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RESEARCH INSIGHT

APAC Climate Action Progress Report

Review of actions taken by corporations on emissions reporting, climate targets and transition risks and opportunities

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Executive summary

In 2023, the global average temperature reached a record high of 1.4°C above preindustrial levels.[1] Continued atmospheric warming may elevate physical risks associated with climate change. Such an outcome could present Asia Pacific (APAC) economies[2] with greater losses than those of global peers, given the vulnerability of many of the region's economic hubs to coastal flooding and extreme heat.[3] Despite this risk, APAC's economies continue to rely heavily on fossil-fuel-powered generation, contributing more than 40% of global greenhouse gas (GHG) emissions in 2023.[4]

Governments in the region have accelerated regulatory efforts in defining decarbonization pathways. Most APAC markets have pledged a nationally determined contribution under the Paris Agreement and have prepared to roll out climate-related regulations to achieve net-zero emissions by around mid-century. Several of these targets are conditioned on international financial support.

Against this context of accelerating climate change and regulatory shifts, this report examines how corporations across 13 APAC markets[5] have responded. This includes emissions disclosures and climate targets, the fuel mix of utilities, transition financing through labeled bonds and clean-tech development and commercialization. Ultimately, the speed and scale at which APAC corporations can decarbonize will depend not only on their ambition, but also on the closure of financing gaps, the presence of stable policies and the availability of necessary technologies.

Key takeaways

- **Corporate progress on emissions reporting and climate targets:** Disclosure of corporate value-chain emissions and climate targets is on the rise in the APAC region, showing progress in climate transparency and accountability. Progress is not, however, uniform. Small- and mid-cap firms lagged their larger counterparts. These smaller companies may see growing demand for emissions disclosures as they face investor pressures and regulatory mandates.
- **Shifting energy mix for utilities:** APAC utilities have grown both renewable and coal-fired electricity generation capacity between 2015 and 2022. Energy security and affordability considerations may influence the speed at which APAC utilities transition away from fossil-fuel-based electricity. Besides expanding clean-electricity capacity, early retirement of coal-powered plants is increasingly seen as a key step for APAC utilities to align with net-zero pathways.
- **Innovating and deploying clean tech:** APAC corporations have emerged as key players in clean-tech innovation. We found examples of industry-leading companies using their supply chain to scale clean-tech deployment and accelerate the speed of research and development of state-of-the-art technology. Companies aiming to expand the use of clean tech, such as hydrogen fuels, could potentially benefit from any available or proposed government subsidies and tax credits.

[1] Pierre Friedlingstein et al., "Global Carbon Budget 2023," Earth System Science Data, December 2023.

[2] We used MSCI AC Asia Pacific Investable Market Index (IMI) constituents and their domiciled markets as our research universe.

[3] Gillian Mollod and Jurgita Balaisyte, "Most Prevalent Climate Hazards Found in Asia-Pacific," MSCI Research, May 10, 2023.

[4] "Emission Gap Report 2023," United Nations Environment Programme, November 2023.

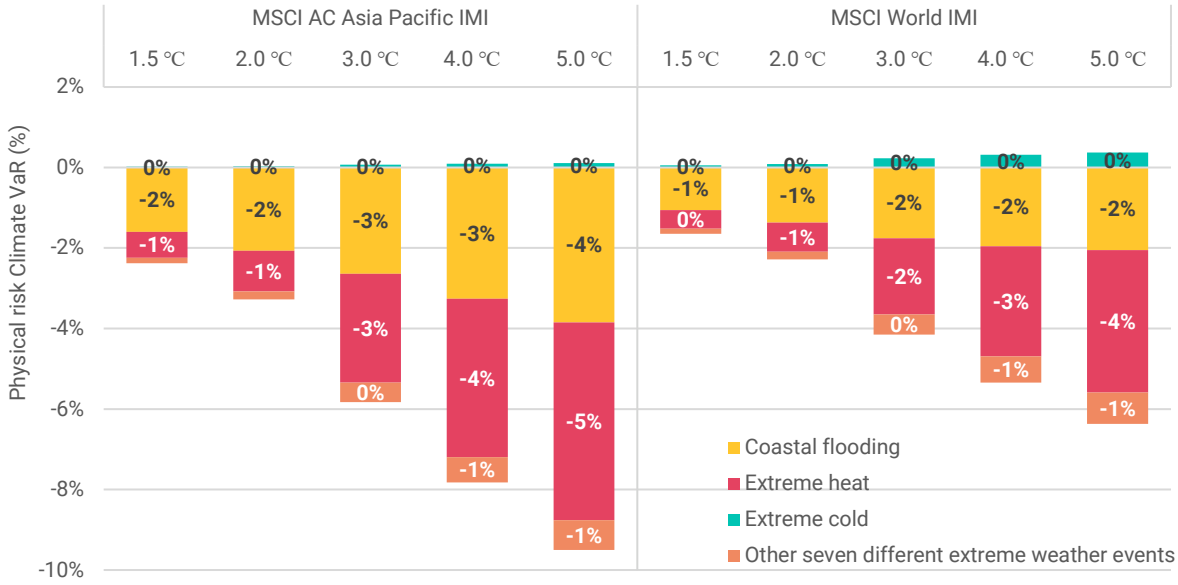
[5] The MSCI AC Asia Pacific Investable Market Index (IMI) constituents are domiciled in 13 APAC markets: Japan, Mainland China, Taiwan, Hong Kong, India, Australia, South Korea, Singapore, Indonesia, Thailand, Malaysia, Philippines, New Zealand. Unless otherwise stated, corporations mentioned in this report are constituents of the index.

Growing attention to climate change in APAC

GHG emissions-intensive growth contributed to a record high in the global average temperature in 2023 (1.4°C above preindustrial levels).[6] Rapidly rising global temperatures are symptomatic of a broader set of physical climate-change impacts. Modeling the intensity and frequency of future physical climate hazards under different emissions scenarios offers one avenue to assess the economic impact of climate change. Coastal flooding and extreme heat present the greatest potential future impact on company valuation in APAC, based on our Climate Value-at-Risk (Climate VaR) model[7] that covers 10 physical climate hazards (Exhibit 1). The higher the emissions released under a future scenario, the more severe these impacts are projected to be.

In the worst-case scenario covered in our analysis, where the global average temperature would rise to 5°C above preindustrial levels, we estimated that the potential discounted loss due to the physical risk hazards could amount to almost a tenth of the enterprise value of the constituents in the MSCI AC Asia Pacific Investable Market Index (IMI). The average physical risk Climate VaR was about 35% higher than for a global investment opportunity set represented by the MSCI World IMI.[8]

Exhibit 1: Physical risk Climate VaR for MSCI AC Asia Pacific IMI and MSCI World IMI constituents



Physical risk Climate VaR indicates the potential financial losses due to the physical impacts of climate change. MSCI ESG Research models five acute hazards (tropical cyclones, river low flow, coastal flooding, fluvial flooding, wildfire) and five chronic hazards (extreme heat, extreme cold, extreme wind, extreme precipitation, extreme snowfall). The "Seven additional types of extreme weather events" represents tropical cyclones, fluvial flooding, river low flow, wildfire, extreme wind, extreme precipitation and extreme snowfall. Data as of Feb. 1, 2024. Source: MSCI ESG Research.

[6] Pierre Friedlingstein et al., "Global Carbon Budget 2023," Eargh System Science Data, December 2023.

[7] MSCI ESG Research assesses the financial impacts of physical climate risks from now until the end of the 21st century with our Physical Risk Model. Physical climate hazards can cause direct asset damage and business interruption, which are measured at the asset level in the model and used to derive the Climate Value-at-Risk (Climate VaR) metric for each hazard. For more details, see "MSCI Climate VaR Methodology Part 4 — Physical Climate Risk," MSCI ESG Research, April 2024 (client access only).

[8] The MSCI AC Asia Pacific IMI and MSCI World IMI constituents referenced in the report are as of Feb. 1, 2024.

The APAC region was a key contributor to global GDP growth in 2023.[9] But this growth was costly in terms of GHG emissions — we estimate that the 13 APAC economies covered in our research produced more than 40% of the record-high 58 gigatonnes of CO2 equivalent (GtCO2e) of global GHG emissions in 2023 (Appendix Exhibits A, B and C).[10] On the other hand, governments in APAC have taken steps to define climate ambitions[11] and introduce supportive policies to reduce emissions and align with global priorities (Exhibit 2).

Exhibit 2: Key climate policies of markets represented in the MSCI AC Asia Pacific IMI

Market grouping	Market	Nationally determined contributions or climate action plans		Renewable energy targets by market	Expected date of ISSB-based disclosure by market
		Interim targets	Carbon neutrality		
Japan	**Japan**	46% below 2013 by 2030	2050	24% by 2030	2027
China	**Mainland China**	65% per GDP below 2005 by 2030, peak emissions by 2030	2060	33% by 2025	n/a
Taiwan	**Taiwan**	20% below 2005 by 2030	2050	20% by 2025	2027
Hong Kong	**Hong Kong**	50% below 2005 by 2035	2050	70% by 2035	2025
India	**India**	45% per GDP below 2005 by 2030	2070	50% by 2030	n/a
Australia	**Australia**	43% below 2005 by 2030	2050	82% by 2030	2024
South Korea	**South Korea**	40% below 2018 by 2030	2050	21% by 2030	2026
Association of Southeast Asian Nations (ASEAN)[12]	**Singapore**	Peak emissions before 2030; reduce to 60 MtCO2e in 2030	2050	30% by 2035	2025
	Indonesia	32% below business as usual by 2030	2060	23% by 2025	n/a
	Thailand	20% below 2005 by 2030	2050	30% by 2037	n/a
	Malaysia	45% per GDP below 2005 by 2030	2050	40% by 2035	n/a
	Philippines	3% below 2020 by 2030	n/a	100% by 2050	n/a
New Zealand	**New Zealand**	30% below 2005 by 2030	2050	50% by 2035	2023*

*Order of markets was based on index weights allocated to companies domiciled in these markets. Renewable-energy targets by market indicate the percentages of renewable energy in the fuel mix by the respective target year. See details in "Renewables 2023 Global Status Report" published by REN21. *New Zealand climate-related disclosures are based on the Task Force on Climate-related Financial Disclosures (TCFD) standard, with some alignment to the International Sustainability Standards Board (ISSB) standard. Data as of Feb. 1, 2024. Sources: MSCI ESG Research, REN21.*

[9] "Regional Economic Outlook. Asia and Pacific," International Monetary Fund (IMF), May 2023.

[10] "Emission Gap Report 2023," United Nations Environment Programme, November 2023. Notes: According to the World Economic Forum (December 2023), global GHG emissions set a record of 57.4 GtCO2e in 2022. International Energy Agency (IEA) (March 2024) estimates 2023 CO2 emissions increased 1.1% over 2022 levels. Therefore, we estimate global economies produced at least a record high 58 GtCO2e in 2023.

[11] "Climate Finance Landscape of Asia and the Pacific," Asia Development Bank, August 2023. Notes: Achievements of NDCs and climate action plans in several APAC markets are conditional on international financial support.

[12] Institutional investors often regard ASEAN companies as a common investment opportunity set, so we combined the five relevant markets covered in our analysis into an ASEAN market in this report.

For example, at the December 2023 United Nations Climate Change Conference (COP28) in Dubai, 198 signatories (including all 13 APAC markets in our analysis)[13] agreed to triple renewable energy and double energy efficiency globally by 2030.[14] Achieving these commitments will require substantial investments over the next decade.[15] But specific markets have taken additional steps.

Following the launch of the International Sustainability Standards Board (ISSB) disclosure standards in mid-2023, Australia has proposed detailed disclosure requirements aligned with these standards.[16] New Zealand has mandated climate-related disclosures since 2023, with some alignment to the ISSB standard.[17] The ISSB-aligned disclosures are expected to become mandatory in Singapore and Hong Kong in 2025, South Korea in 2026, and Taiwan and Japan in 2027.[18] Meanwhile, China, India and several ASEAN markets have yet to announce plans for ISSB-aligned reporting frameworks (Exhibit 7).

While implementing the ISSB standard may place a burden on companies not already measuring and disclosing climate data, it is a key step toward strengthening the consistency, comparability and availability of climate data to enhance investors' ability to make properly informed climate decisions. In the following section, we assess how well-prepared APAC corporations are to respond to this rising regulatory pressure in economies that still rely heavily on power generated from fossil fuels.

Corporate progress on emissions reporting and climate targets

Emissions reporting

Monitoring disclosure of value-chain emissions and progress toward targets is a central element of decarbonization strategies.[19] Corporate emissions disclosures are rising in the APAC region (Exhibit 3), but progress varies across emissions categories and company-size segments.

In our broad sample of MSCI AC Asia Pacific IMI constituents, more than half of companies reported Scope 1 and 2 emissions. In China, India and South Korea, however, less than 25% of companies

[13] "Parties to the United Nations Framework Convention on Climate Change," United Nations Framework for Climate Change Convention (UNFCCC), May 16, 2023. See details in Kenji Watanabe et al., "Unpacking COP28 Renewable Energy and Energy Efficiency Commitments," MSCI Research, March 4, 2024.

[14] "First Global Stocktake," UNFCCC, Dec.13, 2023.

[15] "Unlocking Climate Finance in Asia-Pacific," IMF, January 2024.

[16] "Climate-Related Financial Disclosure. Consultation Paper," Australian Government, The Treasury, June 2023. See details in Kuldeep Yadav, "Cementing Australian Climate Actions," MSCI Research, November 2023 (client access only).

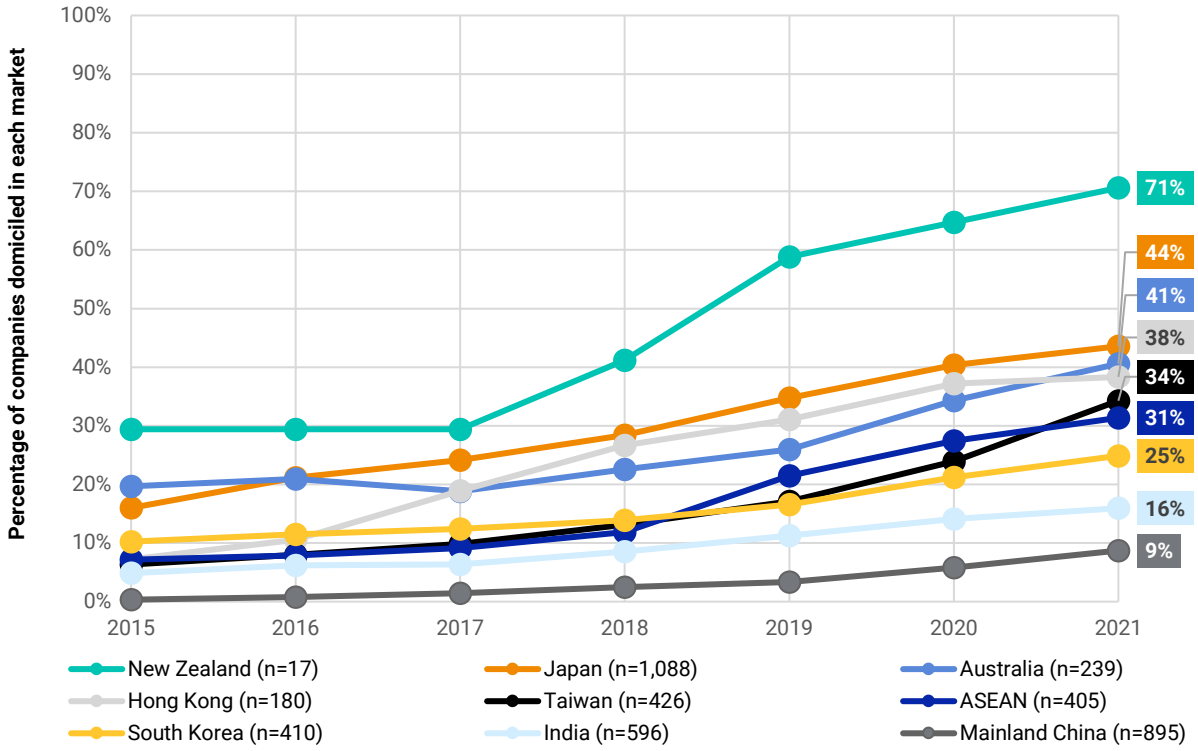
[17] "Aotearoa New Zealand Climate Standards and IFRS Sustainability Disclosure Standards," External Reporting Board, October 2023. See details in Kuldeep Yadav, "New Regulations Are Raising the Standard for Climate-Related Disclosure," MSCI Research, May 2023 (client access only).

[18] "Financial Services Agency Working Group on Sustainability Information Disclosure and Assurance," Financial Services Agency, May 14, 2024; "Singapore's Sustainability Reporting Advisory Committee Recommends Mandatory Climate Reporting for Listed and Large Non-Listed Companies," Sustainability Reporting Advisory Council, July 6, 2023; "Update on Consultation on Enhancement of Climate Disclosures Under ESG Framework," Hong Kong Exchanges and Clearing Limited, Nov. 3, 2023; "Authorities Meet to Discuss ESG Disclosure Standards," Financial Services Commission, Feb. 14, 2024; and "The Financial Supervisory Commission releases the roadmap for Taiwan listed companies to align with IFRS Sustainability Disclosure Standards," Financial Supervisory Commission Republic of China (Taiwan), Aug. 17, 2023.

[19] Kenji Watanabe, Antonios Panagiotopoulos and Siyao He, "Assessing Science-Based Corporate Climate Target-Setting," MSCI Research, June 9, 2023.

reported Scope 3 emissions, in contrast to more than 40% in New Zealand, Japan and Australia (Appendix Exhibit D). This may reflect the region's diverse regulatory landscape, shareholder preferences and the industry mix (Appendix Exhibit E).[20] While mandatory climate disclosure is under development in several APAC markets, regulators in New Zealand and Japan have been early adopters on Scope 3 reporting.[21]

Exhibit 3: Corporate disclosure of Scope 1, 2 and 3 emissions from 2015 to 2021



Corporate emissions disclosures in 2021 were the latest and most consistently available data at the time of this research. We considered any disclosure of Scope 3 emissions, without necessarily covering each Scope 3 category. Data sourced from constituents of the MSCI AC Asia Pacific IMI as of Feb. 1, 2024. Source: MSCI ESG Research.

Regulators in Singapore are adopting a phased implementation by providing temporary relief on Scope 3 emissions based on ISSB recommendations.[22] Malaysia and Australia are imposing requirements on large firms before expanding to smaller firms.[23] The variations in Scope 3 reporting may stem from these different regulatory expectations, stakeholder pressure and levels of support.

[20] See "ISSB Announces Guidance and Reliefs to Support Scope 3 GHG Emission Disclosures," International Financial Reporting Standards Foundation (IFRS), Dec. 15, 2022.

[21] New Zealand was the first country to pass climate-reporting legislation. Japanese regulators have developed guidance to support corporations in measuring Scope 3 emissions. Sources: "Aotearoa New Zealand Climate Standard: Climate-Related Disclosures," External Reporting Board, December 2022, and "Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain Version 1.0," Ministry of the Environment and Ministry of Economy, Trade and Industry, March 2012.

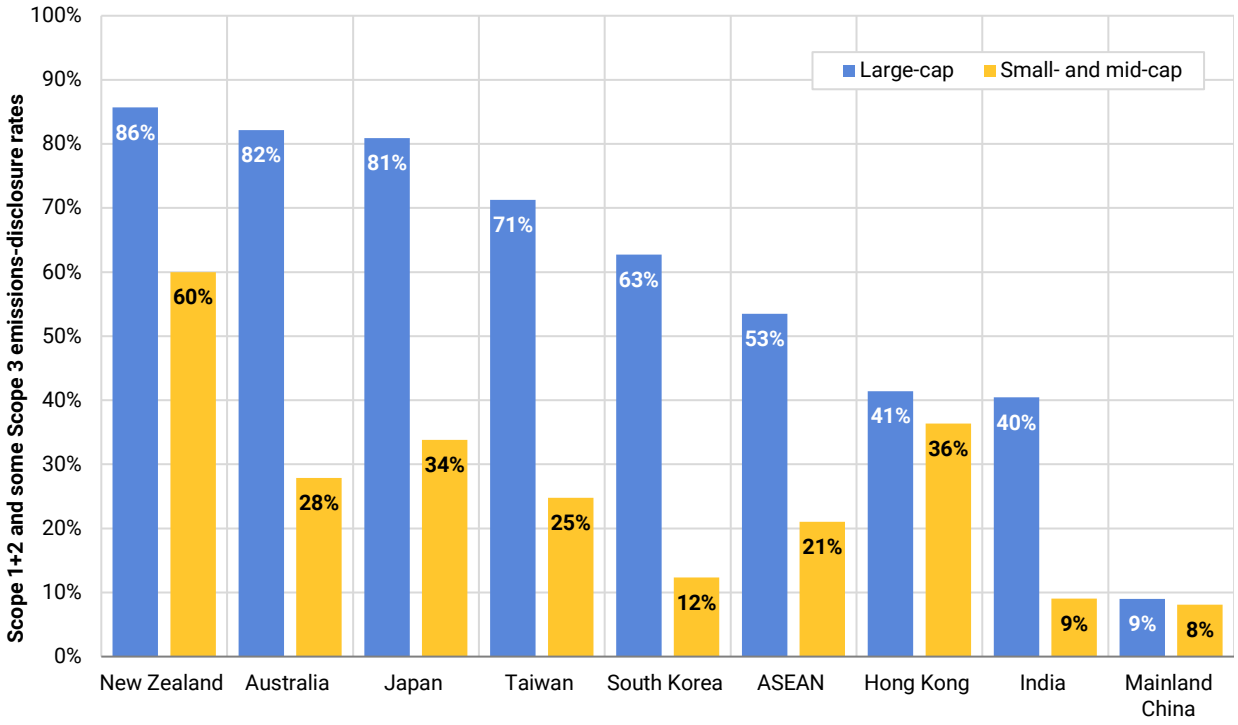
[22] "Turning Climate Ambition into Action in Singapore — Response to the Public Consultation on Sustainability Reporting Advisory Committee's Recommendations," Accounting and Corporate Regulatory Authority Singapore, February 2024.

[23] "Climate-Related Financial Disclosure: Exposure Draft Legislation — Policy Statement," Australia Department of the Treasury, Jan. 12, 2024, and "Public Consultation Paper: Proposed National Sustainability Reporting Framework," Malaysia Advisory Committee on Sustainability Reporting, Feb. 15, 2024.

We also observed that disclosure rates of small- and mid-cap firms[24] trailed those of large-cap firms in the APAC region (Exhibit 4). We found gaps of more than 25% between the two size segments across all markets except for Hong Kong and China. The widest gaps — more than 50% — existed in Australia and South Korea. We estimated Scope 3 emissions made up an average of 70% of corporate value-chain emissions across APAC markets, highlighting the importance of reporting Scope 3 emissions (Appendix Exhibit F).

Along with regulatory development, investor engagement may push companies of different sizes and in different markets to strengthen the quality and comprehensiveness of their emissions disclosures, which can provide investors with more visibility into companies' key transition risks and opportunities.[25]

Exhibit 4: Corporate disclosure of Scope 1, 2 and 3 emissions in APAC markets in 2021



Corporate emissions disclosures in 2021 were the latest and most consistently available data at the time of this research. We considered any disclosure of Scope 3 emissions, without necessarily covering each Scope 3 category. We followed the MSCI methodology for market-cap indexes to define large, mid and small caps. Data sourced from constituents of the MSCI AC Asia Pacific IMI as of Feb. 1, 2024. Source: MSCI ESG Research.

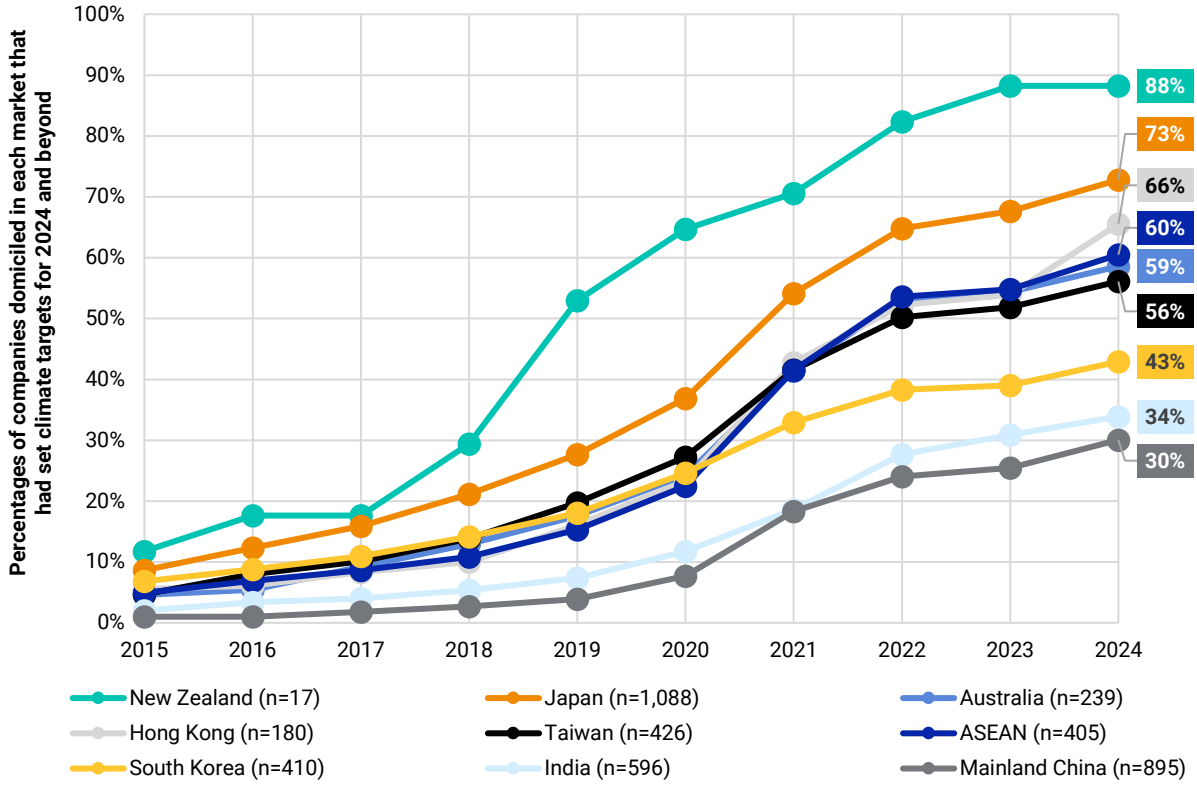
[24] In this report, large-cap firms are represented by constituents of the MSCI AC Asia Pacific Index, and small- and mid-cap firms are represented by constituents of the MSCI AC Asian Pacific IMI, excluding the firms of the MSCI AC Asia Pacific Index. Refer to the MSCI Global Investable Market Indexes Methodology for definitions of size segments.

[25] Disclosure of Scope 3 emissions is a criterion in various net-zero portfolio alignment frameworks, including the Paris-Aligned Asset Owners, Net Zero Investment Framework and Climate Action 100+ Net Zero benchmarks. Source: "Investor Approaches to Scope 3: Its Importance, Challenges and Implications for Decarbonizing Portfolios," IIGCC, January 2024.

Climate targets and progress

We also assessed the climate-target-setting practices of APAC corporations. This analysis may help in understanding a company's intent to both reduce its impact on climate change and to minimize risks to its business associated with the transition to a low-carbon economy.[26] Mandatory ISSB-aligned disclosure programs would make disclosure of companies' progress toward targets a regular feature of financial reporting.[27] We found an increasing number of companies setting climate targets, but the pace of adoption varied by market (Exhibit 5).

Exhibit 5: Rate of corporate climate-target setting between 2015 and 2024



Data was derived from target-level information available on MSCI ESG Manager (client access only). Data sourced from constituents of the MSCI AC Asia Pacific IMI as of Feb. 1, 2024. Source: MSCI ESG Research.

Although an increasing number of companies are setting climate targets, the likelihood of these targets being met will vary. Using several key indicators recommended by the Glasgow Financial Alliance for Net-Zero (GFANZ),[28] we have built our own target-credibility weighting system to help investors assess whether companies have taken the steps necessary to achieve their targets (Appendix Exhibit G).[29]

[26] Kenji Watanabe and Antonios Panagiotopoulos, "Breaking Down Corporate Net-Zero Climate Targets," MSCI Research, May 24, 2021.

[27] "IFRS Sustainability Disclosure Standard: Climate-Related Disclosures," IFRS, June 2023.

[28] "Measuring Portfolio Alignment," GFANZ, August 2022.

[29] For detailed methodology, see "Implied Temperature Rise Methodology," MSCI ESG Research, February 2024.

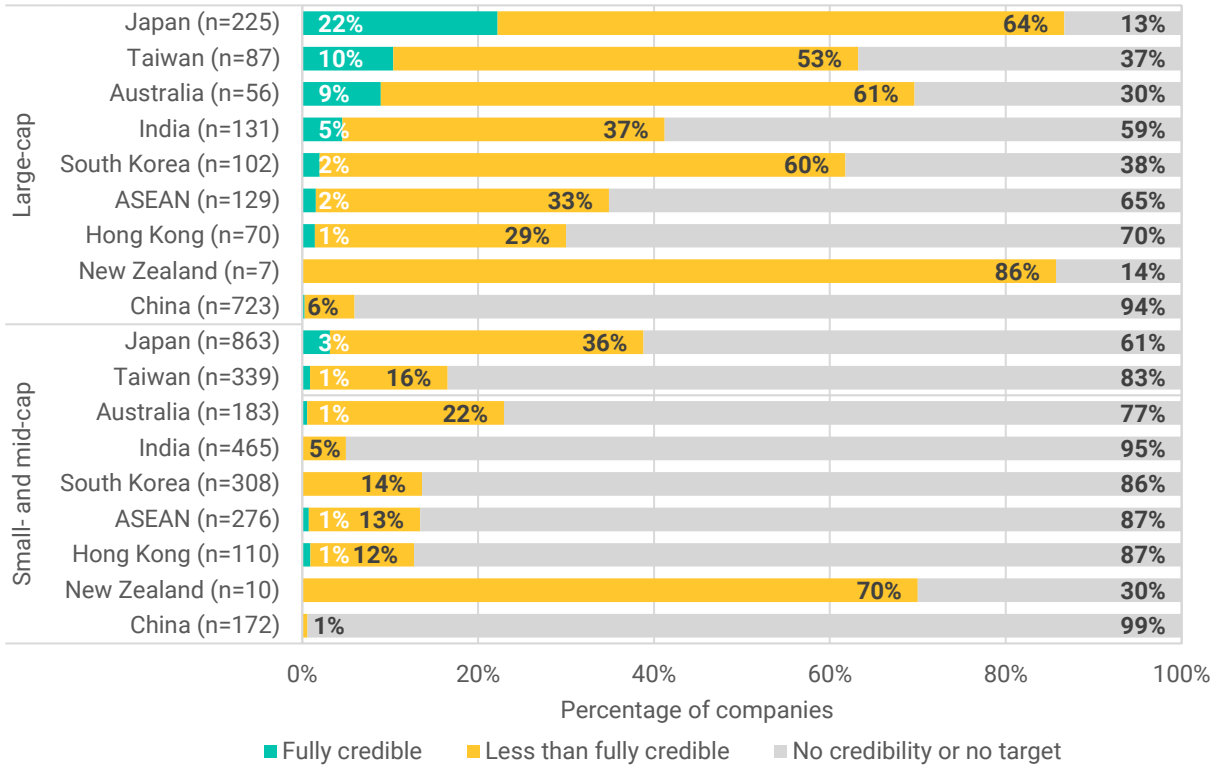
The current target-credibility weighting system is composed of the following four indicators:

1. At least one short-term target for the relevant scope (e.g., Scope 1 absolute emissions reduction by 30% below 2020 levels by 2030)
2. At least one externally validated target
3. A track record of achieving past targets
4. A current trajectory to meet at least some ongoing targets

Similar to our observations on emissions reporting, we found that, on average, small- and mid-cap companies were less likely to have favorable target-credibility assessments compared to their large-cap peers (Exhibit 6). And irrespective of market cap, most companies were not assessed as having fully credible targets (see fully credible targets criteria in Appendix Exhibit G); only in Japan, Taiwan, Australia and India were more than 5% of large-cap firms assessed as having fully credible targets across Scope 1, 2 and 3 emissions boundaries.

The disparities in data availability and quality for emissions disclosure and target-setting practices underline the different starting points and market nuances across the APAC region. With the ongoing rollout of ISSB-aligned disclosure standards, these differences may be reduced over time, helping companies report more consistent, comparable and credible emissions data, target-setting and transition plans, which may support climate-informed capital allocation decisions.

Exhibit 6: Target credibility assessments across APAC markets

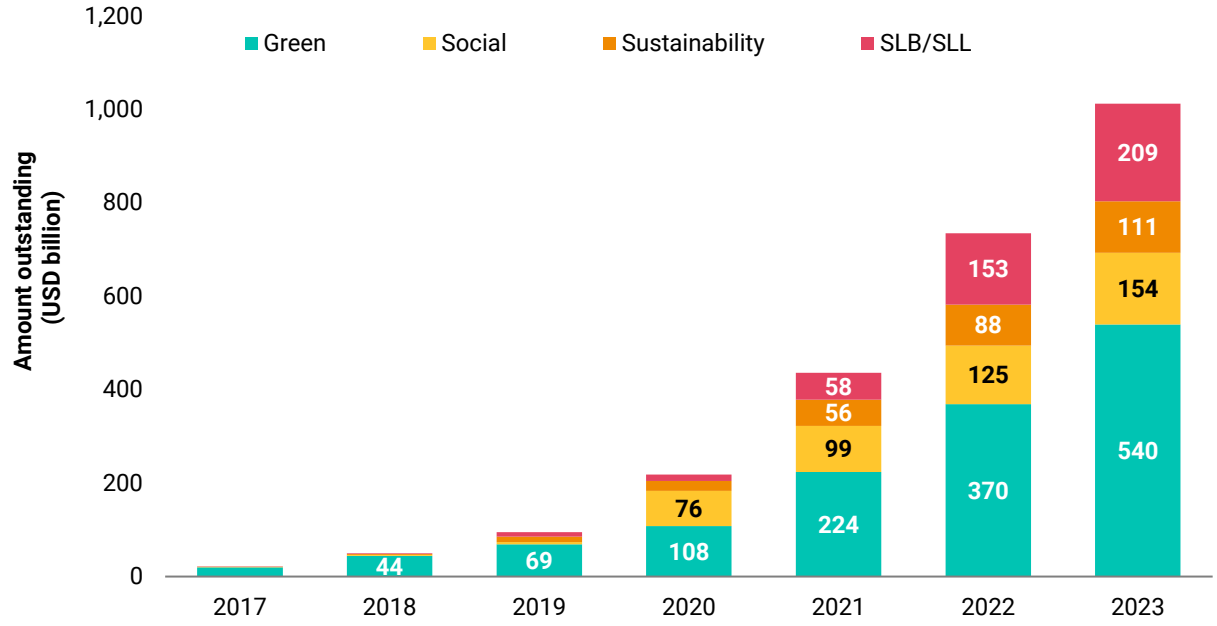


We assessed the target credibility for the MSCI AC Asia Pacific IMI constituents. Target credibility indicates the likelihood of companies achieving their targets as stated. For more details, see the Appendix. We followed the MSCI methodology for market-cap indexes to define large, mid and small caps. Data as of Feb. 1, 2024. Source: MSCI ESG Research.

Backing it up with capital

Climate disclosures and targets can indicate a company's climate ambitions, but achieving such ambitions may require significant capital. It is estimated that the APAC region faces an annual shortfall of USD 800 billion of climate financing.[30] Despite this current shortfall, our data for 2023 suggests that a majority of the steadily growing green, social, sustainability and sustainability-linked bond and loan financing in APAC was linked to green or transition finance.[31]

Exhibit 7: Outstanding amounts of labeled bonds and loans in APAC



The chart shows the total outstanding amount of labeled bonds (based on Refinitiv data) and loans (based on Environmental Finance data) issued by or extended to APAC-based corporate issuers. Data as of Dec. 29, 2023. Sources: MSCI ESG Research, Refinitiv, Environmental Finance.

Our research shows that project categories most often financed through green bonds were alternative energy, energy efficiency and green buildings, as of Dec. 29, 2023. Sustainability-linked debt, particularly loans that are tied to the borrower's performance on predefined sustainability indicators, has also seen substantial growth.

For outstanding amounts, the top three sustainable-debt markets were Mainland China, Japan and Hong Kong, while the top three sectors were financials, industrials and real estate. China-based banks were the top issuers of labeled bonds as well as the top originators of labeled loans, which

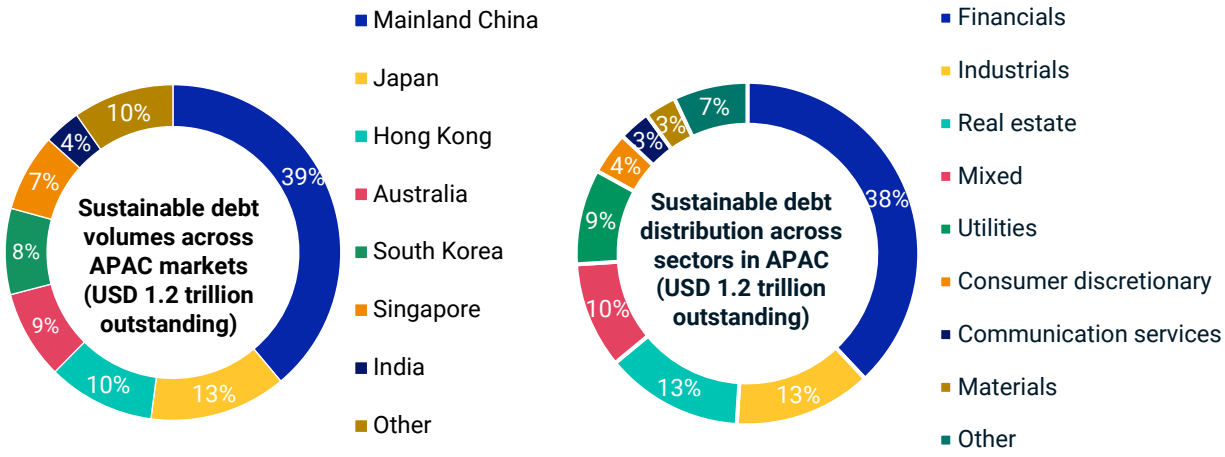
[30] "How Asia Can Unlock $800 Billion of Climate Financing," IMF, Jan. 29, 2024.

[31] Green bonds' proceeds tend to be predominantly invested in projects connected to energy transition and efficiency, while most sustainability-linked bonds tend to be linked to the issuer's climate targets. Jakub Malich and Anett Husi, "Labeled Bonds: Quarterly Market Overview Q4 2023," MSCI Research, Feb. 21, 2024.

may be due to China's efforts to use green lending to achieve peak carbon emissions by 2030 and subsequent carbon-neutrality goals by 2060[32] (Exhibit 8).

Among corporations, our data showed that automakers based in Japan and South Korea investing in future-mobility solutions were among the largest labeled-bond issuers.

Exhibit 8: Market and sector breakdown of APAC labeled bond and loan volumes in 2023



The percentages were calculated based on the total outstanding amount of labeled bonds (Refinitiv data) and loans (Environmental Finance data) issued by or extended to APAC-based corporate issuers. Data as of Dec. 29, 2023. Sources: MSCI ESG Research, Refinitiv, Environmental Finance.

More robust green and transition finance standards may help foster the market's growth and address the region's climate-financing gap. Through incentives such as lower borrowing costs,[33] and disincentives such as reputational risk, issuers participating in sustainable financing markets may be encouraged to take tangible steps to decarbonize, including having more comprehensive emissions-reduction targets than peers who have not issued labeled bonds.[34]

Shifting energy mix for utilities

At COP28, 198 nations agreed to triple renewable-energy capacity and double the annual rate of energy-efficiency improvements globally by 2030[35] — two critical developments that would support the transition of energy systems away from fossil fuels.

To be aligned with the net-zero emissions by 2050 scenario, the International Energy Agency (IEA) estimated that close to 9,000 gigawatts (GW) of clean and renewable energy will need to be added globally between 2022 and 2030.[36] Using projections from the Regional Model of Investment and

[32] "China's Policy Strategies for Green Low-Carbon Development: Perspective from South-South Cooperation," United Nations Conference on Trade and Development, Nov. 28, 2023.

[33] Jakub Malich and Anett Husi, "Labeled-Bond Issuance and Cost of Debt," MSCI Research, July 7, 2023.

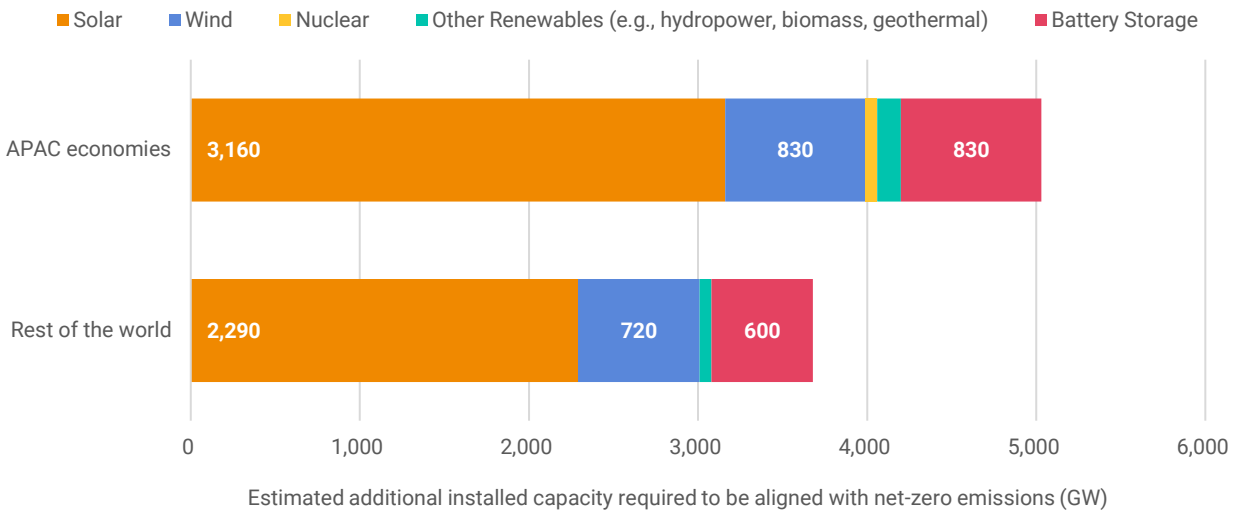
[34] Jakub Malich et. Al, "Sustainable-Debt Issuers on a More Credible Decarbonization Path, but Is It Enough?" MSCI Research, Nov. 13, 2023.

[35] "First Global Stocktake," UNFCCC, Dec.13, 2023.

[36] "Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach," IEA, September 2023.

Development/Model of Agricultural Production and its Impact on the Environment (REMIND-MAgPIE), we estimated that close to 5,000 GW, or 60% of the global capacity additions across solar, wind, nuclear, battery storage and other renewables, would need to be deployed in the APAC region (Exhibit 9) between 2022 and 2030. China and India are estimated to collectively account for close to two-thirds of APAC's required additional capacity over this period.[37]

Exhibit 9: Estimated breakdown of clean and renewable-energy capacity additions required (2022 to 2030) to be aligned with net-zero emissions by 2050 pathways



This estimate is based on the IEA Net Zero Roadmap's global projections for installed renewable-energy capacity for the period between 2022 and 2030. For a regional breakdown, we referred to the REMIND-MAgPIE model's regional projections for the period between 2020 and 2030, because the model provides output only in five-year blocks. "APAC economies" refers to the 13 markets included in the MSCI AC Asia Pacific IMI as well as other markets in the APAC region. Sources: IEA Net Zero Roadmap, Network for Greening the Financial System (NGFS) REMIND-MAgPIE model output accessed from NGFS Phase 4 Scenario Explorer in December 2023, MSCI ESG Research's further analysis of output data.

In terms of individual companies, we estimated that the 117 utilities that are constituents of the MSCI AC Asia Pacific IMI owned a total of 1,331 GW of installed power-generation capacity in 2022 (about 15% of global installed capacity).[38] Of this capacity, coal- and oil-fired plants contributed 45% (600 GW), gas-fired plants contributed 15% (200 GW) and nuclear and renewables made up the remaining 40% (531 GW) (Exhibit 10).

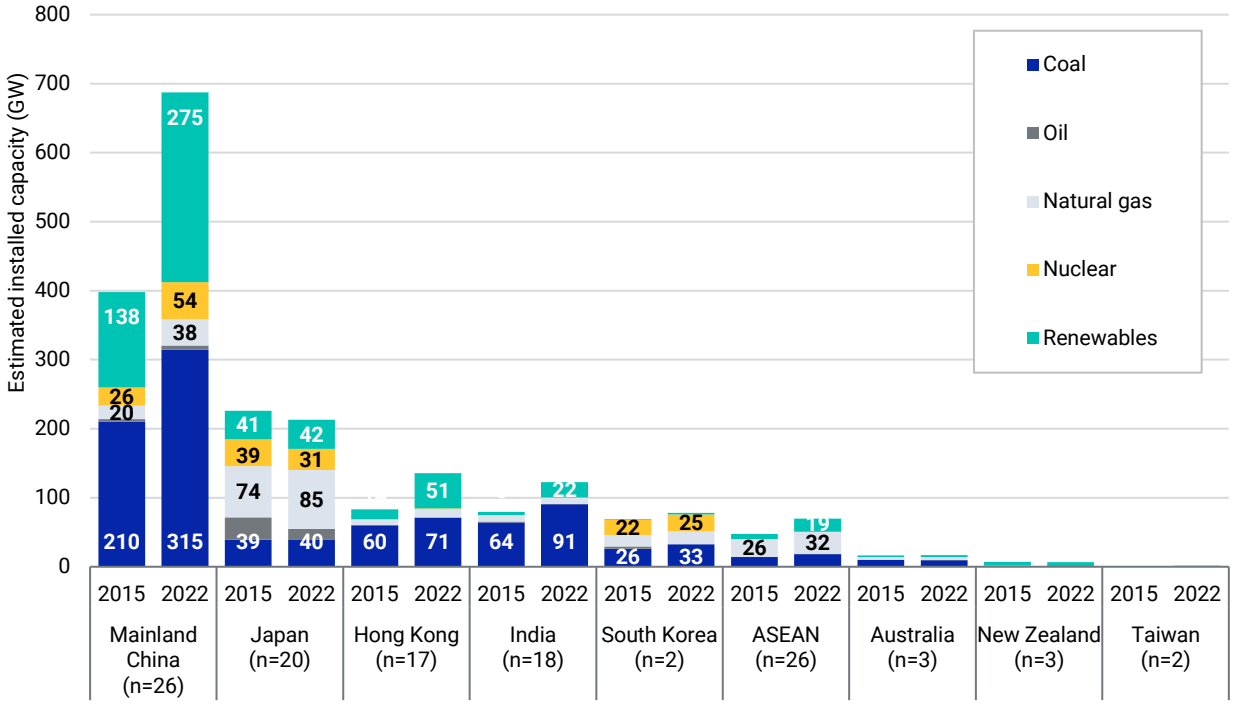
Of the 531 GW of nuclear and renewable-energy capacity, about 70% was owned by utilities domiciled in China and Hong Kong, where nuclear and renewable-energy capacity increased by about 100% and 250%, respectively, in recent years (2015-2022). Further, India and ASEAN increased their renewable-energy capacity by about 350% and 150%, respectively, over the same period. On the other hand, we saw only 1% growth for renewable capacity owned by Japanese utilities.

[37] Kenji Watanabe et al., "Unpacking COP28 Commitments to Renewable Energy and Energy Efficiency," MSCI Research, March 4, 2024.

[38] "Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach," IEA, September 2023.

Of the 600 GW of coal- and oil-fired capacity, about 70% was owned by utilities domiciled in China and India, where coal-fired capacity has increased by about 50% and 40%, respectively, in recent years (2015-2022). Only Australian utilities decreased coal-fired power capacity over the same period (Exhibit 10).

Exhibit 10: Estimated installed capacity for utilities in the MSCI AC Asia Pacific IMI



ASEAN includes Indonesia, Malaysia, Philippines, Singapore and Thailand. For companies that did not report installed capacity in certain years between 2015 and 2022, we used the most recently available data (within two years) to develop estimates. Data sourced from utilities constituents of the MSCI AC Asia Pacific IMI as of Feb. 1, 2024. Sources: MSCI ESG Research, company disclosures.

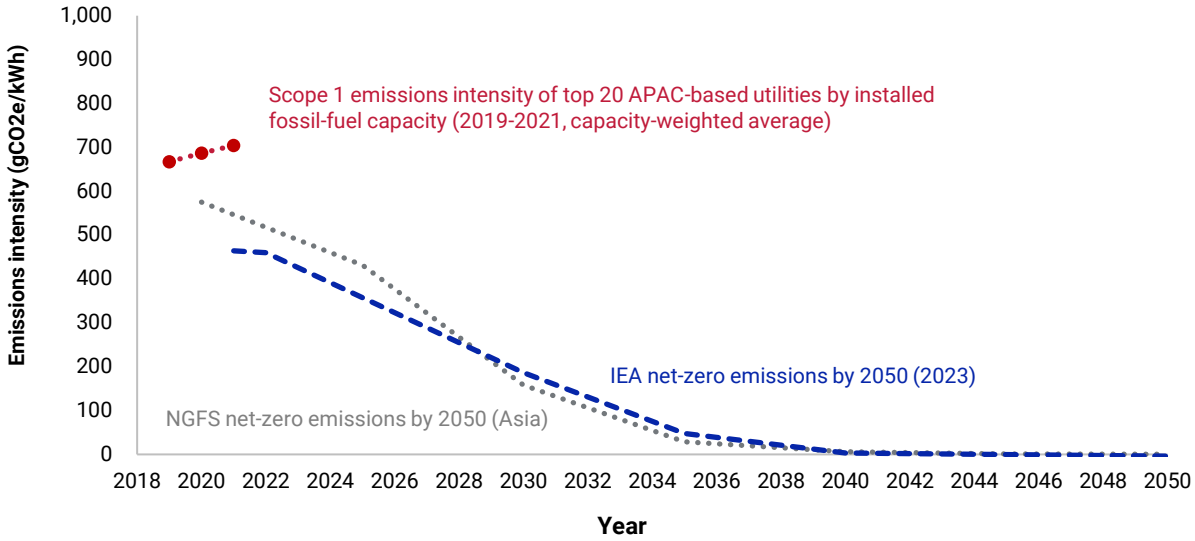
While APAC utilities have expanded renewable-energy capacity between 2015 and 2022, their fossil-fuel capacity has also increased. The continued role of fossil-fuel-based electricity suggests that energy security and affordability have remained priorities in APAC markets and may continue to influence the speed at which APAC utilities can transition away from fossil fuels.

At the time of writing, the direct-emissions intensities of the largest APAC utilities were well above modeled pathways to net-zero emissions by 2050 (Exhibit 11). Beyond expanding clean-energy capacity, retiring coal power plants before the end of their designed lifespans is increasingly seen as an important step for APAC utilities to align with net-zero pathways.[39] In this regard, various efforts are underway to explore the role of capital markets in improving the economic viability of coal-power phaseout programs in APAC while achieving real emissions avoidance and addressing the interests of impacted communities. This includes initiatives to mobilize private capital through blended finance and high-integrity transition credits, and incorporation of environmental and social

[39] If operated for typical lifetimes and utilization rates, the existing worldwide coal-fired fleet would emit 330 Gt of CO_2, or two-thirds of the remaining global carbon budget to limit global warming to 1.5°C. Coal plants in Asian developing economies are, on average, less than 15 years old. Source: "Coal in Net Zero Transitions," IEA, November 2022.

considerations for coal phaseout in sustainable-finance taxonomies.[40] Our research had noted that investor engagement could complement these efforts[41] and that policymakers could consider the varying orderly coal-phaseout pathways across APAC markets in designing their approaches.[42]

Exhibit 11: Emissions intensity of large APAC utilities versus net-zero by 2050 pathways



"Top 20" refers to the 20 utility companies with the largest fossil-fuel capacity and excludes pure renewable-energy companies, gas utilities and water utilities. These companies collectively account for more than 80% of installed fossil-fuel capacity of all utilities in the index. Pathways for CO2 emissions intensity of electricity generation were derived from the REMIND-MAgPIE 3.2-4.6 model for NGFS' pathway and IEA's Net Zero Roadmap (2023 update). Capacity-weighted emissions intensity is in CO2e. Emissions data sourced from 20 utility companies in the MSCI AC APAC IMI, as of Feb. 1, 2024. Sources: NGFS REMIND-MAgPIE, IEA, MSCI ESG Research.

Technology advancements may also be important to the region's energy transition. This includes making progress in carbon capture and storage (CCS) and the retrofitting of power plants to allow for the blending of alternative fuels with coal and natural gas (technology options outlined in the IEA's Net Zero Emissions by 2050 scenario[43]), while ensuring that real emissions reduction is achieved. Based on technical criteria of sustainable-finance taxonomies in the APAC region, gas-powered turbines would likely require a natural-gas blend containing a minimum of 50% hydrogen by

[40] Examples include the Just Energy Transition Partnership and Energy Transition Mechanism looking into blending concessionary capital with private capital, the Monetary Authority of Singapore's Transition Credits Coalition exploring the issuance of carbon credits to bridge the financing gap of phasing out coal-powered plants, and the inclusion of coal phaseout criteria in the Singapore-Asia Taxonomy and ASEAN Taxonomy.

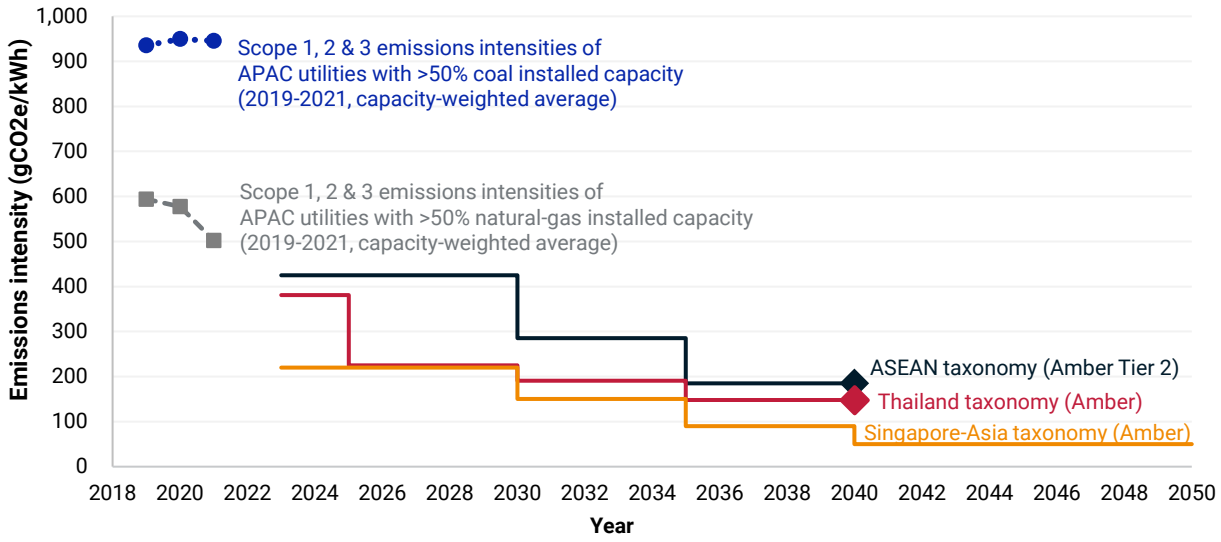
[41] Elchin Mammadov and Manish Shakdwipee, "Investor Pressure May Help APAC Companies Minimize Asset-Stranding Risk," MSCI Research, March 25, 2024.

[42] "Simulating a Managed Phaseout of Coal-Fired Power Plants in the Asia-Pacific Region," MSCI Sustainability Institute, November 2023. Notes: Our research indicated that the most orderly transition in APAC would require coal-powered plants to be retired by 2040. The feasibility of these pathways may depend on factors such as plant age, required renewable-energy capacity to substitute coal and stakeholder interests.

[43] "Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach," IEA, September 2023.

volume.[44] With hydrogen and CCS technologies still in early development stages,[45] coal and gas-dependent utilities in APAC may need to see significant policy and technology breakthroughs to achieve these standards. To this end, Singapore, Malaysia and Australia, among other APAC economies, have launched national hydrogen roadmaps and CCS pilot projects to accelerate the deployment of these technologies (Exhibit 12).[46]

Exhibit 12: Emissions intensity of coal- and natural-gas-dependent APAC utilities versus technical screening criteria in sustainable-finance taxonomies that qualify power plants as "in transition"



At the time of writing, the ASEAN, Thailand and Singapore-Asia taxonomies, which use a "traffic light" approach, have specified lifecycle emissions intensity thresholds for power plants. This chart maps the thresholds for power plants to be deemed "in transition" (amber). (To be deemed "green," power plants will need to achieve 100 gCO2e/kWh today.) The diamond symbol refers to the backstop year when thresholds would cease. We compared the thresholds with the recent Scope 1, 2 and 3 emissions intensities of coal- and gas-dependent utilities in the MSCI AC APAC IMI, defined as those having >50% capacity in coal or gas. Data as of Feb. 1, 2024. Sources: MSCI ESG Research; taxonomies of authorities in ASEAN, Singapore and Thailand; company disclosures.

[44] Advanced combined-cycle gas turbines can achieve 353 kgCO2e/MWh of lifecycle emissions intensity. Blending natural gas with 50% (volume) of hydrogen can reduce lifecycle CO2 emissions by 20%. This broadly corresponds to the ASEAN Taxonomy's Amber criterion, which requires power plants to have lifecycle emissions intensity of less than 285 kgCO2e/MWh by 2030 (~19% reduction). Source: "ASEAN Taxonomy for Sustainable Finance," ASEAN Taxonomy Board, February 2024, and "Emissions Intensity of Power Plants," Jacobs, December 2022.

[45] The IEA rated the Technology Readiness Level of hydrogen and ammonia co-firing of gas and coal power plants at 4 to 5 (early to large prototype stage) and gas and coal power with CCUS to be between 3 and 9 (concept development to commercial operation in relevant environment). Source: "Energy Technology Perspectives 2023," IEA, January 2023.

[46] "Singapore's National Hydrogen Strategy," Ministry of Trade and Industry Singapore, December 2022; "National Energy Transition Roadmap," Ministry of Economy Malaysia, August 2023; and "National Hydrogen Strategy Review Consultation Paper," Department of Climate Change, Energy, the Environment and Water, July 2023.

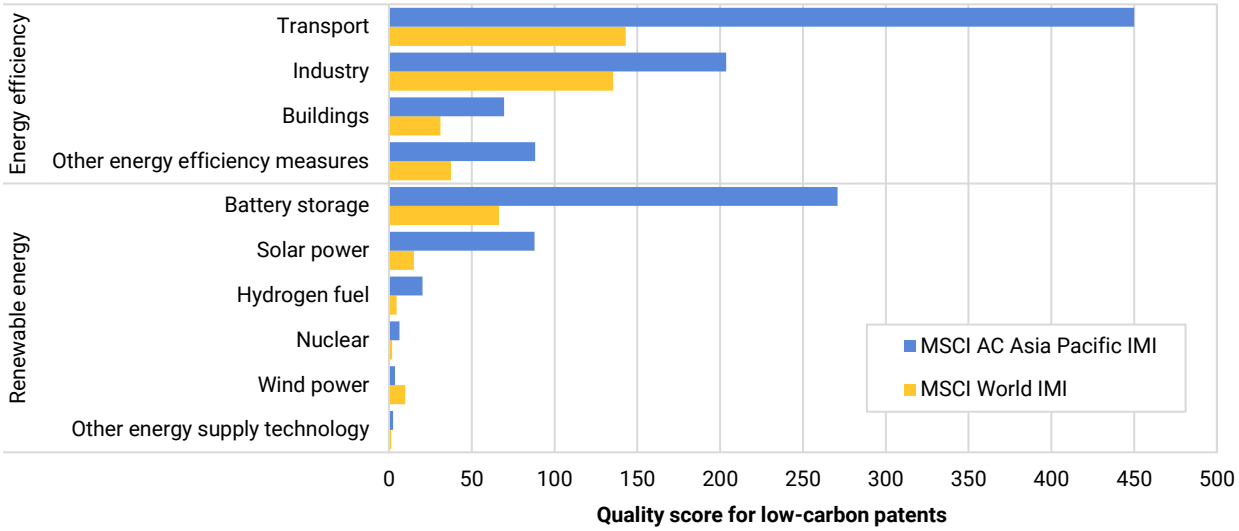
Innovating and deploying clean tech

Scaling up renewable energy and energy-efficiency solutions will be central to a transition away from fossil fuels.[47] The IEA estimated that a threefold increase of renewable-energy capacity between 2022 and 2030 could reduce fossil-fuel demand by about a quarter over the same time. Further, doubling the global pace of energy-efficiency improvement could cut almost one-third of current global energy consumption, accelerating decarbonization.[48]

We used **MSCI Low Carbon Patent Scores**[49] to gain insight into the strategic research and development, investments and innovation capacity of companies in solar, wind, nuclear, hydrogen fuel and battery storage — key technologies for renewable energy growth.[50] We found that constituents of the MSCI AC Asia Pacific IMI had higher average exposure to advanced battery storage, solar and hydrogen fuel than their global peers in the MSCI World IMI. This may indicate a higher potential to benefit from any upside when the technologies and markets mature (Exhibit 13).

In the areas of transport, industry and buildings, where the IEA has predicted the highest future improvements in energy efficiency,[51] we found that companies in the MSCI AC Asia Pacific IMI had higher average exposure to energy-efficiency technologies relative to their global peers. Such technologies include electric vehicle (EV), aircraft, ship and automobile designs for transport; automation and production efficiency for industry; and lighting, insulation and cooling for buildings.

Exhibit 13: Low Carbon Patent Quality Scores in the MSCI World IMI and MSCI AC APAC IMI



We assessed the quality score for low-carbon patents (x-axis) at the portfolio level. We multiplied the portfolio weight of the issuer with the issuer's technology-specific patent quality score. The issuer's weighted-average technology-specific patent quality score was aggregated at the portfolio level. Data as of Feb. 1, 2024. Source: MSCI ESG Research.

[47] "Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach," IEA, September 2023.

[48] Ibid. Also see "Energy Efficiency: The Decade for Action," IEA, June 2023.

[49] For more information, see "Climate VaR Methodology Part 3: Technology Opportunities," MSCI ESG Research, June 2020.

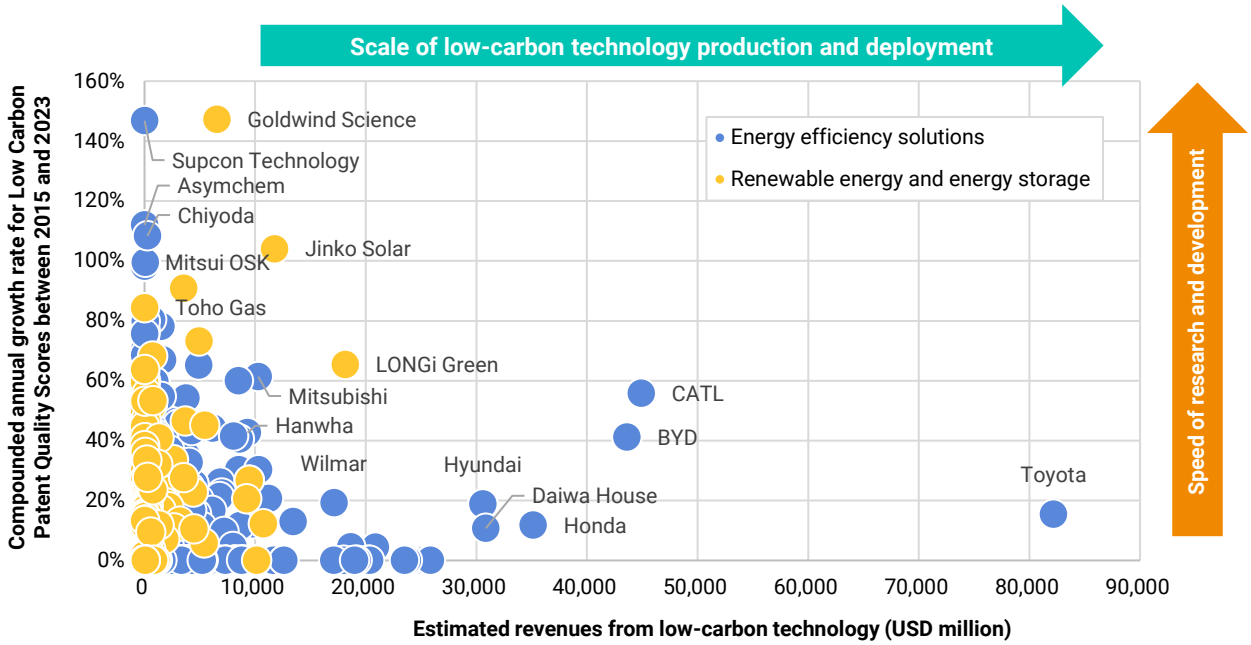
[50] "Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach," IEA, September 2023.

[51] See Kenji Watanabe et al., "Unpacking COP28 Renewable Energy and Energy Efficiency Commitments," MSCI Research, March 4, 2024.

At the issuer level, we assessed the speed and scale of their low-carbon technology development and deployment,[52] using compounded annual growth rates (CAGR) of Low Carbon Patent Quality Scores as a proxy for the speed of technology development. We also used estimated revenues from low-carbon technology as a proxy for the scale of technology deployment (Exhibit 14).

We observed automakers and battery makers, **Toyota Motor Corp., CATL** and **BYD Auto Co. Ltd.,** were the top three companies by estimated revenues from their EVs, EV battery, hybrid vehicles and fuel-cell cars across APAC corporations. Achieving price parity between EVs and conventional cars may help them further the deployment of their transport solutions.[53] Chinese renewable-equipment providers **JinkoSolar Holding Co. Ltd.** and **LONGi Green Energy Technology Co. Ltd.** showed the top two highest estimated revenues from solar power. **Goldwind Science & Technology Co. Ltd.** showed the highest growth of Low Carbon Patent Scores related to wind power. Chinese renewable solutions accounted for half of global renewable-capacity markets in 2023.[54] The companies have accelerated research and development on perovskite solar cells and high-voltage electric current for wind power. Finally, **Chiyoda Corp.**, **Mitsui O.S.K. Lines** and **Toho Gas Co. Ltd.** showed the highest growth of Low Carbon Patent Scores among Japanese companies. These companies have also made investments in hydrogen-fuel supply chains. Yet they derived limited revenues from the solutions (Appendix Exhibit H). Government subsidies and tax credits may help them commercialize hydrogen fuels.[55]

Exhibit 14: Speed and scale for low-carbon technology development and deployment



We estimated the CAGR of Low Carbon Patent Quality Scores based on the time series of the scores. We multiplied the percentage of sustainable impact revenues with a company's latest annual sales. Issuers were classified as energy efficient if their energy-efficiency patent quality scores were higher than renewable and vice versa. Data reflects constituents of the MSCI AC Asia Pacific IMI, as of Feb. 1, 2024. Sources: MSCI ESG Research, company disclosures.

[52] J. Doerr, "Speed and Scale: An Action Plan for Solving Our Climate Crisis Now," November 2021

[53] "Global EV Outlook," IEA, April 2024.

[54] "Renewable Energy Market Update," IEA, June 2023.

[55] "Japan, U.S. in Talks to Bolster Hydrogen Supply Chain Together," *Nikkei Asia,* April 5, 2024.

Conclusion

Under rising regulatory pressure and with physical climate risks intensifying, APAC companies are responding. We assessed APAC companies' climate-transition progress across emissions disclosures, climate-target setting, fuel-mix development and trends in green and transition capital flows. Results differed across markets, which may be explained in part by regulatory differences, policy support, shareholder preferences and the industry mix of the respective markets.

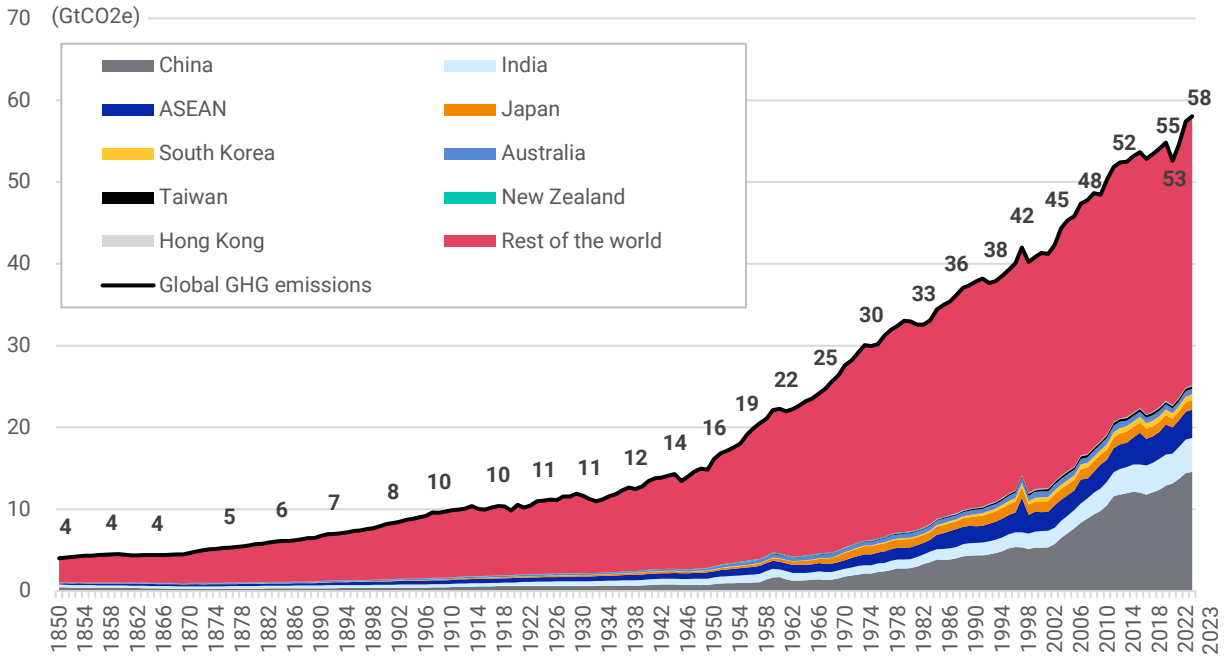
We found that APAC utilities have met growing demand for power generation by increasing capacity at both ends of the energy spectrum — by growing renewables while continuing to add fossil fuels. More than just raising renewable capacity, a successful energy transition may also require retiring coal-fired power plants earlier than their operational life and reducing the emissions contribution of existing fossil-fuel-fired power plants through CCS and hydrogen-blending with fuels. Gaps between the status quo and net-zero pathway were most evident in this situation.

Finally, we analyzed APAC companies' growing prominence in clean-tech production and innovation. These companies accelerated the speed and scale of their low-carbon technology development and deployment. In specific areas, government or policy support may help this growth in the future.

Ultimately, given its economic contribution and emissions growth, APAC's climate trajectories are expected to have a significant impact on global net-zero ambitions, and as corporations respond to various pressures and incentives, both risks and opportunities would emerge for lenders and investors.

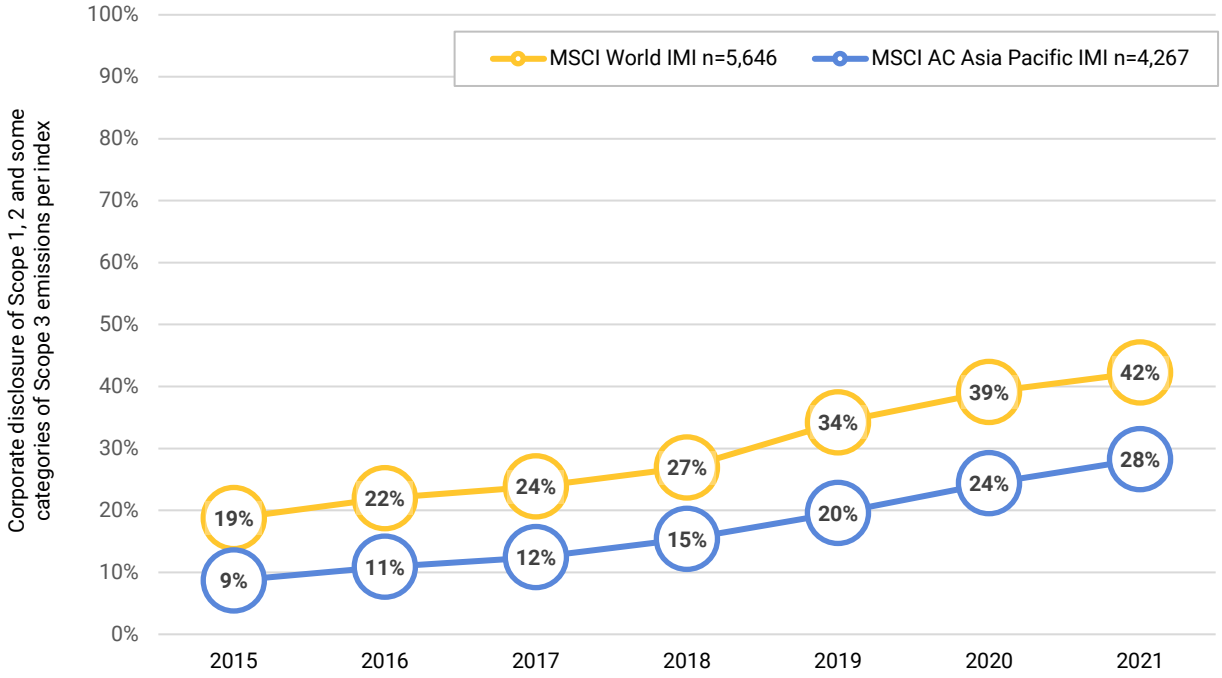
Appendix

Exhibit A: Cumulative GHG emissions per market, 1850 to 2023



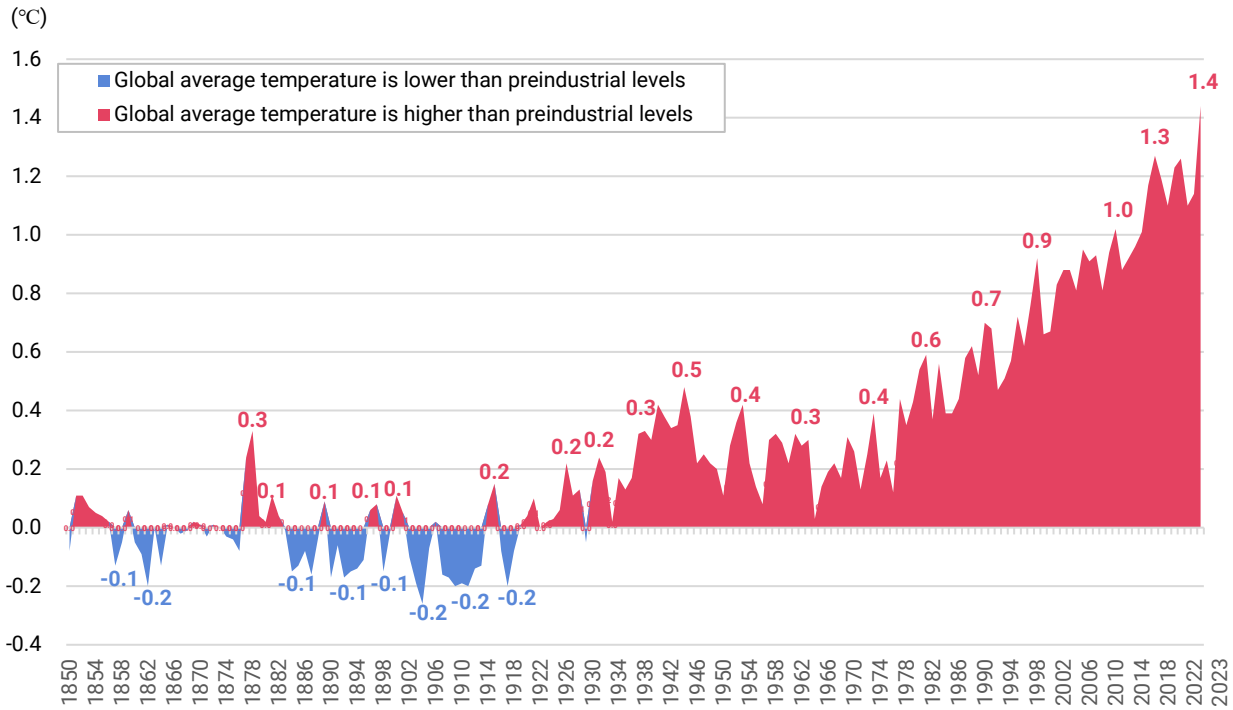
Data as of Feb 1, 2024. Sources: MSCI ESG Research, Our World in Data, UNEP GAP.

Exhibit B: Corporate emissions disclosure for the MSCI AC Asia Pacific IMI and MSCI World IMI



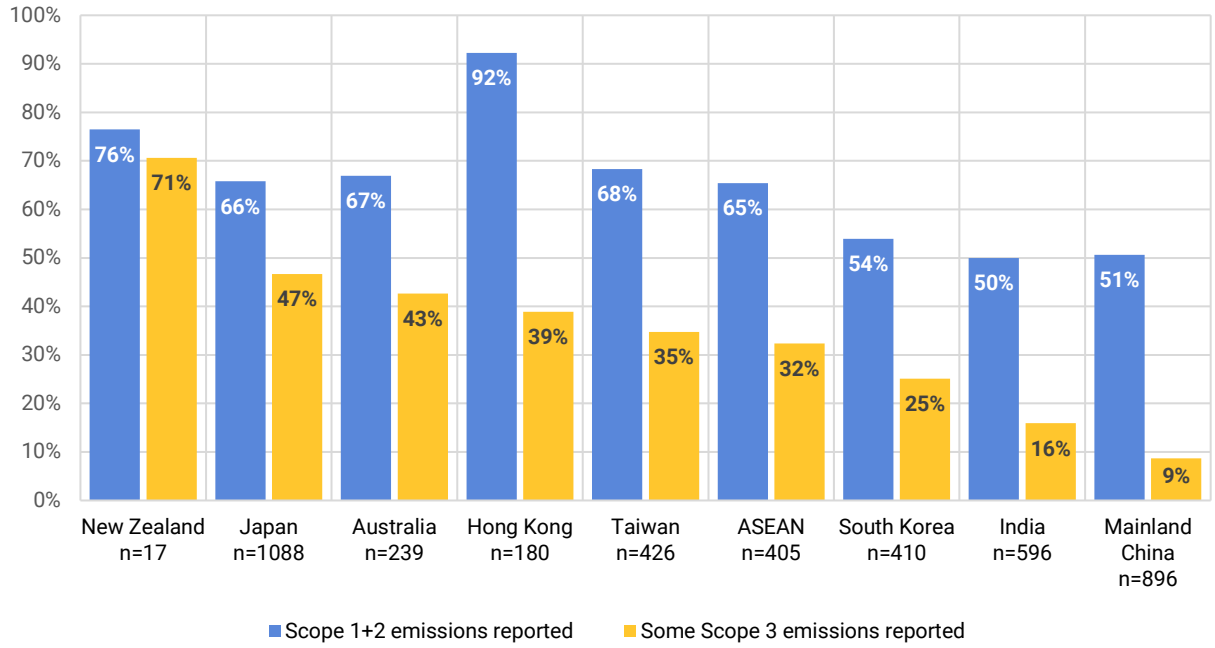
Data as of Feb. 1, 2024. Source: MSCI ESG Research.

Exhibit C: Global average temperature rise above and below preindustrial levels



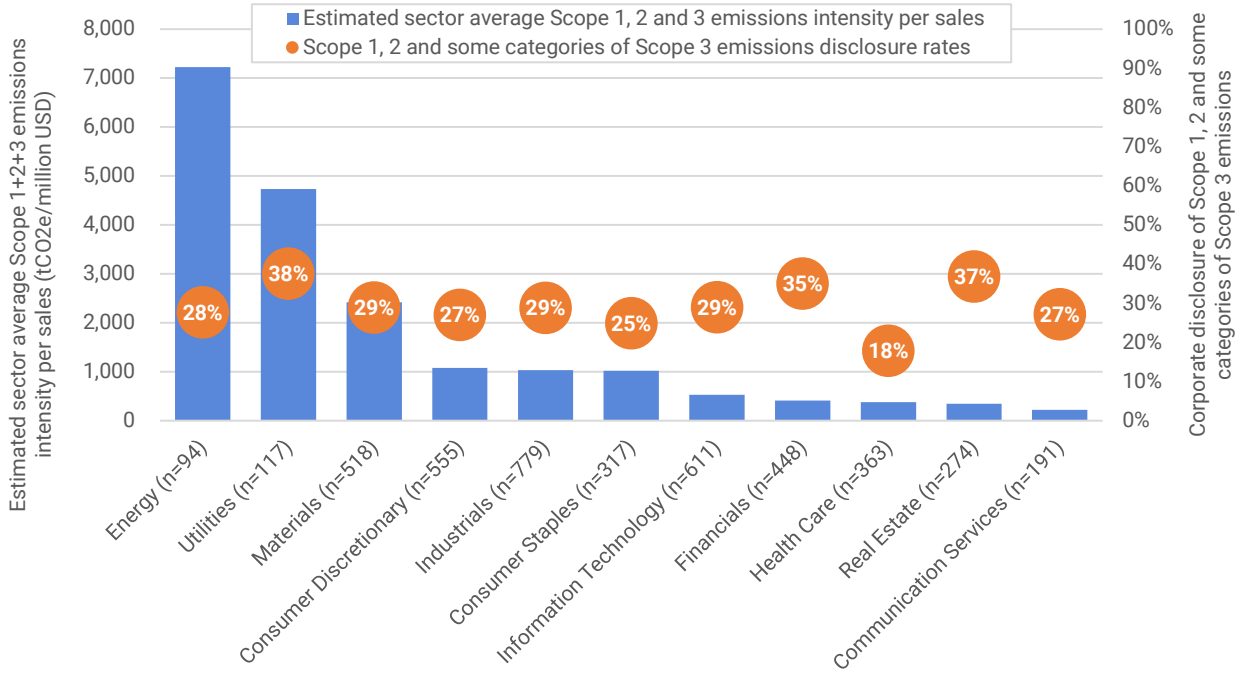
Data as of Feb. 1, 2024. Sources: MSCI ESG Research, Our World in Data, the Met Office Hadley Centre.

Exhibit D: Breakdown by country of corporate disclosure rates of Scope 1, 2 and 3 emissions in 2021



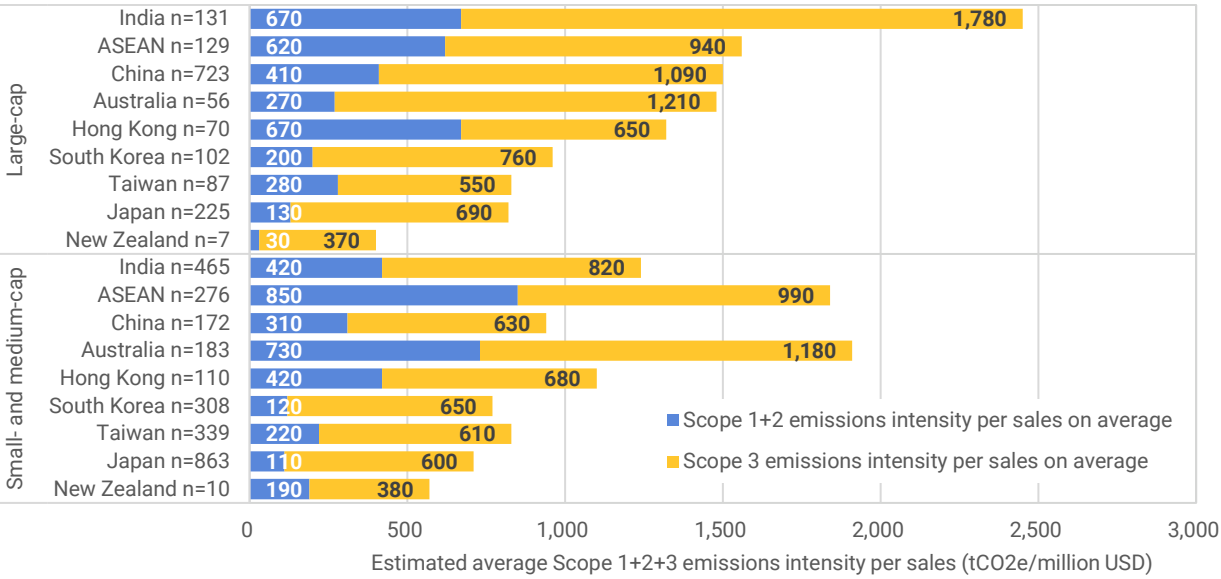
Data for constituents of the MSCI AC Asia Pacific IMI, as of Feb. 1, 2024. Sources: MSCI ESG Research and company disclosures.

Exhibit E: Breakdown by sector of corporate emissions intensity and disclosure rates of Scope 1, 2 and 3 emissions in 2021



Sectors are based on the Global Industry Classification Standard (GICS®). GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence. Data sourced for constituents of the MSCI AC Asia Pacific IMI, as of Feb. 1, 2024. Sources: MSCI ESG Research and company disclosure of carbon emissions in 2021.

Exhibit F: Breakdown by country of corporate emissions intensity of Scope 1, 2 and 3 emissions in 2021



Data for constituents of the MSCI AC Asia Pacific IMI, as of Feb. 1, 2024. Sources: MSCI ESG Research and company disclosure of carbon emissions in 2021.

Exhibit G: Target-credibility weighting system for GICS sectors

Question	Factor	Scope specific?	Weight (adds up to 100%)
Does the company have any short-term targets?	Target year	Scope-specific weighting	40% for having at least one target set between 2020 and 2030 20% for having only target(s) beyond 2030
Does the company have third-party verified targets?	SBTi approved target(s)	Company-wide weighting	Yes = 20% No = 0% (Not applicable for oil and gas companies)
Does the company have a good track record of achieving targets in the past?	Record on achieving targets		Percentage of past targets achieved * 20% (For oil and gas companies, percentage of past targets achieved * 30%)
Is the company currently achieving targets?	Being (linearly) on track to achieve targets		On track for at least some targets = 20% Not on track to meet any targets = 0% (For oil and gas companies, on track for at least some targets = 30%)

Source: MSCI ESG Research.

Exhibit H: Examples of company speed and scale for low-carbon technology development and deployment

Company	GICS sector	GICS sub-industry	Highlights of low-carbon technology and business
Toyota Motor Corp.	Consumer discretionary	Automobile manufacturers	Toyota sold 3.6 million electrified cars including hybrid vehicles (about 95% of the 3.6 million), electric vehicles (about 5%), and fuel-cell vehicles (0.1%) in 2023, about 35% higher than the previous 2.7 million car sales in 2022.
Contemporary Amperex Technology Co., Ltd. (CATL)	Industrials	Electrical equipment	CATL had more than 35% of the global EV battery market share in 2023. The company offers battery-power systems and lithium-battery materials for EVs. CATL also offers energy storage that supports alternative-energy devices.
BYD Co., Ltd.	Consumer discretionary	Automobile manufacturers	BYD manufactures trains, EVs, hybrid vehicles, batteries and photovoltaic (PV) products under its automobiles and related products and other products segments. BYD sold 3.0 million EVs in 2023.
JinkoSolar Holding Co., Ltd.	Information Technology	Semiconductors	Jinko Solar manufactures silicon wafers and solar modules. In 2023, the company developed perovskite-silicon solar cells, with a conversion efficiency of 32.3%, tested by third-party institutions.[56]
LONGi Green Energy Technology Co., Ltd.	Information Technology	Semiconductors	LONGi cut the average lifetime cost per unit of energy generated by its solar panels by 60% during 2015 and 2021. In 2023, the company developed perovskite-silicon solar cells, with a conversion efficiency of 33.9%, leading the global standard.[57]
Goldwind Science & Technology Co., Ltd.	Industrials	Electrical equipment	Goldwind Science & Technology provides overall solutions for wind turbines, wind-power services and wind-farm development. The company has held patents related to high-voltage direct-current transmission and wind-speed prediction devices, among others.
Mitsui O.S.K. Lines, Ltd.	Industrials	Marine transportation	Mitsui O.S.K. Lines is engaged in the international shipping business. In 2023, the company developed a hybrid passenger ship, which utilizes hydrogen and biodiesel fuels. According to the company, the ship can reduce more than 50% of CO2 emissions compared to conventional fossil-fired vessels.[58]
Chiyoda Corp.	Industrials	Construction and engineering	Chiyoda constructs energy-efficient buildings and solar power plants. It also develops hydrogen supply chains. In 2024, Chiyoda and Toyota agreed to jointly develop an electrolysis system with hydrogen production in Japan and overseas markets. They aim to commercialize hydrogen fuels in 2025.
Toho Gas Co., Ltd.	Utilities	Gas utilities	Toho Gas is engaged in gas utilities services, construction and equipment businesses. In 2023, Toho Gas announced its plan to construct a hydrogen production plant with the aim of building a hydrogen supply chain.[59]

The table includes notable companies included in our analysis, which are constituents of the MSCI AC Asia Pacific IMI. Please also refer to Exhibit 14 in the main text. Data as of March 15, 2024. Sources: MSCI ESG Research, company disclosures.

***Toyota, CATL** and **BYD** were the top three companies by estimated revenues from their EVs, EV battery and hybrid vehicles across APAC corporates. Chinese renewable equipment providers **Jinko Solar** and **LONGi Green Energy Technology** had the highest estimated revenues from solar power. **Goldwind Science & Technology** showed the highest growth of Low Carbon Patent Scores related to wind power. **Chiyoda**, **Mitsui O.S.K. Lines** and **Toho Gas** showed the highest growth of Low Carbon Patent Scores amongst Japanese companies.*

[56] "Three-Peat Victory! JinkoSolar Sets New Records for Cell, Module, and Tandem Efficiency Successively," Jinko Solar, Oct. 2023.

[57] LONGi Green Energy Technology cut the average lifetime cost per unit of energy generated by its solar panels by 60% between 2015 and 2021. See "Is China a Climate Saint or Villain?" *The Economist*, March 12, 2024. See "LONGi sets a new world record of 33.9% for the efficiency of crystalline silicon-perovskite tandem solar cells," LONGi Green Energy Technology, November 2023.

[58] "Japan's first Hydrogen and Bio Fuel Hybrid Passenger Ship Named 'HANARIA' - Start servicing from April 2024," Mitsui O.S.K. Lines, Sept. 13, 2023.

[59] "Collaboration in Hydrogen Business," Toho Gas Co, Oct. 18, 2023.

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