

State-owned enterprises and energy transitions: Key research questions for an emerging topic

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What types of institutional arrangements are best at leading rapid and equitable energy transitions? This is a critical question facing policymakers and the research community as all countries grapple with these questions, and some, to date, more successfully than others. In addition to discussions about economic and technology choices that are important to the transition, the role of political economies in catalyzing or obstructing rapid, just, and politically sustainable transitions has emerged as a central, but often poorly understood, set of factors underpinning successful transitions. Notably, research to date has paid less attention to some specific categories of industry actors as substantial political and economic agents, especially “keystone actors” – those corporations who have disproportionately systemic impact on global energy landscape and environmental change (Folke et al., 2019; Österblom et al., 2015). Large energy corporations, for example, have the capacity to directly influence the transition process through their investment preferences and close, often complex, relationships with states. Overall, a set of about 100 of these companies globally are estimated to be responsible for about 70% of greenhouse gas emissions (Griffin, 2017; Heede, 2014).

Among all industry actors with roles to play in the energy transition, state-owned enterprises (SOEs) deserve particular attention. They account for nearly 40% of the overall energy investment globally and the share is particularly high in fossil fuel energy investment, reaching 41% in oil and gas supply and 50% in fossil fuel generation by 2019 (IEA, 2022). SOEs are also among the world's leading fossil fuel energy producers. These include national oil companies (NOCs) like Saudi Aramco, China National Petroleum

(CNPC), National Iranian Oil Company (NIOC), and Rosneft, coal companies such as Coal India, China Shenhua Energy, and Sasol, as well as electric power producers such as China Energy Investment, National Thermal Power Corporation (NTPC), and Tenaga Nasional Berhad. Additionally, SOEs control more than half of the power transmission networks around the globe (IEA, 2022) with notable examples being the State Grid Corporation of China, Power Grid Corporation of India, and Operador Nacional do Sistema Elétrico (ONS) in Brazil. Therefore, how state-ownership in distribution and transmission invest and perform is also key for the decarbonization agenda. The prominent roles that these actors play, and their significant locus in the center of many national political decision-making processes, give rise to an urgent need for systematic analyses of their influence and impact that can inform broader strategies for improving broader societal outcomes.

Geographically, SOEs hold prominent positions in the energy and power sectors in various developed countries, such as France, Italy, and Norway, and will play central roles in the energy transitions of major emerging economies, such as China, Brazil, India, Indonesia, Mexico, the Gulf States, and South Africa. Many of these countries are among the biggest contributors to global carbon emissions. The significance of state-owned enterprises (SOEs) as influential market players and major producers of greenhouse gas emissions in the global energy landscape and climate governance is large and growing (Clark, 2022; Zhang and Zuo, 2023).

More importantly, countries have been increasingly reinforcing state-ownership in the energy sector. For example, China has further consolidated and reinforced already near-total government control over the energy and power sector over the past five years. Elsewhere, France has planned to fully nationalize EDF - the French power SOE and one of the world's largest power producers. The €9.7 billion plan for the French government to acquire the remaining shares in EDF recently received court approval. In September 2022, the German government initiated a similar strategy, aiming to nationalize the country's largest gas and utility company, Uniper. Most recently, the Mexican government strengthened state control in the energy market by purchasing 13 power plants from Iberdrola - Spain's largest power company and the largest private electricity generation company in Mexico, as part of the country's "new nationalization" strategy.

The quasi-governmental attributes of SOEs mean their positions in the political economy of these transitions can differ markedly from those of their private sector counterparts—which have to date received the lion's share of scholarly attention. However, SOEs can be understood not only as commercial companies, but also as policy arms of the state and political entities that are deeply embedded in the domestic (and in some cases, international) socio-political landscape. SOEs can be used by their government shareholders as means of pursuing a variety of non-financial goals, while at

the same time potentially “keeping the government at arm’s length.” In countries like China, SOEs are not only policy tools, but also political entities in their own right, in which the executive officers are often considered as semi-government officials through the cadre systems and company chairpersons increasingly hold dual roles as Party representatives. There is evidence to suggest the existence of a “revolving door” between government agencies and SOEs, and across SOEs themselves (Leutert, 2018). Some scholars have argued that this system allows SOE executives to make investment decisions that are not economically viable, especially in the short-term, in service of social and political goals (Lin et al., 1998). This is particularly the case when SOEs are facing energy security challenges. The state can use SOEs to tighten its control over energy security by expanding state ownership in the national energy system. However, SOEs are nonetheless still companies operating in domestic and international commercial markets, where they compete with other market actors, or seize rents for the state, along the lines proposed by other scholars of state capitalism (Zhu et al., 2019). The multifaceted role of SOEs complicates the political economy of energy transitions with respect to state-business relations, climate governance, and institutions.

Therefore, despite the prominent presence of SOEs worldwide, their roles are often controversial and there is no consensus on the role SOEs should play in the energy transition. As a result, there are a number of major ongoing normative and empirical debates in the field:

(1) Economic inefficiency. Arguments have been made that SOEs are less efficient and cost-sensitive than their private counterparts due to soft budget constraints, although there is limited and context-specific evidence to support this claim;

(2) Unfair competition. Some argue that SOEs enjoy preferential treatment (e.g., lower interest rates for loans) from their government shareholders, which increases their market power relative to non-SOEs, and reduces their exposure to true market competition. This preferential treatment can, some claim, provide SOEs with relatively larger investment resources, and lower barriers to investment. Whether or not SOEs that enjoy these advantages hinder the clean transition by crowding out other market actors remains an open question;

(3) State capitalism and political purposes. In the global market, SOEs’ overseas investments are often associated with concerns about state capitalism, in which SOEs act as economic tools for states to seize capital from the global markets with financial support from the government. There are also concerns that SOEs offer a means for one country to achieve its political goals in other countries. There is a need to understand how any opposition to SOEs’ overseas investments linked to these activities affects the prospects for rapid, just energy transitions around the world.

Although SOEs and the energy transition are an emerging topic, there is a growing body of literature that is beginning to answer some of these and other questions. For example, Prag et al. (2018) find that the share of power generating capacity controlled by SOEs is positively associated with investment in renewable capacity in OECD and G20 countries (Prag et al., 2018). Zhu et al (2022) examined the role of central state-owned enterprises (CSOEs) in driving China's wind power development and how they are embedded in China's institutional arrangements. This research offers new firm-level explanations for China's wind power development that explicitly account for the role of SOEs and has potential policy implications for other emerging renewable markets in which SOEs play a major role (Zhu et al., 2022). Benoit et al. (2022) develop a framework for analyzing the extent to which similarities and differences of SOEs, and the markets in which they operate, affect their relationship to government interventions on decarbonization (Benoit et al., 2022).

However, despite the critical importance of these institutions to the domestic political economies of emerging powers, the impact of SOEs on reform processes in general, and energy transitions in particular, remains understudied. A greater number of detailed single case studies and comparative studies of large and small-n varieties are needed to improve our understanding of how these institutions can be better arranged to produce more favorable climate outcomes.

These features raise a series of important overarching questions: Does the presence of SOEs in a country's energy sector accelerate or impede its energy transition, and under what conditions do they have the most positive impact? Does variance in the characteristics and performance of SOEs and the context in which they operate lead to qualitatively different transitions in terms of industrial or technology outcomes? How can we understand the underlying reasons behind the heterogeneity among SOEs operating within the same legal and regulatory frameworks? And if states adopt state capitalist or SOE-led energy economies as they undertake their energy transitions, what institutional arrangements could encourage these SOEs to increase the pace and quality of their country's transition?

In summary, the role of SOEs in the political economy of energy transitions from a global comparative perspective remains poorly understood as a whole, but with important recent advancements pointing the way toward a more comprehensive approach. Our discussions aim to set a research agenda and identify some of the key research gaps on this topic, such as:

1. Does state capitalism demonstrate better performance with respect to energy transitions than neoliberalism and other varieties of free-market capitalism?
2. How can the presence of SOEs accelerate or hinder energy transitions (i.e., renewable energy deployment and fossil fuel phase-down)?
3. What are the key features of government-SOE relations, and how do they influence energy transitions, once accounting for the dynamics between central government, local government, SOEs and private companies?
4. What are the linkages between SOEs and industrial policy, and what is the role of SOEs in the policy formation, execution, and review process?
5. What are the institutional drivers that direct SOE behaviors during energy transitions?
6. What are the political economy frameworks under which SOEs conduct overseas investments?
7. What enabling factors can help SOEs overcome organizational inertia and take necessary steps for successful energy transition? How do SOEs manage internal organizational dynamics and external political economy context while navigating energy transitions? Under what conditions are they likely to be more successful than private counterparts?

To take the next step in exploring this research agenda, we have organized a panel discussion at the Society for the Advancement of Socio-Economics (SASE) in July this year in Rio de Janeiro, Brazil, entitled “Decarbonization from the Commanding Heights: State-Owned Enterprises and Energy Transitions in Emerging Economies”. We will be presenting four papers including:

- State capitalism, renewable investment and energy transitions: Evidence from the Gulf States
- Private versus state ownership: The political economy of local wind power development in China
- Decarbonization in state-owned power companies: Lessons from a comparative analysis
- A comparative study of state-owned enterprises and energy transition pathways in emerging economies

Beyond this discussion, we invite further engagement and discussions between the research community, the policy community, and those in the enterprises in question.

References

1. Benoit, P., Clark, A., Schwarz, M., Dibley, A., 2022. Decarbonization in state-owned power companies: Lessons from a comparative analysis. *Journal of cleaner production* 355, 131796.
2. Clark, A., 2022. Greenhouse gas emissions from state-owned enterprises: a preliminary inventory.
3. Folke, C., Österblom, H., Jouffray, J.-B., Lambin, E.F., Adger, W.N., Scheffer, M., Crona, B.I., Nyström, M., Levin, S.A., Carpenter, S.R., 2019. Transnational corporations and the challenge of biosphere stewardship. *Nature ecology & evolution* 3, 1396-1403.
4. Griffin, P., 2017. The carbon majors database CDP carbon majors report 2017.
5. Heede, R., 2014. Tracing anthropogenic carbon dioxide and methane emissions to fossil fuel and cement producers, 1854–2010. *Climatic change* 122, 229-241.
6. IEA, 2022. Share of government/SOE ownership in global energy investment by sector, 2015 compared to 2019.
7. Leutert, W., 2018. The political mobility of China's central state-owned enterprise leaders. *The China Quarterly* 233, 1-21.
8. Lin, J.Y., Cai, F., Li, Z., 1998. Competition, policy burdens, and state-owned enterprise reform. *The American economic review* 88, 422-427.
9. Österblom, H., Jouffray, J.-B., Folke, C., Crona, B., Troell, M., Merrie, A., Rockström, J., 2015. Transnational corporations as 'keystone actors' in marine ecosystems. *PLoS one* 10, e0127533.
10. Prag, A., Röttgers, D., Scherrer, I., 2018. State-owned enterprises and the low-carbon transition.
11. Zhang, F., Zuo, J., 2023. State-Owned Enterprises' Responses to China's Carbon Neutrality Goals and Implications for Foreign Investors.
12. Zhu, M., Qi, Y., Belis, D., Lu, J., Kerremans, B., 2019. The China wind paradox: the role of state-owned enterprises in wind power investment versus wind curtailment. *Energy Policy* 127, 200-212.
13. Zhu, M., Qi, Y., Hultman, N., 2022. Low-carbon energy transition from the commanding heights: How state-owned enterprises drive China's wind power "miracle". *Energy Research & Social Science* 85, 102392.