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Enablers or barriers: The multifaceted tales of power generation companies in China's energy transition

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ABSTRACT

Synchronizing creation and destruction in energy transition could be challenging, and the policy mixes might not be well coordinated. Preexisting studies have given state-centered interpretations to the misalignment between the 'creative' and 'destructive' efforts. Complementing the state-centered perspectives, this paper tries to offer an alternative explanation from the lens of the political-economic rationality of the state-owned power companies (SPCs) at the micro-level. The analysis uncovers a blend of strategies through which SPCs navigate the intricate landscape of the transition mandates, including (1) engaging in territory competition, (2) utilizing natural gas to adjust the pace of transition, (3) planning renewable energy investment sequences, (4) implementing supply chain management, and (5) deploying financial innovations. Out of these strategies emerge the multifaceted roles of the incumbents, who occupy a dynamic space that lies between being barriers and serving as enablers. The complex interplay and possible discordance between government intervention and the incumbents' responses introduce elements of complexity and unpredictability into the transition process. These findings call for the integration of macro- and micro-scale perspectives to ensure that policies and interventions are robust enough to accommodate both anticipated and unforeseen challenges.

1. Introduction

Despite the lingering effect of COVID-19, the development of renewable energies remains a success story in China. In 2021, renewable energies contributed to more than half of the growth in global power generation, of which China accounted for up to 50 % [1]. In the short-term forecast for 2020–2026, China will maintain its leadership position by contributing to 43 % of renewable capacity expansion worldwide, followed by Europe, the United States, and India [2]. On the flip side, the Chinese government faces the challenge of phasing out more than 1000 GW of operating coal power plants, which amounts to half the global coal power capacity [3]. Adding to the difficulty, domestic coal demand is still on the rise, and more than 50 % of the global growth in 2021 was concentrated in China [1]. Though China's vow to end funding to overseas coal power plants could potentially help save some 20 gigatons in global cumulative CO_2 emissions, the country is still confronted with the challenge of bringing down emissions from its domestic coal power fleet [4].

These seemly contradictive stories embody the competition between conventional fuels and renewable energies. Inspired by the concept of creative destruction proposed by Joseph Schumpeter, scholars portray the sustainability transition as a delicate balance of creating the new while destroying the old [5]. Under favorable conditions, sustainability transition could happen through niche innovations, incremental learning, progressive cost-performance improvement, and gradual replacement [6,7]. However, it is argued that to accelerate the pace of transition, policy mixes should target broader social-technical system changes and more active destabilization and destruction [5,8].

The last two decades have seen the implementation of policy mixes in China with a dual focus on creation and destruction. On the creation side, the Renewable Energy Law took effect in 2006 [9]. The benchmark feed-in-tariff schemes for wind energy and solar energy came out in 2009 and in 2011 [9–11]. The Notice on Renewable Energy Consumption Ratio for Administrative Regions was announced in 2020 [12], which signaled the final implementation of the Renewable Portfolio Standards. On the destruction side, some policy packages were

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implemented to halt the reproduction of the incumbent regime. The Notice on Promoting the Orderly Development of Coal-Fired Power Sector was announced in 2016, which aimed to establish an early warning mechanism for coal power project planning [13]. China had canceled or suspended a total of 710 GW of coal power capacity between 2010 and 2019 and had retired a total of 97 GW between 2006 and 2019 [14].

However, synchronizing 'creation' and 'destruction' could be challenging. Sometimes the timing of 'creation' and 'destruction' is not well coordinated, and an early emphasis on 'creation' tends to precede the phase-out efforts. Only in later stages of energy transition could more alignment between the 'creative' and 'destructive' efforts be observed. Several explanations are given to address this progressive process [9,15–17]. Thurbon and others examine the phenomenon from the lens of developmental environmentalism [15]. It is argued that the long-standing developmental goals in Northeast Asian countries (centered on local manufacturing capability, technological autonomy, and export competitiveness) explain why we might anticipate an early emphasis on 'creation' [15]. And success in 'creative' arena could, in turn, make it easier for policymakers to adopt a more assertive stance towards implementing 'destructive' measures [15]. Another important reason for policy sequencing lies in the necessity of building political support [16]. The 'creative' practices sometimes face fewer political obstacles. Their early deployment could help create new interest groups, foster a supportive political network, and pave ways for the eventual adoption of the 'destructive' measures [16].

Though serving as helpful theoretical explanations of the particular historical progression, these models share similar assumptions about the central role of the state in terms of guiding industrial development and planning policy sequence. Complementing these state-centered perspectives, this paper tries to offer an alternative explanation of the same progression from the lens of the political-economic rationales of the state-owned power companies (SPCs):

(1) Developmental environmentalism explains the creation-dominated efforts at the early stage as the result of the state's developmental inclinations [15]. We look at the flip side of the same picture (that is, the delayed "destructive" actions) and ask how the delay could be interpreted from the active calculations of SPCs.

(2) While several theories note greater alignments between 'creative' and 'destructive' actions in later stages as the result of the state's successful policy sequence and accumulation of support [15,16], we propose that the strategic planning and proactive adaptation of SPCs hold equal significance.

(3) Additionally, both authoritarian environmentalism and developmental environmentalism carry the undertones of determinism, projecting a positive outlook on the state-led energy transitions in authoritarian regimes or Northeast Asian countries [15,18,19]. By incorporating the micro-level rationale, the paper invites more reading of the contextual variability and uncertainties inherent in energy transition.

It is argued that the government's capacity to engage in the 'creative' and 'destructive' aspects of the Schumpeterian dynamic should not be read separately from the micro-scale calculation of individual enterprises. In response to changing market conditions and regulatory stringency, the incumbents deploy various strategies, including (1) engaging in territory competition, (2) utilizing natural gas to adjust the pace of transition, (3) planning renewable energy investment sequences, (4) implementing supply chain management, and (5) deploying financial innovations. These acts are individually rational and collectively significant in either undermining or enhancing the transition efforts. Moreover, the intricate interactions and discrepancies among varied rational calculations can produce unforeseen outcomes and introduce uncertainties into the trajectory of energy transition.

This paper examines the trajectory of China's energy transition by embedding the micro-level perspective of SPCs' strategic planning into China's grand energy transition. The structure of the paper is organized as follows. In Section 2, the ways of collecting research data and setting an analytical framework are explained. In Section 3, the chronology of evolving policy packages and changing incumbents' responses is broken down into two historical phases. The two phases are narrated as two tales of the incumbents with their multifaceted roles situated somewhere between the two extremes (the barriers and the enablers). The heterogeneous responses are analyzed together with the underlying political-economic rationales. Based on these analyses, Section 4 goes further to discuss the dynamic interactions between government intervention and enterprise responses, which helps us to appreciate the pathway of China's energy transition in the past decade. Finally, conclusions are drawn in Section 5.

2. Data and the analytical framework

2.1. The analytical framework

The deep decarbonization of energy systems is considered as part of the sustainability transition that is critical for tackling the mounting challenging of climate change [20–23]. Rather than being solely an environmental or energy policy concern, the challenge posed by this extensive energy-system transformation lies fundamentally in the realm of socio-technical policy [15,20]. The grand-scale transition encompasses not just the replacement of energy sources but a comprehensive overhaul of industries, infrastructure, and societal norms. What distinguishes this energy transition from its precedents is the speed of the transformation. Instead of being a series of prolonged affairs that unfold over many decades [24], the coming transition is demanded to occur very quickly [15], since the speed at which energy transition progresses will significantly influence our capacity to alleviate the most severe effects of climate change.

Given the unprecedented speed and depth of the transformation, it is broadly acknowledged that the national governments have a responsibility to take all necessary measures to accelerate the progress. Several theoretical models are raised to address the prominent role of the state in energy transition, including 'authoritarian environmentalism', 'developmental environmentalism', and 'developmental state' [15,18,25]. Authoritarian environmentalism describes a transition governance model marked by top-down, command-and-control strategies, commonly utilized by authoritarian regimes. The model assumes that the governments exercising strong central authority can mobilize resources and enforce regulations more swiftly and are therefore more capable of producing notable environmental outcomes than their democratic counterparts [18,26].

Another analytical framework —'developmental environmentalism'—is raised by Thurbon and others. This framework combines Schumpeter's concept of 'creative destruction' and Johnson's idea of 'developmental state' to capture the characteristics of Northeast Asian countries in the new round of energy transition [15,25,27]. These features include elite ideation, political legitimation strategies, and distinct policy methodologies for orchestrating the progression of the green energy transition [15]. Development environmentalism, akin to its 'developmental state' predecessor [25,28,29], posits that the state should take a guiding position in steering the transition towards a green economy. It extends the logic of the developmental state into the environmental realm, arguing that the same features which enabled successful economic development in Northeast Asian countries can be observed in the latest phase of energy transition, which effectively merges the goals of economic prosperity and environmental conservation [15].

Besides the prominent role of the state, scholars have also discovered analogous pathways of energy transition that unfold over time [15,16]. In the initial phases of energy transitions, there is a pronounced emphasis on the 'creative' aspect of the transition, which is evident in the nurturing of nascent green energy sectors. As the process advances, a better synchronization emerges between the 'creative' and 'destructive'

endeavors, where the constructive forces of promoting green industries are increasingly complemented by the systematic retirement of carbon-intensive industries and infrastructures.

In retrospect, each framework offers a distinct perspective on the fundamental dynamics essential to energy transition. Each study examines a unique set of explanatory variables. The authoritarian environmentalism focuses on regime types, while development environmentalism focuses on elite ideation, political legitimacy, and the legacy of developmental state. Moreover, rather than being static models, developmental environmentalism and other policy sequencing models incorporate long-term, processual perspectives by examining different stages of transition [9,15,16]. In these models, policy sequencing by the state is viewed critical for gradual transformation, either as a means to build industrial foundations or a strategy to garner political support.

While these models provide valuable theoretical frameworks, they share common assumptions about the nature of the state, which is well summarized by Allison's Rational Actor Model (RAM) [30]. That is, the nation is perceived as a unified and rational actor capable of defining and prioritizing its key objectives, assessing available alternatives in relation to these goals, and making decisions that maximize its expected utility. The utility, when analyzed in these models, can include political legitimacy, international competition, superpower rivalries, and global influence contests [15,25,28,31]. Though acknowledging the essential role of the state, these assumptions fail to account for other complexities (bounded rationality, institutions and path dependence, and risk perceptions) to offer a more nuanced understanding of real-world policy processes [10,19,30,32–34].

Instead of exhausting all the dimensions that are inadequately addressed in those models, this paper chose to focus on the political lens proposed by Allison [30]. That is, the pluralistic, political nature of societies implies that, in practice, policy processes hinge upon negotiations and compromises among multiple stakeholders and interest groups, each with distinct agendas and perspectives on what constitutes rational actions. The political lens led us to examine the micro-level negotiations, responses and adaptation in China's energy transition, turning our gaze to the micro-level actors, especially SPCs. It helped us to unfold an alternative historical narrative of the transition process.

In the alternative historical narrative, the state is no longer depicted as a coherent, omniscient entity capable of dictating the direction and speed of a long-term transition. Though, compared with other actors, the state may possess a better knowledge of evolving circumstances, this advantage is notably constrained in its scope. The state may fail to coordinate policy mixes and strike a balance between the short-term and long-term goals [35,36]. The financial sustainability of the government may suffer from regulatory loopholes, lack of coordination, and overspending [37,38]. Therefore, the state's governance capacities, its interactions with other actors, and its contribution to energy transition should be reevaluated against these appreciated deficiencies.

Also in the alternative historical narrative, SPCs return to the center stage. It is known that SPCs occupy a unique position within China's political-economic system. On one hand, SPCs function as instrumental arms of the state, following policy directives and fulfilling strategic national objectives, thereby exemplifying a subordinate role. This relation enables the state to exert direct control over key economic sectors, ensuring the fulfillment of public interests and macroeconomic goals [11,39]. On the other hand, SPCs also exhibit a certain degree of agency, particularly in their pursuit of commercial success and industrial competitiveness [11,39]. Empowered by a certain level of operational flexibility and market-driven decision-making, they can influence the decisions of the state by demonstrating the viability of policy choices and at times, drive innovation and industry transformation. Moreover, compared with private investors, SPCs enjoy distinct advantages, including access to resources, resilience to regulatory uncertainties and market fluctuations, expertise in site selection and infrastructural planning, and competencies in financial management [40–42]. This dual nature of being both subordinate executors of state will and proactive agents in market competition underscores the complexity inherent in the state-SPCs dynamics in China's energy transition.

Out of the multiple roles and distinct advantages emerge the SPCs' heterogeneous responses to the mandate of the energy transition. Far from being uniform, these reactions are intricately molded by the diverse assets and resources at their disposal, including their historical knowledge base, accumulated experience in the industry, ingrained organizational cultures, and the breadth of their supply chain linkages. Additionally, to stay ahead, many SPCs are adopting innovative approaches to cut costs, diversify revenue streams, and secure financing. To minimize transaction costs, they strategically reshaping their supply chains [9,43]. In pursuit of new income sources, they venture into nascent markets, tapping into the growth potential of green sectors and thereby expanding their business portfolios. To raise funding, they engage themselves in green financing mechanisms to mobilize internal and external financial resources. As part of green financing, they actively explore green bonds, green credits, and green securities in conjunction with other public and private funding [44–46].

This mélange of calculated moves and potential misalignments casting a veil of uncertainty over the trajectory of the impending energy transformation. As each actor, motivated by their distinct interests and goals, adapts to the evolving circumstances, their combined effects shape the direction of change in ways that are difficult to predict. This underscores the complexity and uncertainties that influence the advancement of energy transition.

Since these heterogeneous responses are subsequently linked with the financial performances of those enterprises, the examination of financial indicators, together with enterprises' strategies and energy portfolios, will allow us to better understand micro-level political-economic rationales as well as their collective impacts. The financial performance indicators used in this study are explained in Section 2.2.

2.2. Research data and methods

This study chose to focus on individual listed companies rather than business groups for case study. This is partly because the extensive scope of business groups can complicate and skew the micro-level analysis of the electricity sector, making it challenging to obtain a detailed and accurate understanding of specific operational dynamics and impacts within the industry, and partly because data on business groups is often less accessible compared to that of listed companies.

According to the total operation income ranking of listed power companies in 2020 [47], the top ten companies were first selected. Then based on principles of representativeness, heterogeneity, and data availability, five companies were finally selected for the case study. They were Huaneng Power International Incorporated (Huaneng International), Huadian Power International Corporation Limited (Huadian International), Datang International Power Generation Corporation Limited (Datang Power), Guodian Power Development Corporation Limited (Guodian Power), and Guangdong Electric Power Development Corporation Limited (Guangdong Electric Power).

Regarding representativeness, the five major power companies are state-owned power companies (SPCs) and have a significant percentage of thermal power in their energy portfolio. Moreover, the income or profits brought about by low-carbon energy businesses have already accounted for a substantial proportion. The transition pathways of these companies are representative of power companies implementing the energy transition. Additionally, the five power companies mentioned above have significant income and revenue scales, which means that their strategic measures will have a significant impact on the country's repositioning towards a low-carbon energy system. Regarding heterogeneity, in the face of policy uncertainty and the unpredictability of energy transition, the five power companies have displayed diverse reactions to the transition challenge. Datang Power and Guodian Power tend to develop hydropower. Guangdong Electric Power has a relatively

high proportion of natural gas installed capacity, and the company also faces more pressure from local governments than other companies [14]. Regarding data availability, the five companies with high visibility in China have their relevant data and materials openly disclosed, which provides sufficient data for the analysis.

To understand the diverse roles and adaptive responses of these companies, the study first examined their energy portfolios between 2011 and 2023. Additionally, this study conducted a financial performance evaluation based on several important indexes, including the current ratio, the total capital turnover ratio, and the return on total capital (see Fig. 1 and Appendix A). The current ratio is selected to evaluate the solvency of a company, that is, the ability of a company to repay short-term and long-term debts with assets. The higher the ratio, the stronger the solvency. Second, the total capital turnover ratio measures a company's capital management. This index not only reflects the company's operation capacity but also indirectly reflects the impact of its business strategies. The higher the total capital turnover ratio, the larger the amount of sales the company is able to generate. Third, the return on total capital measures profitability, that is, the ability of a company to earn profits. The higher the return on total capital, the stronger the competitive strength of the company.

Financial data of these companies were collected from 2009 to 2023. Part of the data was directly extracted from the CSMAR (China Stock Market & Accounting Research) database, and part of the data was collected manually by referring to the companies' annual financial reports.

3. The two tales of the energy transition in China

3.1. The first tale of the incumbents

3.1.1. The three restructurings and the coal rush

The first half of the 2010s was a historical period marked by domestic economic slowdown, which was partly caused by depressed foreign market demand and partly caused by reduced domestic industrial investment [48]. China ended the year 2012 with a GDP growth rate of 7.8 %, a decrease of 1.5 percentage points compared with the previous year [49]. Correspondingly, in the same year, the industrial output increased merely by 7.9 %, the lowest since 2000; iron and steel production experienced a decrease of 4.7 percentage points and a decrease of 2.2 percentage points respectively [48,50]. Subsequently, the increase in total electricity consumption in 2012 hit a record low of 266.3 TWh [51,52].

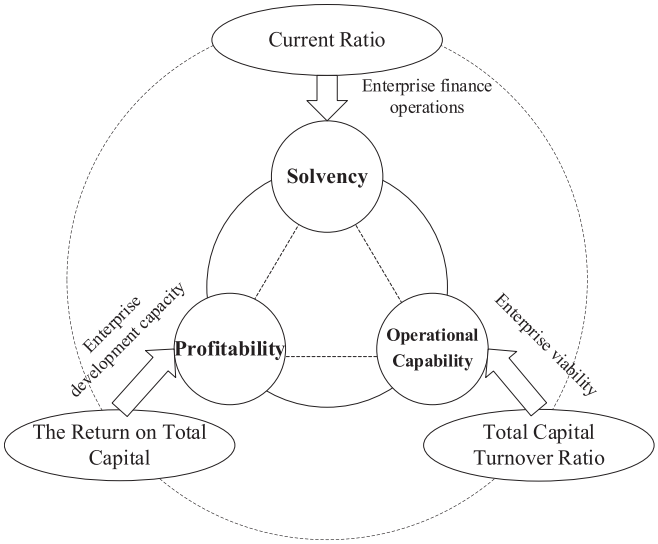

Fig. 1. Evaluation of an enterprise's financial performance.

However, contrary to the trend of the economic slowdown, we witnessed the continuous expansion of thermal power capacity in China. The weakened electricity consumption (from 2010 to 2015) contrasted sharply with the upward trend of installed thermal power capacity (Fig. 2). Even taking into account the time lag between project planning and construction, one could not provide a satisfying explanation for the fact that installed thermal power capacity reported a record high in 2015. Considering the unoptimistic market conditions, the heavy investment in thermal power (mainly coal power plants) seemed to deviate from economic rationality.

In retrospect, this coal rush was pushed by the incumbents (mainly SPCs), whose investment decisions had been greatly influenced by three restructuring reforms. The first restructuring was closely linked with the reform of the electric power system. One of the milestones of this reform can be traced back to the setting of the State Electricity Regulatory Commission (SERC) and the restructuring of the former state power companies into two grid corporations and five large power companies in 2002 [64]. This reform achieved some breakthroughs, including separating generation from transmission and distribution and introducing market competition into the electric power sector. Concurrently, it set into motion a decade-long tournament among the SPCs, competing with one another to claim the electric power market share in each province. The market shares are scarce resources given the stringent demand-supply matching rules in the electric power sector. Each province has its upper limit of installed capacity given its population and industrial structure. The monopolistic competition and installation tournament in each province, to some extent, explain the construction frenzy of thermal power plants from 2010 to 2015.

The second restructuring was concerned with reforming the coal mining industry. In the early 2010s, China's coal industry was plagued by the problems of fragmentation, low productivity, high accident rates, and environmental pollution [65], and the National Energy Administration (NEA) implemented several policies to address the problem of overproduction and improve the competitiveness of the sector. Closing small-scale and inefficient coal mines, conducting mergers and acquisitions, and shutting down illegal collieries were the focus [66]. These efforts, though effective, had been unexpectedly compromised by the worsening supply-demand imbalance induced by the economic slowdown. On the supply side, coal production reached a total of 3.86 billion tons in 2012; On the demand side, domestic coal consumption was estimated to be 3.72 billion tons, with a growth rate of merely 4.4 % [67]. This oversupply subsequently led to a more than 10 % decline in thermal coal pithead prices in 2012 [67]. This downward pricing trend continued until the mid-2010s, which created extra profit margins for large power companies. This explained the fact that the returns on total capital of all the studied enterprises stayed at much higher levels between 2012 and 2015 (Fig. 3). The significant profit margins also explained the underlying rationale of uninterrupted investment in coal power plants even amidst shrinking electricity demand.

The third restructuring was concerned with the energy transition moves of the government. The *Renewable Energy Law* was issued in 2005, providing the first overarching legal framework for governing renewable energies. It guaranteed the full purchase of renewable energies and authorized the setting of the feed-in-tariff schemes for renewables [68]. The design of feed-in tariffs was further elaborated in the *Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation* in 2006 [69]. Moreover, the possible implementation of a renewable portfolio standard (RPS) policy was implied in the *Amendment to the Renewable Energy Law* enacted in 2009 [70]. These official moves sent out a clear signal to the incumbents, demonstrating the central government's firm commitment to an unprecedented nationwide energy transition. With the pending RPS as well as the ever-tightening regulation on carbon emission on the horizon, the incumbents considered the early 2010s as the last window of opportunity to add more coal power plants to their existing fleets.

The rush to seize the last opportunity concurred with the

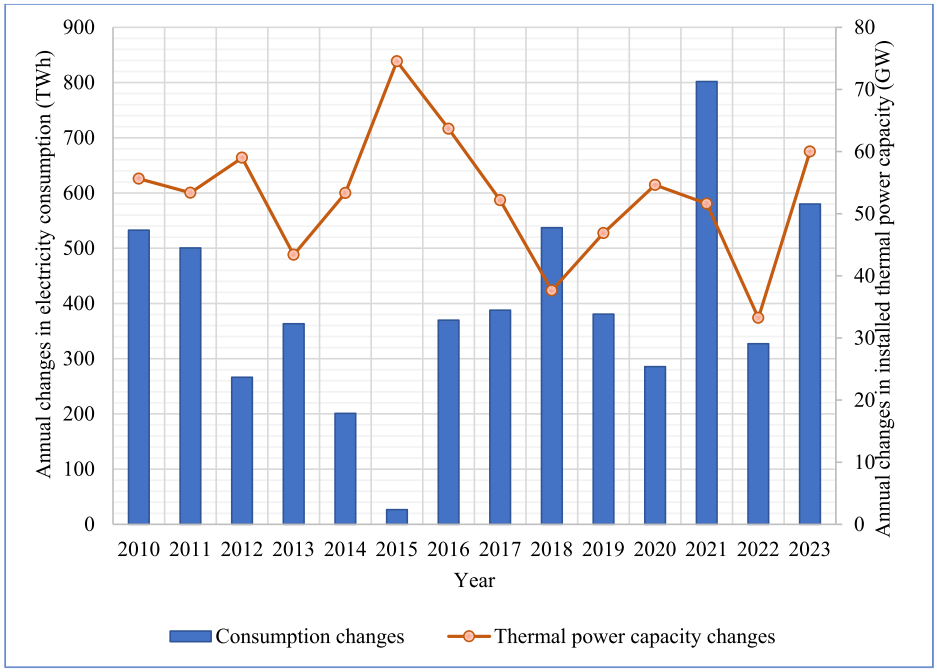

Fig. 2. Changes in total electricity consumption and installed thermal power capacity.
Note: cited from [51–63].

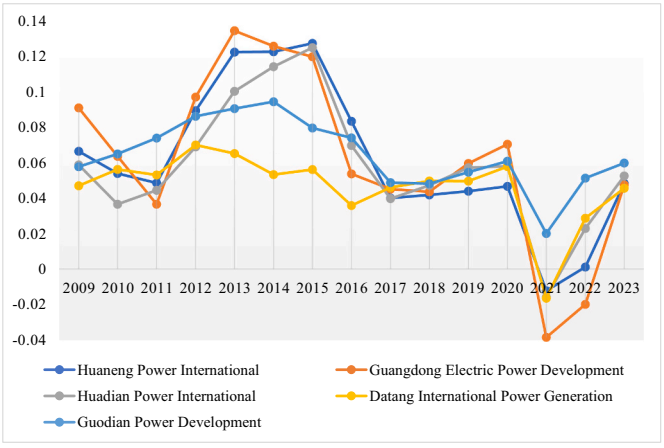

Fig. 3. The returns on total capital of the five companies between 2009 and 2023.

deregulation reform in the mid-2010s. As part of the reform, the authority to approve coal power plants was delegated from the National Development and Reform Commission (NDRC) to the provincial Development and Reform Commissions (DRCs) in 2014, and in the meantime, the authority to approve environmental impact assessments was passed from the Ministry of Environmental Protection to the provincial Environmental Protection Bureaus (EPBs) in 2015 [14]. The combination of the last-opportunity perceptions and the deregulation reform contributed to the surge of coal power in many provinces.

A closer examination revealed deeper political economic rationales behind the seemingly conflicting facts. The coal rush—the sustained investment in coal power—had been stimulated by the monopolistic competition in regional markets, the extra profit margins generated by falling fuel prices, and the haste to take advantage of the last opportunity. The rule of profit maximization still underlay the incumbents' actions.

During the same period, we witnessed a slow growth of renewable energies among the five companies (Table 1). To some extent, coal power was competing with renewable energies for limited resources (including land and funding resources). The heavy investment burden led to weakened short-term solvency, which was indicated by the low current ratios of most companies (except Guangdong Electric Power) in this period (Fig. 4). These dynamics marked the first tale of the incumbents as they made thoughtful decisions among coal power, natural gas, and renewable energies.

3.1.2. The waning coal investment and the worsening financial performances

The coal rush did not last long. Coal power plants' profitability worsened in the second half of the 2010s, which led subsequently to waning investment. The worsening financial performance was partly the result of the declining utilization rate (known as the capacity factor). As shown in Fig. 2, the growth of electricity consumption hit a historical low in 2015. The dropping electricity demand, together with the oversupply of thermal coal power, adversely affected the capacity factor of coal power plants. The capacity factor of coal power plants dropped from the highest point of 60 % in 2011 to the lowest point of 48 % in 2016 and stayed below 50 % between 2016 and 2020 [56,57]. The declining capacity factor severely affected the financial performance of coal power plants.

The financial performance of coal power plants was also adversely affected by low electricity prices in the reformed market. In March 2015, the Chinese government released the *Further Strengthening the Institutional Reform of the Electric Power Industry* (also named Document No.9), which identified several major policy reform areas, including electricity pricing mechanism, electricity trading mechanism, dispatch plans, and electricity distribution [71]. Following the release of Document No. 9, the National Development Reform Commission (NDRC) and the National Energy Administration (NEA) issued six supporting documents in November 2015, covering six key reform areas. One important change was to encourage large industrial consumers to directly negotiate electricity purchase contracts with major power companies. This reform introduced more market mechanisms into electricity trading and exposed the companies to price competition. Given the declining energy demand and thermal power overproduction, most prices negotiated in

Table 1
Energy Portfolios of the five Companies (unit: GW).

Guodian	Coal	Natural Gas	Wind	Solar	Hydro	Biomass	Total
2023	71.77	1.02	9.30	8.54	14.95	-	105.58
2022	70.82	1.02	7.46	3.13	14.96	-	97.38
2021	76.38	1.02	7.07	0.37	14.97	-	99.81
2016	33.75	-	4.63	0.21	12.30	-	50.88
2011	22.91	-	1.88	0.04	7.21	-	32.04
Huaneng	**Coal**	**Natural Gas**	**Wind**	**Solar**	**Hydro**	**Biomass**	**Total**
2023	93.28	13.23	15.51	13.10	0.370	0.16	135.66
2022	94.06	12.74	13.63	6.28	0.370	0.16	127.23
2021	92.12	12.24	10.54	3.31	0.37	0.12	118.70
2016	-	-	-	-	-	-	83.88
2011	-	-	-	-	-	-	55.81
Datang	**Coal**	**Natural Gas**	**Wind**	**Solar**	**Hydro**	**Biomass**	**Total**
2023	45.62	6.63	7.46	4.37	9.20	-	73.29
2022	47.51	6.10	5.42	2.79	9.20	-	71.02
2021	47.95	4.62	5.08	1.91	9.20	-	68.77
2016	35.83	-	2.06	0.30	6.14	-	44.34
2011	32.36	-	1.27	0.03	4.83	-	38.48
Huadian	**Coal**	**Natural Gas**	**Wind**	**Solar**	**Hydro**	**Biomass**	**Total**
2023	46.89	9.09	-	-	2.46	-	58.45
2022	43.70	8.59	-	-	2.46	-	54.75
2021	42.36	8.59	-	-	2.40	-	53.36
2016	42.97		5.17				48.14
2011	27.93		1.88				29.82
Guangdong	**Coal**	**Natural Gas**	**Wind**	**Solar**	**Hydro**	**Biomass**	**Total**
2023	19.89	7.06	2.80	2.15	0.13	0.1	32.13
2022	20.55	6.39	2.35	0.18	0.13	0.1	29.70
2021	20.55	5.47	1.97	0.004	0.13	0.1	29.94
2016	17.35	2.34	0.31				20
2011	-	-	-				8.08

Note: The data were collected and compiled by the authors based on annual reports of the five companies from 2011 to 2023.

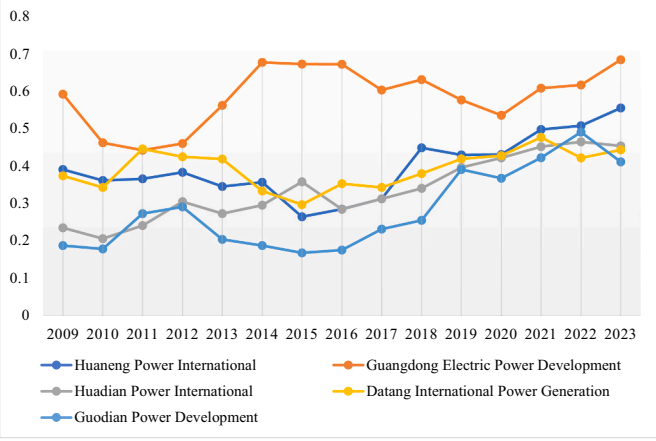

Fig. 4. The current ratios of the five companies between 2009 and 2023.

the reformed electricity market were lower than previous fixed-rate benchmark prices [71], which subsequently reduced the profit margins of power companies.

The financial performances of coal power plants were further influenced by fluctuating coal prices. Behind the price volatility was the political pressure imposed by the national mandate of the energy transition. The government stressed its commitment in the *Action Plan for the Energy Development Strategy* (2014–2020), which not only put an upper limit on the total coal consumption in 2020 but also set the goal to reduce the share of coal in national primary energy consumption to less than 62 % in 2020 [72]. More detailed guidelines were laid out in the *13th Five-Year Plan for the Development of Coal Industry* in 2016 [73]. The new plan urged the provinces with coal oversupply to halt the approval of new projects. These regulations proved to be effective. A total of 5500 coal mines were closed between 2016 and 2020, phasing out the outdated industrial capacity up to 1 billion tons per year [74]. The control of excessive coal production, together with heightened environmental protection requirements [13], led to a decline in coal production and subsequently a situation where the demand exceeded the supply. This situation continued during covid-19 pandemic. As a result, the price for the 5500 kcal/kg NAR thermal coal at Qinhuangdao Port soared from around 375 RMB/ton at the beginning of the year 2016 to approximately 650 RMB/ton at the end of the year 2017 [75], and the price remained high since then. Under high coal prices, the profit margins of coal power plants were squeezed.

Therefore, in retrospect, several factors have contributed to the worsening profitability of coal power plants between 2015 and 2020. These factors include the slowing down of electricity demand growth, the coal power overcapacity, the fierce electricity price competition, and the rising coal prices. All these factors threatened the already slim profit margins. Consequently, the incumbents that previously invested heavily in coal power experienced significant revenue loss and faced enormous financial stress in the second half of the 2010s. The return on total capital fell off a cliff between 2015 and 2018, recovered slightly between 2018 and 2020, and dropped again after 2020 (Fig. 3).

Furthermore, the discord between the weakening demand and the ever-expanding fleet of coal power plants alerted the Chinese government, who announced the *Notice on Promoting the Orderly Development of Coal-Fired Power Sector* in 2016 [13]. The Notice aimed at establishing an early warning mechanism for coal power planning and, in the meantime, accelerating the phasing out of coal power units that failed to meet the requirements of energy efficiency, energy safety, and environmental protection [13]. Moreover, the Chinese government made pledges to halt the construction of new units up to a total of 150 GW and retire 20 GW of outdated units by 2020 [14].

Therefore, the reduced pace of expansion in thermal power

capacities between 2015 and 2022 partly reflected the rational choices made by the incumbents, who were discouraged by decreasing profit margins and potential revenue losses, and partly reflected the strengthened commitment of the central government to the coal phase-out. The efforts of both the incumbents and the government led to the mitigation of the demand-supply imbalance (Fig. 2). Following the Russia-Ukraine war in 2022, China has adopted a cautious stance and re-emphasized energy security. This has partially slowed down the pace of phasing out coal and, subsequently, the increase in annual thermal installed capacity reached a new high point in 2023. Nevertheless, the sharp demand-supply imbalance (the huge gap between the annual consumption growth and the annual capacity growth) in 2015 did not reappear.

3.2. The second tale of the incumbents

3.2.1. Choosing between energy technologies

The first tale illustrates the common path that the incumbent companies had traveled in the past decade. Despite fluctuating profit margins, coal power remained the major source of electricity generation. The incumbents' inclination to stick to coal power was manifested not only in terms of increases in installed capacity but also in terms of continued investments in more advanced coal power plants that are cleaner and more efficient. However, the first tale failed to convey the other side of the story. Rather than staunchly resisting the energy transition, the incumbents are proactive in investing in emerging technologies.

To start the second tale, we need to first clarify the characteristics of the incumbents. Different from private investors, they are SPCs, who are "more sensitive to politics than profit" [76]. Moreover, the SPCs have access to early signals from the central government through exclusive connections [77]. The political signals had been sent and accentuated by the government since 2005. Following the *Renewable Energy Law* in 2005, the government issued multiple national plans with clear quantitative targets for installed renewable energy capacities. In 2007, the *Renewable Energy Development Plan in the Medium and Long Term* was issued, mandating 5 GW installed capacity for 2010 and 30 GW for 2020 [78]. Then the *11th Five-Year Plan for Renewable Energy Development* in 2008 elevated the target to 10 GW for 2010 [79]. This target was renewed again in 2012 through the enactment of the *12th Five-Year Plan for Renewable Energy Development*, which mandated a total of 70 GW of newly installed capacity over 2011–2015 [80]. Therefore, targets had been on a continuous rise and the political signals behind those targets had become increasingly strong.

At first glance, national targets remain targets on paper and seem to have limited regulatory power. In practice, those targets have a strong command-and-control element. After interacting with the central government for decades, the incumbents are acquainted with the government's policy cycle—from planning to experiments and voluntary adoption and eventually to mandatory requirements. Therefore, even at the early stages with top-down mandates absent, the incumbents had already sensed the political signals and expected continuously increasing external pressures. Anticipating upcoming regulations, the incumbents started to leverage resources and capacities to prepare themselves for change.

Although external pressures were the same, the incumbents had different perceptions of the pace of change and levels of regulatory stringency. These different perceptions, coupled with different assets, knowledge, prior experience, and managerial capacities, led to heterogeneous responses and diverse strategic plans. These responses included the choices between renewable energy technologies, supply chain management, and financial innovations, which subsequently resulted in different energy portfolios and different financial performances.

The first decision the incumbents must make was between natural gas and renewable energies. When choosing between the two options, one company—Guangdong Electric Power—acted significantly differently from the others. The company's heavy investment in natural gas power plants led to a notable share of natural gas in its energy portfolio. By 2023, the ratio reached 21.97 %, the highest among all the incumbents studied (Table 1). Guangdong Electric Power made this choice partly out of the consideration of its resources and partly out of the concern of transition pressure. With most assets based in Guangdong Province, it had limited renewable energy resources. This explained that its renewable energy ratio was only 7.36 % in 2021 (Table 1). The situation experienced a slight change due to the growth in wind and solar power, which has resulted in a higher renewable ratio for the year 2023. Additionally, the government of Guangdong Province, as the first runner to initiate power sector decarbonization, put considerable pressure on the company to phase out coal [14]. The asset constraints, the top-down push to phase out coal, and the strive for a stable energy supply explained the company's preference for natural gas.

The natural gas power plant has many advantages. Compared with hydropower, it needs a relatively small initial investment and has a relatively short construction time. Compared with non-hydro renewable energies, unaffected by intermittency and curtailment, it enjoys relatively stable economic returns. Moreover, natural gas enjoyed special tariff systems, through which provincial governments adjust on-grid prices according to average natural gas costs [81,82]. Less initial investment burden and more stable return might give Guangdong Electric Power better capacity to manage cash flow and repay debts, therefore a higher high current ratio (Fig. 4).

The incumbents also had a choice to make between hydropower and other renewable energies. When coming to this decision, Datang Power and Guodian Power distinguished themselves from the others. In 2023, both companies had significant shares of hydropower in their energy portfolios, reaching 12.55 % and 14.16 %, respectively. The two companies' preferences cannot be read separately from their assets and prior experience. Take Datang Power as an example. The company's hydropower assets are concentrated in Yunnan Province, Chongqing City, and Sichuan Province, where rich hydropower resources are located [83].

Although hydropower projects are considered to have the lowest levelized cost due to high capacity factors and low operation costs, their upfront investment costs are inevitably high [84,85]. These high upfront costs would potentially affect the company's short-term and mid-term financial performances, especially capital utilization efficiency. This partially explained that the total capital turnover ratios of Datang Power and Guodian Power were the lowest during the first half-decade (2010–2015) and did not catch up with the others until the tail end of the 2010s (Fig. 5).

The choice between natural gas and renewable energies and the choice between hydropower and other renewable energies epitomized major divergence among the incumbents. When it came to the choice

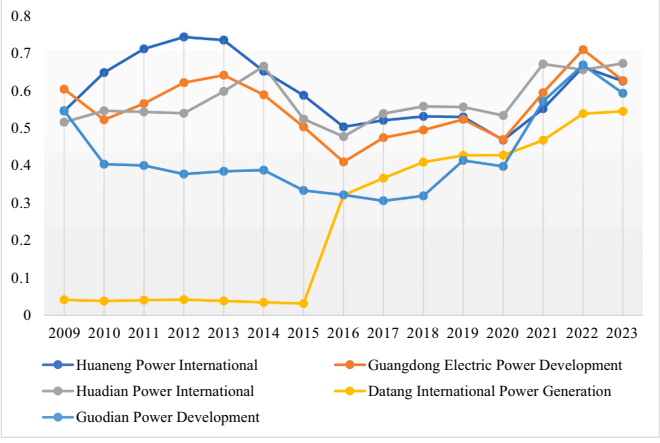

Fig. 5. The total capital turnover ratios of the five companies between 2009 and 2023.

between wind energy and solar energy, although the amounts of installed capacity vary, most of the incumbents chose to invest more in wind (Table 1). This finding supported previous research, which argues that more investment flew to wind energy due to its lower levelized cost during the 2010s [11,37].

No matter what low-carbon energy choices SPCs had made, the incumbents exhibited gradual compliance. Facing progressively stricter regulations, they responded in a timely manner, which was evident in both pre-project planning and installed capacities. The pre-project planning, though not directly visible, was observed by other scholars [39]. Even at the early stage when the development prospect of wind power remained unclear due to high curtailment rates, the incumbents actively negotiated land-use contracts with local governments. They competed with each other to occupy as much wind-rich land as possible to hoard wind resources for later development [39]. What prompted this fierce competition was the incumbents' anticipation of the eventual enforcement of the RPS in the immediate future. This land acquisition prepares the groundwork for latter renewable energy development by shortening project evaluation and planning phases, contributing to the enhanced 'creative' efforts at later stage.

Therefore, the observed alignment between 'creative' and 'destructive' ambitions in the latter stages should not be interpreted solely as a consequence of the state's effective policy sequencing. Instead, this alignment is intricately linked to the strategic planning of SPCs. Given the scarcity of renewable energy-intensive lands, SPCs need to engage in territorial competition as early as the pre-project planning stage, long before the final assessment of installed capacity. Territorial competition, as one of the important strategies that reflects SPCs' proactive calculation, is crucial for their long-term compliance.

Additionally, the choice made between natural gas and renewable energies and the choice between hydropower and other renewable energies reflects another two important strategies—that is 'utilizing natural gas to adjust the pace of transition' and 'planning renewable energy investment sequences'.

3.2.2. *Managing supply chains and conducting financial innovations*

Energy transition does not merely mean escalating regulatory requirements and coerced compliance but also opens new opportunities for enterprises to innovate, expand, and diversify. The analysis focused on the incumbents' supply chain management and financial innovations.

Regarding supply chain management, the incumbents have two directions to reshape their business—upstream and downstream [86,87]. Moving upstream, the incumbents strategically planned the vertical integration between coal production and power generation; moving downstream, the incumbents extended their business into the realm of electricity distribution. In the specific case of the five incumbents, the reorganization of supply chains could be observed since the end of the 2000s. Huaneng International acquired 49 % of the shares of the Huating Coal Group in Gansu Province in 2008 and 2009 [87]. Huadian International bought 70 % of shares in two Shanxi coal companies in 2009 [88]. These strategic moves indicate the incumbents' expansion towards the upstream to cope with the fuel price volatility and secure the fuel supply [86]. Towards the downstream, Huaneng International acquired shares in electricity transmission and distribution companies [89], while Huadian International, instead of holding shares of downstream companies, established its own energy sales branch—Huadian Guangdong Sales Company—in 2016 to explore new opportunities in the retail electricity market [90].

Needless to say, the vertical integration of the supply chain requires financial resources. So does the investment in renewable energies. The reorganization of business operations went in tandem with financial rearrangement and innovation. Financial management means effectively utilizing both internal and external monetary resources. A company can mobilize internal revenues to support daily operations and new investments in low-carbon technologies. The company can also tap new funding pools—such as subsidies, debt, and equity—to augment its internal monetary pool.

Facing financing challenges, the incumbents partly solved the problems by channeling resources from the old regime to the new regime—that was transferring the revenues from coal power projects to renewable energy projects. As stated in the previous section, low coal prices during the first half of the 2010s created extra profit margins for coal power plants, those revenues constituted the first funding pool.

Additionally, the investment in renewable energies was subsidized by international and domestic subsidies. The support by international subsidies, mainly from the Clean Development Mechanism (CDM) under the Kyoto Protocol, was ended in 2013 when the European Union restricted the origin of carbon credits to the Least Developed Countries which excluded China [91]. This led the incumbents to depend more on domestic subsidies—that is, renewable energy feed-in-tariffs. The feed-in-tariff schemes for wind and solar energy came out in 2009 and 2011, respectively, and gradually phased out in the following decade [9–11]. Although the government subsidies were promised, the payment of those subsidies often suffered from postponement and delay due to official budget constraints. It was estimated that by the end of 2019, the delayed payments to 11 large power generation groups amounted to 177 billion RMB [38]. The early ending of CDM credits in 2013 and the delayed payments of the feed-in-tariffs during the 2010s imposed significant financial stress on the incumbents who were at the crucial stage of the energy transition.

In August 2016, the People's Bank of China, in conjunction with the Ministry of Finance, the NDRC, the Ministry of Environmental Protection, the China Banking Regulatory Commission, the China Securities Regulatory Commission, and the China Insurance Regulatory Commission issued the *Guiding Opinions on Building a Green Financial System* [92]. The 'Opinions' stressed the importance of constructing a green financial system, developing green credit, promoting the securities market to support green investment.

Encouraged by green finance policies, and in response to insufficient and delayed subsidies, the incumbents proactively innovated new financing schemes. Huaneng International issued carbon neutrality bonds as well as guaranteed-energy-supply bonds [93]. Huadian International initiated a special plan named "Yingda Securities-Huadian International Electricity Fee Receivables No. 1 Asset-Backed Special Plan" [94], which was considered the first asset securitization project based on the accounts receivables. Then, Guodian Power issued the income-right asset securitization product based on wind power income [95], which made the company the winner of the Global Green Finance Innovation Award in 2020 [96].

In the second tale, SPCs displayed proactive adaptation in response to evolving energy policies. To reduce operational and financial costs, several strategies were deployed, such as optimizing supply chain management and incorporating financial innovations. The reorganization of business operations and financial restructuring are inherently linked. When SPCs undertook vertical integration of the coal power supply chain, they aligned various stages of production and distribution under a unified management structure, which often necessitated substantial initial investment and drove financial innovation. On the other hand, finance innovation, which attracts more capital towards energy projects, would galvanize the optimization of existing coal power operations and the expansion into greener energy solutions.

4. Discussion

The discussion of the dynamics between government intervention and the incumbents' adaptive responses evolved around two different tales. The first tale illustrated the common narrative shared by the incumbents, who were first driven by monopolistic rivalry and low coal prices (during the first half of the 2010s) and later thwarted by soaring fuel prices and steadily tightening government regulation (during the second half of the 2010s).

Like other studies, we observed at the early stage of energy transition

(during the first half of the 2010s) less 'destructive' actions. Developmental environmentalism interprets the less 'destructive' actions as the state's choice in setting policy priorities. It is argued that the long-standing developmental goals in Northeast Asian countries, which prioritize the establishment and growth of domestic industries, explain a more pronounced focus on 'creative' ambitions than 'destructive' ambitions [15]. In contrast, we interpret the same process as a delayed transition which emerged out of the dynamic interactions between the state and SPCs. In response to government intervention, the active calculation of the SPCs—the monopolistic competition in regional markets, the extra profit margins generated by falling fuel prices, and the haste to take advantage of the last opportunity—explains the coal rush and, therefore, the postponed 'destructive' actions.

We also observe increasing destructive actions at the latter stage (during the second half of the 2010s). Rather than being the result of the state's successful policy sequence [15,16], it is the same complex dynamics between the state and SPCs that cool down the fever of investing in coal. The reduced investment in coal was influenced both by the strategic decisions of industry players in face of shrinking profit margins and potential revenue losses (see Fig. 3) and by the central government's increased dedication to phasing out coal. The dynamics laid the groundwork for increasing alignment between creative and destructive measures at the latter stage. By looking at the strategic planning of SPCs in response to state intervention, we offered alternative explanations of the timing and pace of the destructive phase.

The second tale, on the other hand, illustrated the divergent trajectories traveled by the incumbents as they planned the transition to low-carbon energies. Their different decisions were influenced by the pace of the energy transition and the estimation of costs and profits. The former two hinge on the perception of regulatory stringency.

Concerning the pace of the energy transition, Different gauges of the transition pace led to divergent perceptions of the value of natural gas. The incumbents are gauging the contemporary value of natural gas against the timeline of carbon neutrality. Among the incumbents, more investment in natural gas had been observed between 2016 and 2023 (Table 1). By 2023, the ratio of natural gas among the studied companies ranged from 0.97 % to 21.97 %. This wide range reflected the different understanding of the role of natural gas. At the lower end, the ratios of Datang Power and Guodian Power stayed under 10 %. This might be because both companies had large amounts of hydropower to satisfy current RPS requirements. Guangdong Electric Power, on the other hand, had the highest ratio. This was partly because it had limited hydropower and renewable energy resources and partly because it faced more stringent decarbonization requirements from the Guangdong Provincial Government [14]. In this case study of SPCs, it is found that a greater reliance on natural gas power compared to renewable energy could provide a competitive edge for a company. Guangdong Electric Power, for instance, benefited from this energy portfolio and enjoyed higher current ratios, reflecting stronger short-term solvency, less financial risk and potentially making it more attractive to investors.

When choosing which renewable energy sources to invest in, the incumbents were both state-controlled entities and cost-sensitive market competitors. The incumbents kept costs in mind because, downstream, they were facing the cost-conscious grid corporations. Grid corporations, struggling to maintain profit margins under government price controls on both wholesale and retail electricity, would choose to purchase hydro, wind, and solar power in descending order of preference [11]. In response, SPCs adhered to the same order. Datang Power and Guodian Power, the representatives of companies with more hydropower resources, decided to develop hydropower first. Due to the long pre-investment construction cycle and long operation payback period of hydropower projects, the total capital turnover rate of the two companies is low, but in the long run, the cost advantage has been accumulated for hydropower projects, and the total capital turnover rate has shown a rebound state (Fig. 5). The others, with limited hydropower resources, prioritized wind power. This order of preference, which stemmed from the cost-conscious interaction between power companies and grid cooperations, explained the high ratios of hydro and wind power and the relatively low ratios of solar energy among the incumbents (Table 1).

The incumbents were not only cost-conscious but also time-conscious. The incumbents based their understanding of the transition urgency (that is, the impending mandatory requirements of installed renewable energy capacities) on the chronological flow of official documents. The required renewable energy capacities were first implied in national targets—from 5GW by 2010 (the 2007 target), to 10 GW by 2010 (the 2008 target), and to 70 GW by 2015 (the 2012 target). Then, the implementation of the RPS started to be implied in official documents. In 2014, the NDRC and the NEA released the Assessment Measures of Renewable Portfolio Standards in the Electricity Sector (for Trial Implementation), which was protested by major power companies through various channels [97].

The communications around the trial document and the protest channels allow the incumbents to perceive the impending regulations as well as the existence of few buffer years. The perceptions partially led to the sustained high coal investment and the hoarding of wind-rich lands at the early stage. The former was partially driven by a mindset of seizing the final opportunity during the buffer years, while the latter was motivated by the anticipation of eventual consolidation of energy transition policies.

Subsequently, in 2018, the NEA issued the Renewable Portfolio Standards in the Electricity Sector and Appraisal Measures (Draft for Collecting Opinions). Though this document was namely a policy draft and was not legally enforceable at that time, it already tentatively laid down for each province the minimum non-hydro renewable energy consumption ratio by 2020, ranging from 2.5 % to 25 % [98]. In 2020, the NDRC and the NEA announced the Notice on Renewable Energy Consumption Ratio for Administrative Regions in 2020 [12], which signaled the final implementation of the RPS. The incumbents acted on the political signal by planning well in advance. As stated previously, territory competition (including site selection, project feasibility studies, and land contract negotiation) for renewable energies have already begun at the early stage. As a result, when the conditions turn favorable at the latter stage, the incumbents could save pre-project planning efforts during the second half of the 2010s and progressively expand their renewable capacities in a timely manner. By the time the central government finally imposed the RPS, their installed capacities already reached levels that were in line with national goals.

In the second tale, SPCs employed a range of strategic approaches to navigate and shape the energy transition. These strategies included: (1) engaging in territorial competition, which involved vying for access to key regions and resources, thereby influencing the distribution and pace of energy investments; (2) utilizing natural gas as a transitional fuel to modulate the speed of the shift, providing a buffer and a gradual shift; (3) strategically sequencing renewable energy investments, ensuring a phased and efficient deployment of resources that aligns with both market conditions and policy objectives; (4) implementing advanced supply chain management practices, optimizing logistics and reducing costs to enhance operational efficiency and support the broader orientation; and (5) deploying financial innovations, such as new funding mechanisms and investment structures, to tackle the capital needs and risks associated with transitioning to low-carbon energy.

The two tales and multiple choices made by SPCs revealed the important but multifaceted roles of the incumbents, who occupy a dynamic space that lies between being barriers and serving as enablers. Both authoritarian environmentalism and developmental environmentalism inherently possess undertones of determinism, often projecting optimistic outcomes from state-led energy transitions in either authoritarian regimes or Northeast Asian countries. These perspectives tend to emphasize the effectiveness of state interventions and policy sequencing, potentially overlooking the nuances and uncertainties that characterize the state-SPCs interactions. This paper delved into the

intricate and variable contexts within which energy transitions unfold and found that competitive behaviors and adaptive strategies of the enterprises play a crucial role in shaping transition outcomes.

In retrospect, the current ratios of all the companies exhibited an upward trend (see Fig. 4). Capital accumulation at the early stage (see Fig. 3) and the gradual influx of subsidies and green finance at the later stage explain the improvement in overall liquidity. Given the decline in profitability in the later stage (see Fig. 3), the capital accumulation from the earlier coal power expansion played a positive role in supporting liquidity in the later stages, maintaining short-term financial stability, enhancing repayment capacity, and supporting renewable development. For individual companies, the numerous benefits from the earlier coal power expansion were rational choices. However, from the perspective of the overall energy transition, it had a hindering effect.

SPCs' initial heavy investment in coal power made the domestic energy transition even more challenging, while their proactive pre-project planning and renewable energy investments led China to make milestone achievements towards the 2060 carbon neutrality goal. The micro-scale and bottom-up dynamics introduce elements of unpredictability and complexity into the transition process and have influenced the transition trajectory in ways that state policies alone may not fully encompass.

These insights have practical implications for policymakers. Though state-led orientation that guides SPCs' behavior can indeed be effective, such guidance must account for the dynamic and often unpredictable consequences that arise from these interactions. The process of managing energy transitions involves inherent uncertainties, which in turn place higher demands on governmental governance capacity and flexibility. While regime types and developmental ideologies are significant factors driving state-led transitions [15,18,19], other attributes—such as the state's ability to learn, to sustain flexibility in face of uncertainties, and to adapt to evolving circumstances may be equally critical [9,35,97,98]. Our findings underscore the need for a more comprehensive understanding of how diverse organizational strategies and their interactive dynamics drive systemic change in the energy sector, calling for the integration of macro- and micro-scale perspectives to ensure that policies and interventions are robust enough to accommodate both anticipated and unforeseen challenges.

5. Conclusion

Successful energy transition requires the government to well coordinate both creation and destruction policy mixes. However, synchronizing the incentivization of renewable energy production with the phase-out of coal power is not easy. While authoritarian environmentalism and developmental environmentalism highlight the promising outcomes of state-led transitions in authoritarian regimes and Northeast Asia, they may overlook the nuanced interactions between the state and SPCs, along with the uncertainties arising from these interactions. SPCs are driven by profit motives, cost considerations, and time constraints, and they sometimes engage in innovative practices. This case study of the experiences and decisions of SPCs illustrate their multifaceted roles in the energy transition and their substantial impacts on the transition trajectory of the country. A comprehensive approach that integrates both macro-level policy considerations and micro-level organizational behaviors is, therefore, essential for appreciating the pace, prospects, and pathways of the energy transition.

CRediT authorship contribution statement

Ying Sun: Writing – original draft, Project administration, Methodology, Formal analysis, Conceptualization. **Aitong Li:** Writing – original draft, Project administration, Methodology, Formal analysis, Conceptualization. **Taorui Ren:** Formal analysis, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

First-class Index	Second-class Index	The Index Calculation Formula
Solvency	Current Ratio	Current Assets/Current Liabilities
	Leverage	Total Liabilities/Total Assets
Profitability	The Return on Total Capital	(EBIT from Operating Activities + EBIT from Investment Activities)/Total Capital
Operational Capability	Total Capital Turnover Ratio	(Cash Inflow from Operating Activities+Cash Inflow from Investing Activities)/Total Capital

Data availability

Data will be made available on request.

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