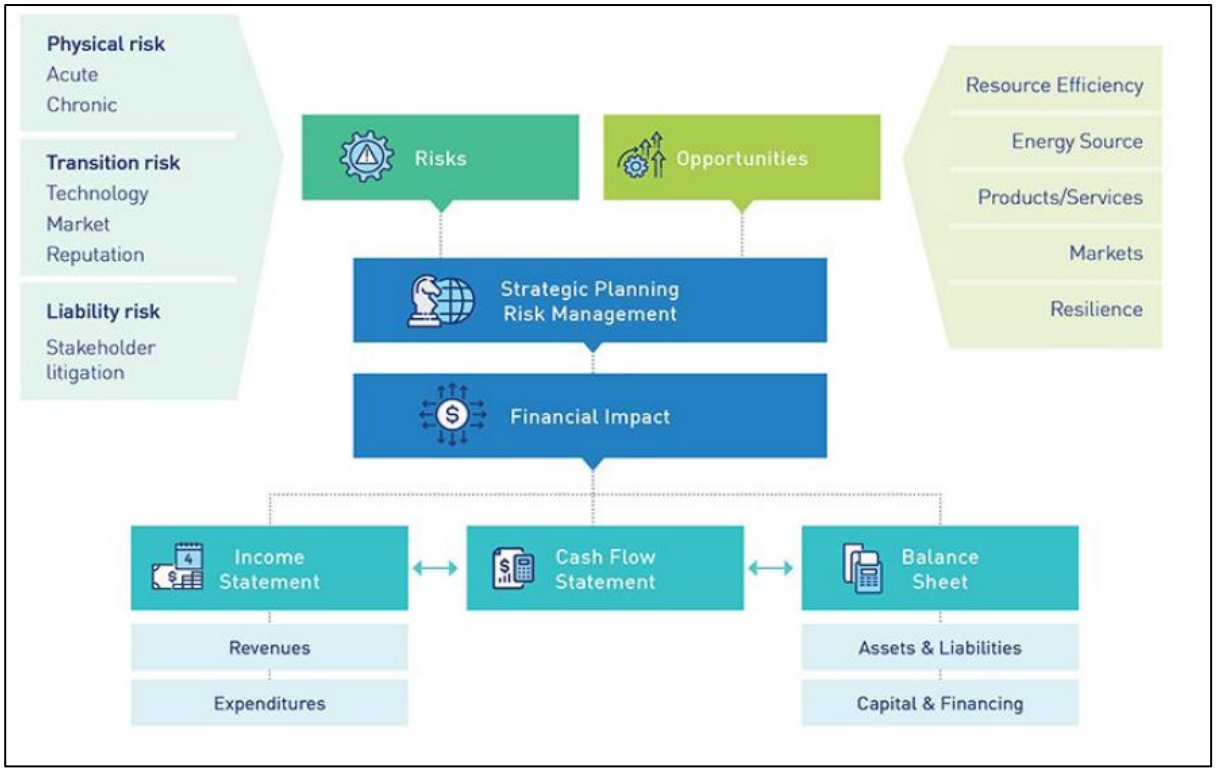
Influence OF the Environment Something for the Future

Whilst the actions of Financial Institutions can influence the environment, so can the environment influence Financial Institutions and as a result the resilience of the financial system as climate change leads to increasing instances of severe weather events. These can negatively impact Financial Institutions' capital position and solvency by affecting a Financial Institution's investment and lending portfolios, weakening borrowers' ability to service loans and/or the collateral supporting them. To address this, regulators are increasingly putting in place formal requirements for Financial Institutions to assess climate risks and to adequately disclose these risks so as to incorporate them into capital adequacy assessments. These requirements in Europe are part of Basel IV and are separate to the mandatory obligations under SFDR.

The illustration of climate-related stress and how climate change can impact the resilience of Financial Institutions and a country's financial sector is encapsulated in the concept of a climate-related stress test, an idea that came from the recommendation of the Task Force on Climate-related Financial Disclosures ("TCFD") that climate-related stress impacts and its reporting should include forward-looking scenario planning of a warmer planet. Prior results of Financial Institution climate risk assessment exercises highlighted however a developing risk that is hard to accurately quantify given it relies on the emissions and transition plan disclosure of their customers, something they have much less control of. Other challenges include shortfalls in Financial Institutions' data monitoring capabilities and infrastructure to deal with the additional disclosures, the influence of policy action on the severity of climate physical risks.

Still this uncertainty has not deterred global regulators from pursuing climate stress test exercises given growing awareness and evidence of this risk. The Australian Prudential Regulation Authority ("APRA") published in September 2021 an information paper that provides an overview of the Climate Vulnerability Assessment and information on what international activities are being done on climate scenario analysis and stress testing. China earlier in 2021 announced that it would monitor financial risks related to climate change and work with other financial regulators to establish a framework for managing climate change-related financial risks in the future as part of its wider annual stress test exercise in 2021. This announcement was followed in June 2021 by **People's Bank of China** ("PBOC") Governor **Yi Gang stating that the PBOC has conducted stress tests to assess climate risks, the results of which will be published in the future. In Singapore, the** Monetary Authority of Singapore ("MAS") announced in 2021 that banks **will have to undertake stress tests by end 2022 under a range of climate change scenarios that impact physical and transition risks with mandatory regulatory disclosures on the management of risks related to climate change and other environmental issues. MAS' climate stress test will reference the climate change scenarios developed by** the Network for Greening the Financial System ("NGFS") that is made up of 91 central banks and monetary supervisors. MAS like other regulators are also consulting the practices and approaches of other global regulators.

Figure 19: Climate risks, opportunities, and financial impact



Source: APRA Information Paper – Climate Vulnerability Assessment, 3 September 2021

There are numerous implications for Financial Institutions going forward from climate related stress tests. KPMG[9] highlighted several establishment considerations even before considering the stress test results including:

(1) Set-up of internal people and processes to conduct these stress tests and who will be responsible for its results.
(2) Criticality of data integrity through quantity and quality of data as well as an adequate understanding of the interdependence of different data.
(3) Data analysis may be negatively impacted by the obvious lack of experience in conducting these relatively novel stress tests and difficulty in judging the results. Together with data integrity, results could be highly prone to error.
(4) Additional technology investments by Financial Institutions to ensure data is collated and presented in the ECB provided templates.

The real implications however could occur as a consequence of the stress test results:

- Higher capital requirements will be necessary if exposure to transition and/or physical risks are elevated.
- Financial Institutions may be forced to change the way they do business – particularly if the cost of doing business in certain jurisdictions or with certain clients or industries outweigh the profits.
- Business segments may be de-emphasized where adequate disclosure of ESG related data is challenging, in particular small to medium-sized enterprises.
- Mandatory disclosure of heightened ESG risks may drive capital and investors away from certain Financial Institutions when they may need it most, thereby creating higher credit dispersion and less competition. This may raise costs for consumers and possibly undermine financial sector stability.
- Disclosure obligations may amplify as regulators seek additional and more routine disclosures for Financial Institutions with poor climate risk stress test results.

Climate risk stress tests appear to be a useful and necessary component of the overall package of sustainable finance related regulations. The ultimate challenge however will come from interpreting the results and gaining confidence in

[9] 2022 ECB climate risk stress test: ready, steady, go - KPMG Global (home.kpmg)

their accuracy. The absolute accuracy of the results may not be as important as the process however, especially if it hastens Financial Institutions' actions in driving impactful sustainable finance activities.

Since 2021, both APRA and MAS have announced updates on their Climate stress testing initiatives. APRA published an Information Paper in November 2022 including the Climate Vulnerability Assessment Results with key objectives of the assessment being to measure potential financial risks to banks, the financial system and economy from physical and transition climate risks, understand how banks can adjust their business models to respond to these risks under different scenarios, and improve banks' climate risk management capabilities. The results were provided on an aggregated basis using modelled data on the estimated future financial impact of climate change on their businesses (and resilience of Australia's banking system), and potential responses to associated physical and transition risks. Key climate change financial risks comprise physical risk, transition risk and liability risk. Data was based on modelled climate risk impacts using two internationally recognised scenarios developed by the Network for Greening the Financial System, one being a continued increase in global emissions to 2050 and beyond, and a second with a rapid reduction in global emissions from 2030. Key insights were:

- Whilst the climate scenario analysis showed a measurable impact on lending losses, in particular from physical and transition risks in the medium-to-long term, the participating banks are likely to be able to absorb these impacts and lending losses arising from climate change would be unlikely to cause severe stress to the banks. However, lending losses could lead to the banking sector being more vulnerable to future economic downturns.
- There was significant variability in lending losses across the banks due to different modelling approaches and climate risk impacts were more concentrated in specific regions or industries that were exposed to more severe and prolonged physical risks or exposed to transition risk towards lower emissions.
- The overall exercise was useful in adjusting banks' risk appetite and lending approaches in response to increasing physical and transition risks and accelerated capability development and risk awareness. That said, climate-related data quality and accessibility remain a challenge, although this should not be a barrier to banks undertaking climate risk analysis now.

APRA's report followed MAS's Financial Stability Review November 2022 which included a special feature on assessing the impact of climate change on financial stability on selected key banks and insurers. A separate study on the potential implications of climate risks for non-financial corporates was also done under the same Network for Greening the Financial System ("NGFS") scenarios. The NGFS is a group of central banks and supervisors that co-operate in the development of climate and environment related risk management in the financial sector and organizing transition financing for a sustainable economy. The assessment was done across three pathways over 2022-2050 (orderly transition based on NGFS net zero 2050 scenario, delayed transition, and no additional policies beyond end 2021 with an acute physical risk and significantly warmer temperatures by 2050 due to no new climate policies) and, according to MAS, was an important learning experience for MAS and the industry for incorporating climate-related considerations into risk assessment frameworks and identifying data and methodological gaps for future data collection and model development work.

Figure 20: Key aspects of MAS' 2022 Stress Test climate scenarios

	Orderly Transition	Disorderly Transition	No Additional Policies
Transition risks	**Moderate**	**Moderate to High** (depending on jurisdiction)	**Limited**
Nature of transition	Early and orderly	Delayed and disorderly	Only policies in place by end-2021
Range of shadow carbon prices[61] globally in 2050 (2010 US$/tCO$_2$e)	600–900	500–1100	Below 30
Physical risks	**Limited**	**Limited**	**High** (both chronic and acute[62])
Mean global warming relative to pre-industrial times in 2050 (°C)	1.6	1.8	3.0

Source: MAS Financial Stability Review November 2022, NGFS, MAS estimates

Not Just About Climate Risk but also Climate Opportunities

Climate risk appears to be driving a perception of increasing threats that are now indirect (hence the need for SFDR and NZBA) but could become more direct sometime in the future (hence the need for climate stress testing). However, the shift in focus and business agendas could also create climate opportunities for Financial Institutions. Financial Institutions have increased innovation in new products that meet government sustainability agendas and appeal to changing consumer preferences and awareness. These include green and sustainable product shelfs including green loans for electric vehicles, solar panels, batteries, and more sustainable home improvements. These could increase in popularity given the rising cost of fossil fuel-based energy sources. New customers are also emerging including the manufacturers of sustainable products as well as the producers of sustainable foods including vertical farmers.

Opportunities will be greater for Financial Institutions who are first movers that capture business opportunities and reputational benefits. Laggards may run the risk of market share impacts and rising stakeholder concerns or negative publicity from climate activists if they cannot get their sustainable finance business right or their business continues to conflict with net zero ambitions (either on a country or organisational level). Other business risks and credit impacts tied to weaker sustainability finance agendas include focusing on obsolete technologies or those that are impacted by regulation and policy changes or a heightened focus by many Financial Institutions on the same limited opportunities which drives elevated valuations, a so-called 'green asset bubble' as some sustainability experts have termed.

Overall, the main opportunity for Financial Institutions though is as an amplifier of economic activity that can drive societal and environmental change by incentivising borrowers to produce credible transition plans to cut emissions and restricting funding to high emitting industries. This translates to a high influence of environmental sustainability factors on Financial Institutions in our view.

Long Standing Social Influences

Banking products in the form of bank accounts, loans, and mortgages to retail and corporate customers are one of the most widely prevalent and used products in today's world. Per the United Nation's ("UN") Financing for Sustainable Development Report 2021, developed countries have 94% of adults with a bank account, while in developing countries that figure amounts to 63%. Zooming into Singapore, this figure is even higher at more than 98%, per an estimation by the Monetary Authority of Singapore back in 2020. The widespread reliance on Financial Institutions to safekeep our money and personal information has naturally resulted in them being rated as organisations bearing high systematic importance and consequently stronger regulatory oversight.

We therefore believe that the long-standing social considerations affecting Financial Institutions' business remain immediate and ongoing influences and that the influence of social sustainability factors on Financial Institutions is high. While the essential nature of such obligations borne by Financial Institutions have been around for some time (perhaps having co-existed with banking since its birth), what has changed are the circumstances that such influences present themselves in and the ways that they can be managed or mitigated. With a business model built primarily on trust, it is crucial for Financial Institutions to constantly monitor and manage such risks for the mass populations they serve in order to avoid these age-old social issues from catching up to them and to continue bettering society as a whole through their critical service.

That said, given that social obligations or influences have been around for a while, so has their compliance with them and Financial Institutions for the large part are experienced in managing these social influences. Furthermore, these influences are also enshrined in regulations and the regulatory and financial consequences of Financial Institutions breaking them are evident. These both function as mitigants against the high influence of social sustainability factors on Financial Institutions in our view. In no order of importance, we delve into some of the key social influences that surround Financial Institutions today through its provision of financial services and customer service considerations:

- Financial inclusiveness:
    - One of the largest social risks facing banks today is the lack of financial inclusiveness. Per the world bank, financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit, and insurance – delivered in a responsible and sustainable way. Theoretically speaking, financial inclusion helps to solve several societal issues, such as economic growth, employment, poverty, and income equality in both developed and developing countries.
    - Financial inclusion is also positively associated with GDP growth, by up to 14% in developing economies per a study back in 2018 by Ernst & Young on Innovations in Financial Inclusion. We thus believe it is in the interests of both Financial Institutions and regulators to promote financial inclusion, especially to

people living outside the financial mainstream to both make the most of untapped revenue sources as well as to help the unbanked population in regions where they operate.

- Confidentiality of client information/Fraud/Mis-selling:
  - Financial Institutions with large retail customer bases expose them to fraud and mis-selling risk. Fraud risk relating to banking products could arise from both internal and external sources in many ways, such as phishing, vishing, investment frauds and many more. Mis-selling on the other hand refers to deliberate attempts by bankers to mislead customers on the suitability of banking products or services.
  - Historical breaches have resulted in fines, customer remediation charges, enforceable undertakings to improve compliance and business processes, higher regulatory oversight, and additional capital requirements to offset higher operational risk (akin to a deferred fine). Other impacts may be harder to quantify and could lead to cross contamination effects on other aspects of the bank's businesses. For instance, reputational damage from any privacy breaches and the trust lost in the ordeal is hard to be measured.
  - Financial Institutions have a duty to put in place robust measures that must prevent confidential client information from passing through to unwanted third parties. Customer accounts, in particular on the retail banking side, could amount to the whole livelihood of families and ordinary citizens.
- Changing consumer preferences as well as demographic shifts in consumption of financial services, leading to technological risks:
  - As a result of the Covid-19 pandemic, there has been a sustained and permanent shift in customer behaviours with a stronger preference for digitalisation amongst other changes.
  - Within banking services, some possible consumer preferences include changing risk appetites, more innovative digital banking, higher demand for omnichannel applications and overall, a more seamless banking experience.
- Anti-Money Laundering/ Terrorist Financing:
  - Social risks stemming from the lack of prudent monitoring for such activities include negative international consequences and weaker foreign investment confidence, increased crime and corruption and damage to the soundness of a country's financial sector and stability.

Enduring Governance Influences To Manage Environmental and Social Influences

Financial Institutions' critical service and high systemic importance has created the need for strong regulatory oversight. Combined with a business model built primarily on confidence and trust, Governance Influences on Financial Institutions are enduring to ensure there is an appropriate corporate culture and adequate risk management and financial strategies so that Financial Institutions' higher business risk can co-exist with its systemic importance and avoid any regulatory breaches. Recent examples with Westpac Banking Corp. and Credit Suisse Group AG have highlighted how governance shortfalls have resulted in significant breaches of anti-money laundering regulations and material losses from lapses in risk management, respectively. Both have had business, management and financial impacts that have put both banks on different strategic paths with a new CEO and Chairman whilst having to repair trust and reputations with regulators, shareholders, customers, and the public.

Governance influences for Financial Institutions are managed with mostly independent boards and committees that are becoming increasingly focused on sustainability impacts on the banks in which they are involved. And they are becoming increasingly experienced and incentivized through KPIs to meet Sustainability agendas.

- BNP Paribas SA's ("BNPP") corporate social responsibility policy is structured around four pillars (economic, social, civic and environmental responsibilities) and 12 commitments which are applied across the group's businesses with a specific governance put in place (Company Engagement Department) to assist with execution of the policy as well as a dashboard to monitor 10 indicators on an annual basis by the Group's Executive Committee and Board of directors. Achievement of the indicators is used in the calculation of the three-year retention plan for more than 7,000 employees, and accounts for 20% of the award conditions.
- UBS Group AG's ("UBS") climate strategy is set by the Group Executive Board and the strategy is overseen by the Corporate Culture and Responsibility Committee ("CCRC") which regularly reviews the execution of UBS's climate strategy and evaluates progress of the climate risk program with the Risk Committee. CCRC members include the Chairman, Group CEO, Group Chief Risk Officer, Board lead for sustainability and impact, and the Chief Sustainability Officer. Other key bodies and issues involved in sustainability include the Risk Committee, Group Sustainability and Impact, Group Risk Control and Climate Risk Program.
- For Standard Chartered PLC ("StanChart"), the Culture and Sustainability Committee provides oversight of StanChart's sustainability strategy and priorities. The Board Risk Committee oversees Reputational and

Sustainability Risk as part of the Enterprise Risk Management Framework while the Group Risk Committee has executive-level committee oversight. The Group Responsibility and Reputational Risk Committee manages reputational and sustainability risk. Climate risk and climate change is the responsibility of the Group Chief Risk Officer who is supported by the Global Head of Enterprise Risk Management. A Climate Risk Management Forum oversees the Group's commitment to manage climate-related financial and non-financial risks. Finally, a Sustainable Finance Governance Committee, appointed by the Group Responsibility and Reputational Risk Committee, leads, governs, and oversees StanChart's sustainable finance offerings while a cross-business Sustainability Forum develops and delivers the Group's wider sustainability strategy.

Governance quality is also directed through regulatory oversight. In its guidelines on corporate governance, the Monetary Authority of Singapore highlighted that "Corporate governance, especially in financial institutions, is essential in guaranteeing a sound financial system, capital markets, and sustainable economic growth. Governance weaknesses at financial institutions can result in the transmission of problems across the finance sector and the economy." Also, "Weak governance may not only undermine public confidence in that particular Financial Institution, but the financial system and markets in which it operates as well." MAS' guidelines are established to guide good corporate governance practices for matters such as board effectiveness and independence, remuneration, accountability and audits, shareholder rights and engagement, managing stakeholder relationships, and related party transactions.

Governance influences on sustainability for Financial Institutions is therefore high in our view and will likely grow as the importance of sustainability increases for the Financial Institution, society, and the government. That said, we believe the high influence of governance sustainability factors acts to effectively manage the high influence of environmental and social sustainability factors on Financial Institutions. As such, the overall sensitivity of Financial Institutions to sustainability is moderate in our view. This is reflected in the mostly 'Medium' SSS for the Financial Institutions we have covered.

Tracking Returns in the SGD credit market

Construction of tracker: With increasing differentiation in performance, we constructed a tracker to help track performance in the SGD credit market. This tracker included only outstanding SGD issues with at least SGD100m in issuances while excluded government and supranational bonds, convertibles, sinkable and defaulted bonds. Rebalancing is on the first applicable day of each month.

Table 14: Summary of performance in the SGD credit market

		Key Statistics					Returns					
	(1 Jan 2021 = 100)	OAS	Eff Mty	YTW	Market Cap	Proportion of Perps/sub	d/d	w/w	m/m	y/y	Since Jan 2021	Description
By Tenor & Structure												
AT1S	100.3	295bps	2.5Y	6.34%	$9,332m	100%	0.09%	0.19%	1.19%	-3.03%	0.28%	AT1s
NON-FINANCIAL PERP	98.2	351bps	12.1Y	6.85%	$12,372m	100%	0.04%	-0.12%	0.31%	-4.86%	-1.81%	Non-financial corporate perpetuals
TIER 2S AND OTHERS	97.6	220bps	4.2Y	5.39%	$9,578m	100%	0.05%	0.15%	0.90%	-4.25%	-2.36%	Tier 2s and other subordinated papers
LONGER TENORS (>9YRS)	76.6	153bps	23.6Y	4.24%	$12,343m	0%	0.00%	-0.49%	1.03%	-17.64%	-23.36%	Bullets above 9Y in maturity
MID TENORS (>3Y-9YRS)	93.9	143bps	5.5Y	4.39%	$39,238m	0%	0.01%	-0.34%	0.64%	-6.63%	-6.07%	Bullets >3Y to 9Y in maturity
SHORT TENORS (1-3YRS)	99.8	170bps	2.1Y	4.72%	$23,456m	0%	0.03%	0.01%	0.56%	-1.56%	-0.21%	Bullets 1 to 3Y in maturity
MONEY MARKET (<12M)	103.6	135bps	0.5Y	4.99%	$10,905m	0%	0.04%	0.10%	0.39%	1.77%	3.63%	Bullets less than 12M to maturity
By Issuer Profile Rating												
POS (2)	96.3	199bps	9.1Y	5.14%	$6,927m	91.7%	0.14%	-0.07%	0.85%	-4.99%	-3.67%	Issues with issuer profile at Pos (2)
N(3)	98.5	148bps	3.1Y	5.35%	$13,326m	46.1%	0.05%	0.13%	1.07%	-3.23%	-1.45%	Issues with issuer profile at N (3)
N(4)	97.6	259bps	7.7Y	5.70%	$19,319m	39.8%	0.05%	0.12%	1.08%	-5.06%	-2.44%	Issues with issuer profile at N (4)
N(5)	101.7	239bps	3.3Y	5.56%	$11,923m	23.7%	0.03%	0.00%	0.87%	-2.17%	1.66%	Issues with issuer profile at N (5)
OCBC MODEL PORTFOLIO	104.8	416bps	1.8Y	7.57%	$5m	71.6%	0.08%	0.15%	1.26%	-0.74%	4.79%	OCBC Credit Research's model portfolio

Source: Bloomberg, OCBC

Differentiation of returns: Year on year, most SGD bonds would have delivered negative total returns, with the exception of bonds below 12 months in maturity (+1.77% y/y total returns). In this period, the largest underperformers are the ones with the longest tenors (>9Y) and those higher in Issuer Profile rating. Structurally subordinated papers delivered -3% to -5% total returns generally.

Figure 21: Total Returns by Tenor and Structure (Jan 2021 = 100)

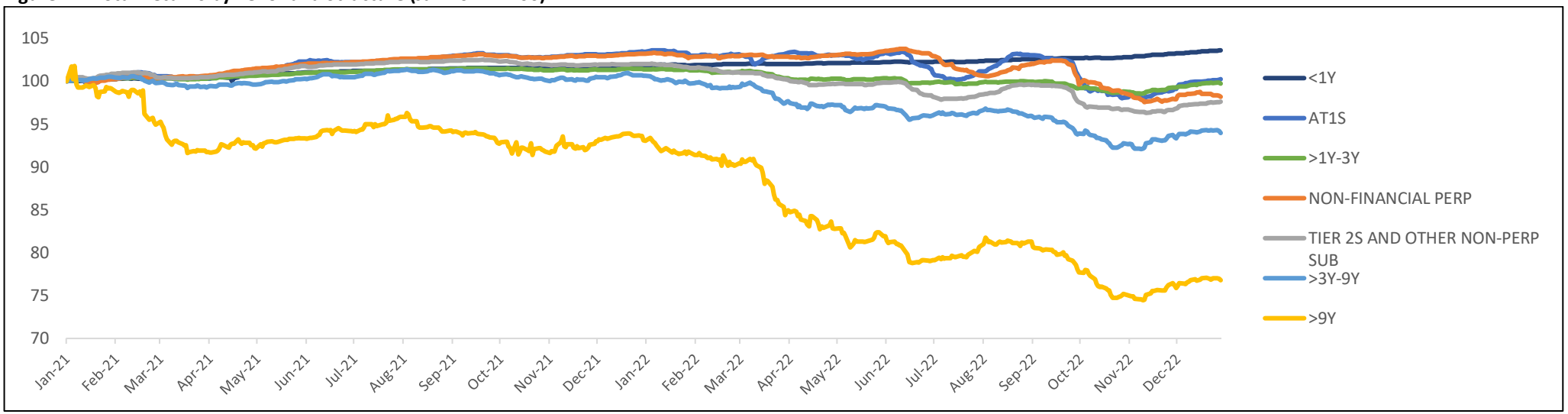
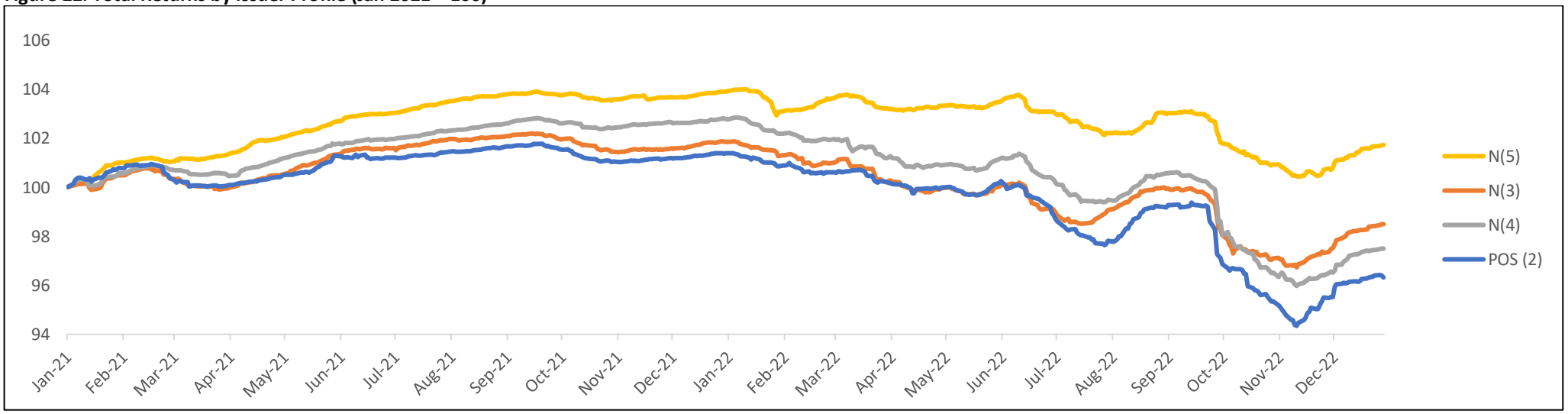


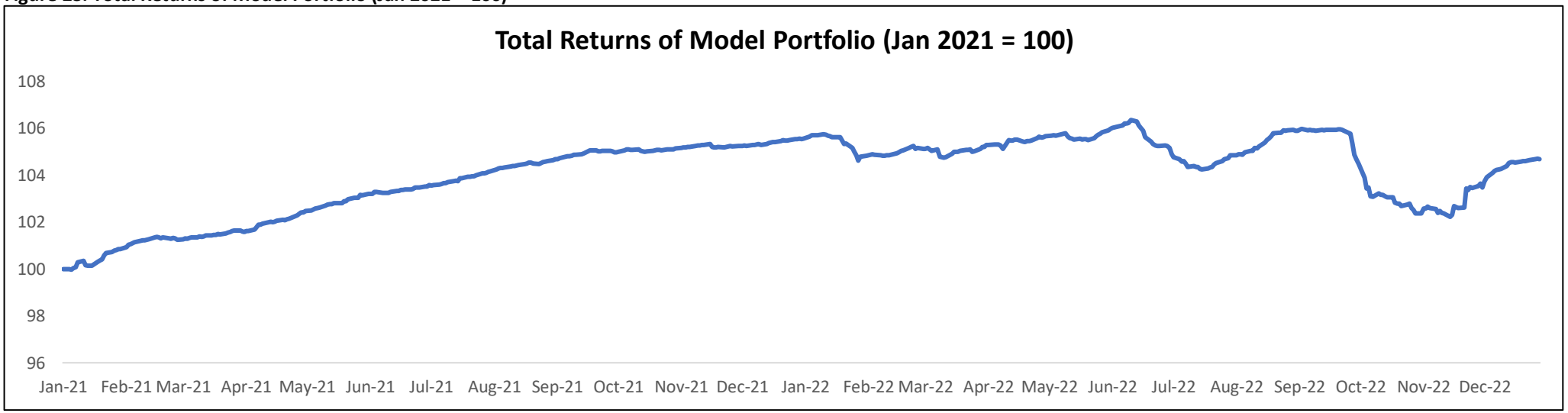
Figure 22: Total Returns by Issuer Profile (Jan 2021 = 100)



Source: Bloomberg, OCBC

Small negative returns for model portfolio: The most testing of times for the bond market has also tested the resilience of the model portfolio, which declined 0.74% y/y. That said, through the strategy of avoiding the longer dated papers and those with a stronger credit profile, with careful security selection, the model portfolio outperformed most bonds except those with less than 12 months to maturity. Over a 24-month horizon, we believe the model portfolio has similarly outperformed by delivering 4.79% total returns.

Figure 23: Total Returns of Model Portfolio (Jan 2021 = 100)



Source: Bloomberg, OCBC

Remain short dated or go selective in credit/structure selection: We continue to avoid the longer-dated papers given the uncertainty in rates. We keep a short-dated bias to the portfolio, which has an average 2.1Y tenor (assuming first call date as maturity or reset date as maturity if not called at first call). The average OCBC Credit Research Issuer Profile rating of the portfolio is 4.1, as we selected mainly the crossovers (issues around the middle of the credit curve) which yield higher while we remain comfortable with the credit profile of the chosen issuers. Although we are Neutral towards perpetuals in general, the portfolio has a heavier weight towards perpetuals especially AT1s, mainly due to bottoms-up selection and avoiding those that are not structured with resets. The simple average yield of the portfolio is 5.98%. By keeping a somewhat high yield, we believe this could offset potential capital losses.

Table 15: Model Portfolio constituents, 3 Jan 2023

Issue Name	OCBC Issuer Profile Rating	Yield to Worst	Maturity / First Call Date / Reset Date	Cost of investment (incl. acc. interest)	Current Value (incl. acc. interest)	Total coupons received	Total Gain/Loss
Property Developers							
OUESP 3.55 05/10/23	5	5.03%	10/05/2023	$252,012	$249,383	$4,401	$1,772
METRO 4.3 04/02/24	4	4.64%	02/04/2024	$254,397	$250,440	$21,500	$17,543
GUOLSP 4.6 PERP	5	6.16%	23/01/2025	$243,735	$245,661	$0	$1,927
CITSP 3 01/17/24	4	4.58%	17/01/2024	$248,627	$248,992	$0	$365
FPLSP 4.38 PERP	5	5.74%	17/01/2028	$240,000	$237,558	$0	-$2,443
REITs							
AAREIT 5.65 PERP	4	6.76%	14/08/2025	$258,838	$244,471	$21,188	$6,821
CERTSP 5 PERP	Unrated	6.78%	24/11/2026	$248,181	$223,885	$12,500	-$11,796
Financial Institutions							
UBS 5 7/8 PERP	3	4.26%	28/11/2023	$265,397	$253,043	$29,375	$17,021
SOCGEN 6 1/8 PERP	4	7.44%	16/04/2024	$264,948	$247,364	$30,562	$12,978
CS 5 5/8 PERP	4	9.14%	06/06/2024	$264,341	$186,608	$28,125	-$49,608
STANLN 5 3/8 PERP	4	5.26%	03/10/2024	$262,020	$252,098	$26,875	$16,953
CMZB 4.2 09/18/28	4	6.17%	18/09/2023	$253,029	$241,673	$5,250	-$6,106
HSBC 5 PERP	3	4.98%	24/09/2023	$256,992	$252,059	$6,250	$1,317
UBS 4.85 PERP	3	5.45%	04/09/2024	$258,118	$249,980	$6,063	-$2,075
BACR 8.3 PERP	4	7.71%	15/09/2027	$262,992	$256,203	$10,375	$3,585
SOCGEN 8 1/4 PERP	4	7.58%	15/07/2027	$260,149	$256,003	$10,313	$6,166
DB 5 09/05/26	Unrated	4.68%	05/09/2025	$251,649	$254,694	$0	$3,045
Others							
FULIN 3.7 04/15/23	Unrated	5.79%	15/04/2023	$252,582	$249,766	$4,612	$1,796
CATHAY 3 3/8 01/22/23	Unrated	4.89%	22/01/2023	$253,643	$252,960	$4,253	$3,571
OLAMSP 4 02/24/26	5	4.88%	24/02/2026	$253,341	$245,531	$20,000	$12,190
ESRCAY 5.65 PERP	Unrated	7.71%	02/03/2026	$255,577	$238,945	$21,188	$4,556
SITB 01/24/23	Unrated	4.18%	24/01/2023	$83,808	$83,808	$0	$0
SGD					$397		

Source: Bloomberg, OCBC

Top Trade Ideas

Top Picks

Company	Ticker	Coupon	Maturity/ Call Date	Amount	Offer Price	Offer YTM/YTC	Rationale
City Developments Ltd	CITSP	3.000%	17-Jan-24	SGD250mn	98.48	4.53%	CDL's credit profile has stabilised, and its shorter dated bonds provide decent spreads and yields versus peers such as CapitaLand and Mapletree.
Fraser and Neave Ltd	FNNSP	3.000%	9-May-25	SGD140mn	96.89	4.41%	The FNNSP curve offers decent spreads for a stable credit profile. FNN is also a rare F&B issuer in the SGD space which offers industry sector diversification.
Lendlease Group	LLCAU	3.900%	27-Apr-27	SGD300mn	97.20	4.81%	At an ask YTW of 4.81%, it implies a premium of 25bps to 45bps over the same rated peers notes (Neutral 3) like CAPITA'27 (4.36%) and MCTSP'27 (4.55%). This bond is also largely trading in line with the lower rated peer (Neutral 4) note namely FNNSP'27 (4.91%).
Metro Holdings Ltd	METRO	4.300%	2-Apr-24	SGD200mn	99.59	4.65%	YTW of 4.65% is attractive for a bond maturing in 15 months. Credit fundamental is well underpinned by recurring income generated from investment properties (67% of total assets). Decent credit fundamental with 2.26x cash-to-short term borrowings and 0.20x net debt/equity ratio.
CapitaLand Ascott Trust	ARTSP	3.630%	20-Apr-27	SGD200mn	95.88	4.70%	At an ask YTW of 4.7%, this sustainability-linked bond is compelling versus other bullets issued by peer REITs. ART's credit profile continues to be anchored by its stronger operating performance from improvement in travel demand since pandemic restrictions have been lifted in many geographies.
Suntec Real Estate Investment Trust	SUNSP	2.850%	2-Aug-23	SGD100mn	99.00	4.62%	SUNSP is a higher yielding REIT focused on the commercial (office and retail) space sector. We have the issuer profile on Neutral (4), with a cautious outlook over a 12 month period. That said, we think the very short dated SUNSP 2.85% '23s trading at an ask 4.62% is interesting as a cash alternative at this point.
ABN AMRO Bank N.V.	ABNANV	5.500%	5-Jul-27	SGD750mn	102.37	4.93%	We are overweight the Tier 2 ABNANV5.5% '32c27s given the decent fundamentals and higher reset spread compared to other recently issued Tier 2s in the SGD space. Credit fundamentals are supported by its solid domestic market positions and low risk loan book.
Crédit Agricole Group	ACAFP	3.800%	30-Apr-26	SGD325mn	95.96	5.14%	We are overweight the Crédit Agricole Group Tier 2s following the recent sell off whilst the bank remains conservatively positioned ahead of potential economic headwinds. CAG's phased in capital position remains well above minimum requirements with the distance to its Maximum Distributable Amount trigger of 771bps or EUR45bn in capital as at 30 September 2022.

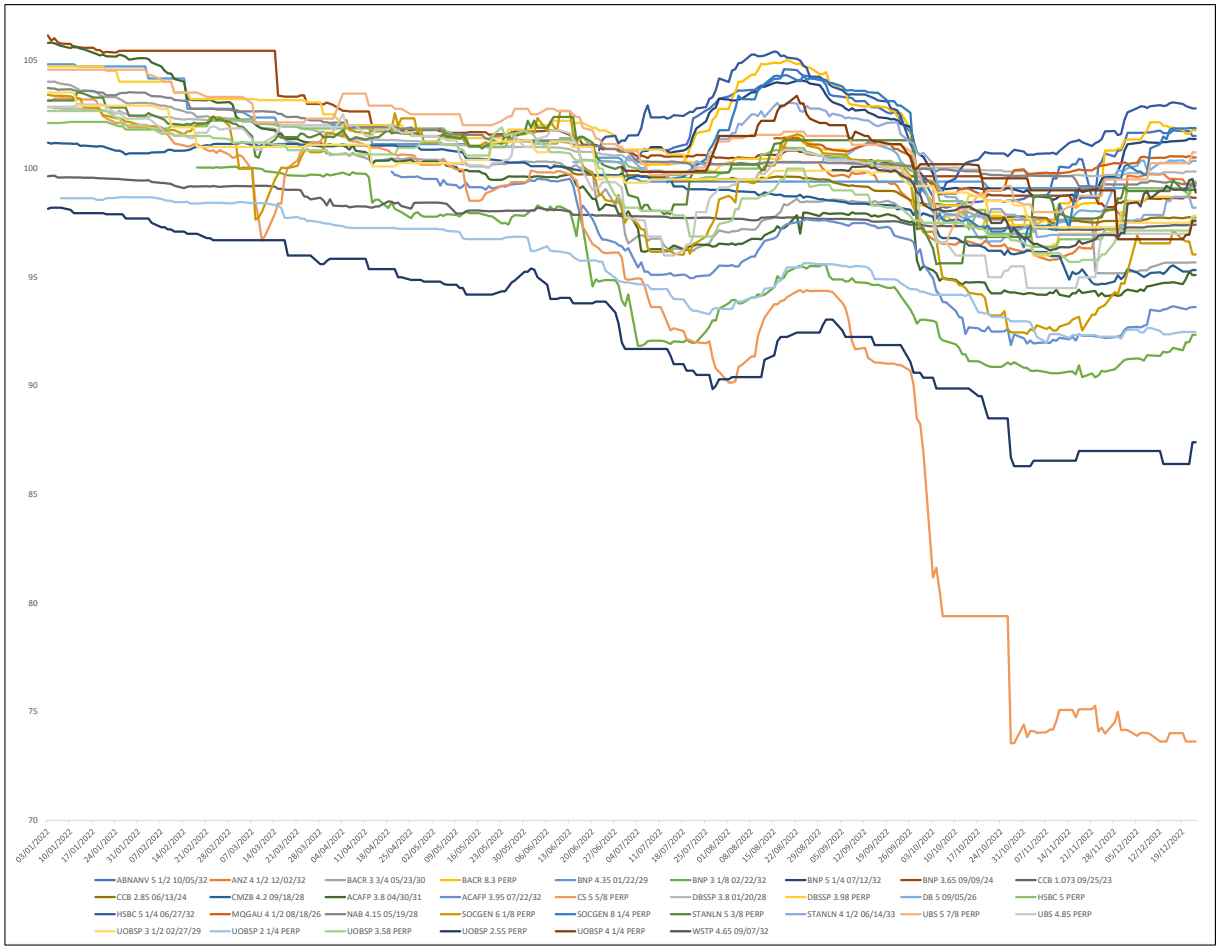
Financial Institutions –Driving Defensively

Our Singapore Credit Outlook 2022 from 12 months ago reflected positive expectations for 2022. Much like our ambitions to resume travel at that time, we sat in the driver seat with our foot on the pedal looking to accelerate into better times. Speed humps however in the form of ongoing geopolitical risks, the Russia-Ukraine conflict, and higher inflation caused us to take the foot off the accelerator in the first half of 2022. This was then followed by the continuing rise in interest rates and questions of an impending and perhaps inevitable recession that presented roadblocks to our outlook in the middle of the year. It was at this time that we turned neutral from overweight on existing bank capital instruments as we expected the double impact of rising rates and rising spreads to put pressure on prices of existing issues, especially those with thin reset spreads.

Following The Map

Since our mid-year outlook and through 2H2022, things have largely played out as expected. Bond prices have fallen across the board, in particular the ones with thin reset spreads such as BNP 3.125% '32c27s, ACAFP 3.95% '32c27s, UOBSP 2.25% 'PERPc26s and UOBSP 2.55% 'PERPc28s. The biggest faller of all though was Credit Suisse Group AG's ("CS") CS 5.625% 'PERPc24s due to other well publicised reasons. On 25th November 2022, we lowered our issuer profile on CS to Neutral (5) given its current weakened credit profile that is (1) no longer comparable to other Neutral (4) Financial Institutions under our coverage and (2) unlikely to improve in the near term with ongoing challenges through the next three years from higher costs related to its restructuring and depressed revenues from current market conditions and existing knock-on effects on client and investor confidence. We expect though that CS' credit profile will remain stable at this level over the next 12 months and supported by its still acceptable capital buffers that has been reinforced by the recently completed capital raising.

Figure 24: Bond price movements of SGD Bank Capital Instruments



Source: Bloomberg, OCBC Credit Research

At the same time (and aside from CS), Financial Institution fundamentals have remained stable. Our neutral call on bank capital instruments in June 2022 factored in the fundamental strength of the Financial Institutions we cover, and

we continue to believe this is enduring owing to strong domestic market positions and diversified businesses. Adding to this and further preserving the resilience of credit profiles for the Financial Institutions under our coverage are past actions by Financial Institutions and regulators to improve earnings and balance sheet quality, timely and explicit government support, and the essentiality and systemic importance of Financial Institutions. These drivers have kept key credit ratios and fundamentals stable in 2022 and are expected to continue doing so in 2023 along with other recent supportive trends including:

1. Higher total income y/y from rising interest rates. This has led to improvements in net interest income from higher net interest margins and loan volumes (customers locking in funding on concerns that rates will continue rising);
2. Ongoing market volatility which is positive for Financial Institutions' trading business depending on their product focus (macro trading including rates and FX have outperformed credit trading); and
3. Resilient loan quality indicators including stable non-performing loan ratios against still elevated loan loss provisions that are a carry-over from the COVID-19 pandemic. Rather than fully writeback these provisions on receding pandemic concerns, they have been kept and re-allocated against weaker macro-economic assumptions and a higher probability of downside economic scenarios in loan loss models.

Are we there yet?

In our view, Financial Institutions' enduring fundamental strength means that investors who can tolerate price volatility can continue to stay invested in bank capital instruments. It also means that the key risk for bank capital instruments continues to be non-call risk above distribution risk and write-down risk despite being somewhat unquantifiable with write-down or loss absorption at the discretion of the regulator. As we covered in our Singapore Mid-Year Credit Outlook 2022, pro-active and pragmatic regulators have frequently pursued courses of actions that were driven by practicalities and idiosyncratic factors rather than theory by using the flexibility within their regulatory frameworks as well as ongoing pro-active oversight to ensure financial sector systemic stability.

Non-call risk also remains a largely contained risk in our view with the risk return reward for bank capital instruments supported by the necessity and permanence of bank capital instruments in the capital structure due to regulatory requirements. This means that pure economic considerations at the time of a call are not the over-riding determinant vis-a-vis corporate perpetuals that also face non-call risks. An earlier example in 2022 of non-economic calls include CS pricing USD1.65bn of new Additional Tier 1 notes in mid-June at a historically high coupon of 9.75% to refinance the 29th of July call of a USD1.5bn 7.125% AT1 bond that could have been extended at a lower cost of about 8.6%. Of interest was that the 7.125% issue was quoted at a cash price of 95.50 pre-announcement, indicating that investors had been expecting it to be extended. More recently in early December 2022, DBS Group Holdings Ltd called its SGD250mn Tier 2 that is approaching first call in January 2023 while UBS Group AG called their 5% USD Additional Tier 1 ("AT1") against expectations with the bond trading below par at time of call. Per Bloomberg, the reset spread of 243.2bps implied a reset of around 6.3% at time of call when its 4.875% USD AT1, issued in January 2022 with first call in February 2027, was trading at a yield to call of ~9% implying the approximate cost to replace the 5% AT1.

We also do not see a rise in non-call risk from recent comments by regulators stating their reluctance for non-economic calls. On 1 November 2022, the Australian Prudential Regulation Authority ("APRA") released its expectations on calling bank capital instruments, effectively asking banks to do so only if it makes economic sense and does not increase their funding cost. Australian banks need APRA's approval before calling bank capital and this statement led to broad underperformance in bank capital issues from Australian Financial Institutions at the time. Ultimately, we think this statement was more a reminder for investors rather than for issuers that calls are not automatic. Given Australian Financial Institutions' historical use of wholesale funding, something that may increase to refinance drawings under the Reserve Bank of Australia's Term Funding Facility, we believe that APRA remains interested in the overall cost of capital for the banking sector and would not be heavy handed when it comes to calling of bank capital instruments.

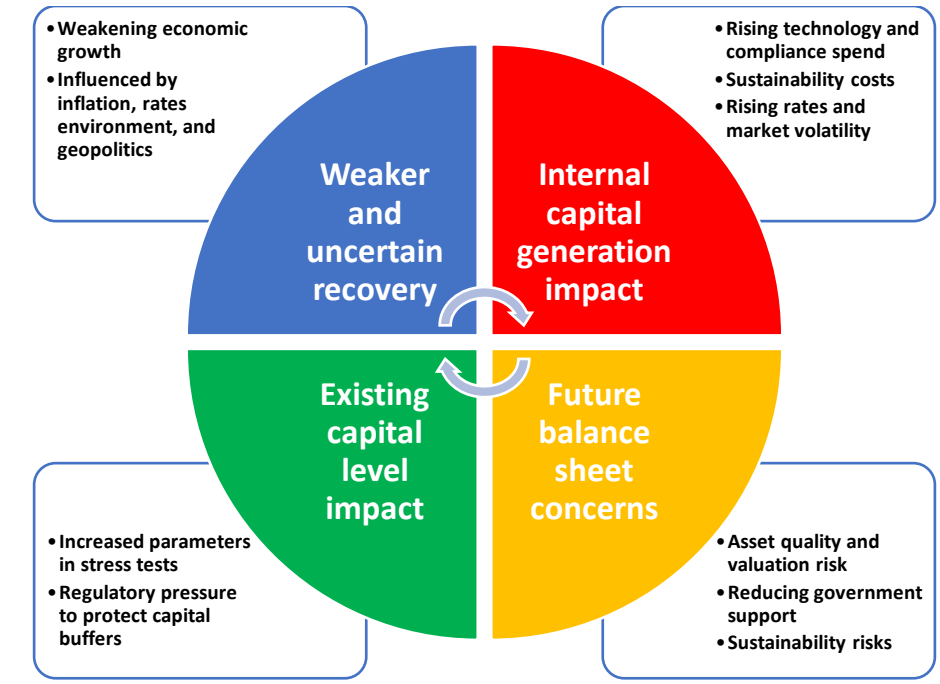
So given enduring fundamentals, manageable non-call risks, and the year-to-date price corrections, is it time to turn overweight on bank capital instruments again? Much depends on the interest rate outlook in the context of a synchronised economic downturn in 2023. Our OCBC Rates Strategist expects interest rates to remain rising and peak in 1H2023 followed by a pause by mid to late 2023. By this time, our Macro colleagues expect greater clarity on central bank resolve and peak interest rates, with 2H2022 a more benign market environment. The answer in our view is not just yet although we will continue to closely monitor for when the time is right to U-turn to overweight again. Until then, we continue to view bank capital instruments from a bottoms-up perspective rather than top-down, although see selective better value in Additional Tier 1s as opposed to Tier 2s, especially those recent ones with higher reset

spreads. This considers Financial Institutions' solid underlying fundamentals based on entrenched market positions, systemic importance, criticality of services and oversight by pro-active and pragmatic regulators. Investors though need to consider the reset spreads and whether they will incentivise a call sometime in the future.

Buckle in for 2023 and beyond

We think Financial Institutions contain adequate safety features to mitigate serious injury in 1H2023 against the synchronised economic downturn in 2023, weakening consumer confidence and still elevated systemic leverage that may lead to rising asset quality issues and lower credit demand. This will present difficult driving conditions and challenges alongside ongoing and evolving influences for Financial Institutions including cyber and fraud risks, sustainability issues including climate risks, rising costs and higher regulatory influence. The inflationary environment is likely to re-invigorate digitalisation efforts that were an emphasis pre-pandemic and before the focus on sustainability. All the above will likely raise overall operating costs although Financial Institutions are well-versed at looking in the rear-view mirror to manage costs given the thin return on equity. Against these influences that are skewed to the downside, we think banks will continue to drive smoothly albeit with the foot closer to the brake then the accelerator.

Figure 25: Key risks for Financial Institutions in 2023



Source: OCBC Credit Research

Singapore Industrial REITS – Pace of rental growth to taper

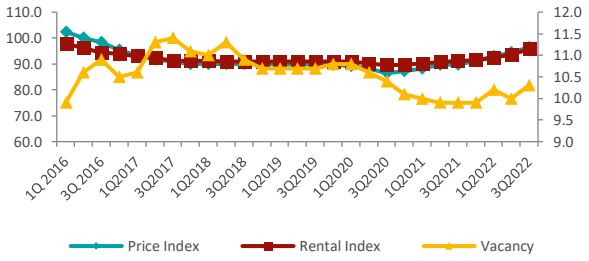
In 3Q2022, q/q price index increased by 2.0% for all industrial properties while on a y/y basis this was up by 7.2%, superseding pre-pandemic levels. Using data from Cushman & Wakefield ("C&W"), a real estate consultancy, 9M2022 saw SGD1.9bn of industrial investment sales in Singapore (2021: SGD4.4bn and 2020: SGD2.1bn). In our view, Singapore industrial properties are less susceptible to the increase in cost of funding given wider cap rates, especially for creditors who have a shorter-term exposure. Industrial properties in Singapore are sold with higher yields (lower price points) in part due to much shorter land tenures.

The rental index for all industrial properties increased by 2.1% q/q (up 4.9% y/y). This represents an eight consecutive quarter where industrial rents have increase and notably high relative versus the segment's historical performance. On a y/y basis, the warehouse segment and multiple-user factory segments saw a 6.0% and 5.8% growth respectively while the business park segment was lacklustre at only a 0.4% y/y increase in 3Q2022. C&W opined that prime logistics, warehouses and city-fringe business parks may see a 2-3% y/y rental growth for full year 2023 though adds that conventional factories and outlying business parks are expected to see rental growth of up to 1.0%.

After two years of pandemic disruption to construction schedules, works have resumed and in 9M2022, the market saw 0.8mn sqm of new supply added. Another 0.6mn sqm was projected for 4Q2022. While this number is high, it is worth noting that at the beginning of the year, JTC estimations (based on approved plans) was that 2.8mn sqm of new supply may be added for the whole of 2022. The new supply estimates have since been spread to the coming years. As at 3Q2022, estimated new supply in 2023 and 2024 would be relatively heavy at 1.6mn sqm and 1.3mn sqm respectively, serving a lid to further rental growth. Adding to headwinds, the manufacturing outlook continues to be soft, with November's manufacturing purchasing manager index for Singapore at 49.8 (dropped below 50 since September 2022). OCBC Bank economists' project Singapore's full year 2023 growth of 2.0%.

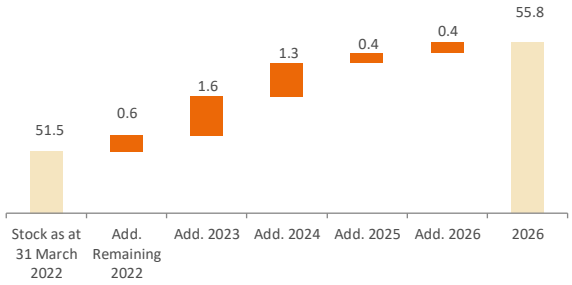
All industries vacancies have edged up to 10.3% in 3Q2022, after a tight market situation in the 12 months prior, driven by new supply though this is still on the lower side versus pre-pandemic. Demand for new industrial space is likely to continue for high specification buildings, data centres, logistics, cold chain centres while self-storage may emerge as a sought-after segment. The moratorium on new data centres has been lifted though regulators demanding higher sustainability standards. While sustainability has not been a key focus for industrial property owners in the past, we think this will progressively change as institutional owners start retrofitting and redeveloping their properties.

Figure 26: Industrial Price, Rental and Vacancy



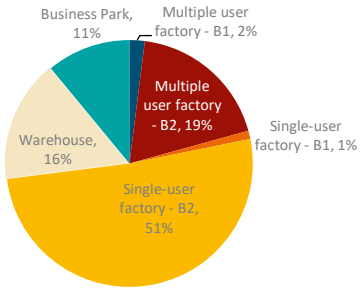
Source: JTC, OCBC Credit Research

Figure 27: Industrial stock and supply pipeline



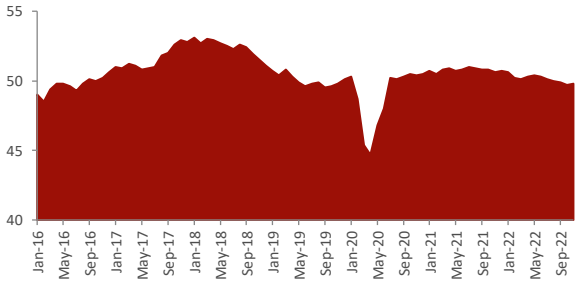
Source: JTC, OCBC Credit Research

Figure 28: Additional supply by sub-segment cumulative 4Q2022 to 2026



Source: JTC, OCBC Credit Research

Figure 29: Singapore PMI – Manufacturing Index



Source: Singapore Institute of Purchasing and Materials Management

Singapore Commercial Office REITS – Fizzling out from strong 2022

Per Colliers, a real estate consultancy, capital values for Core CBD Premium & Grade A market (more reflective of the assets owned by Singapore REITs active in the SGD corporate credit market) was stable q/q. That said, there was a lack of significant transactions in the underlying physical office market. Using data from Real Capital Analytics ("RCA"), an analytics firm focusing on the commercial real estate sector, we find that the median monthly office price per sq ft in 3Q2022 for Singapore (in SGD-terms) was SGD2,744, 0.6% higher than 2Q2022 on the same basis.

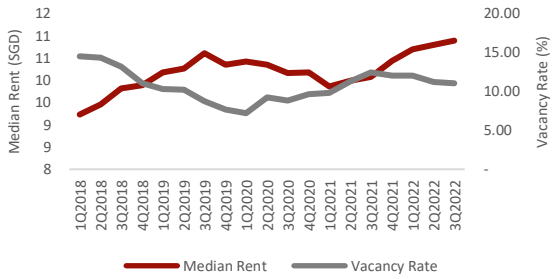
Office rents per URA data continued to rise, by 0.9% q/q (8.1% y/y) in 3Q2022 to SGD10.89 per sq ft per month for office space in buildings located in core business areas in Downtown Core and Orchard Planning Area which are relatively modern or recently refurbished, command relatively high rentals and have large floor plate size and gross floor area. This represents a sixth consecutive quarter where rents have risen. The strong rental performance was bolstered by a tight supply situation while the market also saw strong tenant demand. Vacancy rates was only 11.0% in 3Q2022, despite hybrid working arrangements having become the norm for the market.

However, the pace of rental growth is likelier to fall in the short-term (albeit from a high base) with headwinds from the technology sector and an overall slowing economic outlook for 2023 which typically slows down job creation. After a hiring frenzy in recent years, the technology sector has seen companies announcing mass layoffs and hiring freezes. Per C&W data, technology firms made up 23% of lease transactions in the central business district ("CBD") in 1H2022 (2021: 34%). The Edge reported that CBRE, a real estate consultancy, expects shadow space to increase as some tech firms offer up space on an "early surrender basis."

Whilst office supply had been very tight through 2022, the market is expected to see new supply in the short term. Guoco Midtown is scheduled for completion in end-2022, though this building is located on Beach Road and not in the core CBD area. The property has also seen a ~75% pre-commitment. 231,000 sqm of office space is expected to be completed in 2023. IOI Central Boulevard Towers in the Marina Bay area is the main property to be added into the core CBD market (targeted for 2H2023). Amazon has been reported to take up space in this property as a key tenant.

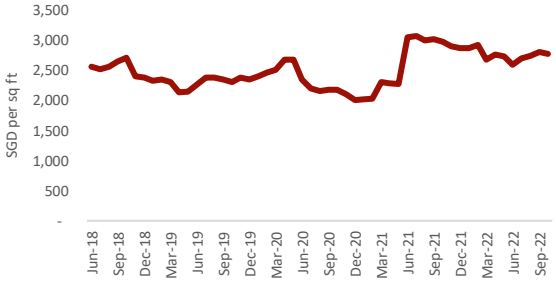
Net yields for the Singapore office market in recent years was ~3.4%-3.5% and some recent investment sales were completed at a net yield of sub-3%. Unless the transaction was completed with a 100% equity, the tight yields imply possibility of negative spreads for recent acquisitions in the current higher interest rate environment. Whilst we have not seen cap rate widening, we expect capital values for Singapore office to stay relatively flat in 2023.

Figure 30: Singapore Office Rent and Vacancy



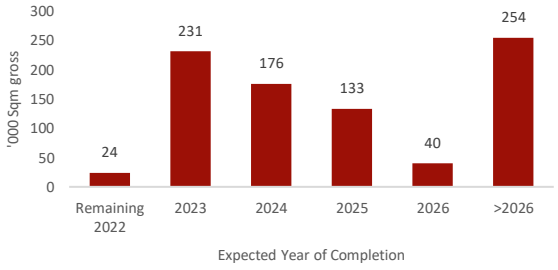
Source: URA

Figure 31: Singapore Office Price



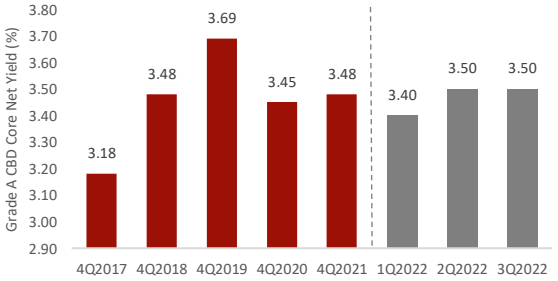
Source: RCA

Figure 32: Pipeline of Office Space



Source: URA

Figure 33: Office Net Yield



Source: CBRE for 4Q2017 to 4Q2021; Colliers for 1Q2022 to 3Q2022

Singapore Commercial Retail REITS – Resiliency of neighbourhood malls to continue

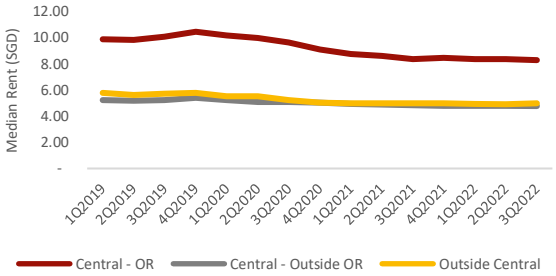
Prices of retail space continued to fall in 3Q2022, falling 3.2% q/q and on a y/y basis this was a 4.0% decline per URA's price index. However, the rental market held up better with median rents in the Orchard area declining only 1.1% q/q and centrally located retail properties outside the Orchard area fell by 0.2% q/q. Bucking the trend, retail properties outside the central area which is indicative of retail properties located closer to residential neighbourhoods saw rentals rise by 1.2% q/q (though still -0.2% y/y). Whilst on a per sq ft per month basis, outside central median rents were ~54-60% that of rents in the Orchard area, variability in rents through the pandemic was significantly smaller hovering at the ~SGD4.90 to SGD5.50 range. Orchard rents was SGD8.28 in 3Q2022 in contrast to the more than SGD10 pre-pandemic.

The dispersion is even more stark when we look at vacancies across these three segments using URA data. Retail properties outside the central area saw vacancy rate stable at 6.1% since 4Q2021, below pre-pandemic levels. Whilst it is now lower, vacancy rates for centrally located retail properties was still at ~11.0% for 3Q2022. According to Frasers Centrepoint Trust data (a Singapore REIT which owns retail properties located in residential catchment areas), for the financial year ended 30 September 2022 ("FY2022"), overall tenant sales were 11.3% higher than FY2021 and is trending 10-15% above pre-COVID levels. This is despite shopper footfall still at 79% of pre-COVID levels. In our view, these indicates resiliency of domestic consumption demand which benefits malls outside the central area. In March 2019, TTG Asia, a trade publication for the travel industry, reported comments from a representative of the Orchard Road Business Association who shared that tourist contribute 30-40% of sales for the Orchard belt.

Whilst the growth rates have started tapering in the past 12 months, total retail sales (excluding motor vehicles) still saw a healthy increase of 14.3% y/y in October 2022. Online sales as a percentage of total retail sales (excluding motor vehicles) was 14.5% in October 2022 (on SGD3.6bn of sales value). In May 2020 where including motor vehicles, online sales was as high as 24.5% of all retail sales. In our view, the decline in proportion of online sales provides some respite for physical retail to adapt to the longer-term transition towards higher proportion of online retail. Prior to the pandemic, less than 10% of total retail sales was done online. The main way that retail owners are adapting is by changing their tenant mix to more activity-based tenants. C&W estimates that in 11M2022, 48% of store openings in prime malls were F&B outlets, adding that digital-first brands are also taking up space.

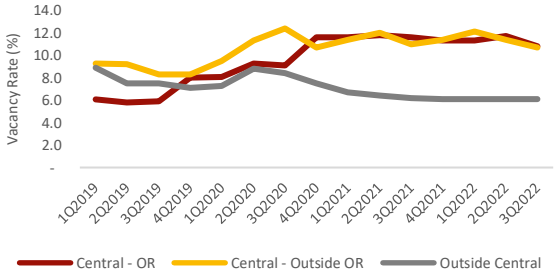
In December 2022, HKSAR-listed Link REIT announced that it will be buying Jurong Point and Swing By@Thomson Plaza from Mercatus Co-operative Limited ("Mercatus") for ~SGD2.2bn, representing a 6.1% discount to the 28 December 2022 appraised value.

Figure 34: Retail Rents SGD per sq ft per month



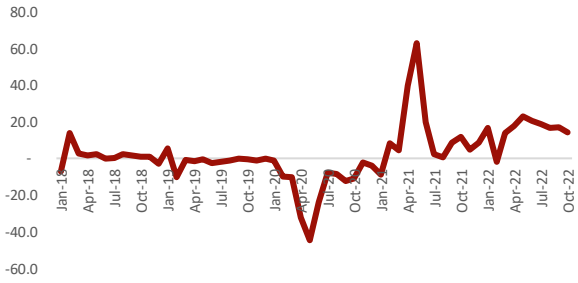
Source: URA
Note: OR refers to Orchard Road

Figure 35: Retail Vacancy Rates (%)



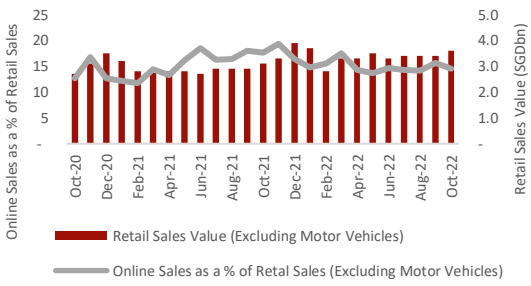
Source: URA
Note: OR refers to Orchard Road

Figure 36: Monthly Retail Sales (excluding Motor Vehicles) y/y % change



Source: Singstat

Figure 37: Monthly Retail Sales Value (excluding Motor Vehicles) in SGDbn and Online Sales %



Source: Singstat, Bloomberg

Singapore Hospitality REITS – Recovery to continue in 2023

Since the start of the pandemic three years ago, vaccines have become widely available. Whilst certain geographies still lack full vaccine coverage for its population, many others have learnt to live with COVID. In recent weeks, China has announced a series of measures to loosen its COVID-measures. Domestic flight travel in China has increased to ~65% pre-pandemic levels per Bloomberg in mid-December 2022. That said, we think it will take time before international travel to and from China will resume to pre-pandemic levels.

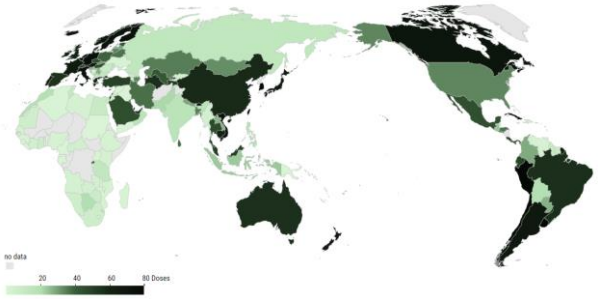
That said, outside of Asia and the Pacific, there has been a strong recovery momentum in tourism in 2022. In 9M2022, international tourist arrival numbers globally narrowed to 37% below that of 2019 (70% below 2019 in 2021), with Europe recovering the fastest. CapitaLand Ascott Trust ("ART"), the largest hospitality SGD corporate credit issuer with a diversified portfolio across Asia-Pacific, Europe, and the US, shared in their 3Q2022 business update that its gross profits were at ~90% of pre-COVID levels. Globally, hotel occupancy rates reached 66% in September 2022 per STR, a hospitality data firm, from only 43% in January 2022.

Within the Asia-Pacific region, Singapore has emerged as a clear beneficiary of an early reopening, with international visitors rebounding from the trough of April 2020 where only 750 visitors travelled to Singapore to 0.82 million in November 2022, around half of pre-pandemic levels. Encouragingly, hotel occupancies and average room rates in Singapore have reached levels that are more akin to pre-pandemic levels. However, available room nights for September and October 2022 were only ~90% of 2019 levels, likely driven by the on-going labour crunch in the travel and hospitality industry, resulting in less rooms being operational.

In a recent interview with the Business Times, a representative for the Singapore Hotel Association expressed cautious optimism for 2023, led by sustained tourism recovery supported by a healthy pipeline of meetings, incentives, conferences, and exhibitions ('MICE") and elevated tourism offerings. The Singapore Tourism Board ("STB") expects full recovery of the MICE industry in 2024-2025. The STB also offers support schemes to the sector, including providing eligible companies funding support that covers a percentage of costs.

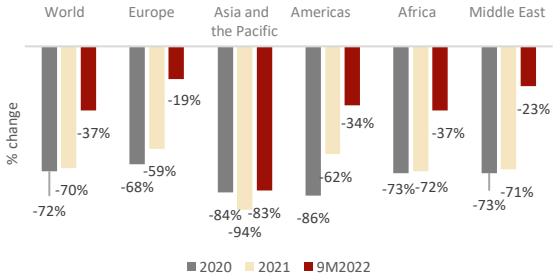
The strong recovery in 2022 has confirmed industry expectations that there is latent demand for travel despite the pandemic disruptions. That said, we observe that issuers under our coverage diversifying their presence into the student accommodation sector and rental housing. Most recently in December 2022, City Development Ltd (which owns Millennium & Copthorne Hotels Limited) announced the acquisition of five purpose-built student accommodation in the UK for ~SGD357mn.

Figure 38: Vaccines Administered Globally



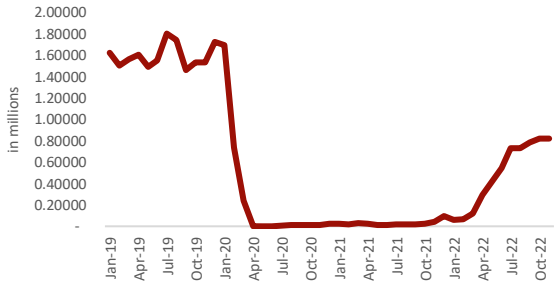
Source: Nikkei Asia; as at 28 October 2022

Figure 39: Change in International Tourist Arrivals (% compared to 2019)



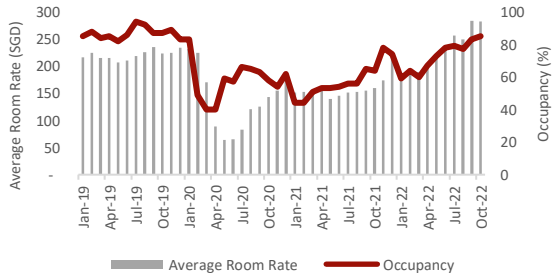
Source: UNWTO

Figure 40: International Visitors to Singapore



Source: Singapore Tourism Board

Figure 41: Singapore Average Room Rate and Occupancy



Source: Singapore Tourism Board

Table 16: REIT statistics (as of 30 September 2022 unless otherwise stated)

	Aggregate Leverage (%)	Interest Coverage Ratio[1]	Debt Duration (years)	Debt Cost (%)	Proportion of debt fixed/hedged (%)	Debt Maturing in 2023 (%)[2]	Debt Maturing in 2024 (%)[2]
Commercial							
CapitaLand Integrated Commercial Trust	41.2	3.9	4.1	2.5	80.0	12.0	17.0
Keppel REIT	38.4	3.6	2.8	2.1	72.0	19.0	23.0
Mapletree Pan Asia Commercial Trust	40.1	4.4	3.0	2.4	72.5	11.8	19.8
Suntec REIT	43.1	2.5	2.7	2.8	58.0	21.1	18.7
Frasers Centrepoint Trust	33.0	5.2	2.0	2.5	71.0	22.6	26.6
Lippo Malls Indonesia Retail Trust	43.7	2.3	2.1	6.7	42.2	8.5	49.9
Starhill Global REIT	36.5	3.2	3.2	3.3	84.0	8.8	13.7
CapitaLand China Trust	39.3	4.1	3.5	2.8	71.0	15.4	16.2
Paragon REIT[3]	30.0	5.2	2.5	1.8	71.0	10.9	19.2
LendLease Global Commercial REIT	39.4	2.3	2.8	2.2	61.0	13.8	26.2
Average	**38.5**	**3.7**	**2.9**	**2.9**	**68.3**	**14.4**	**23.0**
Industrial							
Ascendas REIT	37.3	5.6	3.5	2.2	78.0	10.5	13.8
Mapletree Industrial Trust	37.8	5.2	3.5	2.9	74.2	7.5	5.3
Mapletree Logistics Trust	37.0	3.9	3.6	2.5	82.0	10.0	13.3
AIMS APAC Industrial REIT	36.5	2.5	3.5	3.0	88.0	2.8	21.2
Frasers Logistics and Commercial Trust	27.4	13.0	2.7	1.6	81.7	12.9	28.1
ESR LOGOS REIT^	40.2	3.0	2.9	3.3	66.6	19.6	17.4
Cromwell European REIT^	38.9	5.2	3.0	2.3	76.4	4.9	21.6
Average	**36.4**	**5.5**	**3.2**	**2.5**	**78.1**	**9.7**	**17.2**
Hospitality							
Ascott Residence Trust	35.8	4.3	3.5	1.7	76.0	16.0	18.0
Frasers Hospitality Trust	36.4	2.6	2.0	2.3	81.7	22.9	30.2
Average	**36.1**	**3.5**	**2.8**	**2.0**	**78.9**	**19.5**	**24.1**
Others							
First REIT	35.6	5.2	2.0	4.0	61.7	-	-
OUE Commercial Trust	40.3	2.7	3.1	3.2	69.2	11.9	-
Average	**38.0**	**4.0**	**2.5**	**3.6**	**65.5**	**6.0**	**-**

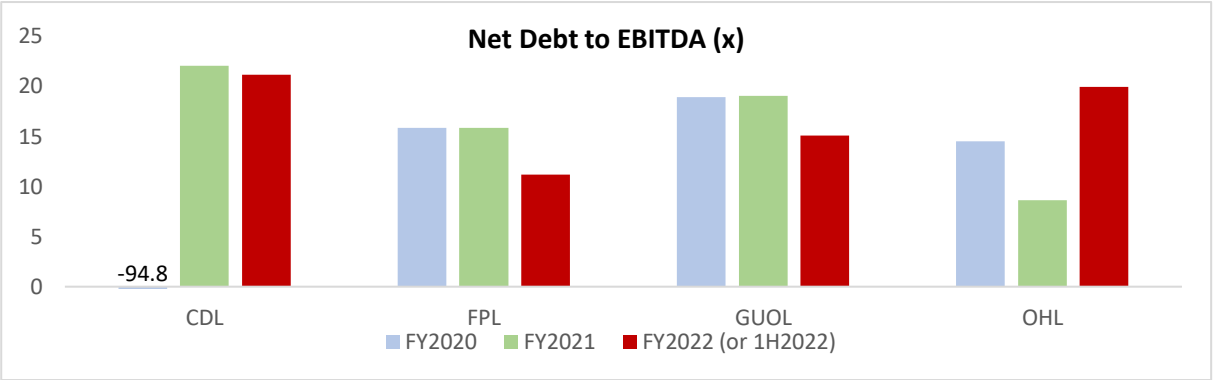
Source: OCBC Credit Research, company financials and investor presentations
** OCBC Credit Research estimates
^ OCBC Credit Research does not currently maintain official coverage of these names
Note: (1) For the trailing 12 months to 30 September 2022; refers to reported Adjusted Interest Coverage Ratio ("Adjusted ICR") where it is provided (Capitaland Ascott Trust, Lippo Malls Indonesia Trust and First REIT have perpetuals outstanding, however Adjusted ICR was not publicly disclosed) (2) As a percentage of total debt for calendar year 2023 and 2024; calendarised figures for REITs whose financial year end differ from 31 December (3) Paragon REIT numbers as at 31 August 2022 given its August financial year end

Singapore Property Developers – Decently Positioned

Positive industry outlook: As published in the 1H2023 Global Outlook (Thematic Report 8, SG Residential: A home and an asset), the growth in Singapore residential prices look unstoppable, which rose by 8.2% in 9M2022 even though the rise in housing prices globally has slowed or reversed. Demand remains firm, lifted by Singaporean buyers who are increasingly wealthy and aspirational. The population has also increased, in part due to the reopening of borders while supply remains significantly constrained. We forecast price growth of 3-5% in 2023 due to strong demand and insufficient supply, though our forecast is less upbeat in 2023 with slowdown observed with the surge in domestic interest rates and a weaker macroeconomic backdrop.

Positive industry outlook is a plus in general for developers: For property developers under our coverage, the stronger outlook is a net positive which contributes to the certainty to move units and sell at higher prices. We believe this is a contributing factor for the improvements seen at City Developments Ltd ("CDL"), GuocoLand Ltd ("GUOL") and Frasers Property Ltd ("FPL") although these companies have other significant parts of the businesses (e.g. property investment, hospitality) that drive profitability with recovery from the depths of the pandemic. On the other hand, for developers that sold most of the developments at earlier years when prices were lower (e.g. Oxley Holdings Ltd), we believe this constrains the capacity to pass on the escalation in construction and land costs.

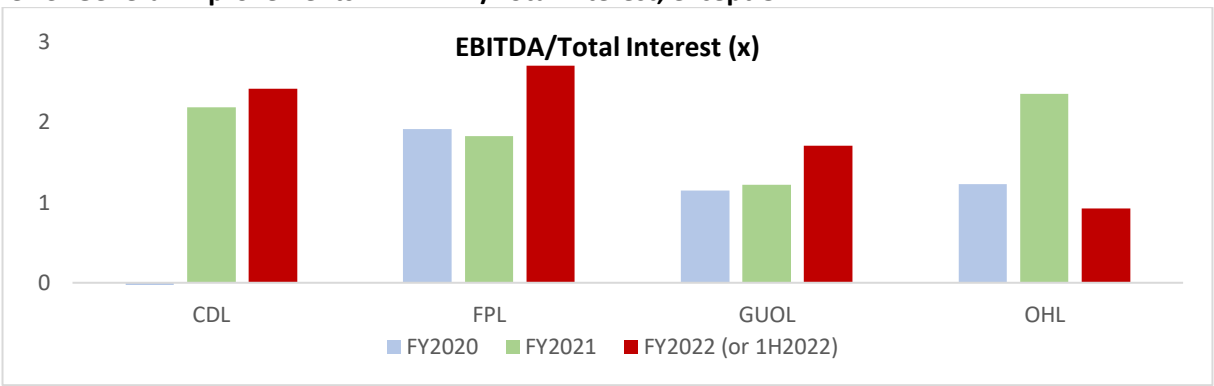
Figure 42: General recovery in net debt to EBITDA, except OHL



Source: Company, OCBC

With stronger profitability, interest-servicing capability should improve and outweigh the rise in financing costs in general. However, EBITDA/Total Interest remains at moderate levels of around 2x to 3x for the larger developers (CDL, FPL, GUOL).

Figure 43: General improvements in EBITDA/Total Interest, except OHL

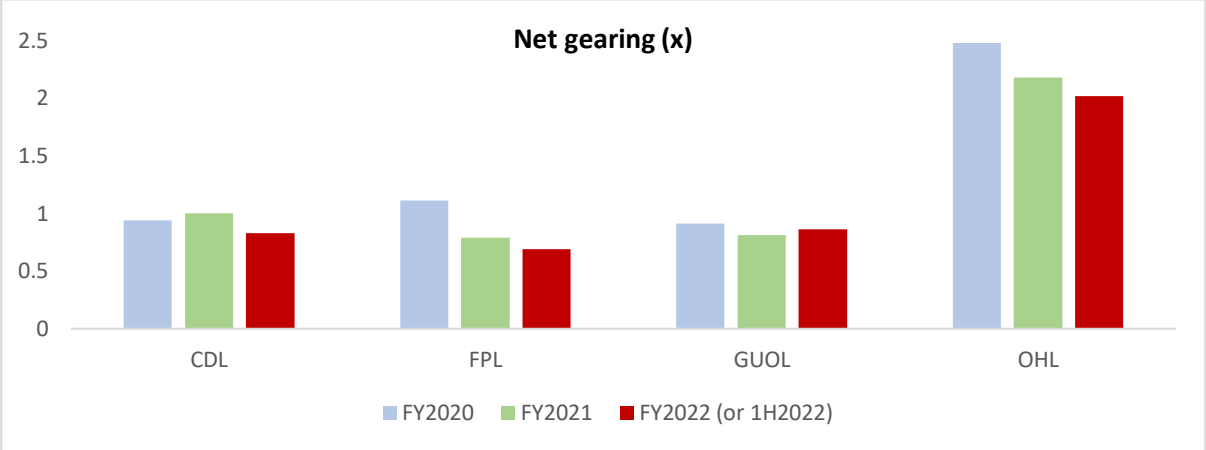


Source: Company, OCBC

With continued moving and monetisation of units, this has allowed developers to contain their net gearing. Levels remain somewhat high for larger developers (e.g. CDL, FPL, GUOL) which are around 0.7x to 0.9x and

elevated for OHL (around 2.0x) though net gearing levels may trend lower as more units are sold/handed over.

Figure 44: General improvements in EBITDA/Total Interest, except OHL



Overall, we believe that developers are decently positioned to weather the storm (if any) from rising interest rates, construction costs and weaker macroeconomics given the strength of the Singapore property market and general improvements in credit metrics. Developers under our coverage also increasingly diversified across various segments (e.g. property investments in various assets such as retail, office, hospitality) and geographies, while opting to recycle capital, which should provide some buffer against business cycles and earnings volatility.

Are developer bonds and perpetuals still worthwhile?

In general, we are comfortable with the credit profile of Singapore property developers given their improving credit metric and diversified business, though due to rising interest rates we stay largely Neutral or small positive on the bonds, and we prefer the shorter part of the curve where we perceive better risk-reward given the decent yields (~4% or more).

Meanwhile, FPL and GUOL have opted not to redeem their perpetuals which are callable in January 2023. This is likely motivated by cost savings versus issuance of a replacement perpetual. While we no longer find both perpetuals attractive, we stay Neutral on them as cash prices are below par, with yield to reset for FPLSP 4.38% PERP and GUOLSP 4.6% PERP still decent at around 6%.

HKSAR Commercial Retail Space – Gradual recovery in 2023 with the reopening

Total retail sales grew modestly by 3.9% y/y in October 2022, helped by improved tourism from eased pandemic restrictions and disbursement of a new batch of consumption vouchers, but the government warned of tightened financial conditions while releasing data. Among the retail segments, consumer durable goods sales increased the most by 17.2% y/y. Online sales surged 34.7% y/y, but department stores headwinds remained, with sales falling by 17.1% y/y.

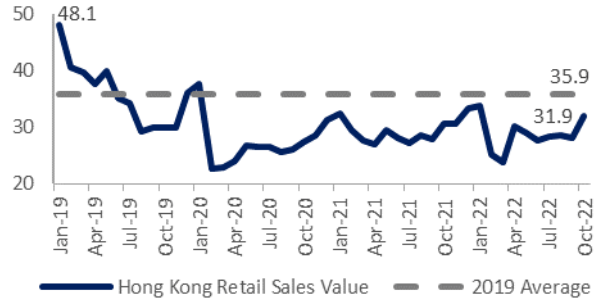
Inbound visitors grew 22% m/m to 81k, though still a contrast against the average of 4,659k in 2019, in October 2022 following the "0+3" quarantine requirement announced in late September. More COVID-easing measures were announced by the government in December 2022, including (1) the landmark lifting of "0+3" quarantine requirement starting from 15 December and (2) a scrap of capacity limits and proof of negative rapid antigen test before entering venues starting from 22 December.

Affected by ongoing pandemic restrictions, retail rents and prices continued to drift sideways from July to October 2022 and is expected to have remained flat over November and December. Prices of retail space fell 4.7% y/y in October 2022, representing a discount of 7.3% against the average of 2019. Similarly, rental rates for retail space fell 6.6% y/y over the same period, or equivalent to a 13.0% discount against the average of 2019. Per JLL data, preliminary 2022 rental of high street shops drop by 10.6% y/y while rents of prime shopping malls fell by a more modest 5.2% y/y. Vacancy pressure in high street shops remained and has led the preliminary 2022 vacancy rate to grow further to 16.6% versus ~11.3% in 4Q2021as inbound leisure tourists are yet to return.

Per Knight Frank, the retail space market remained downbeat and vulnerable as of October 2022. Numerous expired leases were not renewed, and shops outside of shopping malls changed hands at ample losses. In certain areas, the new rents were reportedly 35% - 70% lower than the previous leases.

Having said that, the bottom for retail space is likely nearer compared to beginning of the year on the back of substantial COVID-rules easing announced in December 2022 and highly likely followed by more easing measures in 2023 according to news. Looking ahead to 2023, the retail sector will be underpinned by the return of tourists. Nevertheless, even if tourists do return in numbers, the recovery may still be bumpy owing to (1) weak consumer sentiment, (2) rising interest rates, (3) China's property market woes and (4) unpredictable China's zero-COVID policy.

Figure 45: Retail Sales Value, HKD bn

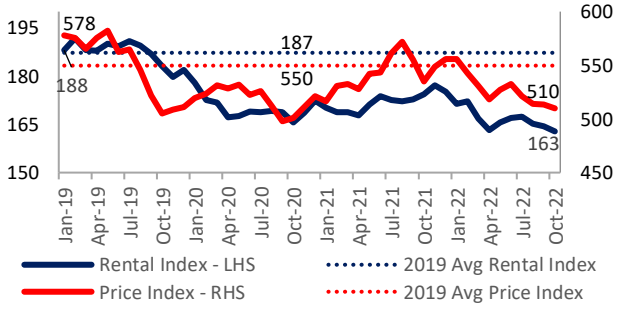


Source: Census and Statistics Department HK, OCBC

Figure 46: HK Inbound Visitors, thousand

Source: HK Tourism Board, OCBC

Figure 47: Retail Rental and Price Indices



Source: HK Rating and Valuation Department, OCBC

HKSAR Commercial Office Space – Reopening recovery hinder by abundant supply

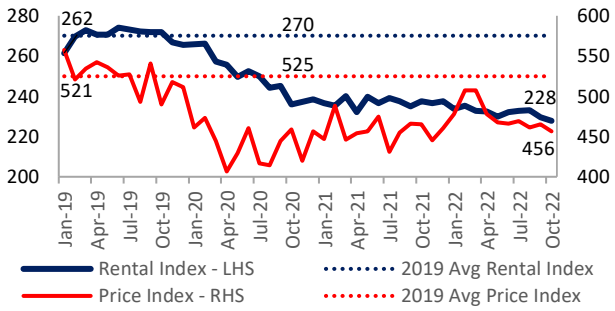
HKSAR office market has been hit hard by quarantine measures, which dampened the demands from corporates Cost-driven office downsizing and quarantine measures led to a substantially higher vacancy rate of 12.6% (+1.4ppts q/q) for grade A offices as of 30 September 2022 compared to the 2019 average of 5.3%. Geographical diversification by multinationals was observed in certain instances, however, there is no evidence of a widespread corporate exit from HKSAR despite a general downsizing trend. The number of regional headquarters in Hong Kong dominated by foreign companies has only seen a decline range of 2% to 3% per annum respectively in 2020 and 2021 versus previous years, according to the Hong Kong Census and Statistics Department. HKSAR retains significant advantages to support longer-term office leasing demand with its deep capital markets and entrenched role in executing offshore renminbi transactions for mainland Chinese companies.

3Q2022 grade A office rental rates fell 1.5% q/q as weaknesses continued. Compared to the 2019 average, the rental rate as of 30 September 2022 represented a 15.5% discount. However, per Colliers' data, encouraging signs were evidenced in 3Q2022 as a net-take up of 554k square feet was registered, which was the highest volume since 2Q2019. Also, Central, the key financial district hub of HKSAR, recorded an uptick of 39k square feet in September 2022, the first positive net take-up since February 2022.

Looking forward to 2023, travel normalisation will meaningfully boost office space demand from corporates, though the demand is expected to be gradual as some corporates continue to downsize. Also, the upcoming supply boom is likely to hold the vacancy rate elevated. Per CBRE, supply is abundant in 2022 – 2024 as there are 8.2mn square feet (~9.3% of total Grade A office space in 2021) of new Grade A office supply coming online. Similarly, per Colliers' research, Central will have a strong new supply pipeline over the next 10 years with three premium projects coming online. In 2023 – 2024, the new Grade A office supply in Central is estimated to be 0.97mn square feet (~6.8% of total Grade A office space in Central as of 31 October 2022).

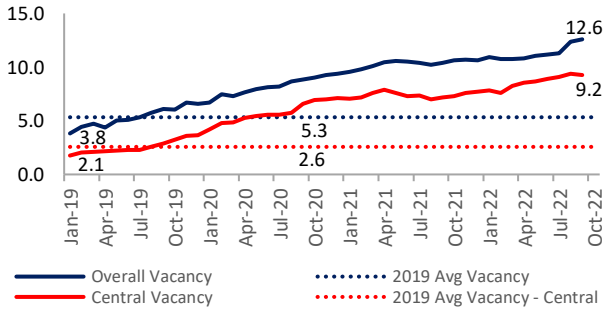
Overall, we expect a subdued office market in 2023 despite demand recovering after meaningful covid easing measurements announced in September and December 2022. That said, abundant new supply is expected to mitigate the positive impacts of recovering demand, holding rental rates muted. Moreover, office segment recovery may also be hindered by weak market sentiments, global economic uncertainties, rising interest rates and flexible working modes.

Figure 48: Grade A Office Rental and Price Indices



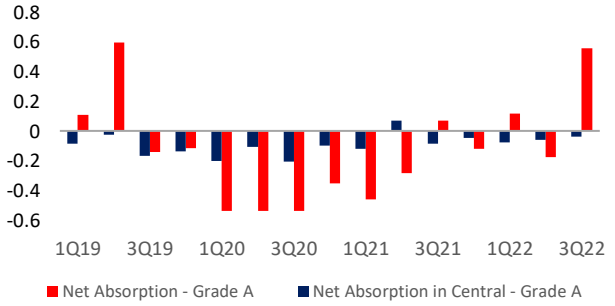
Source: HK Rating and Valuation Department, OCBC

Figure 49: Grade A Office Vacancy Rate (%)



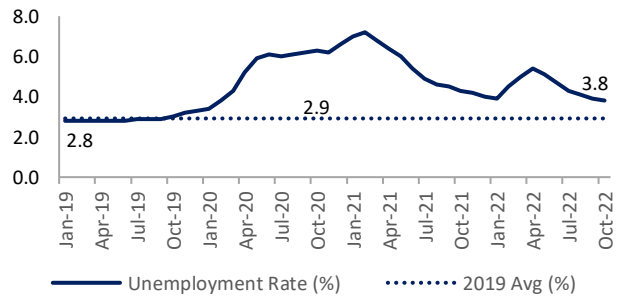
Source: Colliers, OCBC

Figure 50: Grade A Net Absorption Rate (mn sq ft)



Source: Colliers, OCBC

Figure 51: Unemployment Rate (%)



Source: Census and Statistics Department Hong Kong, OCBC

SGD Credit Outlook 2023

Wednesday, January 04, 2023

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Explanation of Issuer Profile Rating / Issuer Profile Score

Positive ("Pos") – The issuer's credit profile is either strong on an absolute basis or expected to improve to a strong position over the next six months.

Neutral ("N") – The issuer's credit profile is fair on an absolute basis or expected to improve / deteriorate to a fair level over the next six months.

Negative ("Neg") – The issuer's credit profile is either weaker or highly geared on an absolute basis or expected to deteriorate to a weak or highly geared position over the next six months.

To better differentiate relative credit quality of the issuers under our coverage, we have further sub-divided our Issuer Profile Ratings into a 7-point Issuer Profile Score scale.

IPR	Positive		Neutral			Negative	
IPS	1	2	3	4	5	6	7

Explanation of Bond Recommendation

Overweight ("OW") – The bond represents **better relative value** compared to other bonds from the same issuer, or bonds of other issuers with similar tenor and comparable risk profile.

Neutral ("N") – The bond represents **fair relative value** compared to other bonds from the same issuer, or bonds of other issuers with similar tenor and comparable risk profile.

Underweight ("UW") – The bond represents **weaker relative value** compared to other bonds from the same issuer, or bonds of other issuers with similar tenor and comparable risk profile.

Please note that Bond Recommendations are dependent on a bond's price, underlying risk-free rates and an implied credit spread that reflects the strength of the issuer's credit profile. Bond Recommendations may not be relied upon if one or more of these factors change.

Other

Suspension – We may suspend our issuer rating and bond level recommendation on specific issuers from time to time when OCBC is engaged in other business activities with the issuer. Examples of such activities include acting as a joint lead manager or book runner in a new issue or as an agent in a consent solicitation exercise. We will resume our coverage once these activities are completed. We may also suspend our issuer rating and bond level recommendation in the ordinary course of business if (1) we believe the current issuer profile is incorrect and we have incomplete information to complete a review; or (2) where evolving circumstances and increasingly divergent outcomes for different investors results in less conviction on providing a bond level recommendation.

Withdrawal ("WD") – We may withdraw our issuer rating and bond level recommendation on specific issuers from time to time when corporate actions are announced but the outcome of these actions are highly uncertain. We will resume our coverage once there is sufficient clarity in our view on the impact of the proposed action.

*OCBC Credit Research team would like to acknowledge and give due credit to the contributions of **Wong Yu Le**.*

Analyst Declaration

The analyst(s) who wrote this report and/or her or his respective connected persons held financial interests in the following above-mentioned issuers or companies as at the time of the publication of this report: Singapore Airlines Ltd, GuocoLand Ltd, Oxley Holdings Ltd, Frasers Centrepoint Trust, Suntec Real Estate Investment Trust, Mapletree Commercial Trust, Frasers Hospitality Trust, Lendlease Global Commercial REIT, CapitaLand Ascott Trust, Frasers Property Ltd.

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