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APAC Climate Action Progress 2025

Focus on transition plans

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Executive summary

In 2024, the rise in the global average temperature reached a record high of 1.5°C above preindustrial levels, making it the first year to surpass the threshold set by the Paris Agreement.[1] Continued atmospheric warming may elevate physical risks, exposing Asia-Pacific (APAC) economies to an increase in damage and adaptation costs given the vulnerability of many of the region's economic hubs to extreme heat.[2] Despite these risks, APAC's economies continue to rely heavily on fossil fuels in energy systems, contributing to more than 40% of global greenhouse gas (GHG) emissions in 2023.[3]

To limit temperature rises, governments in the region are advancing climate regulations, including the adoption of the International Sustainability Standards Board (ISSB) disclosure standards and carbon markets, to drive corporate decarbonization in line with the Paris Agreement. Yet, these regulatory developments come amid growing macroeconomic uncertainty and geopolitical tensions. Most governments have continued to subsidize fossil fuels to address inflation and missed the initial deadline to submit new Nationally Determined Contributions (NDC) under the Paris Agreement.[4]

Against this backdrop, this report examines corporate transition plans across 13 APAC markets, focusing particularly on clean-tech investment.[5] Corporate disclosure of transition plans may drive clean-tech demand by signaling the need for technologies focused on emissions reduction. Ultimately, the speed and scale at which APAC companies can decarbonize will depend not only on their ambition, but also their technology roadmap, capital allocation and access to commercially viable clean technologies.

Key takeaways

- **Progress on corporate climate actions**: Of 837 companies that disclosed transition plans in APAC, the percentage that have committed to the Science Based Targets initiative (SBTi) standard doubled from 25% to 50% in 2023-25, indicating their strategic focus on real-economy decarbonization.
- **Growth of clean-tech providers**: Several renewable-energy equipment and electric-vehicle makers in India and China grew their sales faster than their APAC peers in 2020-23. They are well equipped to address growing energy demand and capitalize on market opportunity driven by the transition.
- **Integrity of carbon credits**: We found that only 2% of about 4,000 carbon projects likely contributed to emissions reduction, indicating a lack of high-integrity carbon credits to support the transition. This limited supply poses risks for companies that rely on such credits to meet interim climate goals.

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[1] "State of the Global Climate 2024," World Meteorological Organization, March 19, 2025.

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

[3] Hanna Ritchie, Pablo Rosado and Max Roser, "CO_2 and Greenhouse Gas Emissions," Our World in Data, last accessed April 22, 2025.

[4] "NDC Registry," UNFCCC, last accessed April 22, 2025. Note: Of 195 parties, 11% updated their NDCs, as of this research.

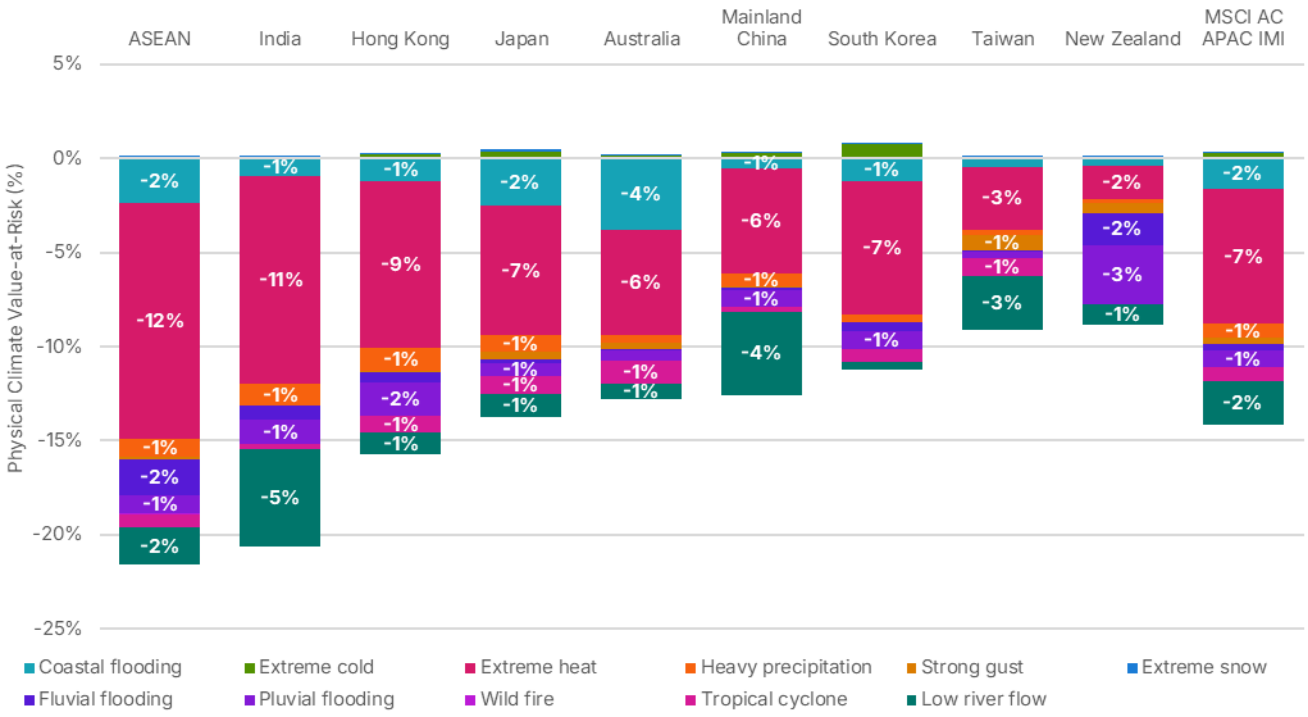
[5] Constituents of the MSCI AC Asia Pacific IMI are domiciled in 13 APAC markets: Japan, Mainland China, Taiwan, Hong Kong, India, Australia, South Korea, Singapore, Indonesia, Thailand, Malaysia, Philippines and New Zealand. Unless otherwise stated, companies mentioned in this report are constituents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

Growing attention to climate change across APAC markets

Rapidly rising global temperatures can drive 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. Based on our Climate Value-at-Risk (Climate VaR) model, extreme heat presents the greatest potential future impact on company valuations in APAC markets.

The higher the temperature rises 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 more than 10% of the enterprise value of the constituents in the MSCI AC Asia Pacific Investable Market Index (IMI).[6] The physical risk Climate VaR was more than 20% in ASEAN markets and India, followed by Hong Kong, where the corresponding risk was more than 15%.

Physical risk Climate VaR by market



Data as of March 31, 2025. Physical risk Climate VaR indicates the potential financial losses due to the physical impacts of climate change. MSCI ESG Research models six acute hazards (tropical cyclones, river low flow, coastal, fluvial and pluvial flooding and wildfire) and five chronic hazards (extreme heat, extreme cold, strong gust, extreme precipitation and extreme snowfall). The flood-hazard model updates led to a decrease in overall flood risk from last year. Source: MSCI ESG Research

[6] The MSCI AC Asia Pacific IMI constituents referenced in the report are as of March 31, 2025.

To curb rising temperatures, governments across APAC have introduced and implemented policies ranging from carbon-pricing mechanisms to national energy-transition roadmaps. To track progress, regulatory momentum has increased for corporate climate disclosure, driven by the adoption of the ISSB standards which offer a standardized framework for climate-related disclosures.[7]

Implementations of ISSB disclosure standards

Markets	Examples of carbon-pricing schemes	Examples of national energy strategy	Entering into force for implementation of ISSB standard	Disclosure of transition plans
Japan	National ETS (Plan), 2026	The 7th basic energy plan, Basic hydrogen strategy	2027	Aligned with IFRS S2
Mainland China	National ETS, 2021	The 30・60 targets	2025	Disclose if available
Taiwan	National ETS (Plan), 2025	Net zero roadmap	2026	Aligned with IFRS S2
Hong Kong	-	Strategy of hydrogen development	2025	Aligned with IFRS S2
India	National ETS (Plan), 2026	National electricity plan	2028	Aligned with IFRS S2
Australia	Safeguard Mechanism, 2023	Powering Australia, Rewiring the nation	2026	Aligned with IFRS S2
South Korea	National ETS, 2015	The 11th basic plan on energy supply and demand	TBC	TBC
Singapore	National carbon tax, 2019	Green plan 2030	2025	Aligned with IFRS S2
Indonesia	National ETS, 2023	National energy plan	TBC	TBC
Thailand	National carbon tax, 2025	Power development plan	TBC	TBC
Malaysia	National carbon tax (Plan), 2026	National energy transition roadmap	2027	Aligned with IFRS S2
Philippines	National ETS (Plan), 2025	Hydrogen and fusion energy roadmap	TBC	TBC
New Zealand	National ETS, 2008	National Energy Strategy	2023	Aligned with TCFD, IFRS S2

Data as of March 31, 2025. Source: World Bank Group, IFRS Foundation, MSCI ESG Research

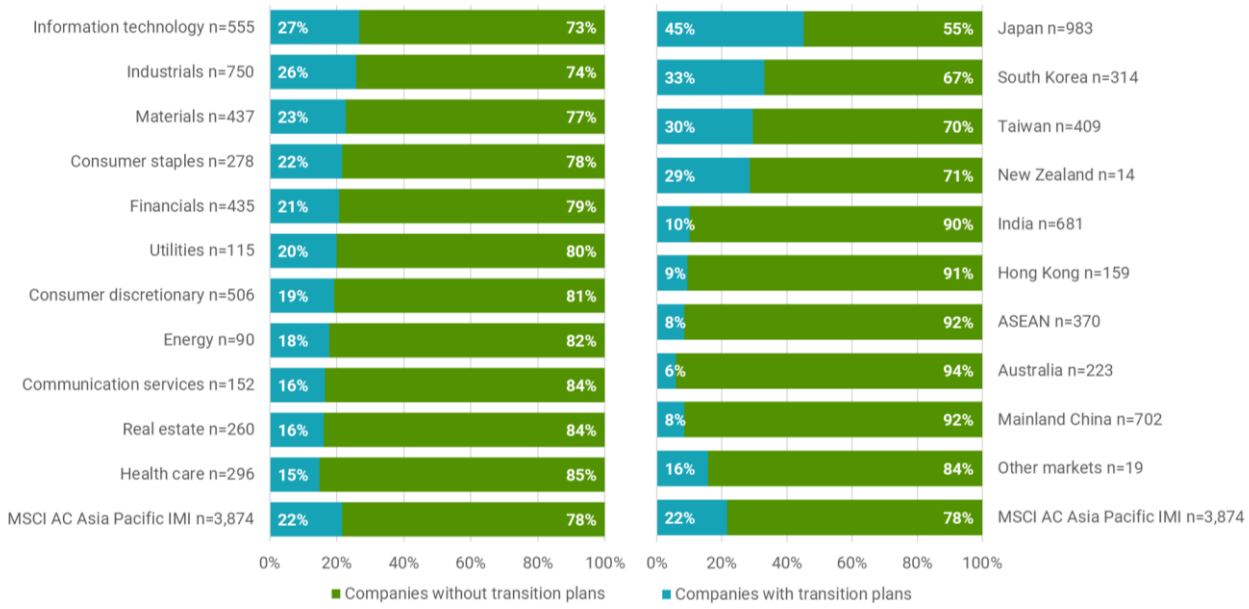
[7] Anja Ludzuweit and Raphael Klein, "Climate Risks and Opportunities Reporting Guide for Financial Institutions," MSCI ESG Research, November 2024 (Client access only).

To help investors understand how companies are adapting and contributing to the transition to a lower-carbon economy, the ISSB standards mandate that companies disclose their transition plans as an integral part of their business strategy. The transition plan outlines an organization's strategic ambition, technology roadmaps and capital allocation to achieve short-, medium- and long-term climate targets.

The transition plan allows investors to assess the credibility of corporate climate targets and gain insight into the associated risks, opportunities and capital requirements for achieving them within the timeframes stated. An illustrative example of a transition plan can be found in the Appendix.

The ISSB standards require companies to disclose not only their transition plans, but also value-chain emissions and interim targets, enabling investors to measure progress toward climate-transition goals.[8] Of the 3,874 constituents of the MSCI AC Asia Pacific IMI, 837 companies (22%) disclosed transition plans to CDP in 2024.[9] Among sectors, information technology (27%) reported the highest rate of transition plans, followed by industrials (26%) and materials (23%).[10] By regional market, Japan (45%) was ahead of South Korea (33%) and Taiwan (30%) in terms of disclosures of such plans.

Percentage of companies with transition plans by sector and market



Data as of March 31, 2025. Source: MSCI ESG Research

[8] "Disclosure Framework," Transition Plan Taskforce, October 2023.

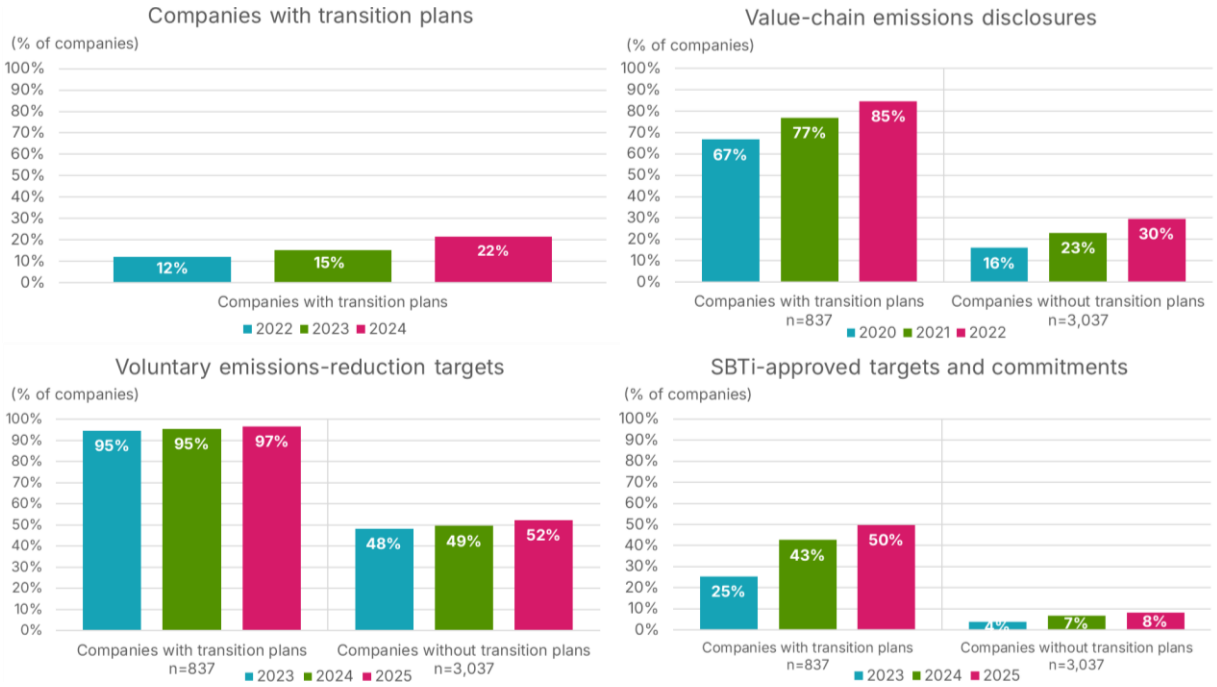
[9] "The State of Play 2023 Climate Transition Plan Disclosure," CDP, June 2024. Note: CDP defined the transition plan as a time-bound action plan that outlines how an organization will pivot its business model toward a trajectory aligned with a 1.5°C climate scenario.

[10] Sectors are based on the Global Industry Classification Standard (GICS®). GICS is the industry-classification standard jointly developed by MSCI and S&P Dow Jones Indices.

We observed an increase in the overall number of companies disclosing transition plans across APAC, rising from 12% to 22% in 2022-24. Companies with these plans were more likely to disclose key climate metrics and were also more likely to report their Scope 1, 2 and 3 emissions and set climate targets.

In fact, nearly all of them have set climate targets, with half having already set, or committed to set, targets approved by the SBTi. Such disclosures can help investors assess the credibility of transition plans, improve decision making and enhance comparability across portfolio companies.[11]

Comparison of corporate disclosure rates between companies with transition plan and those without in MSCI AC Asia Pacific IMI



Data as of Mar. 31, 2025. Source: CDP. MSCI ESG Research

Among the key climate metrics we examined, the following two have shown significant improvement over the past three years:

- **The disclosure of value-chain Scope 1, 2 and 3 emissions,** which enables the measurement of progress against targets, increased to 85% in 2022 from 67% in 2020.
- **Target-setting and commitments based on the SBTi** have doubled to 50% in 2025 from 25% in 2023, consistent with efforts to align with the Paris Agreement.

Disclosure of these two metrics can enhance the credibility of a company's readiness to implement its transition plans. The growing number of companies committing to set SBTi-approved targets indicates their strategic focus on real-economy decarbonization.

[11] "Explore the Disclosure Recommendations," Transition Plan Taskforce, April 2024.

Implementation of transition plans can drive clean-tech demand

To understand how transition plans can drive clean-tech demand in APAC, we analyzed the technology roadmaps and capital allocations outlined in the transition plans of companies in carbon-intensive sectors such as energy, utilities and materials, assessing their potential to reduce emissions across areas such as hydrogen, renewable energy, electrification and carbon capture and sequestration (CCS).[12]

Energy sector

In the energy sector, transition plans are mainly disclosed by companies in the oil and gas industries, with only two companies from the coal and consumable-fuels industry. Of the 90 energy-sector constituents in the MSCI AC Asia Pacific IMI, 16 companies (18%) disclosed their transition plans in 2024. Of these, half of them disclosed capital-allocation strategies to CDP.[13] Companies in the energy sector plan to invest in technologies such as hydrogen, renewable energy, electric vehicles (EVs) and CCS to diversify their business segments and revenue streams, positioning themselves to adapt to the shift away from fossil fuels toward clean-energy systems. All of the oil and gas companies have integrated hydrogen fuels into part of their transition plans. Clean hydrogen fuels can help reduce GHG emissions and support the energy transition across their upstream, midstream and downstream operations.[14]

Technologies and capital allocation outlined in the transition plans of the energy sector

GICS sub-industry	Number of issuers (% of GICS SI)	Disclosure of capital allocation (e.g., CAPEX)	Hydrogen, e-methane and ammonia fuels	Renewable energy and energy storage	EV and EV chargers	CCS and CCUS
Oil & gas refining & marketing	7 (33%)	57%	100%	100%	86%	71%
Integrated oil & gas	2 (29%)	0%	100%	100%	100%	50%
Oil & gas exploration & production	3 (27%)	67%	100%	100%	0%	100%
Oil & gas storage & transportation	2 (15%)	100%	100%	50%	0%	0%
Coal & consumable fuels	2 (7%)	0%	0%	100%	100%	50%
Energy sector	16 (18%)	50%	88%	94%	63%	63%

Data as of March 31, 2025. CAPEX indicates capital expenditure for clean-tech products and services. Companies referenced the above technologies in their transition plans in the form of qualitative mentions, feasibility studies, patent-filing or capital allocation. The level of detail varies — some described intended investments, while others cited that adoption of the technologies is dependent on a cost parity. Source: CDP, company disclosures, MSCI ESG Research

[12] Jeffrey Rissman, "Zero-Carbon Industry," Columbia University Press, February 2024.

[13] CDP (formerly the Carbon Disclosure Project) is a non-profit organization that runs a global platform for climate-related disclosure.

[14] Kai Zhang et al., "The role of hydrogen in the energy transition of the oil and gas industry," *Energy Reviews* 3, no. 4, December 2024.

Hydrogen technology in transition plans

In addition to the 16 energy companies, 200 companies, or around 5% of constituents of the MSCI AC Asia Pacific IMI, across other sectors held hydrogen-related patents as of October 2024.[15] Such technologies extend across the hydrogen supply chain, including production, transport, storage and utilization. They include fuel cells, electrolyzers, solid-state storage and hydrogen-fired power generation. These emerging technologies may demonstrate hydrogen's potential as a low-carbon energy carrier and underscore its strategic importance in the long-term decarbonization of product portfolios for the oil and gas industry. Scaling up hydrogen production and balancing supply and demand may, however, face significant challenges due to high production costs, infrastructure requirements and technical risks such as leakage.[16]

Top 20 companies with the highest share of hydrogen patent scores out of total low-carbon patent-quality score in the MSCI AC Asia Pacific IMI

Company	GICS sector	Hydrogen-patent score % out of total low carbon patent score	Hydrogen production	Hydrogen transport and stroage	Hydrogen utilization
Iwatani	Energy	37%	✓	✓	✓
Kitz Corporation	Industrials	18%		✓	
Samsung E&A	Industrials	10%	✓		
Worley Limited	Industrials	8%	✓		
Japan Steel Works	Industrials	8%		✓	✓
Miura Co., Ltd.	Industrials	7%	✓	✓	✓
Chugoku Electric	Utilities	7%			✓
Hanwha Systems	Industrials	6%	✓	✓	✓
Kawasaki Heavy	Industrials	5%	✓	✓	✓
Kia Corporation	Consumer discretionary	5%	✓	✓	✓
Tokuyama	Materials	4%	✓	✓	
Hyundai Motor	Consumer discretionary	4%	✓	✓	✓
Horiba, Ltd.	Information technology	4%	✓	✓	
Honda Motor	Consumer discretionary	4%		✓	✓
Chiyoda Corporation	Industrials	4%	✓	✓	✓
Toyoda Gosei	Consumer discretionary	4%		✓	
Toyota Boshoku	Consumer discretionary	4%		✓	
Kanadevia	Industrials	4%	✓		
Suzuki Motor	Consumer discretionary	4%		✓	✓
Aisan Industry	Consumer discretionary	4%			✓

Data as of March 31, 2025. The percentage of hydrogen-patent score out of total score can indicate the level of R&D focus on technology. The check mark indicates the company's involvement in the technology either through R&D, feasibility studies or commercial operation based on the disclosure. Source: Company disclosures, MSCI ESG Research

[15] MSCI's Low-Carbon Patent Quality Score seeks to establish a picture of the relative level and quality of patents held by companies. Each patent receives a score based on forward citations, backward citations, market coverage and Cooperative Patent Classification (CPC)/International Patent Classification (IPC) coverage. Our model covers 125 million unique patents that have been granted from more than 70 patent authorities worldwide as of October 2024. For more information, see "Climate Value-at-Risk Methodology: Transition Risk," MSCI ESG Research, Oct. 27, 2024 (client access only).

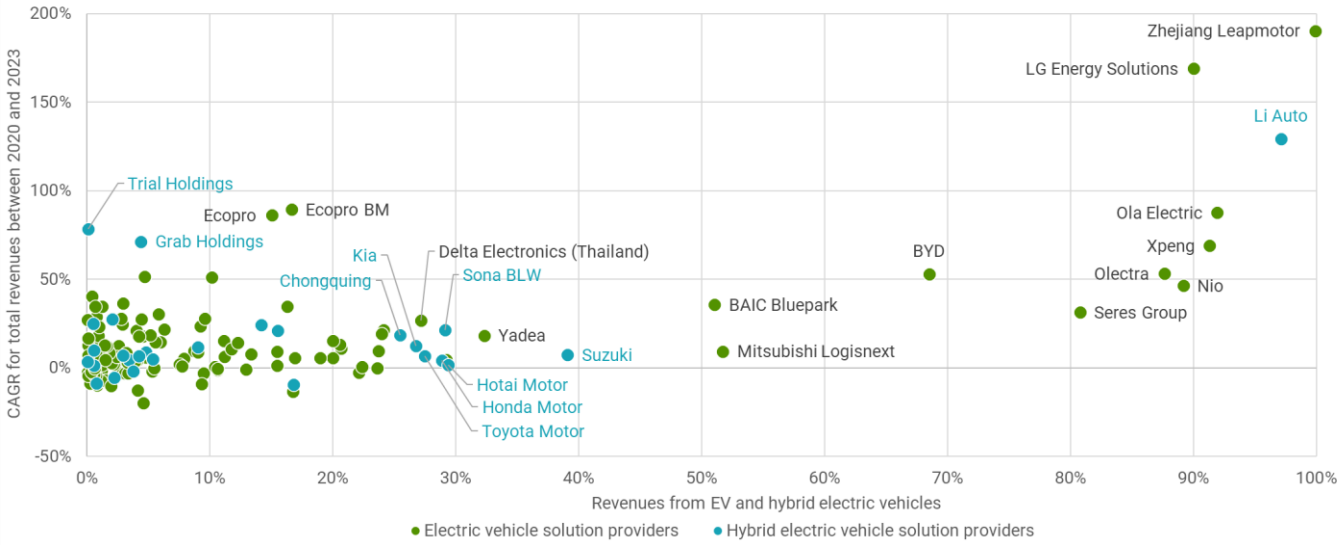
[16] C. McGregor, B. D. Young and D. Hildebrandt, "Risk assessment framework for green hydrogen megaprojects: Balancing climate goals with project viability," *Applied Thermal Engineering* 262, March 2025, and "The energy transition will be much cheaper than you think," *The Economist*, Nov. 14, 2024.

Electric and hybrid electric vehicles in transition plans

Increasing the market penetration of zero-tailpipe-emission vehicles, such as EVs and fuel-cell vehicles, can also accelerate the energy sector's transition by shifting market demand from fossil fuels toward cleaner energy fuels.[17] Challenges still remain, however. While EV chargers can reduce dependence on gas stations, the chargers may still rely on fossil-fired power generation.[18] Further, long charging times and queue congestion at EV charging stations can make EVs less practical for drivers.[19] Plug-in hybrid vehicles and hybrid EVs can serve as transitional solutions, bridging the gap to cleaner energy systems.

Makers of these vehicles can capitalize on market growth and the rising demand for clean-transportation solutions.[20] Of the 3,874 constituents of the MSCI AC Asia Pacific IMI, 150 companies (around 4%) provide clean-transportation solutions. Among them, EV-solutions providers and EV-component makers, such as Zhejiang Leapmotor Technology Co. Ltd. and LG Energy Solution Ltd., posted a compound annual growth rate (CAGR) of over 150% in total sales between 2020 and 2023, albeit from a relatively low starting base. Li Auto Inc., which generated more revenue from hybrid vehicles than EVs, recorded a CAGR of over 100% during the same period. EV makers, such as Ola Electric Mobility Ltd., XPeng Motors, Olectra Greentech and BYD Co., reported a CAGR of over 50%. Their continued growth may increase the market penetration of clean-transportation solutions.

Sales growth and revenue exposure to electric and hybrid vehicles



Data as of March 31, 2025. Source: MSCI ESG Research

[17] "Zero-Emission Vehicles Factbook," *Bloomberg New Energy Finance*, December 2023.

[18] "In the right circumstances, could a hybrid car be "cleaner" than an electric vehicle?" MIT, Jan. 14, 2025.

[19] Frederico Cruz-Jesus et al., "Pragmatic and idealistic reasons: What drives electric vehicle drivers' satisfaction and continuance intention," *Transportation Research Part A: Policy and Practice* 170, April 2023.

[20] "Global EV Outlook 2024," International Energy Agency, April 2024.

Utilities sector

Clean energy and hydrogen-fired generation are emerging as strategic priorities in the utilities sector in the region, with more than 80% of 23 APAC utilities constituents with transition plans indicating their potential use of clean fuels in their technology roadmap. They are exploring the viability of hydrogen- and ammonia-fired or co-fired power generation through feasibility studies and demonstration projects. More than 70% of these companies also disclosed their potential use of carbon-capture technologies.

Diversification of low-carbon power generation is a critical part of the utilities sector's transition plans. Some sources of variable renewable energy, such as solar and wind power, have achieved cost parity with fossil fuels.[21] Research shows, however, that when these renewable powers surpass a 50% share of the electricity market, significant energy storage would be required to stabilize the grid and prevent widespread blackouts.[22] Hydrogen- and ammonia-fired power generation, along with nuclear power, can play a crucial role in diversifying energy sources and maintaining grid stability.[23] Scaling up hydrogen-fuel production will be critical to lowering its supply costs to achieve cost parity. Plans from these utilities companies suggest that the sector may play a role in creating stable large-scale demand for hydrogen.[24]

Technologies and capital allocation outlined in the transition plans of the utilities sector

GICS sub-industries	Number of issuers (% of GICS SI)	Disclosure of capital allocation (e.g., CAPEX)	Hydrogen, e-methane and ammonia fuels	Renewable energy and energy storage	Managed phaseout (MPO)	CCS and CCUS
Electric utilities	10 (40%)	80%	80%	100%	50%	80%
Gas utilities	7 (28%)	29%	100%	100%	43%	71%
Water utilities	1 (17%)	0%	0%	100%	0%	0%
Independent power producers	5 (15%)	100%	80%	100%	60%	80%
Utilities sector	23 (20%)	65%	83%	100%	48%	74%

Data as of March 31, 2025. CAPEX indicates capital expenditure for clean-tech products and services. Companies referenced the above technologies in their transition plans in the form of qualitative mentions, feasibility studies, patent-filing or capital allocation. The level of detail varies — some described intended investments, while others cited that the adoption of the technologies is dependent on a cost parity. Source: CDP, company disclosures, MSCI ESG Research

[21] "Renewable Power Generation Costs in 2023," IRENA, September 2024.

[22] "Next-Generation Power Network Stabilization Technology for Large-Scale Introduction of Renewable Energy," New Energy and Industrial Technology Development Organization, September 2024, and Lere Deguenon et al., "Overcoming the challenges of integrating variable renewable energy to the grid: A comprehensive review of electrochemical battery storage systems," *Journal of Power Sources* 580, October 2023.

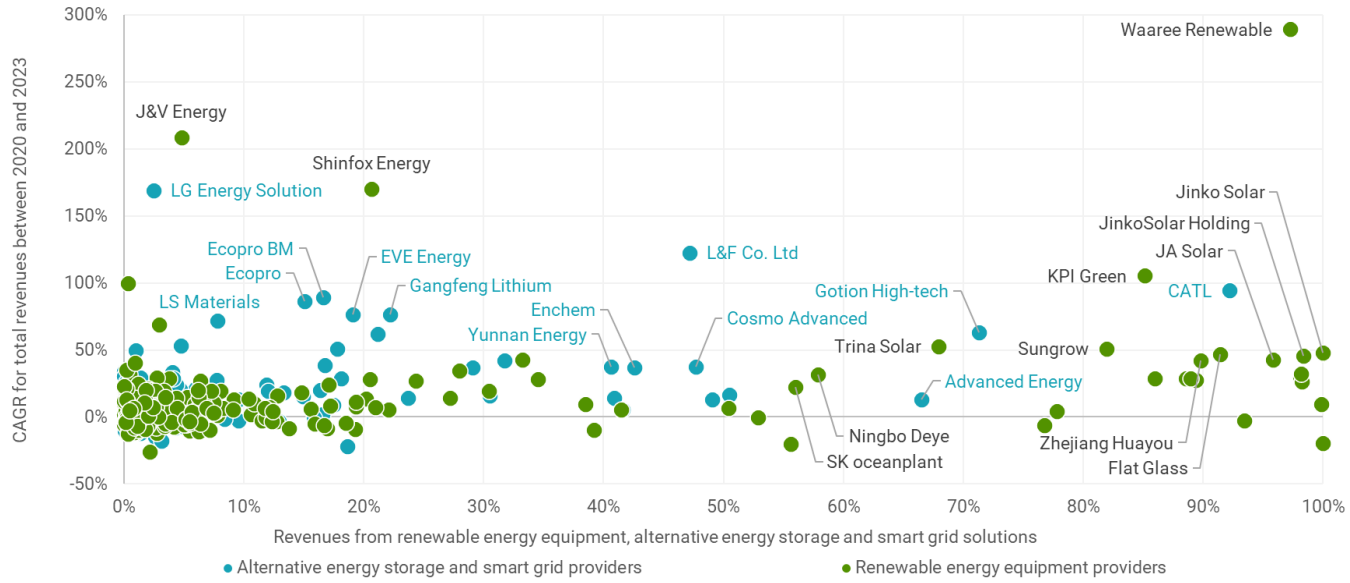
[23] K. Guerra et al., "Opportunities for low-carbon generation and storage technologies to decarbonize the future power system," *Applied Energy* 336, February 2023.

[24] Kikkawa Takeo, "Energy transition: Path to Achieve Carbon Neutrality by 2050," March 31, 2024.

Utilities companies with transition plans can also create substantial demand for renewable-energy and energy-storage solutions.[25] Renewable-energy equipment makers and energy-storage providers are well positioned to meet this demand.[26] These companies may benefit from both growing energy needs and the increased market demand driven by the shift from fossil fuels to clean-energy systems.[27]

We identified two Indian companies, Waaree Renewable Technologies Ltd. and KPI Green Energy Ltd., that derived a high proportion of their revenues from renewable-energy solutions and reported a CAGR in sales of more than 100% between 2020 and 2023. Similarly, Chinese companies, such as Sungrow Power Supply Co. Ltd. and Trina Solar Co. Ltd., recorded more than 50% CAGR in sales during the same period. Among pure-play energy-storage providers, CATL posted a CAGR of nearly 100% in their sales.

Sales growth and revenue exposure to renewable energy and storage



Data as of March 31, 2025. Source: MSCI ESG Research

Further, emerging technologies, such as perovskite solar cells, have the potential to play a transformative role in the renewable-energy market, offering high efficiency, low production costs and flexible applications.[28] While silicon solar cells have a theoretical efficiency limit of 29%, perovskite-on-silicon tandem cells have a higher theoretical efficiency limit of 43%.[29] This leaves more room for innovation.

[25] Fransje van der Marel et al., "Evaluating the revenue potential of energy storage technologies," McKinzey & Company, Feb. 11, 2025.

[26] Andrés Gluski and Christian Bruch, "Powering the future: How to meet global energy demand in the age of electricity," World Economic Forum, March 19, 2025.

[27] Laura Cozzi et al., "Clean energy is boosting economic growth," International Energy Agency, April 18, 2024.

[28] Savisha Mahalingam et al., "Advancements in flexible perovskite solar cells enabling self-powered systems," *Renewable and Sustainable Energy Reviews* 213, May 2025.

[29] "Perovskite PV to transform the global solar market," Oxford PV, last accessed April 29, 2025.

One study projected the global perovskite solar-cell market will grow to USD 1.7 billion by 2032 from USD 105 million in 2024, exhibiting a CAGR of 42% during the forecast period.[30]

Our research identified 20 companies that are involved in the development of perovskite solar cells, highlighting many technological advancements in the markets. Among these companies, Panasonic Holdings Corp. and Sekisui Chemical plan to commercialize the technology in 2026 and 2027, respectively.[31] Longi Green and Jinko Solar attained the highest energy-conversion efficiency in a lab setting of 34% and 33%, respectively in 2025.[32] Konica Minolta Inc. and Canon Inc. have developed advanced materials to extend the longevity of the technology.[33] Further, perovskite solar cells offer clear advantages for large-scale expansion due to their low material demand and abundance of key inputs.[34]

Top 20 companies with the highest share of solar-patent scores out of total low-carbon patent-quality score in the MSCI AC Asia Pacific IMI

Company	GICS sector	Solar and energy supply-related patent scores % out of total low carbon patent	Progress on research and development
Hoshiden Corporation	Information technology	72%	Investment in Enecoat Technology that attained conversion efficiency of 30%
Jinko Solar	Information technology	66%	Perovskite tandem solar cell with conversion efficiency of 33%
Kaneka Corporation	Materials	65%	Perovskite tandem solar cell with conversion efficiency of 29%
Hanwha Solutions	Materials	64%	Perovskite tandem solar cell with conversion efficiency of 29%
Longi Green	Information technology	58%	Perovskite tandem solar cell with conversion efficiency of 34%
Trina Solar	Information technology	53%	Perovskite tandem solar cell with conversion efficiency of 31%
Fujifilm holdings	Information technology	43%	Development of chemical solutions used for perovskite solar cells (e.g., iodide)
Konica Minolta	Information technology	36%	Development of protective films that double the life of perovskite solar cells to 20 years
Sekisui Chemical	Industrials	35%	Investment of USD 2 bn (JPY 310 bn) to build a production capacity of 100 MW by 2027
Panasonic Holdings	Consumer discretionary	30%	Plan to start trial sales of perovskite solar cells with conversion efficiency of 18% in 2026
LG Electronics	Consumer discretionary	26%	Development of advanced materials such as perovskite photoactive layering
Toyoda Gosei	Consumer discretionary	24%	Research and development of perovskite solar cells for wearable applications
BYD Company	Consumer discretionary	23%	Research and development of perovskite solar cells
KDDI Corporation	Communication services	19%	Demonstration projects to apply perovskite solar cells to telecommunication base stations
Ricoh Company	Information technology	17%	Multiple demonstration projects including applications to spaceships, parks and schools
Canon Inc	Information technology	16%	Development of protective materials that double the life of the technology to 20 years
Toyota Motor	Consumer discretionary	15%	Research and development of perovskite solar cells for automotive applicatoins
Hyundai Motor	Consumer discretionary	12%	Research and development of perovskite solar cells for rooftop applications
GCL Technology	Information technology	6%	Perovskite tandem solar cell with conversion efficiency of 22%
Aisin Corporation	Consumer discretionary	3%	Demonstration projects to install 30 kW of perovskite solar cells at factories

Data as of March 31, 2025. The percentage of solar and energy supply-related patent score out of total score can indicate the level of R&D focus on technology. Source: Company disclosures, MSCI ESG Research

[30] "Perovskite Solar Cell Market Size, Share & Industry Analysis," Fortune Business Insights, last accessed April 7, 2025.

[31] "Sekisui Chem to begin mass production of perovskite solar cells in 2027," *Reuters*, Dec. 26, 2024, and "Panasonic HD to commercialize 'electricity-generating glass' by 2026, two years ahead of schedule," *Nikkei Asia*, July 25, 2024.

[32] "34.85%! LONGi Breaks World Record for Crystalline Silicon-Perovskite Tandem Solar Cell Efficiency Again," Longi Green, April 21, 2025.

[33] "Konica Minolta aims to double life of flexible solar cells with new film," *Nikkei Asia*, April 23, 2025.

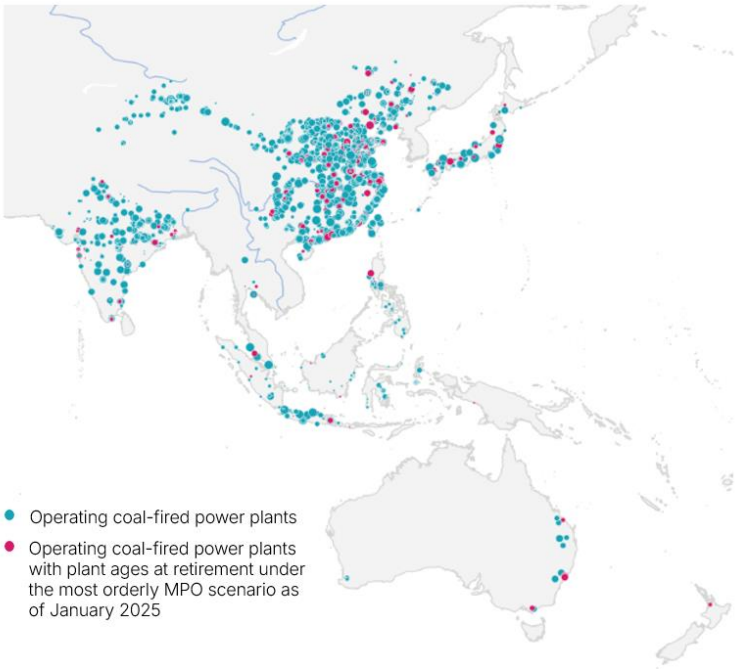
[34] Lukas Wagner et al., "The resource demands of multi-terawatt-scale perovskite tandem photovoltaics," *Joule* 8, April 17, 2024.

Possibility of a managed phaseout

While clean power is gaining momentum, today's policy frameworks and market dynamics do not deliver fast enough growth to move onto a pathway to net-zero emissions, according to the International Energy Agency.[35] To accelerate decarbonization, a managed phaseout (MPO) of coal-fired power plants could bridge the gap until renewable energy and hydrogen solutions are deployed at scale and become cost competitive with fossil fuels. MPOs offer an alternative strategy for governments to meet their climate pledges by halting new coal-plant construction and retiring existing coal assets ahead of their lifespans.

Our analysis suggests that 2040 represents a key backstop year for the most orderly MPO scenarios across different markets. In many APAC markets, including Mainland China, India and Indonesia, MPOs would target retiring coal plants that have operated for about 20 years — roughly halfway through their expected lifetimes. In 2025, about 15% of operating coal plants in Mainland China and Indonesia, and 20% in India, need to be retired to align with the most orderly MPO trajectory in line with a 1.5°C scenario.[36] If the retirement of operating coal plants would cause grid-stability issues, lowering the utilization rates of these plants may help achieve the same emissions-reduction effect. For instance, Japanese operators shut their plants during off-seasons when demand is low. [37]

Map of operating coal-fired power plants in APAC markets



Data as of March 31, 2025. Source: MSCI ESG Research

[35] "World Energy Outlook 2024," International Energy Agency, October 2024.

[36] "Global Coal Plant Tracker, Global Energy Monitor," Global Energy Monitor, January 2025 release. The authors calculated the percentages of coal-fired power plants that operated for 20 years out of total operating coal-fired power plants in each market.

[37] Koki Izumi, "Japan's JERA to shut coal plants during off-season to cut carbon," *Nikkei Asia*, March 21, 2025.

Materials sector

The development of renewable-energy and low-carbon products are central to the transition in the materials sector, each cited by more than 90% of the 99 companies that disclosed their transition plans. Low-carbon products include low-carbon steels, cement and hydrogen, to name a few. Of these 99 companies, about one-third disclosed capital allocation. The sector's main sources of emissions are cement factories, chemical plants and steel mills. These facilities require intense heat for operation, and burning fossil fuels remains the most practical method today. Despite their carbon-intensive operations, less than half of the companies considered adopting CCS into their operations. Cutting emissions from these hard-to-abate sectors depends on the development of new technologies. [38]

Technologies and capital allocation outlined in the transition plans of the materials sector

GICS sub-industries	Number of issuers (% of GICS)	Disclosure of capital allocation (e.g., CAPEX)	Hydrogen, e-methane and ammonia fuels	Renewable energy and energy storage	Low-carbon products	CCS and CCUS
Industrial gases	2 (67%)	0%	100%	100%	100%	50%
Diversified chemicals	11 (50%)	9%	82%	100%	91%	55%
Paper & plastic packaging	1 (33%)	0%	0%	100%	100%	0%
Commodity chemicals	27 (32%)	37%	74%	96%	96%	59%
Paper products	4 (29%)	50%	25%	75%	50%	75%
Metal, glass & plastic containers	3 (27%)	0%	33%	100%	67%	0%
Specialty chemicals	17 (23%)	24%	53%	88%	100%	18%
Steel	15 (22%)	60%	73%	87%	100%	47%
Construction materials	9 (20%)	33%	44%	100%	89%	33%
Aluminum	2 (18%)	50%	100%	100%	100%	0%
Diversified metals & mining	6 (15%)	67%	100%	100%	67%	50%
Fertilizers & agricultural chemicals	1 (4%)	0%	0%	100%	100%	0%
Gold	1 (4%)	100%	100%	100%	100%	0%
Materials sector	99 (23%)	35%	67%	94%	94%	42%

Data as of Mar. 31, 2025. CAPEX indicates capital expenditure for clean-tech products and services. Companies referenced the above technologies in their transition plans in the form of qualitative mentions, feasibility studies, patent-filing or capital allocation. The level of detail varies — some described intended investments, while others cited that the adoption of the technologies is dependent on a cost parity. Source: CDP, company disclosures, MSCI ESG Research.

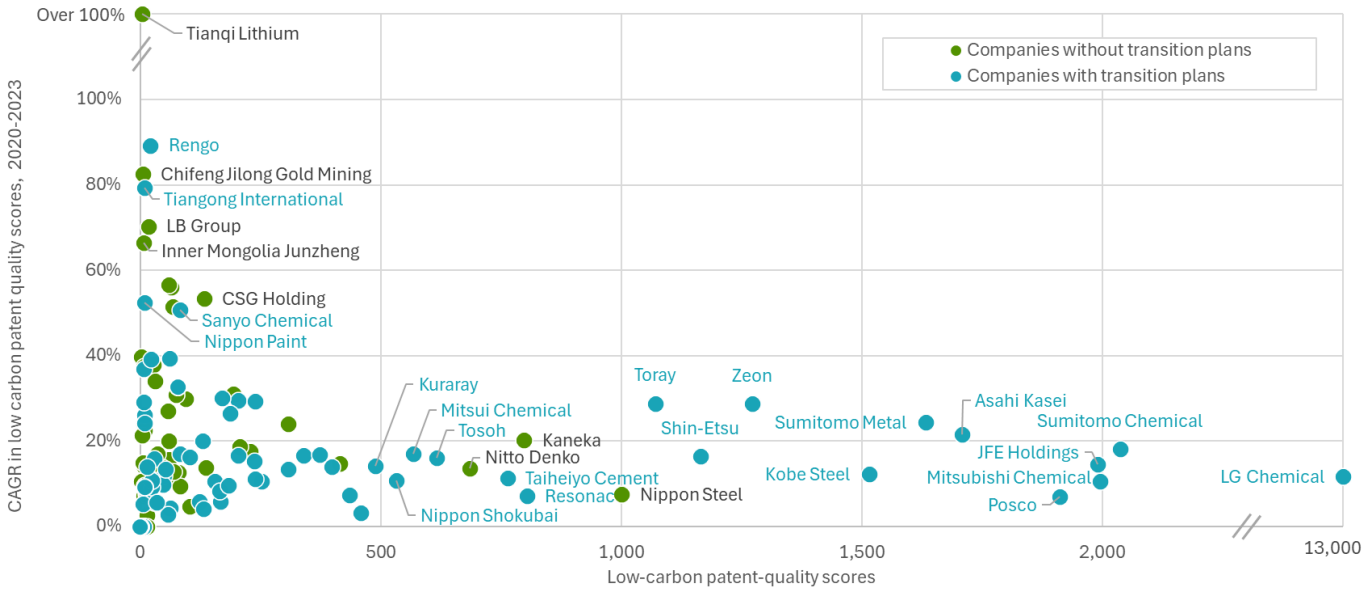
[38] Gabriel Crossley, "China hopes to dominate the next phase of green innovation," *The Economist*, Nov. 20, 2024.

We analyzed the speed and scale of clean-tech innovation and development in the materials sector using the low-carbon patent-quality scores. Our analysis indicated that companies with transition plans have developed higher patent-quality scores for their low-carbon solutions than those without transition plans. LG Chem Ltd. showed the highest low-carbon patent-quality scores in chemical industries, followed by Sumitomo Chemical Co. Ltd. and Mitsubishi Chemical Group. Their patents have focused on energy supply, solar power and battery. These three chemical companies have also developed blue, turquoise and green hydrogen production capacities based on methane, ethanol and artificial photosynthesis sources, respectively.[39]

In the steel industry, JFE Steel Corp., POSCO Co. Ltd. and Kobe Steel Ltd. have the highest quality scores for their low-carbon patents. Their patents have focused on process efficiency and energy supply related to electric arc furnace and low-carbon fuel-based operations. Starting from a low basis, Chinese and Taiwanese companies without transition plans, such as Tianqi Lithium, Chifeng Jilong Gold Mining Co. Ltd. and LB Group, grew their low-carbon patent-quality scores at a CAGR of more than 70% between 2020 and 2023. Their patents focused on areas such as energy efficiency, energy management and plastic recycling.

While these emerging technologies are still nascent in the materials sector, their adoption and development could support the implementation of transition plans and improve the prospects for decarbonizing both operations and product portfolios in the future.

Low-carbon patent-quality scores and their growth in the materials sector



Data as of March 31, 2025. Source: MSCI ESG Research

[39] "LG Chem to Produce and Run NCC Plant on Hydrogen," LG Chem, June 20, 2022, and "Sumitomo Chemical and Microwave Chemical to Jointly Develop Energy-Saving and Highly Efficient Hydrogen Production Process to Help Achieve Carbon Neutrality by 2050," Sumitomo Chemical, Feb. 21, 2022, and "Artificial Photosynthesis: A dream technology, converting CO_2 into a resource," Mitsubishi Chemical, Feb. 1, 2023.

Risk factors that may decelerate the transition

Fossil-fuel subsidies

Real-economy decarbonization in APAC may slow if governments continue to provide fossil-fuel subsidies. These subsidies can distort markets by keeping fossil-fuel prices artificially low, discouraging clean-tech investment and reducing incentives for companies to take action in the near term.[40] According to the International Monetary Fund (IMF), fossil-fuel subsidies can be broadly categorized into explicit and implicit forms. Explicit subsidies are direct government payments or tax breaks that lower the cost of fossil-fuel production or consumption, while implicit subsidies arise from underpricing the negative externalities of fossil-fuel use or from forgone tax revenues.[41]

Most APAC markets have provided implicit fossil-fuel subsidies. Data suggests that they can slow the transition to a lower-carbon economy. For example, the Japanese government has offered gasoline subsidies since 2020. While these subsidies are intended to ease inflationary pressures, they can potentially contradict Japan's NDC under the Paris Agreement. The subsidies slowed the emissions-reduction trajectory of the transportation sector in Japan between 2020 and 2023.[42]

Explicit and implicit fossil-fuel subsidies in the APAC markets in 2022

Markets	Fossil-fuel subsidies (% of GDP)	Explicit subsidies for petroleum	Explicit subsidies for natural gas	Explicit subsidies for coal	Implicit subsidies for petroleum	Implicit subsidies for natural gas	Implicit subsidies for coal
Malaysia	16%	✓			✓	✓	✓
Indonesia	13%	✓	✓	✓	✓	✓	✓
Thailand	12%		✓		✓	✓	✓
Mainland China	12%	✓	✓	✓	✓	✓	✓
India	10%	✓	✓	✓	✓	✓	✓
Taiwan	7%	-	-	-	-	-	-
South Korea	6%		✓	✓	✓	✓	✓
Japan	5%	✓	✓		✓	✓	✓
Singapore	5%				✓		✓
Philippines	5%		✓		✓	✓	✓
Australia	2%	✓	✓	✓	✓	✓	✓
New Zealand	2%				✓	✓	✓
Hong Kong	2%	-	-	-	-	-	-

Data as of March 31, 2025. Taiwan and Hong Kong did not have specific data. Source: IMF, MSCI ESG Research

[40] Tara Laan et al., "Seven Ways Fossil Fuel Subsidies Undermine Energy Security," International Institute for Sustainable Development, April 22, 2025.

[41] "Fossil Fuel Subsidies," International Monetary Fund, last accessed April 29, 2025.

[42] "GHG inventory in Japan," National Institute for Environmental Studies, last accessed April 29, 2025.

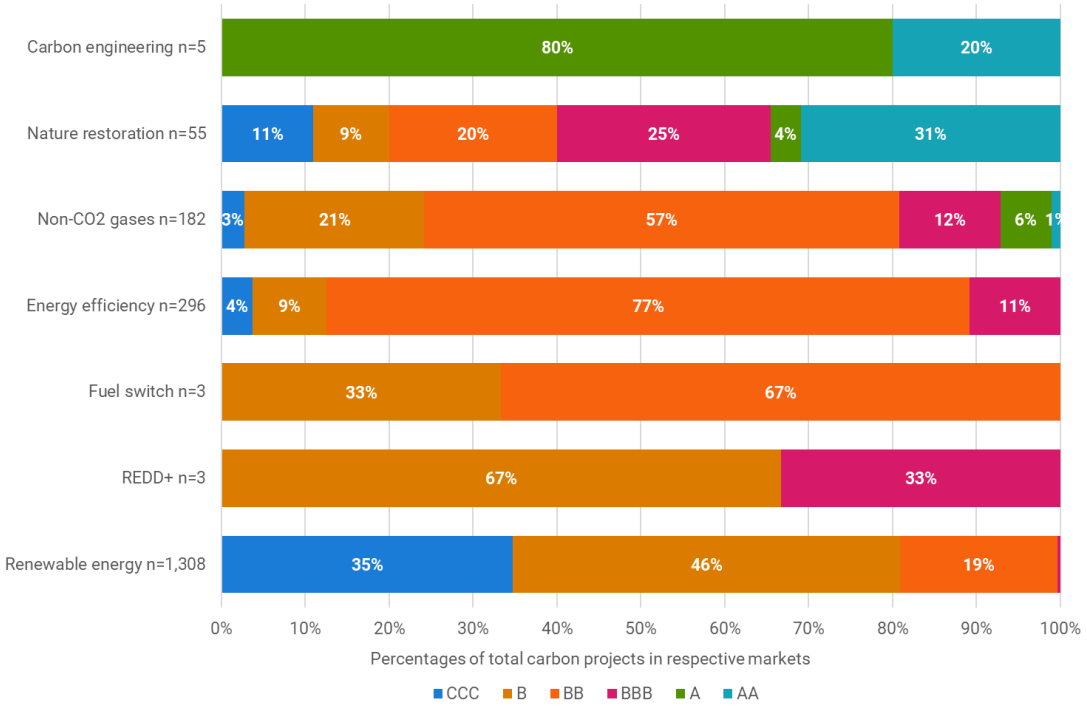
Carbon-project integrity

Many companies with transition plans intend to use carbon credits to offset residual emissions during their shift to low-carbon operations. There is a major gap, however, between the quantity and quality of carbon projects in APAC markets. According to MSCI Carbon Project Integrity Ratings, only 2% of projects are rated A or AA, indicating a shortage of high-quality options to support credible transitions.

In contrast, about 65% of projects fall into lower-quality ratings (B to CCC), raising concerns about their environmental impact and the reputational risks for companies that are dependent on them to meet interim climate goals. This integrity gap may undermine transition plans, especially in markets where access to commercially adaptable clean technology is limited.

New carbon-engineering projects, like Biochar, show strong environmental potential but are still in the early stages, with only five registered in Australia and Philippines. Nature-restoration solutions, such as afforestation (ARR) projects and agricultural land management (ALM) projects in China and India, are more widespread, but most projects are still mid to low quality. APAC's progress on decarbonization depends not just on ambition, but also on the technologies and financing companies choose. Carbon credits can help, but only if they are high quality. Strengthening the integrity and transparency of carbon markets is key to building trust and avoiding overreliance on poor-quality offsets.

Integrity of carbon projects by type in APAC markets



Data as of February 2025. Of the 6,000+ carbon projects assessed, around 4,000 received a full rating and about 2,000 received preliminary assessments. A full rating includes both a score and a letter grade, while a preliminary assessment provides only a score. Source: MSCI ESG Research

Conclusion

This report highlights the progress in climate-related disclosures and clean-tech development by companies in the APAC region. Despite the region's continued reliance on fossil fuels, there is growing momentum toward adopting transition plans and advancing technological innovation to support corporate decarbonization efforts. Notably, among the 837 companies that have disclosed their transition plans, the percentage that have committed to SBTi standards has doubled to 50% between 2023 and 2025, indicating their strategic focus on real-economy decarbonization. Robust value-chain emissions reporting is also enabling measurable progress in emissions reduction.

As more companies disclose and operationalize their transition plans, there is growing potential to generate demand and catalyze clean-tech adoption, as outlined in the technology roadmaps and associated capital allocation. Companies domiciled in emerging markets are leveraging rising demand for renewable energy and EV solutions, while those in developed markets are advancing emerging technologies such as hydrogen fuels and perovskite solar cells to shape future demand and decarbonize hard-to-abate sectors including energy, utilities and materials. The development and deployment of these clean-energy technologies may enable the managed phaseout of coal-fired power plants in the region, which could be a critical step toward achieving the ambitious goals of the Paris Agreement.

Several risk factors may, however, weigh on progress. Fossil-fuel subsidies remain prevalent in many APAC markets, potentially limiting the effectiveness of emissions-reduction efforts. Additionally, the limited supply of high-integrity carbon credits presents a challenge for companies that incorporate these instruments in their interim climate strategies.

Despite these challenges, companies in APAC have made significant strides in climate disclosures and in the development and deployment of clean technologies, with speed and scale. Navigating a route between persistent risks and emerging opportunities will be critical for these companies — not only to sustain momentum, but also to accelerate the shift from fossil fuels toward clean-energy systems.

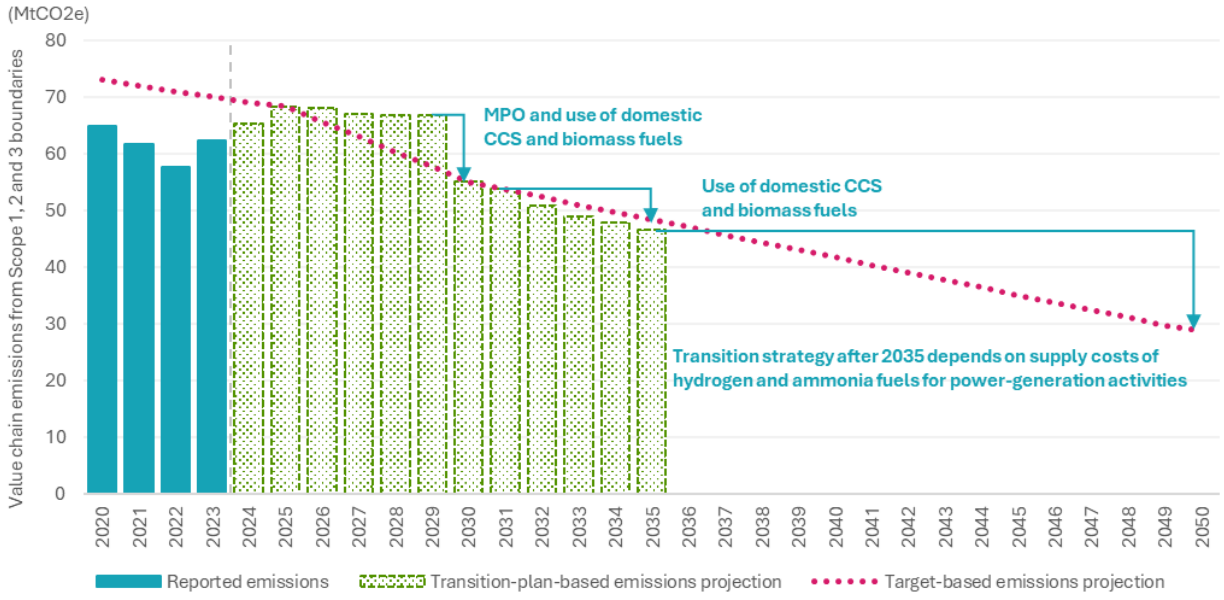
Appendix I: Illustration of transition plans

The ISSB standards provide investors and their portfolio companies with sustainability disclosures that can help inform capital allocation and financing decisions. These standards mandate companies to disclose their transition plans as an integral part of their business strategy in a standardized manner.[43] The plans outline an organization's strategic ambition, technology roadmaps and capital allocation to achieve short-, medium- and long-term climate targets.[44]

The following chart illustrates a transition plan for a hypothetical utilities company. The company set short-, medium- and long-term targets to reduce 10 MtCO2e and 15 MtCO2e from 2023 levels by 2030 and 2035, respectively. It aims to achieve net-zero Scope 1 emissions by 2050. The company plans to allocate USD 30 million per year during 2024 and 2035 and install CCS, switch fuels to biomass and undertake the MPO of two coal-fired power plants.

In its long-term target, the company plans to install hydrogen- and ammonia-fired or co-fired power-generation units. Its capital-allocation strategy beyond 2035 is not disclosed, however. Such a strategy may depend on the supply costs of hydrogen and ammonia in the markets. This transition plan indicates that the MPO of the coal-fired power plants would contribute the most to emissions cuts, followed by fuel switching and CCS. Using the transition plans, investors can assess the adequacy of the capital allocation, decarbonization impacts of the technologies and market risks of the transition.

Illustration of transition plans for a hypothetical company



Data as of March 31, 2025. Source: MSCI ESG Research

[43] "Explore the Disclosure Recommendations," Transition Plan Taskforce, April 2024.

[44] Ibid.

Examples of companies that disclosed transition plans in the energy sector

Companies with transition plans	GICS sub-industry	Market	Hydrogen and ammonia fuels	Renewable energy, energy efficiency and energy storage	EV and EV chargers	CCS and CCUS
Bharat Petroleum	Oil & gas refining & marketing	India	✓	✓	✓	
Eneos	Oil & gas refining & marketing	Japan	✓	✓	✓	✓
Cosmo Energy	Oil & gas refining & marketing	Japan	✓	✓		✓
Idemitsu Kosan	Oil & gas refining & marketing	Japan	✓	✓	✓	
Japan Petroleum Exploration	Oil & gas exploration & production	Japan	✓	✓		✓
PTT Public Company Limited	Integrated oil & gas	Thailand	✓	✓	✓	
SK Innovation	Oil & gas refining & marketing	South Korea	✓	✓	✓	✓
Itochu Enex	Oil & gas refining & marketing	Japan	✓	✓	✓	✓
INPEX	Oil & gas exploration & production	Japan	✓	✓		✓
Iwatani	Oil & gas storage & transportation	Japan	✓			
Indian Oil Corporation	Oil & gas refining & marketing	India	✓	✓	✓	✓
Oil and Natural Gas Corporation	Integrated oil & gas	India	✓	✓	✓	✓
PTT Exploration and Production	Oil & gas exploration & production	Thailand	✓	✓		✓
SK Gas	Oil & gas storage & transportation	South Korea	✓	✓		
PT Indika Energy	Coal & consumable fuels	Indonesia		✓	✓	
PT Harum Energy	Coal & consumable fuels	Indonesia		✓	✓	✓

Data as of March 31, 2025. Companies referenced the above technologies in their transition plans in the form of qualitative mentions, feasibility studies, patent-filing or capital allocation. The level of detail varies — some described intended investments, while others cited that the adoption of the technologies is dependent on a long-term cost parity. Source: CDP, company disclosures, MSCI ESG Research

Examples of companies that disclosed transition plans in the utilities sector

Companies with transition plans	GICS sub-industry	Market	Hydrogen and ammonia fuels	Renewable energy, energy efficiency and energy storage	MPO	CCS and CCUS
Acen Corporation	Independent power producers	Philippines		✓	✓	✓
Chubu Electric	Electric utilities	Japan	✓	✓	✓	✓
Contact Energy	Electric utilities	New Zealand		✓		
J-Power	Independent power producers	Japan	✓	✓	✓	✓
Tenaga Nasional Berhad	Electric utilities	Malaysia	✓	✓	✓	✓
Osaka Gas	Gas utilities	Japan	✓	✓	✓	✓
Kyushu Electric	Electric utilities	Japan	✓	✓	✓	✓
Tohoku Electric	Electric utilities	Japan	✓	✓		✓
Gail (India)	Gas utilities	India	✓	✓		
TOKYO GAS	Gas utilities	Japan	✓	✓	✓	✓
NIPPON GAS	Gas utilities	Japan	✓	✓		✓
Chugoku Electric	Electric utilities	Japan	✓	✓	✓	✓
Hong Kong and China Gas	Gas utilities	Hong Kong	✓	✓		✓
Kansai Electric	Electric utilities	Japan	✓	✓		✓

Data as of March 31, 2025. Companies referenced the above technologies in their transition plans in the form of qualitative mentions, feasibility studies, patent-filing or capital allocation. The level of detail varies — some described intended investments, while others cited that the adoption of the technologies is dependent on a long-term cost parity. Source: CDP, company disclosures, MSCI ESG Research

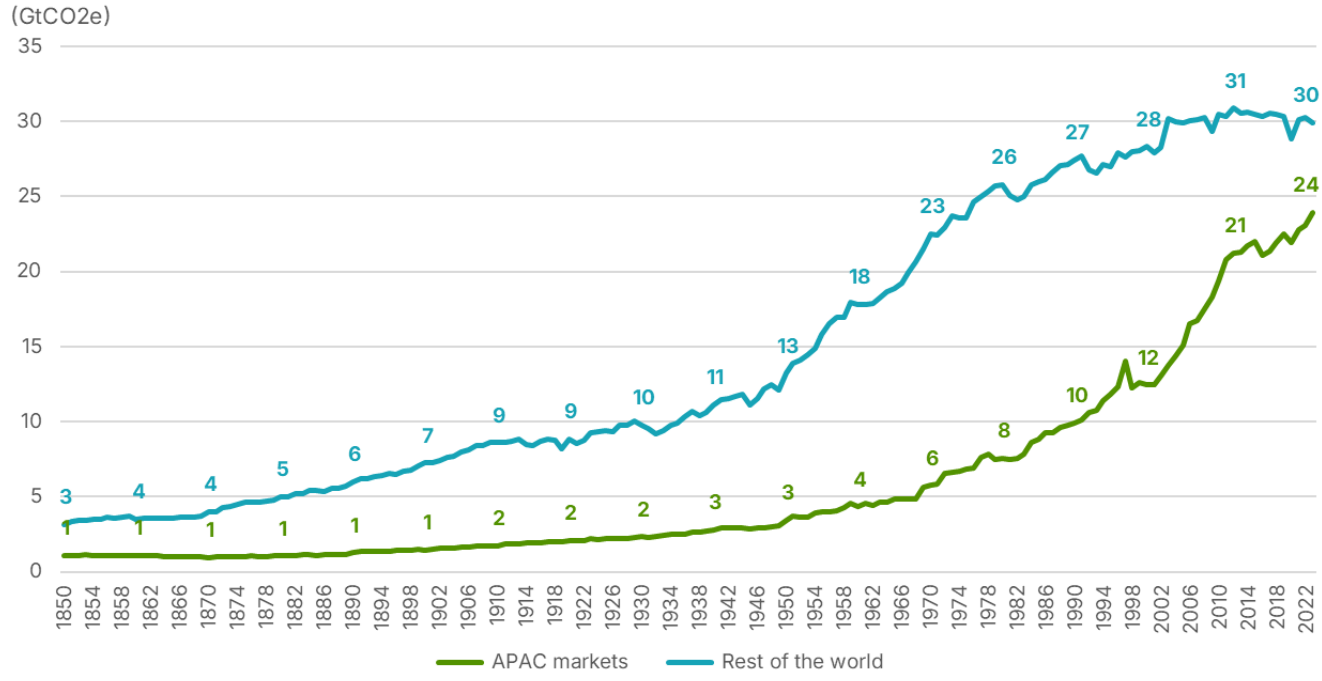
Examples of companies that disclosed transition plans in the utilities sector

Companies with transition plans	GICS sub-industry	Market	Hydrogen and ammonia fuels	Renewable energy, energy efficiency and energy storage	Managed phaseout	CCS and CCUS
Korea Electric	Electric utilities	South Korea	✓	✓	✓	✓
KoreaGasCorporation	Gas utilities	South Korea	✓	✓		
Toho Gas	Gas utilities	Japan	✓	✓	✓	✓
Tokyo Electric	Electric utilities	Japan	✓	✓		✓
JSW Energy	Independent power producers	India	✓	✓		
Mercury NZ	Electric utilities	New Zealand		✓		
Adani Power	Independent power producers	India	✓	✓	✓	✓
VA Tech Wabag	Water utilities	India		✓		
Global Power Synergy	Independent power producers	Thailand	✓	✓		✓

Data as of March 31, 2025. Companies referenced the above technologies in their transition plans in the form of qualitative mentions, feasibility studies, patent-filing or capital allocation. The level of detail varies — some described intended investments, while others cited that the adoption of the technologies is dependent on a long-term cost parity. Source: CDP, company disclosures, MSCI ESG Research

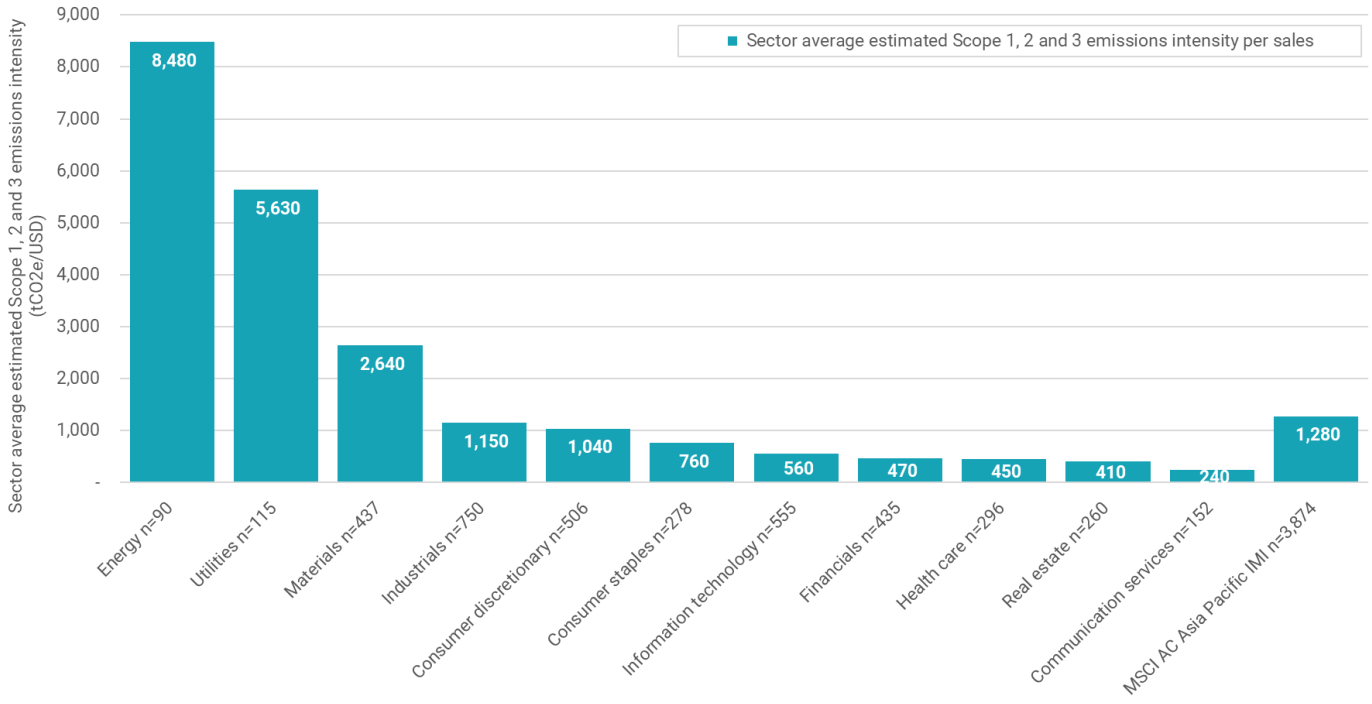
Appendix II: Illustration of emissions and emissions intensity

Annual GHG emissions from APAC markets and rest of the world



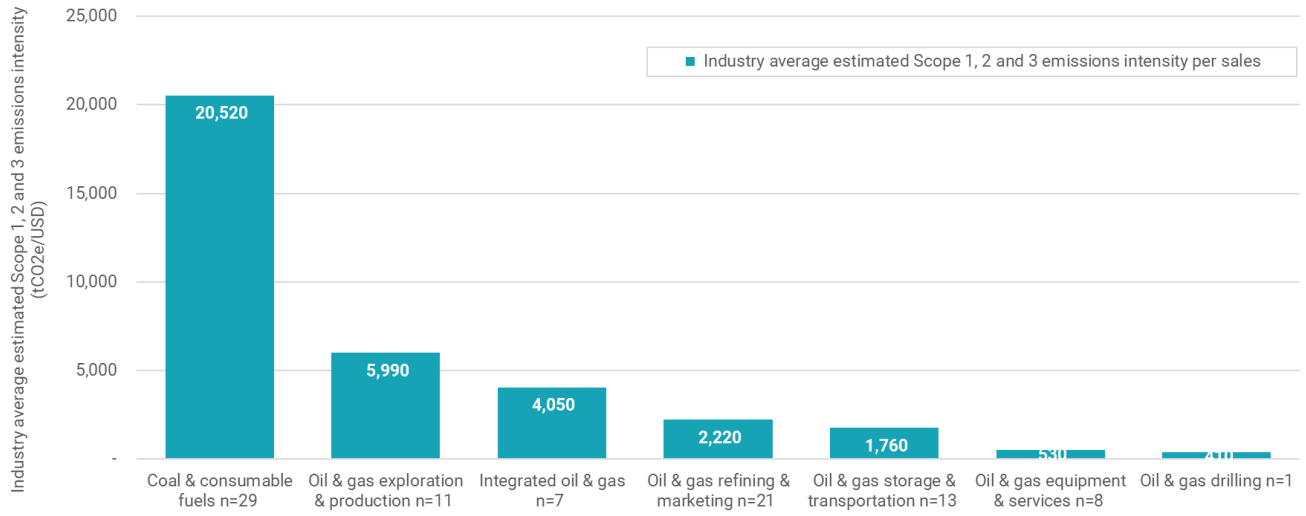
Data as of March 31, 2025. Source: Our World in Data, MSCI ESG Research

Emissions intensity per sales by sector in the MSCI AC Asia Pacific IMI



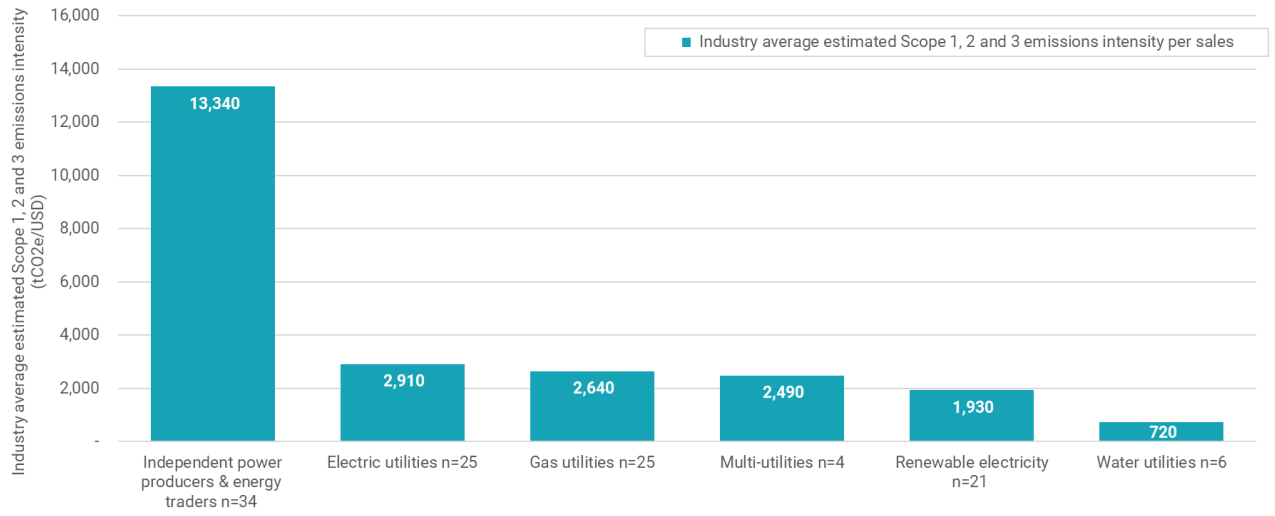
Data as of Mar. 31, 2025. Source: MSCI ESG Research

Emissions intensity per sales across sub-industry in the energy sector in the MSCI AC Asia Pacific IMI



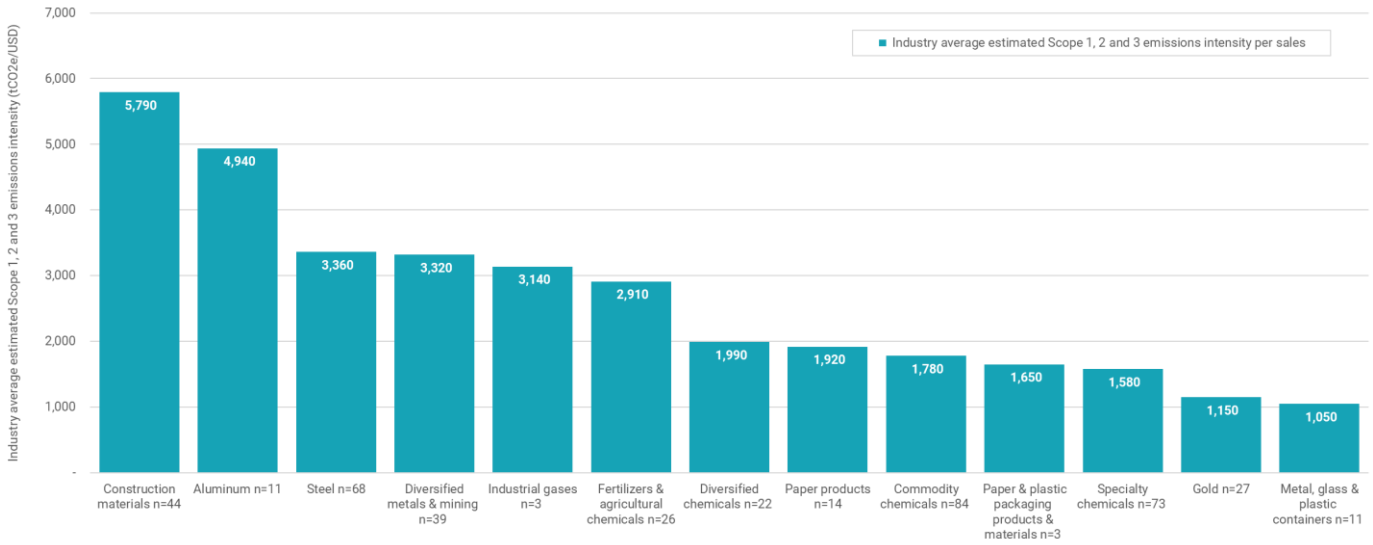
Data as of March 31, 2025. Source: MSCI ESG Research

Emissions intensity per sales across sub-industries in the utilities sector in the MSCI AC Asia Pacific IMI



Data as of March 31, 2025. Source: MSCI ESG Research

Emissions intensity per sales across select sub-industries in the materials sector in the MSCI AC Asia Pacific IMI



Data as of March 31, 2025. Source: MSCI ESG Research

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