China’s Climate Disclosure Regime: How Regulations, Politics, and Investors Shape Corporate Climate Reporting

By Edmund Downie, Dr. Erica Downs, and Yushan Lou

November 2023
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Executive Summary

Part of the great power competition between the United States and China is a question of who will lead the low-carbon economy. One facet of this contest is building financial systems that can channel capital toward companies that are ready to adapt to this new economy and reduce exposure to companies that are not. This requires strong climate disclosure regimes that can ensure that companies provide useful information to investors to support their decision-making. The US is finalizing its first systematic series of climate disclosure mandates this year. But what does China’s disclosure regime look like? Existing literature has provided only fragmentary answers to this question.

This report, part of the China Energy and Climate Program at the Center on Global Energy Policy at Columbia University SIPA, offers the most comprehensive English-language analysis to date of China’s climate disclosure regime—the regulations, pressures, and informal norms that drive firms’ decisions around publicizing climate-relevant information about their businesses. The report begins by reviewing the climate disclosures of 39 of China’s largest carbon-emitting firms—its “carbon majors”—to provide a baseline survey of climate disclosure quality among large, emissions-intensive firms. The sample spans seven of China’s highest-emitting industrial sectors and includes both listed and unlisted firms. The authors combine this review with an analysis of cross-national corporate climate disclosure quality datasets to map China’s climate disclosure regime.

The main takeaways of the report are as follows:

- **China has a distinctive climate disclosure regime based upon three pillars: regulatory compliance; political expectations; and international investor pressure.** This regime drives significant variations in the quality and depth of disclosures from China’s carbon majors. The disclosures around emissions volume, climate risk, and board-level climate responsibilities of Hong Kong–listed carbon majors tend to be more comprehensive than those of their unlisted or Shanghai- and Shenzhen-listed peer because of the stricter regulatory requirements that they face as well as their exposure to international investors. The variation in the disclosure of emissions reduction targets and mitigation plans, however, reflects political expectations. State-owned companies are more thorough disclosers in these areas because they use such disclosures to signal support for China’s national emissions peaking and reduction targets and mitigation plans.

- **Disclosures by large, emissions-intensive Chinese firms tend to lag behind those of their international sector peers.** The gap is especially noteworthy in sectors with a heavy presence
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of unlisted firms such as steel and thermal power generation. For example, the unlisted firms included in this analysis rarely disclose their carbon emissions publicly.

- The quality gaps can be explained in part by the distinctive role of the party-state—a powerful owner-regulator-financier with no parallel in most other large financial markets. It can directly express its disclosure expectations via regulation, making voluntary disclosures less meaningful. The party-state institutions that dominate China’s corporate governance can access information and exercise authority through non-public channels much more effectively than private actors in Western markets. For instance, all substantial emitters in China are already obligated to report their emissions internally to the government, though data quality remains a challenge.
I. Introduction

A growing element of the great power competition between the United States and China involves leadership in a globally decarbonizing economy. One of the many facets of this contest lies in building a financial system that allows investors—from private asset managers to state-owned banks—to assess firms’ “transition readiness”: their ability to navigate their sectors’ low-carbon transition and prepare for emerging climate risks.

The ability to make such assessments in part depends upon a country’s climate disclosure regime. This refers to the regulations, pressures, and informal norms that drive firm decisions around publicizing climate-relevant information about their business. Such information can include carbon emissions footprints and targets to reduce those footprints, but also how the firm is incorporating climate into corporate governance, strategy, and risk management. Sometimes investors can get this information through private interactions with firms, such as bondholders requesting it directly from bond issuers. But public disclosure boosts accessibility to this information and incentivizes quality and reliability in reporting to withstand public scrutiny. Strong disclosure regimes drive firms to issue more thorough disclosures that will be relevant and useful to investors in their decision-making. Such benefits have motivated the US Securities and Exchange Commission to propose the first systematic series of climate disclosure mandates for listed companies in the US, with a final rule expected in fall 2023.

As the US examines its own disclosure regime, what does China’s look like? Existing literature is only starting to answer this question. An extensive academic literature, supplemented by white papers, covers the drivers of corporate social responsibility (CSR) and environmental, social, and governance (ESG) reporting by Chinese firms. But work specifically on climate disclosures is thinner. Both academic and non-academic studies tend to focus on narrow aspects of climate disclosure—single drivers of firm behavior, say, or specific types of disclosures. The few broader studies use idiosyncratic measures of disclosure quality, or do not connect their findings to ESG and financial disclosures literature. Most studies do not publicize firm-level disclosure quality assessments or compare Chinese firms with international peers. No studies look at unlisted firms, a major portion of China’s emissions-intensive sectors. The literature’s gaps, taken together, result in a fragmentary grasp of the country’s climate disclosure regime.

This report tackles these gaps to provide a fuller understanding of China’s disclosure environment amid the country’s low-carbon transition. It reviews the climate disclosures of 39 of China’s largest-emitting firms—its “carbon majors”—to provide a baseline survey of climate disclosure quality.
among large, emissions-intensive firms. The 39 firms span seven of China’s highest-emitting sectors and include a mixture of listed and unlisted firms. Each of their carbon footprints is formidable—as large, in some cases, as major industrialized countries like Germany or South Korea.6

The authors use findings from the survey of these companies, as well as analyses of cross-national corporate climate disclosure quality datasets, to answer several questions:

1. What do China’s largest emitters disclose about climate, and what does that tell us about China’s climate disclosure regime? The authors’ survey indicates that, though all reviewed firms acknowledge climate change is business-relevant, they vary widely in the quality and depth of disclosures. Patterns in that variation, though, indicate a distinctive climate disclosure regime in China, shaped by three pillars: (1) regulatory compliance; (2) political expectations; and (3) international investor demand. Regulatory demands on the Hong Kong Stock Exchange (HKEX), for instance, have motivated much more frequent disclosures around emissions volumes from firms listed on this market than from unlisted or mainland-listed peers. But the high political priority attached to China’s national “dual carbon” goals of peaking carbon emissions before 2030 and achieving carbon neutrality before 2060 has prompted a different response from unlisted state-owned firms: they are enthusiastic about setting targets, especially for carbon peaking and neutrality. Meanwhile, stronger performance from HKEX-listed firms on indicators like climate risk discussion in part reflects the expectations of international investors, who largely invest in Hong Kong when investing in Chinese companies. Mainland capital markets, which attract less international investment, are currently less demanding.

2. How do Chinese firms’ disclosures compare with international peers’ disclosures? Analysis of disclosure quality data from the Transition Pathway Initiative that covers large, emissions-intensive Chinese firms and their peers in developed and developing countries indicates that Chinese firms’ disclosures lag their peers’ on several fronts. Disclosure gaps are especially noteworthy in sectors with a heavy presence of unlisted firms, such as steel and thermal power generation. The authors’ survey found that unlisted firms rarely report their carbon footprints, and so the sectors in which these firms concentrate see especially limited disclosure levels.

3. Why do Chinese firms’ disclosures lag those of their international peers? The survey findings, as well as the ESG and financial disclosures literature, indicate at least one major driver of these quality gaps: the distinctive role of the party-state in China’s disclosure regime. The party-state is a uniquely powerful owner-regulator-financier, with no parallel in most other large financial markets. ESG scholarship stresses that the party-state, not investors,
is traditionally the core audience for Chinese environmental information reporting. These conditions can incentivize voluntary climate disclosures on politically salient topics, like target-setting around carbon peaking or neutrality. But for less politicized issues like climate risk, regulatory requirements offer the clearest signal of party-state expectations, so firms may have weaker incentives to go beyond existing mandates. More generally, scholars of Chinese financial reporting note how public disclosure serves a less central role in Chinese corporate governance than in Western economies. The key party–state institutions that dominate Chinese corporate governance—as financiers, owners, and regulators—can access information and exercise authority through non-public channels much more directly than private actors in Western markets.

Public disclosures are a smaller part of the information environment for China’s low-carbon transition than they are in Western markets, yet Chinese authorities seem to see real value in strengthening the disclosure regime. In some areas, they have long been ahead of the US—the HKEX has had mandates for emissions reporting since 2017, while the SEC is only just introducing its first serious mandates around any climate reporting. A series of announced regulations from Hong Kong and mainland authorities should continue to strengthen disclosure requirements in the coming years. Indeed, mainland regulators are seeking to expand ESG reporting not only to support the dual carbon goals but also to align with global standards. Consequently, China’s evolving disclosure environment bears watching for insight into how China is positioning itself in the competition for leadership in the global low-carbon economy.

This report first describes the sample of companies surveyed and presents the main findings of a review of these carbon majors’ climate disclosures. It then explains how the findings reflect the three pillars of China’s disclosure regime. Finally, the authors show how that same regime explains disclosure gaps between Chinese firms and their international peers.
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II. Methodology

Our research covers 39 of what we call China’s “carbon majors”: the largest players in the country’s highest carbon-emitting sectors. We reviewed these companies’ core investor-facing reports—their annual reports and ESG reports. We also reviewed several other types of documents for unlisted companies, whose disclosures take place in a different regulatory framework.

Below, we describe in detail our selection methodology as well as the document categories we reviewed. We also present overall characteristics of the resulting sample of companies. Two features stand out:

- The sample of companies covers 30–70 percent market share in China’s seven highest-emitting sectors—a significant chunk of China’s emissions.
- A much larger portion of China’s carbon majors are state-owned unlisted companies compared to their peer firms globally.

Selection Methodology

We identified members for our sample in two steps:

1. **Sector selection:** We first identified a set of focus industries—seven large-emitting industries that the Chinese government has proposed for coverage in its emissions trading system (ETS). These are thermal power, iron and steel, cement, aviation, petrochemicals, chemicals, and aluminum. (The ETS has so far been implemented only in the power sector; expansion to other sectors is not expected until at least 2023.) Unofficial sectoral emissions estimates in China suggest that these industries’ carbon footprints are very large. Data from the China Emissions Accounts and Datasets project estimates that around 90 percent of China’s Scope 1 emissions and around two-thirds of Scope 1 and 2 emissions comes from seven officially defined sectors (Table 1). (Scope 1 emissions are direct emissions from sources owned or controlled by a company, and Scope 2 emissions are indirect emissions from the generation of energy purchased by a company.) The seven industries we review would be reasonably expected to comprise most of these sectors’ emissions.
Table 1: Sectoral CO₂ emissions in China (2019)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Scope 1 basis</th>
<th>Scope 1 and 2 basis</th>
<th>Selected industry for review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production and supply of electric power, steam, and hot water</td>
<td>47.4%</td>
<td>4.2%</td>
<td>Thermal power</td>
</tr>
<tr>
<td>Smelting and pressing of ferrous metals</td>
<td>18.9%</td>
<td>22.8%</td>
<td>Iron and steel</td>
</tr>
<tr>
<td>Nonmetal mineral products</td>
<td>11.4%</td>
<td>13.5%</td>
<td>Cement</td>
</tr>
<tr>
<td>Transportation, storage, post, and telecommunication services</td>
<td>7.5%</td>
<td>8.5%</td>
<td>Aviation</td>
</tr>
<tr>
<td>Petroleum processing and coking</td>
<td>1.8%</td>
<td>3.2%</td>
<td>Petrochemicals</td>
</tr>
<tr>
<td>Raw chemical materials and chemical products</td>
<td>1.7%</td>
<td>6.5%</td>
<td>Chemicals (ammonia, methanol)</td>
</tr>
<tr>
<td>Smelting and pressing of non-ferrous metals</td>
<td>0.7%</td>
<td>4.6%</td>
<td>Aluminum</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>89.2%</strong></td>
<td><strong>63.3%</strong></td>
<td></td>
</tr>
</tbody>
</table>


Company selection: Company selection took place in two steps. First, we identified the largest three to five companies in each sector on sector-specific indicators of likely emissions output—installed coal power capacity for thermal power companies, for instance, or crude steel output for iron and steel companies. This approach yielded 30 companies. Second, we reviewed the 20 unlisted companies in our sample to identify any listed subsidiaries likely to account for at least half of the parent’s carbon-intensive assets, production, or sold goods in the selected industry. This approach yielded a further nine companies that we added to our sample.

For company selection, a full description of the indicators of likely emissions output used in Step 1, as well as our size criteria for subsidiary inclusion in Step 2, is provided in Appendix Section A.

The resulting sample of 39 companies is shown in Table 2.
### Table 2: China’s carbon majors reviewed

<table>
<thead>
<tr>
<th>#</th>
<th>Company name</th>
<th>Parent company</th>
<th>Industry</th>
<th>Controlling ownership</th>
<th>Domestic market share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Listed in Hong Kong</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HK1</td>
<td>Aluminum Corporation of China Limited (Chalco)</td>
<td>UL1</td>
<td>Aluminum</td>
<td>Govt. (central)</td>
<td>10%</td>
</tr>
<tr>
<td>HK2</td>
<td>Hongqiao Group</td>
<td></td>
<td>Aluminum</td>
<td>Private</td>
<td>9%</td>
</tr>
<tr>
<td>HK3</td>
<td>Air China Limited</td>
<td></td>
<td>Aviation</td>
<td>Govt. (central)</td>
<td>11%</td>
</tr>
<tr>
<td>HK4</td>
<td>China Southern Airlines Company Limited</td>
<td></td>
<td>Aviation</td>
<td>Govt. (central)</td>
<td>17%</td>
</tr>
<tr>
<td>HK5</td>
<td>China Eastern Airlines Corporation Limited</td>
<td></td>
<td>Aviation</td>
<td>Govt. (central)</td>
<td>14%</td>
</tr>
<tr>
<td>HK6</td>
<td>Huaneng Power Int’l, Inc.</td>
<td>UL5</td>
<td>Thermal power</td>
<td>Govt. (central)</td>
<td>8%</td>
</tr>
<tr>
<td>HK7</td>
<td>Datang Power Int’l Generation Ltd.</td>
<td>UL6</td>
<td>Thermal power</td>
<td>Govt. (central)</td>
<td>4%</td>
</tr>
<tr>
<td>HK8</td>
<td>China National Building Material Co., Ltd. (CNBM Ltd.)</td>
<td>UL13</td>
<td>Cement</td>
<td>Govt. (central)</td>
<td>NA</td>
</tr>
<tr>
<td>HK9</td>
<td>Anhui Conch Cement Company Limited</td>
<td></td>
<td>Cement</td>
<td>Govt. (prov.)</td>
<td>12%</td>
</tr>
<tr>
<td>HK10</td>
<td>BBMG Corporation</td>
<td></td>
<td>Cement</td>
<td>Govt. (prov.)</td>
<td>6%</td>
</tr>
<tr>
<td>HK11</td>
<td>Huaxin Cement Co., Ltd.</td>
<td></td>
<td>Cement</td>
<td>Private</td>
<td>4%</td>
</tr>
<tr>
<td>HK12</td>
<td>China Petroleum &amp; Chemical Corporation (Sinopec Corp.)</td>
<td></td>
<td>Petrochemicals</td>
<td>Govt. (central)</td>
<td>30%</td>
</tr>
<tr>
<td>HK13</td>
<td>PetroChina Company Limited</td>
<td></td>
<td>Petrochemicals, chemicals</td>
<td>Govt. (central)</td>
<td>22% (petrochemicals)/NA (chemicals)</td>
</tr>
<tr>
<td>HK14</td>
<td>China Coal Energy Co., Ltd.</td>
<td>UL19</td>
<td>Chemicals</td>
<td>Govt. (central)</td>
<td>22% (petrochemicals)/NA (chemicals)</td>
</tr>
<tr>
<td>HK15</td>
<td>China Shenhua Energy Company Limited</td>
<td>UL20</td>
<td>Chemicals, thermal power</td>
<td>Govt. (central)</td>
<td>3% (thermal power)/NA (chemicals)</td>
</tr>
<tr>
<td></td>
<td><strong>Listed only in the mainland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>HBIS Co., Ltd.</td>
<td>UL9</td>
<td>Steel</td>
<td>Govt. (prov.)</td>
<td>~2%</td>
</tr>
</tbody>
</table>

Continued on next page
### China’s Climate Disclosure Regime: How Regulations, Politics, and Investors Shape Corporate Climate Reporting

#### Listed only in the mainland (cont’d)

<table>
<thead>
<tr>
<th>#</th>
<th>Company name</th>
<th>Parent company</th>
<th>Industry</th>
<th>Controlling ownership</th>
<th>Domestic market share</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2</td>
<td>Rongsheng Petrochemical Co., Ltd.</td>
<td></td>
<td>Petrochemicals</td>
<td>Private</td>
<td>4%</td>
</tr>
<tr>
<td>M3</td>
<td>Yunnan Yuntianhua Co., Ltd.</td>
<td>UL17</td>
<td>Chemicals</td>
<td>Govt. (prov.)</td>
<td>NA</td>
</tr>
<tr>
<td>M4</td>
<td>Hubei Yihua Chemical Industry Co., Ltd.</td>
<td>UL18</td>
<td>Chemicals</td>
<td>Govt. (muni.)</td>
<td>NA</td>
</tr>
</tbody>
</table>

#### Unlisted

<table>
<thead>
<tr>
<th>#</th>
<th>Company name</th>
<th>Industry</th>
<th>Controlling ownership</th>
<th>Domestic market share</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL1</td>
<td>Aluminum Corporation of China (Chinalco)</td>
<td>Aluminum</td>
<td>Govt. (central)</td>
<td>18%</td>
</tr>
<tr>
<td>UL2</td>
<td>Xinfa Group</td>
<td>Aluminum</td>
<td>Private</td>
<td>5%</td>
</tr>
<tr>
<td>UL3</td>
<td>State Power Investment Corporation (SPIC)</td>
<td>Aluminum, thermal power</td>
<td>Govt. (central)</td>
<td>7% (aluminum) /NA (thermal power)</td>
</tr>
<tr>
<td>UL4</td>
<td>East Hope Group</td>
<td>Aluminum</td>
<td>Private</td>
<td>6%</td>
</tr>
<tr>
<td>UL5</td>
<td>China Huaneng Group Co., Ltd.</td>
<td>Thermal power</td>
<td>Govt. (central)</td>
<td>11%</td>
</tr>
<tr>
<td>UL6</td>
<td>China Datang Group Co., Ltd.</td>
<td>Thermal power</td>
<td>Govt. (central)</td>
<td>8%</td>
</tr>
<tr>
<td>UL7</td>
<td>China Huadian Group Co., Ltd.</td>
<td>Thermal power</td>
<td>Govt. (central)</td>
<td>9%</td>
</tr>
<tr>
<td>UL8</td>
<td>China Baowu Iron and Steel Group Co., Ltd.</td>
<td>Steel</td>
<td>Govt. (central)</td>
<td>12%</td>
</tr>
<tr>
<td>UL9</td>
<td>HBIS Group Co., Ltd.</td>
<td>Steel</td>
<td>Govt. (prov.)</td>
<td>4%</td>
</tr>
<tr>
<td>UL10</td>
<td>Jiangsu Shagang Group Co., Ltd.</td>
<td>Steel</td>
<td>Private</td>
<td>4%</td>
</tr>
<tr>
<td>UL11</td>
<td>Ansteel Group Corporation Ltd.</td>
<td>Steel</td>
<td>Govt. (central)</td>
<td>5%</td>
</tr>
<tr>
<td>UL12</td>
<td>Beijing Jianlong Heavy Industry Group Co., Ltd.</td>
<td>Steel</td>
<td>Private</td>
<td>4%</td>
</tr>
<tr>
<td>UL13</td>
<td>China National Building Material Group Co., Ltd. (CNBM Group)</td>
<td>Cement</td>
<td>Govt. (central)</td>
<td>21%</td>
</tr>
<tr>
<td>UL14</td>
<td>Hongshi Holding Group Co. Ltd.</td>
<td>Cement</td>
<td>Private</td>
<td>4%</td>
</tr>
<tr>
<td>UL15</td>
<td>Sinochem Holdings Corporation Ltd.</td>
<td>Petrochemicals</td>
<td>Govt. (central)</td>
<td>7%</td>
</tr>
<tr>
<td>UL16</td>
<td>China National Offshore Oil Corporation (CNOOC)</td>
<td>Petrochemicals</td>
<td>Govt. (central)</td>
<td>6%</td>
</tr>
</tbody>
</table>

*Continued on next page*
China’s Climate Disclosure Regime: How Regulations, Politics, and Investors Shape Corporate Climate Reporting

Several features stand out. First, our selected carbon majors dominate China’s high-emitting industries (Table 3). Second, a high share of China’s carbon majors are state-owned and unlisted companies, compared to their international—and especially Western—peers. Unlisted companies comprise more than half of our sample (20 of 39), while state-owned companies account for around 80 percent (31 of 39) (see Table 4). Also of note, the selected companies include the following:

- Half of thermal power and clinker capacity; and
- 30 to 70 percent of output in aluminum, oil refining, and crude steel, as well as 40 percent of domestic aviation traffic. (Quantitative market share data for chemicals was not available; we used rankings data instead.)

Table 3: Market shares of China’s carbon majors

| Share of domestic crude oil refining capacity | 70% |
| Share of domestic primary aluminum production | 54% |
| Thermal power capacity as a % of all-China thermal power capacity | 51% |
| Share of domestic cement clinker capacity | 47% |
| Share of domestic passenger-kilometers flown | 41% |
| Share of domestic crude steel production | 29% |

Note: Quantitative market share data for chemicals was not available.
Source: See Appendix A, Authors’ analysis.
Table 4: Characteristics of selected carbon majors

<table>
<thead>
<tr>
<th>Total companies in sample</th>
<th>39</th>
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<tbody>
<tr>
<td>Ownership</td>
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<tr>
<td>State-owned enterprises (SOEs)</td>
<td>31</td>
</tr>
<tr>
<td>Central government</td>
<td>23</td>
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<td>Provincial or local government</td>
<td>8</td>
</tr>
<tr>
<td>Private companies</td>
<td>8</td>
</tr>
<tr>
<td>Listings</td>
<td></td>
</tr>
<tr>
<td>Listed companies</td>
<td>19</td>
</tr>
<tr>
<td>Listed in US, Hong Kong, and mainland China</td>
<td>5</td>
</tr>
<tr>
<td>Listed in Hong Kong and mainland China</td>
<td>10</td>
</tr>
<tr>
<td>Listed in mainland China only</td>
<td>4</td>
</tr>
<tr>
<td>Unlisted companies</td>
<td>20</td>
</tr>
<tr>
<td>Subsidiary vs. parent</td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>30</td>
</tr>
<tr>
<td>Listed parents</td>
<td>10</td>
</tr>
<tr>
<td>Unlisted parents</td>
<td>20</td>
</tr>
<tr>
<td>Major listed subsidiaries</td>
<td>9</td>
</tr>
<tr>
<td>Subsidiaries of central SOEs in sample</td>
<td>6</td>
</tr>
<tr>
<td>Subsidiaries of provincial or local SOEs in sample</td>
<td>3</td>
</tr>
</tbody>
</table>

State ownership, at least, is relatively common among carbon majors outside of Western Europe and North America, but a much larger share of the world’s major firms outside China in carbon-intensive sectors are listed on public equity markets. Consider, for instance, the 15 firms that comprise the top five sector leaders outside China in coal power, steel, and aluminum. Of these, 12 are listed and seven are state-owned—with six of the seven state-owned companies based outside Western Europe or North America. By contrast, among the corresponding top 15 in China, just one is fully listed (Hongqiao Group), while 10 are state-owned. (Another five companies have large listed subsidiaries included in our sample; see Appendix Section A for the full inclusion criteria for listed subsidiaries.) The contrasts are particularly pronounced in some sectors. For instance, three of
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China’s largest five steel producers are state-owned unlisted firms, and none of the five are publicly listed. Outside of China, nine of the top 10 biggest steel producers are privately owned firms, and all 10 are publicly listed.

The climate disclosures movement historically emerged out of Western market economies with lower shares of state ownership and greater reliance upon public equity markets for financing. China’s carbon majors reflect a different profile that may have important implications for their disclosure behavior. We return to this topic in Section IV.

Materials Reviewed

We assessed disclosures by the companies reviewed using publicly available documentation. That documentation differed according to company characteristics:

- **Listed companies:** We reviewed each company’s annual and ESG reports for fiscal year [FY] 2021. Annual reports were available for all companies reviewed, and ESG reports for all but one company reviewed.
  - Most listed companies in our dataset were listed across multiple jurisdictions and, in some cases, issued separate annual and/or ESG reports for different exchanges. For companies listed only on mainland Chinese exchanges, we reviewed reports on these exchanges.
  - All other companies were listed in Hong Kong; for these companies, we reviewed reports filed in Hong Kong, because Hong Kong’s disclosure requirements are the strictest.

- **Unlisted companies:** Public documentation was less consistently accessible for these companies. We reviewed FY2021 ESG reports and annual reports as well as bond prospectuses (2022). We also reviewed readouts on company WeChat channels about company meetings laying out corporate work priorities for 2022. Lastly, we reviewed a handful of published low-carbon action plans referenced but not discussed at length in other reviewed documentation. For more details, see Appendix Section B.

Indicators Assessed

We evaluated the documents identified for each company based on seven indicators. The indicators were developed from a review of existing disclosure assessment methodologies from three major players in this space: the Transition Pathway Initiative,14 the Task Force on Climate-Related Financial Disclosures,15 and Climate Action 100+.16 These assessment frameworks have usually been applied to publicly listed companies, but our sample includes a number of unlisted companies.17 Unlisted companies generally face fewer disclosure requirements than listed companies, because they are not raising equity capital from public markets.
With this in mind, we developed a set of indicators that would allow us to measure broad variation in disclosure quality among firms. These include foundational indicators of climate governance such as emissions measurement and emissions reduction targets and plans, as well as more advanced indicators around risk control and board engagement. Higher-quality disclosures use specific and measurable targets for climate progress, share information that investors need to measure performance, and demonstrate that a firm recognizes the relevance of climate for core business strategy. Our indicators attempt to capture these attributes, which align broadly with criteria like “verifiability, reliability, comparability, and consistency” in disclosures that, per the literature, can signal better sustainability performance. The seven disclosure evaluation indicators used in this study are:

- **Q1**: Does the company discuss climate or greenhouse gas (GHG) emissions in any fashion?
- **Q2**: Does the company report its Scope 1 and 2 emissions for 2020 or 2021? If so, what are they (in million metric tons)?
  - Note: No companies reported Scope 1 but not Scope 2 emissions.
- **Q3**: Does the company present a specific and time-bound target for reducing emissions or emissions growth (excluding targets that are the same as the national 30-60 target)?
- **Q3a**: Does the company present a specific and time-bound target for reducing total emissions below peak or current levels (excluding targets that are the same as the national 30-60 target)?
  - Note: Q3a is more stringent than Q3, as it requires targets to actually reduce emissions as against some current or peak level—that is, to bend their emissions curve downward. Companies that only target peaking emissions or reducing emissions intensity (emissions per unit of GDP) meet the criterion of Q3 but not Q3a; their pledges entail slower or plateauing emissions growth but do not specify a subsequent absolute reduction.
- **Q4**: Does the company present statements of corporate plans or visions that (1) could support deep emissions cuts across all of the company’s major emissions pathways and (2) have at least some concrete detail on planned actions?
- **Q5**: Does this company discuss risk it faces related to GHG emissions or climate?
- **Q6**: Does this company explicitly assign responsibilities to the board on corporate actions to mitigate emissions or respond to climate change?

For more details on how we interpreted Q3, Q3a, and Q4, see Appendix Section C.
III. Findings

The survey found that levels of climate disclosure among China’s carbon majors vary widely (Table 5). All firms surveyed, except those with minimal public documentation, at least mentioned emissions or climate in the materials reviewed (Q1). But majors listed in Hong Kong provide much fuller climate reporting than their unlisted or mainland-listed counterparts.
### Table 5: Climate disclosures by China's carbon majors

<table>
<thead>
<tr>
<th>#</th>
<th>Company name</th>
<th>Parent company</th>
<th>Industry</th>
<th>Controlling ownership</th>
<th>Q1</th>
<th>Q2 (mt CO₂e emissions)</th>
<th>Q3</th>
<th>Q3a</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
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<td>HK1</td>
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<td>UL1</td>
<td>Aluminum</td>
<td>Govt. (central)</td>
<td>X</td>
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<td>X</td>
<td>X</td>
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<td>Aviation</td>
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*Continued on next page*
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<th>Parent company</th>
<th>Industry</th>
<th>Controlling ownership</th>
<th>Q1</th>
<th>Q2 (mt CO₂e emissions)</th>
<th>Q3</th>
<th>Q3a</th>
<th>Q4</th>
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<th>Q6</th>
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**Listed only in the mainland**

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<th>Q2 (mt CO₂e emissions)</th>
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<th>Q3a</th>
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<th>Q5</th>
<th>Q6</th>
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**Unlisted**

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<th>Q5</th>
<th>Q6</th>
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<tr>
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<td>Govt. (provincial)</td>
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<th>Parent company</th>
<th>Industry</th>
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<th>Q1</th>
<th>Q2 (mt CO$_2$e emissions)</th>
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<th>Q3a</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
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<td></td>
</tr>
<tr>
<td>UL20</td>
<td>China Energy Investment Corporation (CHN Energy)</td>
<td></td>
<td>Chemicals, thermal power</td>
<td>Govt. (central)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Emissions are given in million metric tons of carbon dioxide equivalent (CO$_2$e). * indicates that at least one of the major disclosure documents (ESG reports, annual reports, and bond prospectuses) were not found for this company. For Hubei Yihua Chemical Industry Co., this was the ESG report. For unlisted companies, see Appendix Table A-2. ** indicates that the figure reported is for 2020 and that no figure is available for 2021. *** indicates that the figure reported is for 2020 and is presented only in a chart.

Source: Authors’ Analysis.
There are certainly major areas for improvement in disclosure quality. Almost no unlisted firms report total emissions, for instance, while the reviewed firms that were listed only on the mainland offered very limited disclosures, particularly related to addressing Q3 to Q6.

Of course, the climate disclosures movement is a global one—Chinese firms are not the only ones working to adapt. To compare Chinese firms’ disclosure performance with their international peers, the authors analyzed data from the Transition Pathway Initiative (TPI), which has scored corporate climate governance quality for around 600 listed companies across 16 sectors. This data indicates that Chinese listed firms’ disclosure performance tends to lag international peers—both within the seven sectors covered in this report and across all 16 sectors in the dataset.

Survey Results

Most emissions disclosure is by Hong Kong–listed firms.

HKEX–listed companies account for the majority of the 18 companies in our dataset that disclose emissions volumes (Q2). All 15 companies listed in Hong Kong report Scope 1 and Scope 2 emissions. Of the remaining three companies that disclose emissions, two are listed only in the mainland and one is unlisted. In terms of ownership, 11 of the 15 HKEX–listed companies and the single unlisted company that disclose Scope 1 and Scope 2 emissions are central state–owned enterprises (SOEs). The remaining six firms that report emissions volumes are evenly divided between provincial SOEs and private companies (see Table 6).
None of the carbon majors disclose Scope 3 emissions, which are emissions from value chain activities. The carbon majors for which the reporting of Scope 3 emissions is most relevant are oil and natural gas companies. In the oil and natural gas industry, Scope 3 emissions are primarily emissions that are released when consumers drive, fly, or heat homes and buildings.\textsuperscript{19} Data from CDP shows that Scope 3 emissions account for 89 percent of total emissions from oil and natural gas companies.\textsuperscript{20} Of the 58 oil and gas companies in the TPI dataset, 40 disclose Scope 3 emissions. Such reporting is not limited to countries domiciled in Western markets; 10 of the 16 oil and gas companies in this dataset from countries outside the Organisation for Economic Co-operation and Development disclose Scope 3 emissions, including companies headquartered in Brazil, India, Russia, South Africa, and Thailand.\textsuperscript{21}

**Majority of emissions targets are by unlisted firms.**

Target-setting is relatively strong from unlisted companies. Ten out of the 20 unlisted firms have set specific and time-bound targets for reducing or mitigating CO\textsubscript{2} emissions growth (eight of the 10

### Table 6: China's carbon majors corporate climate disclosure survey results

<table>
<thead>
<tr>
<th>Disclosure evaluation indicators</th>
<th># of companies</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q3a</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>By listing location</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listed in Hong Kong</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Listed only in the mainland</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Unlisted</td>
<td>20</td>
<td>17</td>
<td>1</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>36</td>
<td>18</td>
<td>17</td>
<td>10</td>
<td>14</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td><strong>By ownership</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owned by central government</td>
<td>23</td>
<td>23</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>10</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Owned by a provincial government</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Owned by a municipal government</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Privately owned</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>36</td>
<td>18</td>
<td>17</td>
<td>11</td>
<td>14</td>
<td>22</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Authors’ Analysis.
are central SOEs) (Q3). Seven of these unlisted companies have also set targets for reducing total emissions below peak or current levels that are different from China’s national targets of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060 (Q3a). CNOOC, a national oil company, has set both types of targets. The company aims to peak its emissions by 2028 and achieve carbon neutrality by 2050. It has also targeted a 10–18 percent reduction in carbon emissions intensity between 2021 and 2025 (See Table 7).22

Table 7: China carbon majors that have emission peaking and/or reduction targets

<table>
<thead>
<tr>
<th>Listing info.</th>
<th>Company</th>
<th>Date for peak carbon emissions</th>
<th>Date for carbon neutrality</th>
<th>Other carbon reduction target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed in Hong Kong</td>
<td>Aluminum Corp. of China Limited (Chalco)</td>
<td>2025</td>
<td></td>
<td>2035: Reduce carbon emissions by 40%</td>
</tr>
<tr>
<td>Listed in Hong Kong</td>
<td>Anhui Conch Cement Company Limited</td>
<td></td>
<td></td>
<td>2025: 6% reduction in carbon intensity of clinker prod. from 2020</td>
</tr>
<tr>
<td>Listed in Hong Kong</td>
<td>Huaxin Cement Co., Ltd.</td>
<td></td>
<td></td>
<td>2030: 70% reduction in carbon intensity of clinker production from 2005 levels</td>
</tr>
<tr>
<td>Listed in Hong Kong</td>
<td>China Petroleum &amp; Chemical Corporation (Sinopec Corp.)</td>
<td>2030</td>
<td>2050</td>
<td>2023: 12.6 million metric ton reduction in carbon emissions from 2018 level</td>
</tr>
<tr>
<td>Listed in Hong Kong</td>
<td>PetroChina Company Ltd.</td>
<td>~2025</td>
<td>~2050</td>
<td></td>
</tr>
<tr>
<td>Listed in Hong Kong</td>
<td>China Shenhua Energy Company Limited</td>
<td>2025</td>
<td>2060</td>
<td></td>
</tr>
<tr>
<td>Listed in mainland only</td>
<td>HBIS Co., Ltd.</td>
<td>2022</td>
<td>2050</td>
<td></td>
</tr>
<tr>
<td>Unlisted</td>
<td>Aluminum Corporation of China (Chinalco)</td>
<td>2025</td>
<td></td>
<td>2035: Reduce carbon emissions by 40%</td>
</tr>
<tr>
<td>Unlisted</td>
<td>State Power Invest Corporation (SPIC)</td>
<td>2023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlisted</td>
<td>China Baowu Iron and Steel Group Co., Ltd.</td>
<td>2023</td>
<td>2050</td>
<td>2025: Achieve the technological capability of reducing carbon emissions by 30% 2035: Reduce carbon emissions by 30%</td>
</tr>
</tbody>
</table>

Continued on next page
Most plans that could support deep emissions cuts are by state-owned firms.

Fourteen companies disclosed at least somewhat detailed plans or visions that could support deep emissions cuts across all of their emissions pathways, 12 of which are SOEs. For example, China Datang Group, an unlisted power generation central SOE, aims to increase the share of non-fossil generation capacity from 35 percent in 2021 to around 60 percent by 2030. The company also aims to decrease the share of thermal power generation capacity to less than 10 percent by 2060. China Datang intends to develop energy storage and hydrogen and to pursue “low-carbon, zero-carbon and carbon-negative technological advances” to support its goals of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060.

---

<table>
<thead>
<tr>
<th>Listing info.</th>
<th>Company</th>
<th>Date for peak carbon emissions</th>
<th>Date for carbon neutrality</th>
<th>Other carbon reduction target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlisted</td>
<td>China Datang Group Co., Ltd.</td>
<td>2030</td>
<td>2060</td>
<td>2030: 20% reduction in emissions per kilowatt-hour</td>
</tr>
<tr>
<td>Unlisted</td>
<td>China Huadian Group Co., Ltd.</td>
<td>2025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlisted</td>
<td>China Baowu Iron and Steel Group Co., Ltd.</td>
<td>2023</td>
<td>2050</td>
<td>2025: Achieve the technological capability of reducing carbon emissions by 30% 2035: Reduce carbon emissions by 30%</td>
</tr>
<tr>
<td>Unlisted</td>
<td>HBIS Co., Ltd.</td>
<td>2022</td>
<td>2050</td>
<td>2025: 10%+ reduction from peak 2030: 30%+ reduction from peak</td>
</tr>
<tr>
<td>Unlisted</td>
<td>Ansteel Group Corporation Limited</td>
<td>2025</td>
<td></td>
<td>2035: 30% reduction in total emissions from peak 2035: 30%+ reduction in carbon emissions intensity</td>
</tr>
<tr>
<td>Unlisted</td>
<td>Beijing Jianlong Heavy Industry Group Co., Ltd.</td>
<td>2025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlisted</td>
<td>China National Offshore Oil Corporation (CNOOC)</td>
<td>2028</td>
<td>2050</td>
<td>2025: 10–18% reduction in carbon emissions intensity from 2021 level</td>
</tr>
<tr>
<td>Unlisted</td>
<td>China National Coal Group (China Coal Grp.)</td>
<td></td>
<td></td>
<td>2025: 20% reduction in the carbon intensity of output value</td>
</tr>
</tbody>
</table>

Source: Company reports.
Discussions of climate risks are more prevalent among Hong Kong–listed firms.

Companies listed in Hong Kong generally disclose more about the risks they face from climate change or GHG emissions than do companies listed only in the mainland or not at all. Several of the Hong Kong–listed companies—including Anhui Conch (cement), China Shenhua (chemicals, thermal power), and PetroChina and Sinopec Corp. (petrochemicals)—identify different categories of climate-related risk and their responses. The categories range from acute risks (extreme weather events interrupting production) to market risks (consumers buying more low-carbon goods and services) to technology risks (the cost of investing in low-carbon technologies).

Discussions of climate risk by other carbon majors are more cursory. For example, Rongsheng Petrochemical, a privately owned company listed in Shenzhen, noted in its 2021 ESG report that it has formulated emergency plans to deal with extreme weather caused by climate change. China National Coal Group, an unlisted company owned by the central government, stated in a 2022 bond prospectus that policies supporting carbon neutrality may have an adverse impact on coal demand.

All companies that assign climate responsibilities to the board are Hong Kong–listed.

Seven companies in the survey dataset assign responsibilities to the board for corporate actions to address climate change, and all are listed in Hong Kong. One of the seven is Sinopec Corp. Its board of directors has several committees with responsibility for climate change. The Strategy Committee is responsible for reviewing plans and policies related to climate change, and the Audit Committee is in charge of identifying, assessing, and managing risks related to climate change. The Sustainability Committee is responsible for supervising the company’s commitment to and performance on climate change. It is comprised of four members, including the chairman of the board, an executive director, a non-executive director, and an independent director.

Major areas for improvement in disclosure quality apply to many firms.

The survey identifies major gaps in reporting. Most striking is the lack of emissions volume disclosures by unlisted firms and, by extension, from leaders in sectors like steel, where no top-five firm or major listed subsidiary discloses its emissions. Former China Energy Investment Group researcher Anthony Ku estimated that China’s top five thermal power companies emitted 3.2 billion metric tons of carbon dioxide equivalent (CO$_2$e) in 2019, more than the total emissions of any country other than China or the US. None of these companies officially reported emissions in 2021. The three major listed subsidiaries reviewed reported emissions of 711 million metric tons, around one-third of their parents’ estimated emissions, per Ku’s figures. Disclosures were also generally limited across all areas for companies listed solely on mainland markets, though the survey captured only four such firms.
Comparative Assessment: Chinese Climate Disclosures in an International Context

How do Chinese firms’ reporting practices compare with those of their international peers? There are very few public analyses of this question. The handful of assessments that have been published or reported cover large-cap firms listed in China and indicate lagging disclosure quality in areas like climate risk and emissions volumes.31

The fragmentary evidence available, however, suggests the need for more comprehensive surveys, particularly ones that compare Chinese firms with their peers in the developing world. A partial step in this direction is to analyze Chinese and non-Chinese companies’ scores under the Transition Pathway Initiative (TPI) project. The TPI assesses 19 indicators against publicly available information, with final scores across five “levels” from 0 to 4. (For context, a Level 0 company is “unaware of (or not acknowledging) climate change as a business issue,” whereas a Level 4 company integrates “a more strategic and holistic understanding of risks and opportunities related to the low-carbon transition into its business strategy and capital expenditure decisions.”32) The 19 indicators include many similar to the disclosure indicators examined in the authors’ survey, such as disclosures on emissions volumes and reduction targets, as well as other indicators like membership in trade associations and the inclusion of climate performance in executive compensation. Like the authors’ survey, it mostly covers large companies in fossil-linked or emissions-intensive sectors. But around half belong to sectors outside of the authors’ study (e.g., coal mining, shipping, auto manufacturing, and consumer goods), and almost all are listed (95 percent or more).

TPI data does suggest a gap in disclosure quality between Chinese firms and their peers in both the developing and developed world. The 47 Chinese companies’ mean (1.4) and median (1) scores lag well below corresponding figures globally (2.9 and 3) and for the developing world (2.1 and 2). This gap extends across a host of different indicators of disclosure quality. On every one of the indicators in the TPI dataset, average scores for Chinese firms trailed both developing country and global averages.33 Among indicators with particularly large gaps between China and its developing-country peers were several associated with disclosures covered in the authors’ survey, including target-setting, risk management, and board appointments.34 Weaker disclosures by Chinese firms are unlikely to reflect differences in firm-level characteristics between Chinese and non-Chinese firms in this dataset. Chinese firms’ average scores trailed cross-sectional averages across different firm sizes, sectors, and listing statuses.35 These gaps likewise persist when restricting comparisons between Chinese and non-Chinese firms to only those in the sectors covered in this report. For further information, see Appendix Section D.
IV. Three Pillars of China’s Climate Disclosure Regime

The survey findings indicate substantial differences in disclosure behavior among Chinese carbon majors, based on their listing status, location, and ownership. To explain these differences, it is essential to comprehend the broader “climate disclosure regime” within which these companies operate, which includes the formal and informal rules and norms that influence their decision-making regarding climate disclosure.

Three pillars of the climate disclosure regime account for the observed disclosure patterns in the survey. The first pillar pertains to regulatory compliances, which are instrumental in explaining why Hong Kong–listed firms in the sample exhibit a much higher rate of emissions disclosure than other firms (Q2). The second pillar relates to political expectations, which drive SOEs to announce decarbonization targets and visions more frequently than other indicators (Q3, Q3a, and Q4). The third pillar encompasses private investor demands: the expectations of international investors encourage Hong Kong–listed firms to discuss climate risk (Q5) and create climate-related board responsibilities (Q6) in greater detail than their unlisted or mainland-listed counterparts. In contrast, mainland Chinese capital markets are currently less demanding in this regard.

Regulatory Compliance

Regulatory compliance is one driver of climate disclosures of Chinese carbon majors, as firms must adhere to their respective regulatory environments, which vary by location, listing status, and sector. Listed companies must follow their exchanges’ policies on the disclosure of climate-related information, while both listed and unlisted companies must comply with government regulations on climate-related information.

Among listed carbon majors, those reviewed are present across all three of China’s major stock exchanges: the Hong Kong Stock Exchange (HKEX) as well as the mainland-based Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE). A handful are also cross-listed on the New York Stock Exchange (NYSE). Of these, the HKEX is the only exchange that mandates specific disclosure of GHG emissions or any other climate issues (see Table 8).
Table 8: Stock exchange climate and ESG reporting policies

<table>
<thead>
<tr>
<th>Activity</th>
<th>HKSE</th>
<th>SSE</th>
<th>SZSE</th>
<th>NYSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issuing ESG reports</td>
<td>Mandatory</td>
<td>Mandatory for STAR Market members</td>
<td>Mandatory for Shenzhen 100 Index members</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Reporting GHG emissions</td>
<td>“Comply or explain” (current)</td>
<td>Voluntary</td>
<td>—</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Disclosing information around climate issues</td>
<td>“Comply or explain”</td>
<td>Voluntary</td>
<td>—</td>
<td>Voluntary</td>
</tr>
</tbody>
</table>

Note: The STAR market is a dedicated board at the Shanghai Stock Exchange for science and technology-focused startup companies. The Shenzhen 100 Index is the Shenzhen Stock Exchange’s flagship index, intended to capture its 100 largest and most liquid companies. None of the reviewed carbon majors fall into these groups. “Voluntary” indicates that the information listed in the Activity column is included in that stock exchange’s ESG reporting guideline.

Source: Authors’ Analysis.

The HKEX has a “comply or explain” rule, whereby noncompliance requires an explanation from the filing company. The list of “climate-related information” subject to this provision includes:

- Scope 1 and 2 emissions, emission targets, and activities taken to accomplish them.
- Description of the “significant climate-related issues which have impacted, and those which may impact, the issuer, and the actions taken to manage them.”

Around 94 percent of issuers in FY2021 chose to comply and provide information on each of these items.

The NYSE does not mandate any climate-specific disclosures. The mainland exchanges require some categories of firms to issue ESG reports, but there are no specific requirements on climate information, and none of the carbon majors reviewed with SSE or SZSE listings fall into the categories for which ESG reports are required. Even among mainland-listed companies that do issue ESG reports, quality can vary significantly due to the fragmented landscape of voluntary guidelines and a lagging familiarity with best-practice reporting among smaller companies.

Hong Kong’s mandates appear to be driving emissions volume disclosures (Q2). As noted above,
all 15 of the Hong Kong–listed carbon majors in the survey disclose emissions, but just two of the four mainland-listed companies and one of the 20 unlisted companies provide any emissions disclosures. Timing of the Hong Kong–listed firms’ first disclosures underscores the importance of regulatory mandates in initiating this behavior: around half of these firms first started disclosing emissions in FY2017, when the exchange’s mandate on this matter went into effect.\(^{39}\)

Unlisted companies are, of course, not subject to any equity–market reporting requirements. But both listed and unlisted companies must comply with Chinese government regulations on collecting climate-related information (Table 9). Authorities have required some firms to report CO\(_2\) emissions internally to the government since 2014.\(^{40}\) From 2022, however, the Ministry of Ecology and Environment (MEE) has begun to introduce a regulatory framework for mandatory emissions disclosure by large and medium-sized firms across thermal power and heavy industry, as part of broader environmental information disclosure requirements.\(^{41}\) The government authorities are required to establish a “legal environmental information disclosure system” (环境信息依法披露系统) to receive firm disclosures and make them freely accessible to the public.\(^{42}\) The power sector implemented this mandate first via MEE regulations issued in March 2022 that apply to all firms with at least 26,000 metric tons of CO\(_2\)e emissions in either 2020 or 2021.\(^{43}\) Firm-level reports are available online at the National Emissions Permit Management Information Platform Public Terminal (全国排污许可证管理信息平台公开端).\(^{44}\)
### Table 9: Selected Chinese government regulations for internal reporting and external disclosure

<table>
<thead>
<tr>
<th>Date</th>
<th>Internal reporting measures in grey; external disclosure measures in white</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2021</td>
<td>The “Notice on Strengthening the Work Related to the Management of Corporate Greenhouse Gas Emissions Reporting” requires that enterprises in eight industries (power, petrochemicals, chemicals, building materials, steel, non-ferrous metals, paper, and aviation) with GHG emissions equal to or greater than 26,000 tons of CO$_2$e in any year from 2013 to 2020 report their emissions to the government. Similar requirements for internal reporting (i.e., reporting to the government) have been in place since 2014. (Issuing agency: MEE.)</td>
</tr>
<tr>
<td>May 2021</td>
<td>The “Notice on Printing and Distributing the Reform Plan for the Legal Disclosure of Environmental Information” sets out the goal of having a “mandatory environmental information disclosure system basically formed” by 2025. It has no specific language on GHG disclosures. But it does require disclosure of corporate environmental information in annual reports and “other relevant reports” for listed or bond-issuing companies that meet certain criteria. One category of affected companies, “key polluters” (重点排污单位), includes “large and medium-sized companies” across emissions-intensive industries such as thermal power, cement, steel, non-ferrous metals, petrochemicals, chemicals, and others in heavy industry. (Issuing agency: MEE.)</td>
</tr>
<tr>
<td>June 2021</td>
<td>The “Guidelines on the Content and Format of Information Disclosure by Companies Offering Securities to the Public No. 2 – Content and Format of Annual Reports (Revised in 2021)” encourages listed companies to voluntarily disclose “the measures and effects [they] took to reduce [their] carbon emissions” as part of their annual reports. (Issuing agency: China Securities Regulatory Commission.)</td>
</tr>
<tr>
<td>February 2022</td>
<td>The “Measures for the Administration of Legal Disclosure of Enterprise Environmental Information” mandates disclosure of carbon emission volumes and source facilities as part of eight categories of required environmental information disclosure from three types of companies. One type, “key polluters” (重点排污单位), includes “large and medium-sized companies” such as thermal power, cement, steel, non-ferrous metals, petrochemicals, chemicals, and others in heavy industry. The measures stipulate that the MEE will establish a free, open online portal to receive and publish these disclosures. (Issuing agency: MEE.)</td>
</tr>
<tr>
<td>March 2022</td>
<td>The “Notice on Doing a Good Job in the Management of Corporate Greenhouse Gas Emissions Reporting in 2022” states that all enterprises with GHG emissions of at least 26,000 tons of CO$_2$e or comprehensive energy consumption of about 10,000 tons of standard coal in either 2020 or 2021 across industries including building materials, steel, nonferrous metals, petrochemicals, chemicals, papermaking, and civil aviation must carry out GHG emission reporting and verification and report their emissions to the government. (Issuing agency: MEE.)</td>
</tr>
<tr>
<td>March 2022</td>
<td>The same regulation states that all electric power enterprises with GHG emissions of at least 26,000 tons of CO$_2$e or comprehensive energy consumption of about 10,000 tons of standard coal in either 2020 or 2021 must disclose their GHG emissions for the 2019-20 carbon market compliance cycle and for 2021. (Issuing Agency: MEE)</td>
</tr>
</tbody>
</table>

Source: See endnote 45 for full reference information.
These new MEE regulations have created China’s first framework for systematic corporate reporting across China’s major emitters. They align with China’s high-level aim of having a “mandatory environmental information disclosure system basically formed” (环境信息强制性披露制度基本形成) by 2025. However, the usefulness of the current system is limited due to several factors. First, authorities have not yet implemented mandatory disclosures beyond the power sector, which likely reflects the scope of China’s emissions trading system (ETS), a significant driver of its firm-level disclosure mandates. As noted above, although the ETS was launched in 2021 within the power sector only, it is earmarked for expansion across seven other major emitting sectors in heavy industry and transportation in the coming years.

Second, the reporting platform does not include identifying information on the ultimate parent companies in subsidiary reporting—crucial information for investors. Major thermal power companies in China often consist of many small subsidiaries, with each owning a handful of the parent’s power generation assets. For instance, Huadian Power International (HDPI), a listed subsidiary controlling just under half of the coal power capacity owned by power-sector carbon major Huadian Group, lists in its 2021 annual report more than 25 different subsidiaries owning its coal-fired power plants. The entities that report on the MEE platform are these subsidiaries, not the parent company—but it is often the parent company that accesses capital markets to finance these assets. Lenders and capital market participants that provide financing to companies like HDPI or Huadian Group cannot use the MEE platform to directly look up the company’s total emissions; they would need to identify all of the company’s asset-owning subsidiaries and pull emissions data from each one. Including identifying information on ultimate parent companies in subsidiary reporting could make this data easier to use for investors.

Nonetheless, the climate disclosure environment in China is evolving rapidly. The China Enterprise Reform and Development Society (CERDS), a government think tank supervised by the State-Owned Assets Supervision & Administration Commission (SASAC), released China’s most authoritative voluntary ESG disclosure guidelines yet in June 2022. These guidelines emphasize quantitative data disclosure on climate topics from emissions volumes to climate risk management. The CERDS guidelines are part of a broader trend, as authorities seek to expand ESG reporting in ways that align with global standards, work for Chinese firms, and serve national goals. SASAC expects publicly listed central SOEs to issue ESG disclosure reports by 2023. China Securities Regulatory Commission vice chair Fang Xinghai said in April 2022 that establishing “standards for mandatory [ESG] disclosure” for listed companies is “the next step,” and more recent media reports suggest that drafting for this process is underway.
Political Expectations

Regulatory mandates around climate disclosures for Chinese corporates today cover only emissions volumes. Understanding the drivers of other types of disclosures requires considering incentives from stakeholders.

The party-state is particularly important—as an owner, a financier, and a political authority with broad discretionary powers. The state is the controlling shareholder in most of the reviewed companies, including 17 of the 20 unlisted firms. Even for private firms, China’s Company Law requires companies with three or more Communist Party members to establish party organizations. According to Kenny Tsang of asset manager Federated Hermes, one such organization, the Party Committee, functions as a third-party auditor to make sure a company’s board aligns with the goals of China’s leadership. Meanwhile, the state also owns the large banks that dominate China’s debt capital markets as lenders, investors, and underwriters.

These conditions help explain why the state is a much more important audience for ESG reporting in China than in market economies. Indeed, the state drove early ESG reporting in China—the practice first emerged there as a top-down state mandate, rather than a bottom-up response to investor demands. Companies use ESG reports to show compliance with the Chinese leadership’s policy priorities. As researchers from the State Grid Corporation of China and North China Electric Power University wrote in 2022, “companies can show the government their determination to actively respond to environmental protection and emission reduction policies and fulfill their social responsibilities” through climate disclosures.

Some types of disclosures, though, align more immediately with national policies than others. The dual carbon goals of peaking emissions before 2030 and achieving carbon neutrality by 2060 are the centerpieces of Chinese climate policy. Firms can demonstrate support for leadership on peaking and neutrality by announcing their own emissions reduction targets, plans, and visions. These considerations should be particularly important for state-owned enterprises, which bear special responsibility for carrying out policy aims. Indeed, after the dual carbon announcement, some of the first policy statements prioritizing neutrality and peaking were directed at central SOEs.

The authors’ survey confirms that political considerations are an important driver of disclosures around emissions reduction targets, plans, and visions (Q3, Q3a, and Q4) (Table 7). As noted earlier, SOEs—and especially central SOEs—are more likely to offer these kinds of disclosures than their private counterparts. Around half of the SOEs reviewed (15 of 31) shared targets for reducing emissions or mitigating emissions growth (Q3), as opposed to a quarter of private firms (two of eight). Central SOEs comprised a disproportionate share of the firms (nine of 11) that announced...
targets to cut emissions below peak or current levels (Q3a), and SOEs were almost all of the firms (12 of 14) with plans or visions for emissions cuts meeting criteria Q4.

Of course, a comparison of private and state-owned firms in the sample suffers from the small number of private firms included. But examining disclosures specifically by state-owned enterprises confirms the role of political considerations in driving disclosures of targets, plans, and visions. Two pieces of evidence stand out:

- The shares of unlisted state-owned companies making these disclosures is similar to those of Hong Kong–listed state-owned companies. By contrast, Hong Kong–listed SOEs are much more likely than their unlisted peers to meet other indicators. Most notably, almost all state-owned firms disclosing emissions volumes (Q2) or explicitly assigning responsibilities around climate change to the board (Q6) are listed in Hong Kong.

- Thirteen of the 15 state-owned firms with targets to mitigate emissions growth are explicitly targeting to peak emissions and/or achieve carbon neutrality in advance of the national peaking and neutrality goals. All but one (PetroChina) of these 13 announced their targets after Chinese leader Xi Jinping announced China’s dual carbon targets.

China Baowu, an iron and steel SOE, offers a vivid example of political motivations shaping disclosures around targets, plans, and visions. The company’s 2021 social responsibility report frames its detailed action plan for emissions reduction with the following invocation: “China Baowu is determined to, following the guidance of Xi Jinping’s thought on ecological civilization, act as a firm leader in the green and low-carbon development of the steel industry in the new era, and explore the path to achieve carbon neutrality in the steel industry.”

**International Investor Pressure**

Publicly traded Chinese companies—along with those of other countries—are under pressure from international investors to strengthen their climate disclosures. Chinese companies have an incentive to provide this information because it is essentially a prerequisite for foreign institutions to invest in them or for foreign banks to do business with them. Indeed, China Securities Regulatory Commission vice chair Fang Xinghai said in April 2022:

“If you don’t disclose, you can’t go public, and you won’t get the support of international capital. Now, international investors attach great importance to ESG disclosures. If a company does not disclose or the disclosure standard is not high or the quality of the disclosure is not good, then international capital may not invest, which would have a significant negative impact on the valuation of our companies.”
China’s Climate Disclosure Regime: How Regulations, Politics, and Investors Shape Corporate Climate Reporting

The authors’ survey indicates that engagement with international investors can motivate Chinese companies to make more thorough climate disclosures, especially with respect to discussions of climate risk (Q5) and the assignment of responsibilities for addressing climate change to the board (Q6). Indeed, nearly 60 percent of the companies reviewed that identify climate risks are listed in Hong Kong (HKEX-listed companies make up under 40 percent of the total sample). Moreover, as noted in Section III, all seven of the carbon majors that assign responsibilities for responding to climate change to the board are HKEX-listed companies.

The role investors can play in spurring China’s companies to strengthen climate disclosures, especially around climate risks (Q5) and board responsibilities (Q6), is illustrated by Federated Hermes’ engagement with two of China’s national oil companies (and carbon majors), Sinopec Corp. and PetroChina. Federated Hermes met with senior representatives of both companies to encourage them to publish more information about their climate change strategies and risk mitigation measures.64 The asset manager also held a workshop for Sinopec Corp. on the recommendations of the Task Force on Climate-Related Financial Disclosures and discussed how to analyze the resilience of its portfolio to various low-carbon scenarios.65

According to Federated Hermes, Sinopec Corp. and PetroChina both subsequently strengthened their climate disclosures. In a case study of its engagement with Sinopec Corp., the asset manager details a number of changes that occurred at the company since the start of their engagement, such as the establishment of board oversight on climate governance, the creation of internal task forces to assess climate risks and opportunities, and the disclosure of total emissions by business unit.66 Climate Action 100+ credits engagement with Federated Hermes as contributing to PetroChina’s improved disclosure of a climate change strategy and intention to align its climate policy with the Paris Agreement and a less than 2°C temperature increase scenario.67

While investors on public equity markets have been a primary driver for increased reporting on climate-related risk by oil and natural gas exploration and production companies,68 China’s carbon majors rely less on equity markets for financing than their international peers. Fixed-income markets—sources of debt financing for both listed and unlisted firms—have been slower globally to integrate ESG considerations into investing decisions than equity markets.69

In contrast to international investors, China’s mainland investors are not a source of pressure for stronger climate disclosures. According to Remoca Shi of WeCarbon, a Shanghai-based firm focused on sustainability tech and ESG consulting, “domestic private investors have been deploying into their investment decisions ESG concepts, but not ESG evaluation, as the latter is not yet standardized and mature within China.”70 Her comments align with remarks that Ma Jun, chair of
the Green Finance Committee of the China Society for Finance and Banking, made about mainland investors and ESG investing:

“Investors’ understanding and needs for ESG are not yet in place. At present, the ESG investment philosophy of investors in the asset market, especially retail investors, has not been fully popularized, and the demand for ESG products is still not strong. The development of the ESG investment market is still in its infancy.”71
V. China’s Disclosure Regime and Quality Relative to International Peers’

The distinctive disclosure regime that Chinese companies experience helps drive the large variations in disclosure quality across carbon majors. This regime may also help explain the different patterns of disclosure behavior of Chinese versus non-Chinese firms.

As noted in Section III, the authors’ analysis of TPI data aligns with fragmentary evidence from other studies to suggest that, in general, Chinese firms’ disclosures tend to be more limited than those of both developing- and developed-world peers. A full assessment of this issue is beyond the scope of this paper, but further studies of this gap, particularly between Chinese firms and their developing-world peers, could be worth exploring.

That said, a pattern of weaker disclosures among Chinese firms aligns with a distinctive feature of China’s disclosure regime: the role of the party-state. The party-state is central to all three pillars of the regime: the highest national regulator, the overarching political authority, and the owner of many of China’s carbon majors. It is also an unusually important audience for ESG reporting by Chinese corporates, as noted above. This context could affect corporate incentives around disclosures in two ways.

First, the centrality of the state as an audience for ESG reporting may tie Chinese firms’ corporate reporting practices more closely to formal requirements than their international peers’. Those requirements are limited at present, as described in Section IV. The central government’s dual carbon targets made target-setting politically salient, as a way for firms to demonstrate alignment with state priorities. On more niche climate disclosure topics like climate risk, however, regulatory requirements are the clearest signals of state priorities; without such requirements, firms may see little reason to disclose. This context makes regulators’ interest in strengthening regulatory requirements for mainland equity markets particularly important.

Second, at least some types of climate disclosures that are valued by private investors may be less important to the party-state. One example is the explicit assignment of climate change responsibilities to the board, disclosed by only seven of the 39 carbon majors in our survey. Such disclosures give private investors a tool to both influence and monitor how boards incorporate climate into their mandates. But the party-state has more direct tools to those ends. At state-owned enterprises, it controls leadership appointments and can impose these responsibilities directly as part of its performance evaluation system. And institutions like party committees, described earlier, can...
help the party-state direct and monitor agenda-setting in private companies.

Even with target-setting, in which the firms surveyed have been more proactive, the state may not need firms to set targets themselves. It can impose targets upon firms, as it did with energy efficiency targets for large energy consumers from 2006 to 2016.73 More broadly, firms are indirectly subject to a host of national, subnational, and sectoral targets for guiding economic activity; on climate issues, firms that have eschewed peaking targets are still subject to national plans based upon the 2030 peaking goal.74

The weak incentives for voluntary climate disclosures described above align well with existing literature on financial reporting in China. Canadian academics Hai Lu, Jee-Eun Shin, and Mingyue Zhang identify several reasons from that literature for why public disclosure serves a less central role in Chinese corporate governance than in Western economies.75 Accounting practices in Western economies have emerged to provide private, arms’-length shareholders and financiers with the information they need to monitor managerial behavior at firms that receive their capital. Public information disclosure ensures access to this information across these many and diffuse actors. Ownership structures in China are often far more concentrated, with the state as a dominant shareholder or financier. More generally, corporate decision-making relies less on shareholder preferences and more on coordination across state agencies, banks, and other stakeholders. Chinese accounting practices have evolved to serve this diverse array of stakeholder needs as opposed to shareholder needs. In this environment, Lu, Shin, and Zhang explain, “private communication and close relations with major stakeholders constitute a viable and effective communication channel.”76

Although the party-state can access information and exercise control through channels unavailable to private investors in Western markets, it could still benefit from disclosure mandates. For one, such mandates could bolster Chinese firms’ access to international capital. They could help improve firms’ data quality as well as stakeholders’ access to it. (Regulators have cited poor emissions data quality, in particular, as a barrier to the expansion of the carbon market.)77 The expansion of China’s environmental information disclosure requirements during the 2000s and 2010s—including new mandates for firms and local governments to publicize pollution and air quality data—reflected in part the recognition of transparency’s many benefits to regulators; the requirements helped regulators enlist the public in monitoring firm behavior, for instance, and forced firms to monitor their pollution levels more diligently.78 Better climate disclosure could serve similar purposes.

Regulatory efforts to strengthen disclosure practices will be crucial for progress that persists amid fluctuating political priorities. For instance, the dual carbon goals initially prompted a flurry of emissions reduction targets and plans by bureaucrats and firms. But these announcements slowed in late 2021, as price shocks and the war in Ukraine shifted the political focus to energy security.79 Disclosure mandates can standardize better climate reporting amid these ebbs and flows.
VI. Conclusion

Leadership in the low-carbon transition requires building a financial system that accounts for the changing profiles of risk that the transition brings. Climate disclosures—data on emissions footprints and mitigation targets, for instance, or information about how a company is incorporating climate into governance, strategy, and risk management—can provide the information needed to better manage that risk. These benefits and others have prompted the Securities and Exchange Commission to propose the US’s first systematic climate disclosure mandates for listed companies.

This report provides a baseline understanding of the disclosure environment in China, the world’s biggest carbon emitter. A survey of disclosures from 39 of China’s largest emitters—its “carbon majors”—reveals variations in disclosure depth and quality that point to a distinctive climate disclosure regime centered around three pillars: regulatory requirements, political expectations, and international investor pressure. Stricter regulatory requirements and greater exposure to international investors explains why Hong Kong–listed companies’ disclosures around emissions volume, climate risk, and board-level climate responsibilities tend to be more comprehensive than their unlisted and mainland–listed peers. But state ownership rather than listing status seems to be a higher marker for disclosures of targets and mitigation plans, reflecting political expectations: state–owned companies use such disclosures to signal support for China’s national targets and mitigation plans.

The three-pillar regime helps explain variation among Chinese firms. It also connects neatly with existing literature on Chinese ESG and financial reporting to explain why Chinese firms’ disclosure quality can lag that of developed– and developing–world peers. Existing literature offers fragmentary evidence of such a gap. The authors strengthen that evidence with an analysis of 600 Chinese and non–Chinese firms’ disclosures captured by TPI. The gap with developed–world countries is unsurprising: investor pressure is strongest in developed–world markets that birthed the climate disclosures movement. But even among developing–world markets, no large economies have a stakeholder like the Chinese party–state. It dominates Chinese capital markets as an owner and a financier, while officials, too, have an unusually important role in Chinese corporate governance. These conditions encourage some kinds of climate disclosures to signal alignment with political priorities, but otherwise create weaker incentives for voluntary disclosures beyond regulatory requirements.

Still, China’s ever–evolving disclosure environment bears monitoring. The Chinese Ministry of Ecology and Environment is building a framework for mandatory emissions and other environmental
disclosure by large and medium-sized firms in thermal power and heavy industry. Meanwhile, climate disclosure requirements for listed companies in China are likely to intensify as part of a broader regulatory push on ESG reporting. The State-Owned Assets Supervision & Administration Commission expects all publicly listed SOEs to issue ESG disclosure reports by 2023, and China Securities Regulatory Commission vice chair Fang Xinghai has said that establishing mandatory ESG reporting requirements for all listed companies is the “next step.” Additionally, China’s emissions trading system will expand beyond power generation to seven other major carbon-emitting sectors, thereby necessitating emission reporting by many unlisted firms operating in these sectors. Future investors should have more opportunities to incorporate climate into their investing decisions in China.
Appendix

A. Company Selection Methodology

We identified the largest three to five Chinese companies in each sector based on their share of key indicators of likely emissions output (Table A-1). For instance, for iron and steel companies, we looked at the largest five companies by crude steel output, while for aviation we looked at the largest three companies by scheduled revenue passenger-kilometers. Indicators used are all capacity or production measures. Data on emissions intensity is not available; in its absence, these measures are best-available proxies.

Table A-1: Sector-level indicators used for company selection

<table>
<thead>
<tr>
<th>Sector</th>
<th>Indicator</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity generation</td>
<td>Coal power capacity</td>
<td>Global Energy Monitor</td>
</tr>
<tr>
<td>Iron and steel</td>
<td>Crude steel production</td>
<td>World Steel Association</td>
</tr>
<tr>
<td>Cement</td>
<td>Clinker capacity</td>
<td>China Cement Association</td>
</tr>
<tr>
<td>Aviation</td>
<td>Scheduled revenue passenger-km</td>
<td>International Air Transport Assoc.</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Synthetic ammonia production (top 4)</td>
<td>Media reports</td>
</tr>
<tr>
<td></td>
<td>Methanol production (largest)</td>
<td></td>
</tr>
<tr>
<td>Petrochemicals</td>
<td>Refining capacity</td>
<td>Fei, Wang, and Gao (2022) (industry expert report); Corp. annual reports</td>
</tr>
<tr>
<td>Aluminum</td>
<td>Primary aluminum production</td>
<td>Corporate annual reports</td>
</tr>
</tbody>
</table>

Source: See note 80 for full reference information.

The companies identified by this approach, of course, have subsidiaries—and, in the case of listed subsidiaries of unlisted parent companies, they often disclose more than their parents. We chose to add such “major listed subsidiaries” of unlisted parent companies to our review. We defined a “major listed subsidiary” as a listed subsidiary that, based on public information, accounted for at least half of its parent’s carbon-intensive assets, production, or sold goods in the selected industry. Where a firm’s reporting did not provide enough data to make this judgment, we used operating revenue as a (rough) proxy. Where listed subsidiaries comprised more than three-quarters of the parent’s carbon-intensive assets, production, or sold goods, we reviewed the listed subsidiaries only and not the unlisted parent companies.
B. Documentation Reviewed for Unlisted Companies

Public documentation for unlisted companies is less consistently available than for listed companies, so our review covered a broader range of documents:

- ESG reports from 2021, available for 12 of the 20 companies reviewed.
- Annual reports from 2021 aimed at bondholders, available for 15 companies.
- Bond prospectuses for the most recent medium-term note (two to three years or longer) issued by each company in 2022 on the Shanghai Clearing House, the largest platform in China’s inter-bank bond market for debt financing by non-financial corporates. These were available for 14 companies.
- Readouts on company WeChat channels about key end-of-year or start-of-year meetings for 2022 that lay out corporate work priorities for the coming year. (Examples of such meetings were annual work meetings, representative meetings, cadre meetings, employee representative meetings, and full committee meetings.) These were available for 17 companies.

For a small number of companies, we reviewed additional documents. These included ESG reports from 2020 where 2021 ESG reports were unavailable, for instance, as well as published low-carbon action plans referenced but not discussed at length in other reviewed documentation. (See Table A-2.)

Table A-2: Documents reviewed for unlisted companies

<table>
<thead>
<tr>
<th>Company name</th>
<th>Industry</th>
<th>Controlling ownership</th>
<th>ESG report</th>
<th>Annual report to bondholders</th>
<th>Bond prospectus</th>
<th>Meeting readouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Corporation of China (Chinalco)</td>
<td>Aluminum</td>
<td>Govt. (central)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Xinfa Group</td>
<td>Aluminum</td>
<td>Private</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Power Investment Corporation (SPIC)</td>
<td>Aluminum, thermal power</td>
<td>Govt. (central)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>East Hope Group</td>
<td>Aluminum</td>
<td>Private</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China Huaneng Group Co., Ltd.</td>
<td>Thermal power</td>
<td>Govt. (central)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Company name</td>
<td>Industry</td>
<td>Controlling ownership</td>
<td>ESG report</td>
<td>Annual report to bond-holders</td>
<td>Bond prospectus</td>
<td>Meeting read-outs</td>
</tr>
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<td>-------------------------------------------------------</td>
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<td>-------------------------------</td>
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<td>------------------</td>
</tr>
<tr>
<td>China Datang Group Co., Ltd.</td>
<td>Thermal power</td>
<td>Govt. (central)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>China Huadian Group Co., Ltd.</td>
<td>Thermal power</td>
<td>Govt. (central)</td>
<td>X*</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>China Baowu Iron and Steel Group Co., Ltd.</td>
<td>Steel</td>
<td>Govt. (central)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>HBIS Group Co., Ltd.</td>
<td>Steel</td>
<td>Govt. (provincial)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Jiangsu Shagang Group Co., Ltd.</td>
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<td>Private</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ansteel Group Corporation Limited</td>
<td>Steel</td>
<td>Govt. (central)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Beijing Jianlong Heavy Industry Group Co., Ltd.</td>
<td>Steel</td>
<td>Private</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>China National Building Material Group Co., Ltd.</td>
<td>Cement</td>
<td>Govt. (central)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Hongshi Holding Group Co., Ltd.</td>
<td>Cement</td>
<td>Private</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sinochem Holdings Corporation Ltd.</td>
<td>Petrochemicals</td>
<td>Govt. (central)</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>China National Offshore Oil Corporation (CNOOC)</td>
<td>Petrochemicals</td>
<td>Govt. (central)</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Yuntianhua Group Co., Ltd.</td>
<td>Chemicals</td>
<td>Govt. (provincial)</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Hubei Yihua Group Co., Ltd.</td>
<td>Chemicals</td>
<td>Govt. (muni.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China National Coal Group (China Coal Group)</td>
<td>Chemicals</td>
<td>Govt. (central)</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>China Energy Investment Corporation (CHN Energy)</td>
<td>Chemicals, thermal power</td>
<td>Govt. (central)</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

*FY2020 version reviewed (FY2021 version not available at time of analysis)*

Note: *FY2020 version reviewed (FY2021 version not available at time of analysis)*

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C. Disclosure Evaluations: Q3, Q3a, and Q4

We established several interpretative standards to guide our assessment of corporate disclosures. Below, we list the relevant questions and the associated standards used.

- **Q3:** Does the company present a specific and time-bound target for reducing emissions or mitigating emissions growth?
  - **Note:** We marked as “no” companies that targeted peaking emissions by 2030 or achieving carbon neutrality by 2060. Such targets may be simply reiterating national targets and thus may not reflect independent corporate action.

- **Q3a:** Does the company present a specific and time-bound target for reducing total emissions below peak or current levels (excluding targets that are the same as the national 30–60 target)?
  - **Note:** We marked as “no” companies that targeted achieving carbon neutrality by 2060. Such a target may be simply reiterating national targets and thus may not reflect independent corporate action.

- **Q4:** Does the company present statements of corporate plans or visions that (1) could support deep emissions cuts across all of the company’s major emissions pathways and (2) have at least some concrete detail on planned actions?
  - **Note:** This criterion was intended to assess whether a company was willing to publicly recognize the actions it needed to take to achieve deep decarbonization in its operations. Meeting this criterion did not require specific deployment or action targets in each pathway, but it did require concrete proposed actions, as opposed to general statements.
    - For pathways where emissions reduction measures are heavily pre-commercial (as in cement or steel), the proposed actions did not need to deliver deep emissions cuts but merely to support long-term progress toward that end.
    - **Example:** In the cement sector, emissions come from two major pathways, fuel combustion (30–40 percent) and calcination (60–70 percent). Suppose we are evaluating two companies:
      - **Company A** says it will reduce emissions by powering its grinders with 75 percent renewable electricity and raising its use of waste-derived fuels from 5 percent to 25 percent. These measures both involve mature technologies that can significantly fuel combustion emissions. But the company does not describe any efforts to reduce calcination emissions. It receives a “no.”
Company B says it will reduce emissions by deploying renewable electricity, increasing its use of waste-derived fuels, carrying out carbon-capture pilots, and researching low-clinker cements. These measures cover both of the two major emissions pathways (fuel combustion and calcination). Calcination emissions reduction efforts are heavily pre-commercial, and carbon-capture pilots and low-clinker cement research can support the company’s long-term deployment of these technologies. It receives a “yes.”

D. TPI Data: Cross-Sectional Average Scores

Table A-3 presents cross-sectional average scores for each indicator in the Transition Pathway Initiative (TPI) dataset according to geography, sector, and firm size/listing status. For each indicator, TPI analysts score firms as a “yes” (1) or “no” (0). The average scores reflect the percentage of firms answering “yes.” The analysis uses TPI scores as of November 22, 2022.

The TPI indicators are as follows:

- **Q1:** Does the company acknowledge climate change as a significant issue for the business?
- **Q2:** Does the company recognize climate change as a relevant risk and/or opportunity for the business?
- **Q3:** Does the company have a policy (or equivalent) commitment to action on climate change?
- **Q4:** Has the company set greenhouse gas emission reduction targets?
- **Q5:** Has the company published information on its operational (Scope 1 and 2) greenhouse gas emissions?
- **Q6:** Has the company nominated a board member or board committee with explicit responsibility for oversight of the climate change policy?
- **Q7:** Has the company set quantitative targets for reducing its greenhouse gas emissions?
- **Q8:** Does the company report on Scope 3 emissions?
- **Q9:** Has the company had its operational (Scope 1 and/or 2) greenhouse gas emissions data verified?
- **Q10:** Does the company support domestic and international efforts to mitigate climate change?
- **Q11:** Does the company have a process to manage climate-related risks?
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- Q12: Does the company disclose materially important Scope 3 emissions? [excluded below, as this indicator is only evaluated for a subset of sectors]
- Q13: Does the company disclose its membership and involvement in organizations or coalitions dedicated specifically to climate issues?
- Q14: Has the company set long-term quantitative targets for reducing its greenhouse gas emissions?
- Q15: Does the company’s remuneration for senior executives incorporate climate change performance?
- Q16: Does the company incorporate climate change risks and opportunities in its strategy?
- Q17: Does the company undertake climate scenario planning?
- Q18: Does the company disclose an internal price of carbon?
- Q19: Does the company ensure consistency between its climate change policy and the positions taken by trade associations of which it is a member?
Table A-3: TPI indicator scoring, all companies

<table>
<thead>
<tr>
<th>Category</th>
<th>Group</th>
<th># of companies</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
<th>Q11</th>
<th>Q12</th>
<th>Q13</th>
<th>Q14</th>
<th>Q15</th>
<th>Q16</th>
<th>Q17</th>
<th>Q18</th>
<th>Q19</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>China</td>
<td>47</td>
<td>89.4%</td>
<td>42.6%</td>
<td>87.2%</td>
<td>21.3%</td>
<td>66.0%</td>
<td>17.0%</td>
<td>17.0%</td>
<td>4.3%</td>
<td>14.9%</td>
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### China's Climate Disclosure Regime:
How Regulations, Politics, and Investors Shape Corporate Climate Reporting

| Category            | Group      | # of companies | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  | Q7  | Q8  | Q9  | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 | Q16 | Q17 | Q18 | Q19 |
|---------------------|------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| By Sector           | Shipping   | 26             | 96.2% | 73.1% | 92.3% | 61.5% | 80.8% | 42.3% | 61.5% | 34.6% | 50.0% | 11.5% | 46.2% | 0.0% | 3.8% | 61.5% | 11.5% | 30.8% | 19.2% | 19.2% | 0.0% |
|                     | Steel      | 43             | 97.6% | 88.1% | 95.2% | 83.3% | 85.7% | 69.0% | 83.3% | 57.1% | 54.8% | 21.4% | 66.7% | 0.0% | 2.4% | 78.6% | 38.1% | 35.7% | 28.6% | 28.6% | 2.4% |
| By size/listing status | Large listed | 320           | 98.7% | 91.8% | 97.2% | 87.3% | 94.0% | 83.2% | 86.1% | 75.6% | 74.7% | 50.0% | 86.4% | 21.8% | 8.2% | 84.2% | 57.3% | 53.2% | 53.5% | 47.5% | 7.9% |
|                     | Medium listed | 184         | 96.6% | 87.2% | 96.1% | 79.3% | 88.3% | 75.4% | 78.8% | 64.8% | 58.1% | 35.8% | 74.3% | 5.6% | 3.9% | 76.5% | 47.5% | 48.0% | 38.0% | 38.0% | 1.1% |
|                     | Small listed | 70           | 98.5% | 83.8% | 92.6% | 63.2% | 77.9% | 57.4% | 63.2% | 44.1% | 38.2% | 13.2% | 51.5% | 4.4% | 0.0% | 63.2% | 19.1% | 19.1% | 19.1% | 16.2% | 0.0% |
|                     | Unlisted    | 25            | 92.0% | 64.0% | 88.0% | 44.0% | 56.0% | 36.0% | 44.0% | 28.0% | 28.0% | 16.0% | 40.0% | 8.0% | 0.0% | 40.0% | 16.0% | 16.0% | 8.0% | 16.0% | 0.0% |


The 47 Chinese companies included in this analysis only partially overlap with the carbon majors reviewed in this report; 12 of our carbon majors feature in the TPI dataset directly, while another three are subsidiaries of unlisted firms we review. (All 15 of these companies are listed in Hong Kong.) The partial overlap largely reflects much broader sectoral coverage in the TPI dataset. However, the gaps in disclosure performance between Chinese and non-Chinese firms’ patterns persist, even when we restrict our comparison to the seven TPI sectors that align with those covered in our report: airlines (aviation), aluminum, cement, chemicals, electricity utilities (power generation), oil and gas (petrochemicals), and steel.
## Table A-4: TPI indicator scoring, selected sectors

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<td>65.0%</td>
<td>66.3%</td>
<td>55.0%</td>
<td>56.3%</td>
<td>1.3%</td>
<td></td>
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<tr>
<td>Steel</td>
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<td>43</td>
<td>97.6%</td>
<td>88.1%</td>
<td>95.2%</td>
<td>83.3%</td>
<td>85.7%</td>
<td>69.0%</td>
<td>83.3%</td>
<td>57.1%</td>
<td>54.8%</td>
<td>21.4%</td>
<td>66.7%</td>
<td>2.4%</td>
<td>78.6%</td>
<td>38.1%</td>
<td>35.7%</td>
<td>28.6%</td>
<td>28.6%</td>
<td>2.4%</td>
<td></td>
</tr>
<tr>
<td>By size/ listing status</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Large listed</td>
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<td>99.5%</td>
<td>93.4%</td>
<td>98.4%</td>
<td>90.7%</td>
<td>96.2%</td>
<td>87.9%</td>
<td>89.6%</td>
<td>78.6%</td>
<td>78.6%</td>
<td>53.8%</td>
<td>90.1%</td>
<td>11.5%</td>
<td>87.9%</td>
<td>58.8%</td>
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<tr>
<td>Medium listed</td>
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<td>88.0%</td>
<td>95.7%</td>
<td>84.6%</td>
<td>88.9%</td>
<td>77.8%</td>
<td>83.8%</td>
<td>65.8%</td>
<td>59.8%</td>
<td>33.3%</td>
<td>74.4%</td>
<td>3.4%</td>
<td>82.1%</td>
<td>53.8%</td>
<td>47.9%</td>
<td>38.5%</td>
<td>40.2%</td>
<td>1.7%</td>
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</tr>
<tr>
<td>Small listed</td>
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<td>34</td>
<td>100.0%</td>
<td>93.9%</td>
<td>93.9%</td>
<td>69.7%</td>
<td>72.7%</td>
<td>66.7%</td>
<td>69.7%</td>
<td>42.4%</td>
<td>33.3%</td>
<td>18.2%</td>
<td>63.6%</td>
<td>0.0%</td>
<td>69.7%</td>
<td>24.2%</td>
<td>27.3%</td>
<td>18.2%</td>
<td>24.2%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>Unlisted</td>
<td></td>
<td>7</td>
<td>85.7%</td>
<td>85.7%</td>
<td>71.4%</td>
<td>57.1%</td>
<td>71.4%</td>
<td>28.6%</td>
<td>57.1%</td>
<td>42.9%</td>
<td>28.6%</td>
<td>14.3%</td>
<td>42.9%</td>
<td>0.0%</td>
<td>42.9%</td>
<td>0.0%</td>
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<td>0.0%</td>
<td>0.0%</td>
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</tr>
</tbody>
</table>

The 16 Chinese companies in these sectors offer a reasonable proxy for our Hong Kong–listed carbon majors, as they consist largely of Hong Kong–listed carbon majors we review (10) or companies that are Hong Kong–listed subsidiaries of unlisted carbon majors we review (two). The persistence of disclosure quality gaps between these firms—the strongest disclosers in our review—and their international peers reinforces our inference about broader gaps in disclosure quality between China’s carbon majors more generally and their global peers.
Notes


6. Former China Energy Investment Group researcher Anthony Ku has estimated 3.2 Gt CO₂e of emissions in 2019 from China’s top five thermal power companies, more than the total emissions of any country other than China or the US. Anthony Ku, *Carbon Neutrality in China by 2060: An Energy Company’s Perspective*, C-PREE Bradford Seminar (Princeton University, 2021), loc. 14:00, [https://www.youtube.com/watch?v=tOjadJvwtA](https://www.youtube.com/watch?v=tOjadJvwtA).


10. In 2016, the Chinese government proposed eight sectors for the first stage of its national emissions-trading system: petrochemicals, chemicals, building materials, steel, non-ferrous metals, pulp and papermaking, electricity, and aviation. We excluded pulp and papermaking because it is a very small contributor to national emissions—just 0.1 percent on a Scope 1 basis and 0.8 percent on a Scope 1 and 2 basis. See Yuru Guan et al., “Assessment to China’s Recent Emission Pattern Shifts,” Earth’s Future 9, no. 11 (2021), https://doi.org/10.1029/2021EF002241.


13. Top five ex-China sector leaders were compiled based upon the same set of sources listed in Table 2.


15. Task Force on Climate-Related Disclosures, “Recommendations of the Task Force on Climate-Related Financial Disclosures.”


17. The TPI and Climate Action 100+ projects cover only public companies with their assessments. The TCFD evaluates the adoptions of its recommendations on disclosures only for public companies.

18. The connection between carbon disclosures and emissions reductions is a subject of ongoing research. Studies document how the types of voluntary disclosures examined in this report can be a tool for strong climate performers to differentiate themselves—but also how firms


21. Transition Pathway Initiative, “TPI Online Tool,” accessed November 22, 2022, https://www.transitionpathwayinitiative.org/sectors. We excluded four companies in the dataset whose disclosure performance had not been evaluated as of our date of access.

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24. Ibid., 15.


29. Ibid., 11.


33. Firms receive yes-no scores on each indicator. We take averages by coding a Yes as 1 and No as 0. For the full list of indicators and the underlying scoring methodology, see Dietz et al., “TPI’s Methodology Report: Management Quality and Carbon Performance.”

34. Others included the use of climate-related incentives in executive remuneration as well as verification of GHG data reporting.

35. Our sample overlaps imperfectly with the Chinese firms in the TPI dataset—12 of its 47 firms are among our carbon majors, and another three are subsidiaries of firms that we review. Those 15 firms perform just as well as the developing-country firms reviewed, but they are all Hong Kong–listed firms.


39. Of the 13 Hong Kong–reviewed firms that were issuing ESG reports by at least FY2016, six of them made their first emissions disclosure in FY2017.


42. Ibid.

43. This cutoff is similar to the US Environmental Protection Agency’s (EPA) facility-level reporting requirements of 25,000 tons of CO₂e per year. US Code of Federal Regulations title 40, part 98, section 2.a.2, accessed December 11, 2022, available at https://www.ecfr.gov/current/title-40/
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chapter-1/subchapter-C/part-98.


46. Ministry of Ecology and Environment, “Notice on Strengthening the Management of Corporate Greenhouse Gas Emission Reports” (关于加强企业温室气体排放报告管理相关工作的通知). This notice
referred to the “Administrative Measures for Carbon Emissions Trading (Trial)” and the “2019-2020 National Carbon Emissions Trading Allowance Setting and Allocation Implementation Plan (Power Generation Industry)” at the beginning and stated that “in order to accurately grasp allocation ... in the power generation industry, consolidate the data foundation for expanding industry coverage of the national carbon emission trading market and improving the quota allocation method, and do a solid job in the construction and operation of the national carbon emission trading market, the relevant work requirements for strengthening the reporting management of corporate greenhouse gas emissions are hereby notified as follows…”


49. The Chinese Academy of Social Sciences has issued guidelines on corporate social responsibility reporting since 2009, but the new guidelines from CERDS are the first formal ESG guidelines. Xinhua, “The First National Enterprise Association Standards ‘Guidelines for ESG Disclosure’ Go into Effect in June; Alibaba and Others Participate in Drafting” (全国首份企业团体标准《ESG企业披露指南》6月起施行，蚂蚁集团等参与起草--新华网), June 7, 2022, http://www.xinhuanet.com/tech/20220607/6dc0b50941954bc7be9fc3c23812e029/c.html.


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54. Interview with Kenny Tsang, November 9, 2022.


57. For more on the use of CSR or ESG reports to signal political compliance, see Ervits, “CSR Reporting in China’s Private and State-Owned Enterprises: A Mixed Methods Comparative Analysis”; and Marquis and Qian, “Corporate Social Responsibility Reporting in China: Symbol or Substance?”


60. Notably, the only private firm with a target to mitigate emissions growth, Huaxin Cement, does not have a target framed in terms of peaking or neutrality.


62. We thank Gautam Jain for this point.


66. Ibid.


70. Email from Remoca Shi (施怡然), May 9, 2023.


73. For more on this policy, see Valerie J. Karplus, Xingyao Shen, and Da Zhang, “Herding Cats: Firm Non-Compliance in China’s Industrial Energy Efficiency Program,” The Energy Journal 41, no. 4 (October 1, 2020): sec. 2.2, https://doi.org/10.5547/01956574.41.4.vkar.


76. Lu, Shin, and Zhang identify several other reasons why public information disclosure incentives are weaker in China. These include the prevalence of “relationship-based business transactions” as well as the weaker legal regulatory environment for enforcing shareholder claims upon firms.


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84. This accounts for 12 of the 15 companies in both the TPI dataset and our set of carbon majors. The three remaining companies are classified by TPI as coal mining companies; we exclude them to maximize comparability with our carbon majors.