

Original Research Article

Managing decarbonization in Chinese energy SOEs: Strategic space, governance hierarchy, and coal exposure

Yaning Xu

Farabi International Business School, Al-Farabi Kazakh National University, Almaty, 050040, Kazakhstan

Abstract: Chinese state-owned energy enterprises (SOEs) face the same national decarbonization agenda, yet their room to act differs sharply. This article develops a management-oriented diagnostic framework for judging strategic space before transition targets, investment plans, or restructuring programs are fixed. Strategic space is shaped by two conditions: A firm's position in the state-ownership hierarchy and its exposure to coal through assets, revenue, workforce, and regional obligations. Their interaction produces four managerial situations that the simple central-provincial distinction cannot capture. A structured comparison of CHN Energy, China Huaneng, Shandong Energy Group, and Zhejiang Provincial Energy Group shows that SASAC's 2022-2024 tenure-assessment mechanism matters as a central-tier pressure signal, but it does not determine behavior by itself. The framework calls for portfolio reconfiguration where room is wide, credible sequencing where coal lock-in is severe, and closer scrutiny where targets mainly produce symbolic alignment.

Keywords: Chinese state-owned enterprises; strategic management; decarbonization; governance hierarchy; coal exposure; managerial discretion; dynamic capabilities; comparative case analysis; SASAC

1. Introduction: Decarbonization as a management problem

China's carbon-peaking and carbon-neutrality agenda has made decarbonization a practical management problem for large energy SOEs, not merely a policy slogan. Firms now have more technical and financial options, including renewable generation, storage, flexible grid services and green finance, but common policy exposure has not generated common organizational behavior (State Council of the People's Republic of China, 2021; SASAC, 2022; Wang & Mu, 2023). Some enterprises can redirect capital and reshape portfolios with visible urgency; others must defend coal assets, workers, local fiscal ties and energy-security functions before they can credibly change course.

The central question is therefore not whether transition is desirable, but how supervisors and executives can judge what is feasible for a given SOE at a given time. Strategic space refers to the practical room managers have to redirect investment, reorganize business units and reduce reliance on legacy assets while still satisfying state owners, creditors, employees, customers and host jurisdictions. The concept is deliberately managerial: It distinguishes technical ability from the discretion to use that ability under political, financial and social constraints.

2. Theoretical positioning

Dynamic-capabilities theory helps explain how firms sense threats and opportunities, seize them through investment choices, and reconfigure assets as conditions change (Teece et al., 1997; Teece, 2007). In energy transition, however, these capabilities are filtered by managerial discretion. Recent work stresses the role of senior judgment in mobilizing capabilities, but Chinese SOEs add further constraints: Cadre evaluation, party-state monitoring, public-service duties and regional stability commitments (Baishya et al., 2025). A firm may know how to build wind, solar, hydrogen or storage businesses and still lack the freedom to run down coal quickly.

Chinese state capitalism also matters because state ownership is hierarchical rather than uniform. Central SOEs are supervised through central SASAC and national personnel systems, while provincial SOEs are embedded in provincial employment, fiscal and industrial-policy networks (Alami, 2023; Beck

& Brødsgaard, 2022; Lin et al., 2020; Mattlin, 2009; Xiang & Wang, 2024). The 2022-2024 SASAC tenure assessment, which incorporated energy-saving and carbon-reduction indicators for high-emission central enterprises, strengthened formal pressure on central managers, but it did not remove operational lock-in (SASAC, 2022; Wang et al., 2026).

Resource-dependence theory explains the other side of the problem. Coal-heavy SOEs rely on mines, coal-fired plants, logistics, cash flow, skills, local taxes and supply-security obligations that cannot be redeployed without loss (Pfeffer & Salancik, 1978). These ties create carbon lock-in: Assets, finance, regulation and regional development become mutually reinforcing, making rapid exit costly even when low-carbon alternatives are available (Unruh, 2000; Seto et al., 2016; Malz et al., 2023).

3. Conceptual framework: Governance position and coal exposure

The framework combines two structural conditions. Governance position asks whether the enterprise is centrally or provincially owned and therefore who evaluates senior managers. Coal exposure asks how strongly coal shapes the firm's assets, revenue, workforce and regional role. Neither condition is sufficient on its own. Central supervision can intensify carbon pressure, but high coal exposure limits the speed and form of response. Provincial ownership can either entrench local coal dependence or support clean-energy upgrading, depending on the regional economy and the firm's portfolio.

Table 1. Condensed strategic-space matrix and management tests.

Strategic space	Typical condition	Main risk	Better management test
I. Central / high coal exposure	Central assessment pressure meets a large coal base and supply-security duties.	Over-promising or symbolic compliance under pressure.	Time-bound sequencing, coal-unit flexibility, renewable integration, worker-transition planning.
II. Central / lower coal exposure	Central pressure operates on a more diversified portfolio.	Underusing a relatively wide room for reconfiguration.	Capex shift, low-carbon revenue, retirement or repurposing of inefficient assets.
III. Provincial / high coal exposure	Coal assets, jobs, fiscal income and local industrial systems are tightly linked.	Defensive coal upgrading without diversification.	Non-coal revenue growth, mine-area redevelopment, reskilling and fiscal substitution.
IV. Provincial / lower coal exposure	Provincial ownership is embedded in a diversified regional economy.	Comfortable incrementalism despite favorable conditions.	Speed of clean-energy build-out, storage/grid capability and commercial performance.

Source: compiled by the author.

These quadrants are diagnostic starting points rather than moral rankings. A firm's placement should be treated as a hypothesis and checked against evidence on capital allocation, asset flexibility, organizational authority, financial resilience and non-market obligations. Wide-space firms should be asked to reconfigure more deeply; narrow-space firms should be judged by the credibility, sequencing and irreversibility of their transition steps.

4. Method and evidence template

The article uses a structured comparative case design. Four polar cases - CHN Energy, China Huaneng, Shandong Energy Group and Zhejiang Provincial Energy Group - were selected because they vary by both ownership tier and coal exposure while operating under the same national decarbonization agenda. The evidence base consists of public material from the 13th and 14th Five-Year Plan periods, including annual and ESG reports, company announcements, policy documents, industry statistics, bond and offering documents, and rating commentary.

Coal exposure was coded before quadrant assignment. A firm was treated as highly exposed when coal was material in at least three of four dimensions - assets, revenue, workforce and regional-system dependence - or when one dimension created obvious lock-in, such as very large coal production combined with supply-security obligations. Uneven disclosure remains a limitation, especially where consolidated group data are unavailable; subsidiary reports and public proxies were therefore used cautiously.

5. Case diagnosis

The four cases show why ownership tier alone is too blunt. CHN Energy and Huaneng are both central

enterprises, yet their transition costs differ because coal exposure differs. Shandong Energy and Zhejiang Energy are both provincial enterprises, yet the former is embedded in a coal-dependent regional system while the latter can connect transition with coastal industrial upgrading. A single national target therefore travels through very different organizational structures.

Table 2. Case placement and condensed evidence.

Case	Governance and coal exposure	Low-carbon evidence	Diagnosis
CHN Energy	Central SOE with an integrated coal-transport-power system; coal output reached about 620 Mt in 2024.	Renewable capacity exceeded 140 GW, or more than 40% of total capacity.	Quadrant I: real low-carbon growth, but coal dependence makes credible sequencing the key test (China Energy Investment Corporation, 2025).
China Huaneng	Central SOE with large thermal assets, roughly 146 GW, but less mining-centered lock-in.	Total capacity exceeded 279 GW; clean energy was above 53%, and new-energy capacity exceeded 72 GW.	Quadrant II: central pressure can support deeper portfolio reconfiguration (Huaneng Power International, 2025; "Huaneng to step up," 2024).
Shandong Energy Group	Provincial SOE owned by Shandong SASAC; about 214,000 employees in a coal-power-chemicals-logistics core.	Diversification is visible, but coal remains central to business logic and regional stability.	Quadrant III: transition must loosen coal from jobs, fiscal dependence and local industry (Fitch Ratings, 2024; Shandong Energy Group, 2025).
Zhejiang Provincial Energy Group	Provincial SOE in a wealthy coastal economy; still thermal-dominated but less regionally coal-locked.	Installed capacity was about 39.4 GW by end-2022; renewables were about 16% and rising, led by offshore wind and clean-energy projects.	Quadrant IV: provincial alignment can help clean-energy upgrading, but slow movement is harder to justify (Zhang & Myllyvirta, 2024).

Source: compiled by the author.

6. Cross-case findings and implications

The SASAC KPI explains where formal pressure is strongest, not what action will follow. In Quadrant II it can push substantive reconfiguration; in Quadrant I it is more likely to produce sequencing; and in coal-locked settings it may generate disclosure alignment unless the indicator is connected to feasible operating changes. Falling renewable costs, green finance and clean-energy competition set the overall direction, while strategic space shapes the speed and credibility of each firm's response. Nationally, renewables accounted for roughly 56% of installed capacity by the end of 2024, with wind and solar above 1,400 GW, but coal power still expanded for security and system-stability reasons (Center for Research on Energy and Clean Air & Global Energy Monitor, 2025; China Energy Transition Program, 2025).

For SASAC supervisors, the implication is differentiated KPI design. Wide-space firms should be pressed on capital reallocation, low-carbon revenue, retirement or repurposing of inefficient assets, and the organizational authority of new-energy units. Narrow-space firms still need firm milestones, but those milestones should emphasize irreversible sequencing: Coal-dependence reduction, flexible operation, transparent retirement or retrofit plans, financing and worker transition. Without this distinction, constrained firms are pushed toward ritual compliance, while less constrained firms are not pushed hard enough.

For SOE executives, the framework is a pre-strategy diagnostic. Before announcing a pathway, management should identify who evaluates the leadership team, what share of profit and cash flow still comes from coal, which stakeholders lose from transition, which assets are truly movable, and whether low-carbon commitments are backed by capital, authority and milestones. This guards against two familiar failures: Promising a transformation the structure cannot support, or using legacy constraints as a permanent excuse for slow action.

7. Conclusion

Decarbonization in Chinese energy SOEs is best understood as a question of strategic space. Governance position shapes the performance signals and political audience that managers must satisfy; coal exposure determines what the firm must protect before it can move. Together they explain why the same carbon mandate can produce deep portfolio reconfiguration in one enterprise, credible sequencing in another, and symbolic alignment where targets are detached from organizational constraints.

The framework contributes a practical diagnostic tool and a theoretical refinement of dynamic-

capabilities thinking. In SOEs, the ability to sense, seize and reconfigure is inseparable from the discretion to act under hierarchical supervision and resource lock-in. The analysis is limited by its four-case design and reliance on public documents; future research could test the matrix through interviews, larger samples, process tracing, and scoring-based comparisons across provinces and energy subsectors.

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