Tsinghua-Invesco China ESG research series

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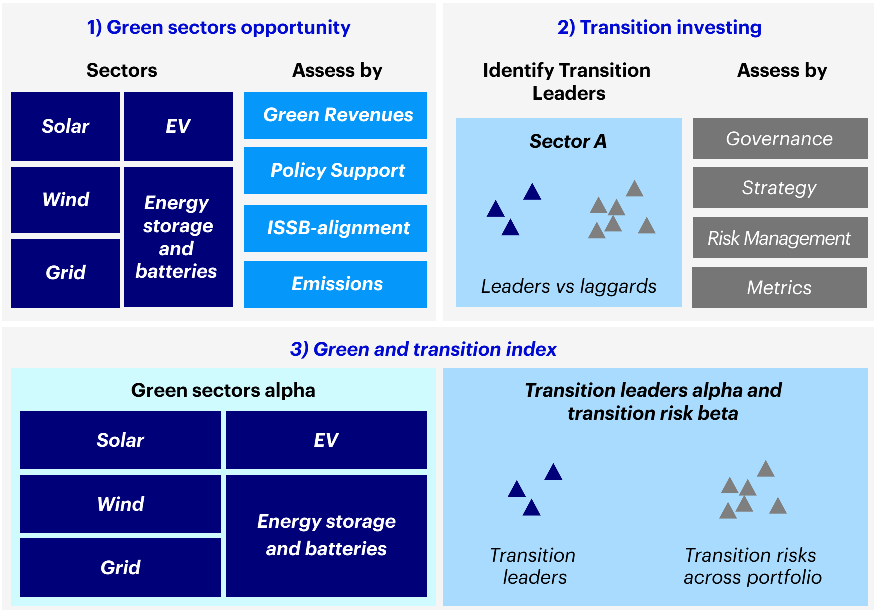
China climate investing: Climate solutions, transition investing, green indexes

We expect China's energy transition to create corresponding investment opportunities across green and transition sectors. This aligns with our global outlook where we suggest investors can consider climate opportunities holistically across mitigation, transition and adaptation themes. This research looks at three different opportunities and approaches to investing in China's low-carbon transition.

Figure 1 – Green and transition investing: Three approaches to investing in China's low-carbon transition



Source: Tsinghua-Invesco Research; for illustrative purposes only.

1. **Green sectors investment opportunity: investing in green revenue and climate solutions**

    - **Opportunity:** Chinese green sectors could see meaningful growth given policy targets and export opportunities and could be both a source of thematic alpha as well as helping investors increase climate solutions allocation to meet decarbonization targets in investment portfolio
    - **Approach: A framework to analyze green sectors investments would consider: a) green revenues alignment; b) policy tailwinds; c) material risks and disclosures; and d) emissions.**
        - Green revenues: Using taxonomy alignment to identify green activities helps minimize greenwashing and enables investors to assess the extent of each company's green revenues.
        - Policy support: Analyzing the degree of policy support across the value chain given that we expect policy tailwinds to be a strong driver of sector growth. This would include looking at taxes, subsidies, loans, national targets, and carbon taxation policies.
        - Material risks and disclosures: Looking at the alignment of disclosures with International Sustainability Standards Board (ISSB) standards can help provide a lens on how well companies are managing material risks in their supply chains and operations.

- Emissions impact: Assessing end-to-end emissions through approaches like process-based life cycle assessment (PLCA) and hybrid life cycle assessment (HLCA). Understanding the full emissions lifecycle of these sectors would be critical for export potential given carbon regulations relating such as the EU Ecodesign and Energy Label legislation for solar photovoltaics modules.

2. Framework for transition investing: Identifying transition leadership in China

- **Opportunity:** The increase in global carbon pricing through emissions trading schemes and taxes creates material costs for high-emitting businesses. At the same time, the growth of green revenues brings about new market opportunities. Companies making early transition progress in disclosures and planning can be seen as transition leaders and can capture financial upside as these risks and opportunities are priced in by the market.
- **Approach: Tsinghua's research has expanded on previous work on high-emitting sectors in China; expanding its coverage to new sectors including petrochemicals, cement, and aluminum. An updated transition framework also helps to assess issuers based on forward-looking metrics to identify transition leaders in each sector.** Such a framework could include:
  - **Governance:** Assessing board and management alignment and commitment as a signal of the importance placed on the topic; the formation of sustainability or carbon neutrality committees
  - **Strategy:** Enacting a strategy on climate particularly by assessing material climate risks and opportunities for a business
  - **Risks and opportunities:** Quantifying and managing risks and opportunities identified such as through green revenues (with reference to the Common Ground Taxonomy)
  - **Metrics and targets:** Eight metrics across the themes of mitigation, transition, adaptation, and nature and biodiversity.

3. China's green and transition index strategy: Combining alpha and beta exposure in index construction

- **Opportunity:** Green and transition indexes can drive financial product innovation and market growth. These indexes can present investors with an innovative and cost-effective approach to achieve portfolio thematic alpha and diversification while also supporting China's low-carbon transition.
- **Approach: Combining alpha and beta in green and transition index construction through the creation of a green index which is 2x overweight on green sectors and 1.5x overweight on transition leaders.** The index would enable exposure to thematic alpha of green sector growth and transition leaders whilst also allowing for beta management through oversight of transition risks.

In this research series we examine each of the above opportunities and approaches and showcase how our research findings can help offer a framework for investing in China's low carbon transition and high-quality development.

Invesco

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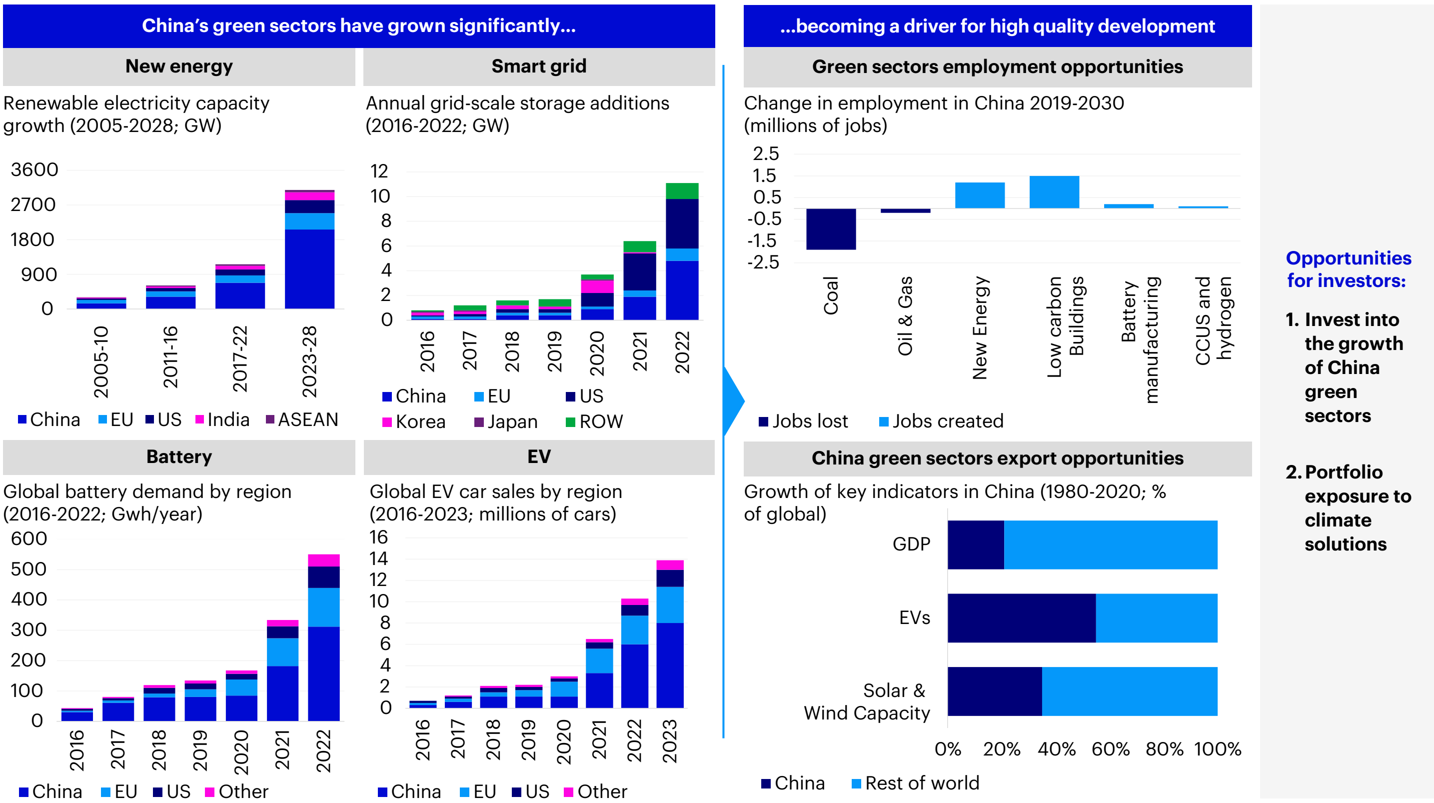
Tsinghua-Invesco China ESG research: Investing in climate solutions and green revenues

The green sectors investment opportunity: Returns and climate solutions exposure
We believe green sectors are a critical driver for high quality economic growth and development in China. These sectors provide investment opportunities aligned to various investment objectives. Investors focused on returns can capitalize on the growth of China's green sectors. For investors focused on decarbonization objectives, investing in green sectors can provide them with exposure to climate solutions.

Themes and considerations when investing in green sectors

Figure 1 – Green sectors opportunity: China's green sectors could be a key driver of high quality development



Source: IEA New Energy; Smart Grid; Battery; EVs ; IEA Energy Sector Roadmap to carbon neutrality in China.

The Communist Party of China (CPC) Central Committee held its 12th group study session in February 2024 which focused on new energy technologies. President Xi emphasized the role of green sectors in driving China's high-quality development whilst also ensuring energy security. [i] China has seen significant build out of its green sectors with one of the most complete value chains globally. These sectors are expected to drive economic development, notably with additional jobs created by green sectors as well as increases in export opportunities and longer-term GNP growth. Green sectors were the largest drivers of China's economic growth in 2023, accounting for 40% of GDP growth. [ii] Specific thematic areas include:

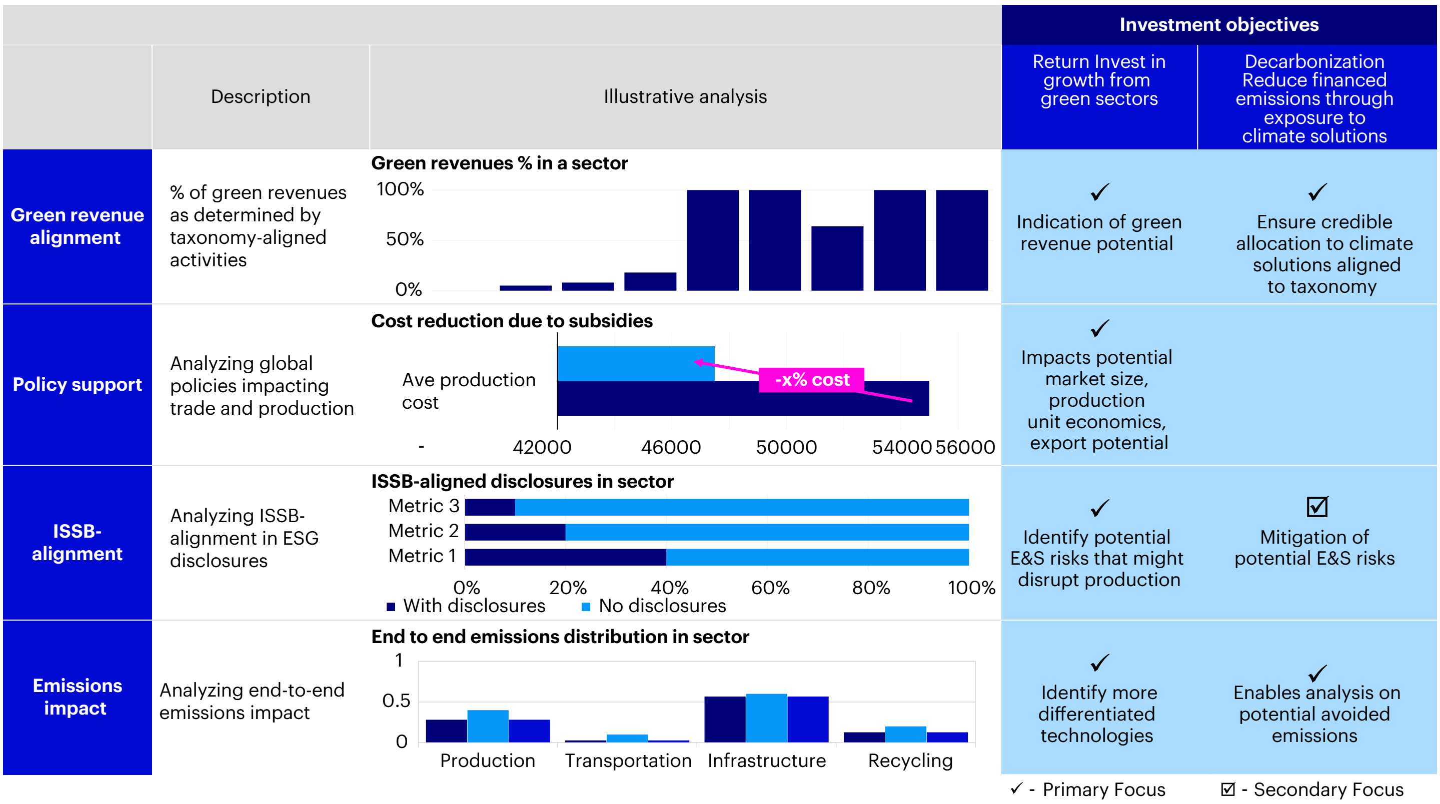
i. English.Gov.Cn, Mar 2024, Xi stresses high-quality development of new energy, greater contributions to building clean, beautiful world
ii. Carbon Brief, Jan 2024, Clean energy was top driver of China's economic growth in 2023

- **Renewables and clean energy:** Renewable energy accounted for more than 50% of China's total installed power generation capacity in 2023 [iii] including a doubling of solar capacity and 66% increase in wind power capacity. These technologies are being exported to more than 200 countries globally and accounted for 60% of new renewable capacity added globally in 2023. [iv]
- **Electric vehicles (EVs):** New electric car registrations in China grew by 35% in 2023 versus 2022 and just under 60% of new electric car registrations globally were in China. [v] China's auto exports also surged to more than 63% in 2023 [vi] with a reach to various regions including Europe, Southeast Asia, and Latin America.
- **Underlying infrastructure:** We expect underlying clean energy and EV infrastructure to see investment growth, with grids expected to see about a 2.3x multiplier and energy storage roughly a 2.8x multiplier of investments required before 2030. [vii]

While these sectors have seen strong growth, continued cost declines and increasing competition also signifies the need for investors to be selective in picking the right winners rather than just broad sector allocation. Investors need to understand broader supply chain dynamics particularly by analyzing opportunities in the underlying infrastructure and enabling technologies such as batteries, energy storage, and grid and transmission. Investors with additional investment objective of increasing climate solutions allocation or emissions reduction targets would also need to assess the alignment of issuers to ensure credible allocation and minimizing risks of greenwashing. These considerations call for the need for a framework to best analyze green sectors.

Framework for green sectors analysis and investing

Figure 2 – Framework for green sectors investing



Source: Tsinghua-Invesco Research; for illustrative purposes only.

iii. English.Gov.Cn, Jan 2024, China drives world renewables capacity addition in 2023
iv. English.Gov.Cn, Jan 2024, China drives world renewables capacity addition in 2023
v. IEA, Jan 2024, Global EV Outlook 2024
vi. AP, Jan 2024, China auto exports rose 64% in 2023
vii. BloombergNEF 2024, Jan 2024, Energy Transition Investment Trends

Broadly speaking, investors could be interested in green sectors either to invest in the growth of the green economy, or if they have additional investment objectives to decarbonize their financed emissions – in which case an allocation to climate solutions could help. Key areas that investors could assess include:

- **Green revenue alignment:** The best way to define or identify green sector names is often by determining if the revenues of these businesses can be considered green. Taxonomy alignment is often the basis, where be it the EU Taxonomy or China Green Bond Catalogue, these taxonomies help to define the different types of green and sustainable activities and products or services. Taxonomy alignment can provide a "first look" analysis of whether an investment can be considered a climate solution. Green revenue as a proportion of total revenue is another metric which can be particularly helpful in analyzing issuers that are not pure-play solutions names but rather transition names that are gradually increasing their share of climate solutions.
- **Policy support:** Green sectors have been a priority area for government policy; understanding the extent of government policy helps to provide context on where the sector could be headed in the future. The range of policies include:
  - **Industrial policy:** This includes holistic sectoral policies across production, consumption, financing, and infrastructure. Under China's 1+N policy, the EV sector for example crosses multiple areas involving industrial production, infrastructure, energy, and transport. These policies can also help to inform the potential size of the market given national targets for renewable growth or EV market share.
  - **Taxes, subsidies, and loans:** To incentivize production and consumption uptake, China's government has enacted policies around production tax reductions, subsidies, or loans for green sectors. These help to improve the unit economics of production and can enhance the initial market uptake of the segment. It is important to note however that EV subsidies have been declining over time as the market matures and that purchase subsidies ceased at the end of 2022. [viii]
  - **Cross-border implications:** There is an increasing emphasis being placed on investors to understand policy developments globally that might affect China's market growth. While industrial policies overseas like the EU Green Deal offer valuable insights into how global market sizes might shape up, recent supply chain policies might also impact the extent of export opportunities for China. Notable policies include the EU Carbon Border Adjustment Mechanism which seeks to address carbon leakage through carbon taxation on imports to the EU in sectors like cement, power, steel and aluminum, or the US's Inflation Reduction Act designed to incentivize local green sector production in the US through production tax credits.
- **International Sustainability Standards Board (ISSB) and material risks:** ISSB-aligned disclosures in green sectors provide a helpful reference framework with which to identify financially material ESG risks and metrics. For example, for the solar sector, water resource management and potential water stresses is a key area that investors can look at to determine how companies are sufficiently managing production-related risks. Companies with better disclosure standards can act as a proxy of whether they have adequately put in place supply chain policies or measures to prevent production disruptions. For investors with additional ESG investment objectives on top of financial returns, this analysis can also help to identify potential environmental and social risks.
- **Emissions impact (output):** Global regulations relating to carbon footprint in products such as the EU Ecodesign and Energy Label legislation for solar photovoltaic modules need to understand the end-to-end emissions impact. Companies with a competitive advantage in bringing down lifecycle emissions could be more favorable when considering export opportunities to Europe. Tsinghua's research explores the approaches to assessing emissions impact including process-based life cycle assessment (PLCA), input-output life cycle assessment (I-O LCA) and hybrid life cycle assessment (HLCA). These approaches enable a comprehensive look at emissions across the value chain from production (including processing of materials) to transportation to recycling. Investors with climate solutions allocation as an objective can also go one step further to analyze the degree of avoided emissions to factor into their allocation decisions.

The above framework provides investors looking at green sectors with various dimensions for analysis. It illustrates how various factors can impact market growth and valuations of green sectors including competitive advantages, risks, and policy tailwinds. At the same time, the framework also provides assessment criteria that increases the credibility of identifying climate solutions in a portfolio.

viii. Yahoo Finance, Mar 2024, A closer look at China's changing EV landscape

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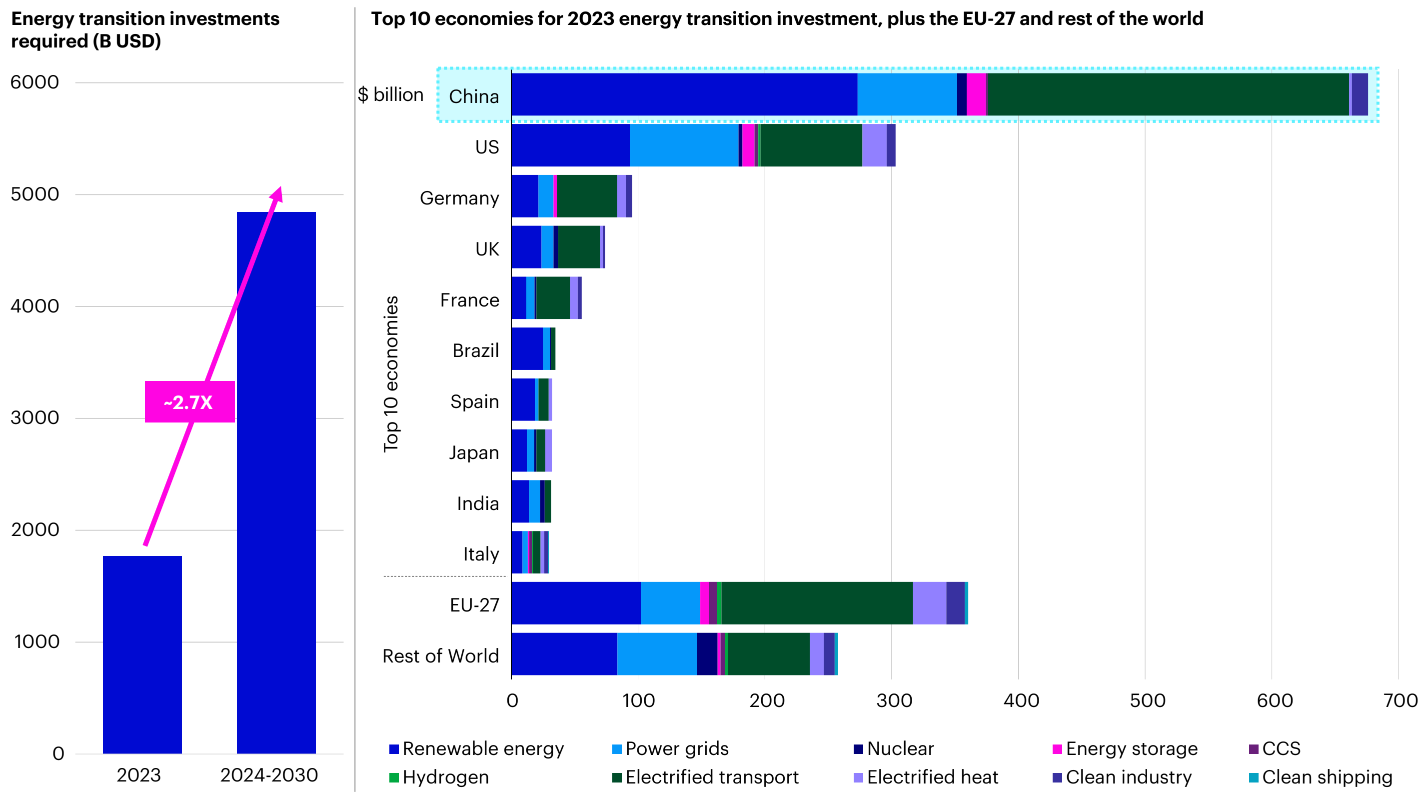
Tsinghua-Invesco China ESG research: Transition investing in China

We expect the global energy transition to create demand for transition finance across a range of sectors and increased investments into green capex. This is especially key in China's market given the scale of transition required while at the same time having to balance the country's energy security and economic growth considerations. For the second part of our research series, we examine transition investment opportunities in China and share a proposed framework that emerged from our research for assessing transition.

Transition investing opportunities in China

Figure 1 – Transition finance needs present opportunities across regions and sectors especially in China



Source: BloombergNEF. Note: The **EU-27** bar also includes the EU member states shown separately. The **Rest of World** bar covers global investment excluding the EU and individual economies in the chart. **CCS** refers to carbon capture and storage.

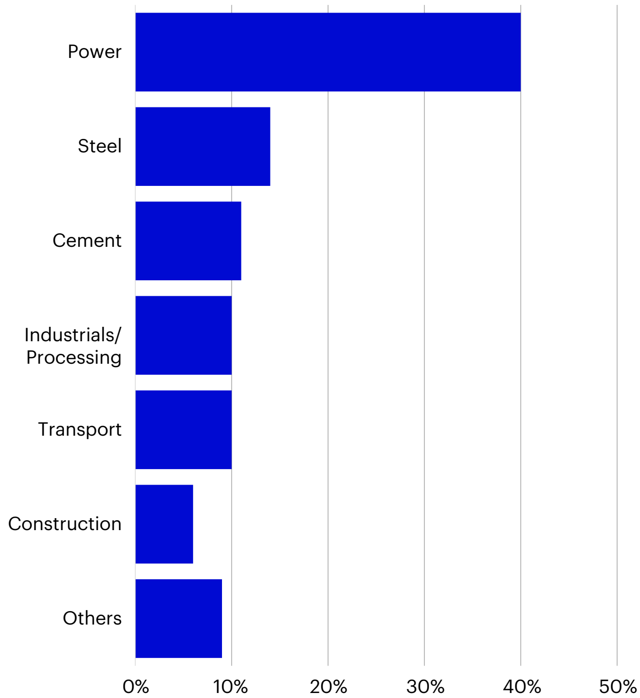
The amount of energy transition investments required globally are expected to grow to nearly US $5 trillion by 2030 [ix] and China is expected to have a significant share in transition financing. There have also been increased regulatory developments in various markets relating to transition planning as well as transition taxonomies in recent years, with an aim of making more capital available for transition finance.

ix. BloombergNEF, Jan 2024, Energy Transition Investment Trends

Figure 2 – Transition finance: Investing in transition finance can be enabled by taxonomies to facilitate issuances and frameworks to assess transition progress

Transition required across broad sectors...

China emissions by sector (2020; %)



...creating opportunities for transition finance

Green investing (green today)		
	Green activities	Green sectors and companies
Basis / framework	Green taxonomies	Green revenues
Significance	Defines green activities and sectors	Defines what companies can be considered as green
Financing opportunity	Green bonds/ issuances	Green or sustainable equities or funds

Transition investing (brown today, green tomorrow)		
	Transition activities	Transition leadership
Basis / framework	Transition taxonomies	Transition plans
Significance	Defines transition activities	Assess credibility of transition strategy
Financing opportunity	Transition issuances (loans or bonds)	Transition investing/ funds

Source: Tsinghua-Invesco Research; for illustrative purposes only.

There are broadly speaking two approaches to transition finance - investing in transition labelled issuances and investing in transition leaders in a portfolio:

- **Transition issuances:** China has been rapidly developing frameworks on transition with cities like Huzhou and Shanghai launching transition taxonomies in the past year across high-emitting sectors like chemical, cement, steel, agriculture [x]. These taxonomies provide activity-based guidance on sector and production activities and facilitate labelled issuances. By the end of 2022, Chinese issuers raised a cumulative 10.4 billion RMB in transition labelled bonds. [xi] Future areas of development could include looking at issuers' transition plans as well as just transition considerations such as the impact on employment opportunities.
- **Transition leaders:** Whereas transition issuances are more specific to fixed income investment opportunities, for equity investors, having a transition strategy requires analyzing issuers more broadly to understand potential transition risks or opportunities. Typically, the basis of such an analysis is to look at transition plans or issuer strategies, providing investors with insight into potential green revenues or green capex plans and evaluating the financial impact of the issuers' decarbonization trajectories. As shared in previous articles, the investment thesis is to identify transition leaders that are better prepared to weather potential climate risks and are looking to capture revenue opportunities presented by the energy transition. Evaluating transition leadership therefore requires a holistic framework with which to differentiate companies.

x. ARE, Dec 2023, Closing the gap: evolution of climate transition finance in China
xi. ARE, Dec 2023, Closing the gap: evolution of climate transition finance in China

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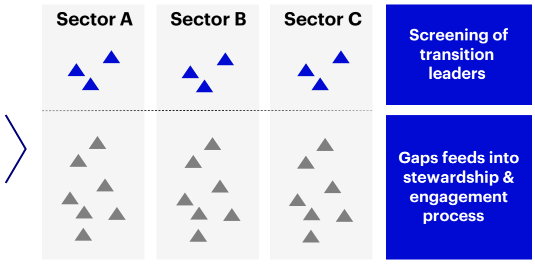
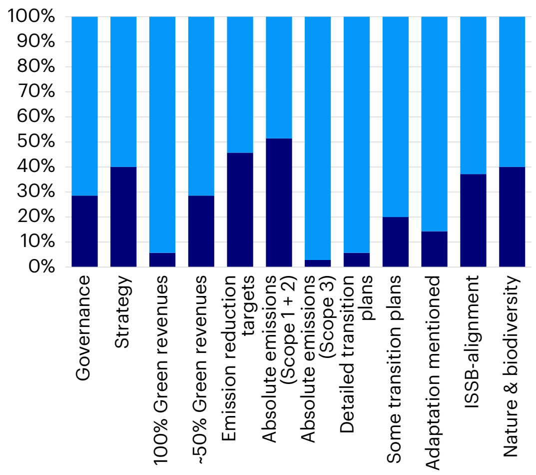
Research framework for assessing transition

Figure 3 – Transition framework: Identifying transition leaders and gaps for engagement

Area	Metric	Sub-metric	Description
Governance		Climate governance	Presence of governance structure for climate
Strategy		Climate strategy	Presence of climate strategy
Management of risks and opportunities		Green revenues	Quantification of green revenues
Metrics and targets	Emissions reduction	Emissions reduction targets	Presence of emissions reduction targets; this can include longer-term carbon neutrality commitment or short-medium term reduction target
		Emissions disclosure	Disclosures on emissions; variables include scope (1-3), absolute vs intensity, unit (per production, revenue, valuation)
		Emissions progress	Estimated emissions based on triangulating with issuers' actual production activity
	Transition	Transition strategy	Presence of transition planning in strategy
	Emissions reduction measures	Emissions reduction initiatives	Disclosure on initiatives to drive emissions reduction
	Climate adaptation	Climate adaptation	Disclosures on climate adaptation strategy and measures (minimum disclosures of risks vs understanding of risk, specific initiatives)
	Disclosures	ISSB-aligned disclosures	Disclosures aligned to ISSB standards based on disclosure coverage by sector
	Nature and biodiversity		Disclosures of biodiversity-related strategies and initiatives



Illustrative disclosures % amongst selected material sector names



Source: Tsinghua-Invesco Research; for illustrative purposes only.

As mentioned previously, investing in climate transition in Asia requires identifying the forward-looking signals of companies. Our research framework is anchored by two key principles: 1) the use of forward-looking metrics incorporating latest trends such as International Sustainability Standards Board (ISSB) alignment and green revenues; and 2) alignment with global standards such as adopting the Task Force on Climate-Related Financial Disclosures' (TCFD) framework for governance, strategy, risk management and metrics. Our proposed framework considers eleven metrics across the following:

- **Governance:** Assessing board and management alignment and commitment as a signal of the importance placed on a topic; the formation of sustainability or carbon neutrality committees
- **Strategy:** Enacting a strategy on climate particularly by assessing material climate risks and opportunities for a business
- **Management of risks and opportunities:** Quantifying and managing risks and opportunities identified such as through green revenues (with reference to Common Ground Taxonomy)
- **Metrics and targets:** Eight metrics across the themes of mitigation, transition, adaptation, nature and biodiversity as well as ISSB disclosures alignment.

This framework presents a list of indicators and metrics relevant for assessing issuers on their transition preparedness. Investors can take a building block approach and utilize the metrics that are most relevant for their target investments and the framework can also be used as an additional source of analysis for screening or for engagements.

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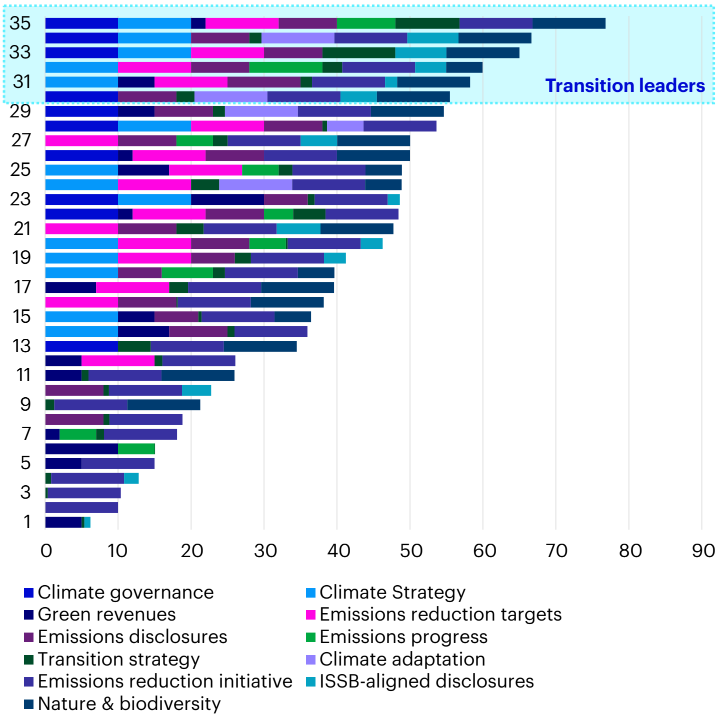
Applying the framework to analyze transition progress in each sector

Figure 4 – Transition assessment where transition leaders can help to drive outperformance

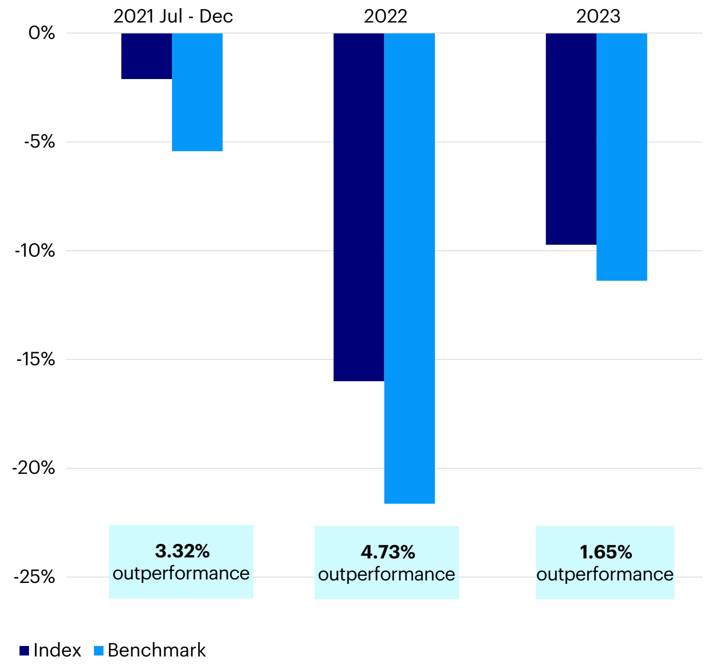
Distribution of transition readiness within a sector...

Transition assessment scores for Chinese materials sector)



...with index overweighting transition leaders delivering outperformance

Transition index vs benchmark returns (%; 2020-23)



Source: Tsinghua-Invesco Research; for illustrative purposes only.

Taking the materials industry as a reference, our research analyzed 35 companies using the above framework. The results are reflective of broader industry trends. We found that while disclosures are gradually improving, the key gaps are in the details of climate strategies and plans. Generally, one-third of companies have basic governance and strategy in place. Most companies do not disclose their green revenues, but those that do see a significant share of revenues from new green materials. Nearly half the companies have emissions reduction targets and disclose their absolute emissions. Fewer companies disclose details around their specific transition initiatives and measures.

Because the range of disclosures and plans captured by these metrics is a proxy for a company's preparedness, this analysis allows investors to assess the companies that are most likely to be transition leaders. One investment strategy might be to identify such transition leaders across each sector. For example, an index overweighting the top-performing transition leaders (as assessed by above framework) shows some outperformance compared to market benchmarks. The analysis is also helpful in reflecting on the existing gaps and risks that companies may have and can inform investors of priority issuers and topics for engagement on financially material issues.

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Tsinghua-Invesco China ESG research: Green and transition indexes in China

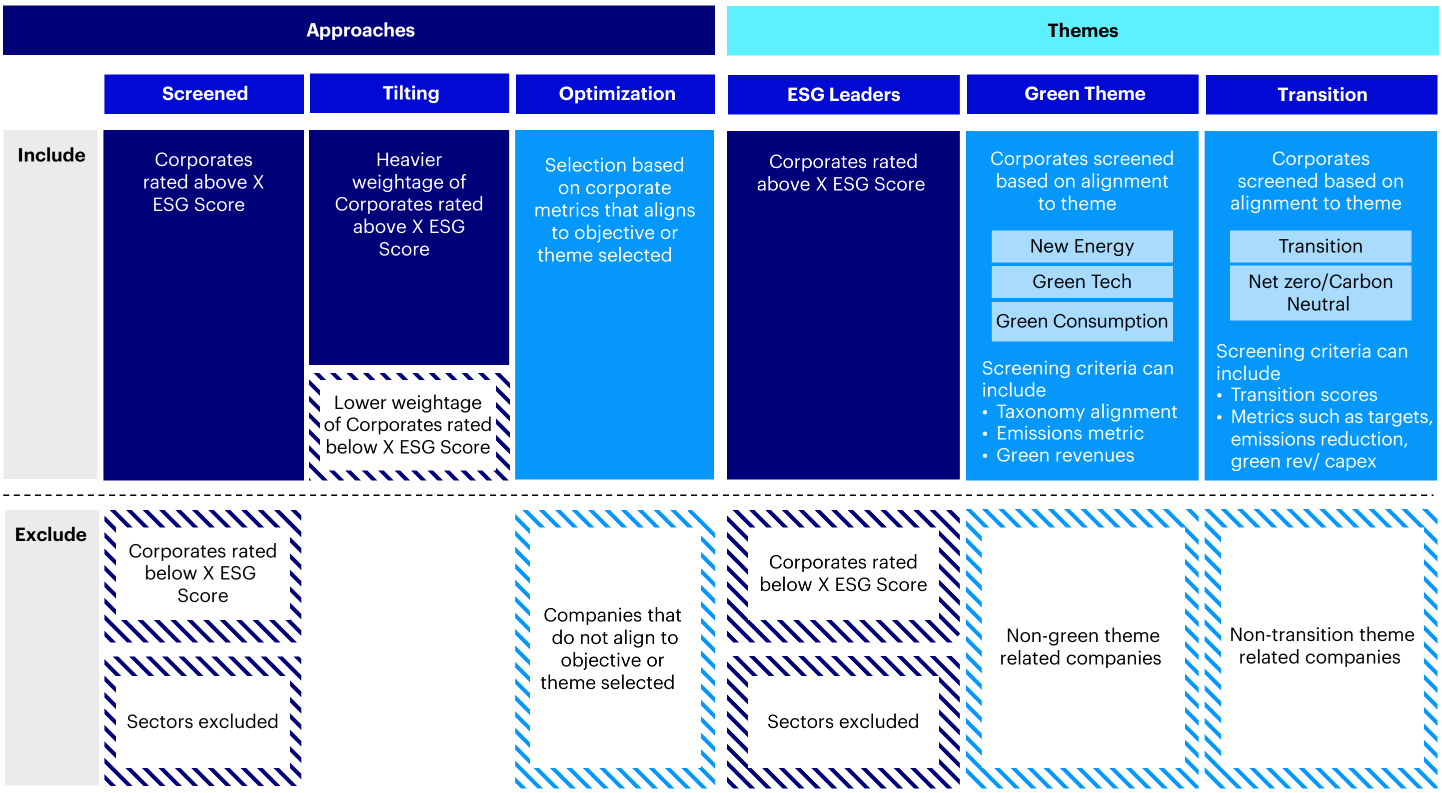
We are seeing growth in sustainable investments globally and particularly in China, alongside increasing demand for transition financing. Indexes have always served as a compass and signal for market trends, growth, and volatility. 2022 saw ESG indexes grow by 55.1% year-on-year [xii] and since then we've seen a proliferation of relevant investment opportunities in green and transition indexes.

1. Green indexes can drive financial product innovation and market growth
As shared in a previous article, ESG index and passive strategies help to facilitate financial product innovation and can be customized for investor's objectives and preferences to achieve thematic exposure. In the context of the China market, we believe three opportunities stand out:

- **Asset allocation into green and transition investments:** Green and transition indexes provide a framework for defining green and transition investments and facilitate asset allocation and capital flows towards these opportunities. This objective also aligns with China's Central Finance Work Conference priority areas where green finance is a key component.
- **Incorporating green considerations and risks into an investment strategy:** There has been an increasing emphasis on climate-related risks as seen in regulatory developments; green indexes can allow for better risk management and climate considerations in the investment process.
- **Supporting industrial and manufacturing upgrades:** Capital flows into green and transition sectors can support China's economic transition by focusing on quality growth through exports and manufacturing upgrades.

2. Index landscape: Indexes can be customized based on investors' objectives and preferences

Figure 1 – Landscape of ESG indexes by approaches and themes



Source: Tsinghua-Invesco Research; for illustrative purposes only.

xii. Tsinghua-Invesco Green Index and Ratings Research, June 2024

Global indexes have a range of approaches that can be implemented with a long history since the 1990s when social and sustainability indexes were created. Globally there are more than 50,000 ESG indexes [xiii] that generally fit into three broad categories:

- **ESG screened or leaders:** Excluding companies with lower scores or certain sectors or on the flip side adopting positive screening for portfolio construction. This can be based on financially material risks or sectoral/ value preferences of investors.
- **ESG tilting:** Increasing portfolio weights based on ESG metrics; ESG ratings or ESG momentum/ trends
- **ESG optimization:** Optimizing on an indicator or outcome (e.g. lower carbon emissions versus benchmark)

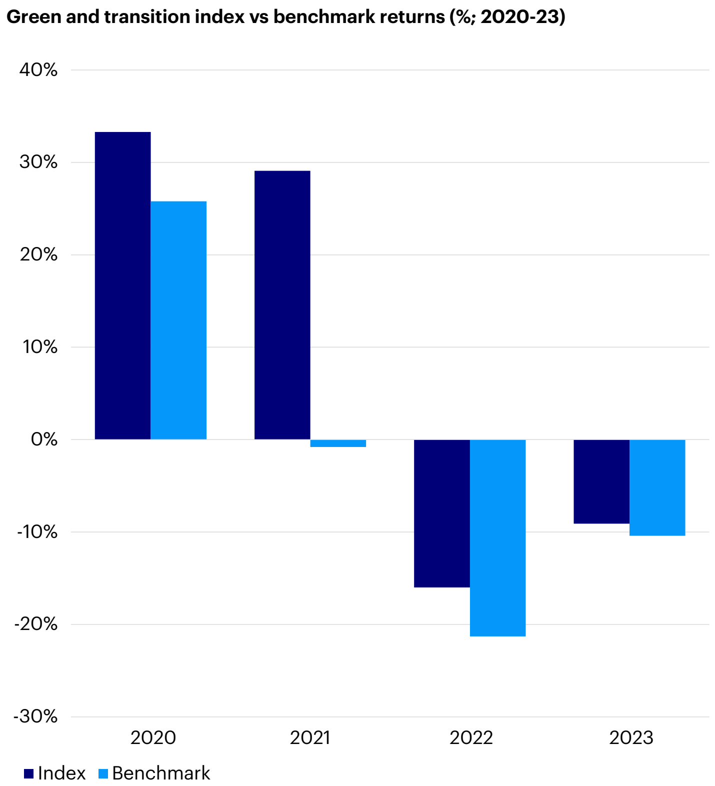
Within the China landscape, ESG indexes have focused more on themes selection with many more aligned to clean energy or electric vehicle (EV) themes. Broad themes include:

- **ESG:** ESG leaders or ESG screened such as excluding companies with lower ESG ratings; screening or tilting on ESG ratings; using ESG as a factor to mitigate financially material ESG risks while also considering other value, quality, or growth factors
- **Green themes:** Themes relating to green technologies or green consumption, including looking at technologies relating to solar, wind, batteries and energy storage, grid and EVs; universe construction based on alignment to the theme in question
- **Transition:** Focused on carbon neutrality; universe construction based on assessing companies' transition progress such as looking at metrics relating to targets, emissions progress and transition plans

3. Construction approaches: Combining alpha and beta in index construction

Figure 2 – Green and transition indexes: Providing alpha and beta exposures in index construction

	Approach	Alpha	Beta	Index Weight
Green sectors	Corporates screened based on alignment to theme New Energy Green Tech Green Consumption Screening criteria can include • Taxonomy alignment • Emissions metric • Green revenues	Growth		2
Transition	Corporates screened based on alignment to theme Transition Net zero/Carbon Neutral Screening criteria can include • Transition scores • Metrics such as targets, emissions reduction, green rev/capex	Transition Leaders	Portfolio Diversification Climate Risk integration	1.5 for top 20% improvers 1 for rest



Source: Tsinghua-Invesco Research; for illustrative purposes only.

xiii. Tsinghua-Invesco Green Index and Ratings Research, June 2024

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Green and transition investing if combined through an index could offer investors exposure to both alpha and beta management.

- **Green sectors can be a source of thematic alpha exposure.** China's green sectors like renewables and EVs can be a driver of quality economic growth and export opportunities.
- **Transition assessment can be seen as additional risk management in a portfolio.** For one it enables portfolio diversification as the inclusion of high-emitting sectors can mitigate market volatility, promote sector diversification and prevent concentration. The economic share of transition sectors also presents longer-term upside for transition leaders who are better positioned with reduced risks on costs if carbon pricing comes into play and increased opportunities relating to capture green revenues growth.
- **Climate outcomes alignment:** For investors with climate targets and commitments, this strategy looks at aligning a portfolio to outcomes, such as allocating to climate solutions while also progressively looking to decarbonize the portfolio.
- **Research findings:** As detailed in Figure 2, the model index in Tsinghua's research is 2x overweight on green sectors and a 1.5x overweight on transition leaders (top 20% performers in each sector). Backtesting of the index over past 4 years shows an outperformance of 9.4% versus the benchmark.

Globally, we believe opportunities exist across the themes of climate mitigation (solutions and technologies driving decarbonization), adaptation (solutions that can increase climate resiliency), and transition (adoption of green technologies and business models). Complementing our previous analysis across Asia, ASEAN, Japan and India, this research series delves into the various opportunities in the China market and calls for investors to consider three broad approaches to investing in green and transition opportunities.

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Investment risks

The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested.

When investing in less developed countries, you should be prepared to accept significantly large fluctuations in value.

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