

The Contribution of State-Owned Enterprises to Climate Change Mitigation in China

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Abstract

China has announced the implementation of a nation-wide market-based mechanism for greenhouse gas mitigation, appearing thus to replicate the method used most famously in the European Union to price greenhouse gas emissions. However, China's new mechanism represents only be the tip of the mitigation iceberg. Banking on the unique characteristics of a socialist market economy, China's government has largely relied on State-Owned Enterprises as a tool for implementing rapid changes. In this article, we discuss the role played by Chinese SOEs to advance the country's ambitious mitigation objectives. After a general description of the incentives created for emission limitation and energy saving through SOE supervision, we highlight the corresponding efforts made in the fossil-fuel, power-generation, and other key sectors.

Keywords

China; socialist market economy; climate change mitigation; State-Owned Enterprises (SOEs); State-Owned Assets Supervision and Administration Commission (SASAC).

1. Introduction

In 1992, developed states agreed to 'take the lead in combating climate change'.¹ This was followed in 1995 by quantified emission-limitation and reduction commitments in the Kyoto Protocol. With the United States out of the Kyoto Protocol, the European Union assumed the global leadership on climate change mitigation. The EU's tools to limit and reduce greenhouse gas emissions were multiple and diverse, but the flagship

¹ UNFCCC, art. 3(1).

measure was the implementation of the EU ETS.² Developing states were progressively ‘socialized’ into a market-based approach to international mitigation action, in particular through the Clean Development Mechanism.³ China has been by far the largest host of CDM projects. Most of them were funded by the European Union.⁴

In 2006, China surpassed the United States as the world’s largest greenhouse gas emitter. It now accounts more than a quarter of global greenhouse gas emissions.⁵ In the period between the 2009 Copenhagen Accord and the 2015 Paris Agreement, China agreed to ever more ambitious steps on mitigation. This culminated in China’s Intended Nationally Determined Contribution in the months prior to the Paris Agreement, in which the country committed ‘To achieve the peaking of carbon dioxide emissions around 2030 and making best efforts to peak early’.⁶ This commitment will require a mitigation effort of an unprecedented scale and pace.⁷ An array of new or enhanced measures will likely be implemented.

China’s climate laws and policies, present and future, may be assumed to be influenced to some extent by those of Western, and in particular, European nations. The soft power of academic research, reports by think tanks, advice by international organizations and even by China’s own increasingly foreign-educated elites are conducive to that effect. China’s government is also open to replicating instruments that have been developed elsewhere without the need to innovate. The UNFCCC not only called on developed states to take mitigation measures first, it called on them to *take the lead*,⁸ suggesting that mitigation tools first developed in the West could later be extended to the Rest. European governments and Western think tanks have not been timid in promoting market-based mechanisms as *the* tool to reduce greenhouse gas emissions in China.⁹ China’s decision to establish an ETS was in order to ‘make the market play the decisive

² Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community, OJ L 275, 25.10.2003, p. 32-46.

³ See *Kyoto Protocol*, art. 12.

⁴ See e.g. LIN Han, ‘The contribution of the Clean Development Mechanism (CDM) towards China’s Climate Change Mitigation and Sustainable Development’ in Curtis Andressen (ed.), *China’s Changing Economy: Trends, Impacts and the Future* (London: Routledge, 2016).

⁵ On greenhouse gas emissions attributed to each country, see the CAIT Climate Data Explorer developed by the World Resources Institute and available at <<http://cait.wri.org>>.

⁶ *Enhanced Actions on Climate Change: China’s Intended Nationally Determined Contributions*, 30 June 2015, available at <<http://www4.unfccc.int/submissions/INDC/Published%20Documents/China/1/China's%20INDC%20on%20on%2030%20June%202015.pdf>>, at 5.

⁷ Thus, the World Resources Institute notes that China’s commitment to 20% of non-fossil fuel energy by 2030 will require the deployment of non-fossil fuel sources of energy roughly equivalent to the United States’ total current electricity capacity. See Taryn Fransen et al., ‘A Closer Look at China’s New Climate Plan (INDC)’ *World Resource Institute*, 2 July 2015, available at <<http://www.wri.org/blog/2015/07/closer-look-chinas-new-climate-plan-indc>>.

⁸ UNFCCC, art. 3(1).

⁹ See e.g. Olivia Gippner, ‘Emissions trading and climate diplomacy between Europe and China’ (Norwegian Institute of International Affairs, Policy Brief No. 32, 2016), at 3 (right), noting for instance that ‘[t]he European Commission’s DG Climate Action even has a specific office dedicated to emissions trading in China.’

role in resource allocation'.¹⁰ This was despite the findings of legal,¹¹ policy,¹² and economics¹³ scholars, who emphasized the difficulties that market-based mechanisms would face in China's particular political and economic circumstances, characterized by the prevalence of State-Owned Enterprises with little appetite for market-based incentives intruding in their key sectors.¹⁴

Whether or not China's market-based mechanism will be a useful tool in climate change mitigation, it will surely not be a sufficient one. Other laws and policies will need to be implemented as well.¹⁵ The transplantation and adaptation of tools developed in the European Union or other Annex I parties could help China, but innovation in law and policy is likely to play at least as significant a role. China's policy innovations could then, in turn, influence mitigation strategies that other developing States will be devising in the coming decades. Such innovations are likely to relate to the particular circumstances of China's socialist market economy. In particular, they are likely to seek to address endemic issues having to do with enforcement, corruption, and *guanxi* (informal networks of personal influence), as well, of course, as a much more direct economic role. China's Thirteenth Five-Year Plan, adopted in 2016, mentions 'effective control' over key economic sectors as the first of a list of measures to mitigate climate change.¹⁶

This article looks at one particular aspect of this emerging toolkit by focusing on the potential role of SOEs. An SOE is a company controlled by the state through equity

¹⁰ China's INDC, *supra* note 6, at 14 (paragraph L). See also National Development and Reform Commission (NDRC), 'Interim Measures for the Administration of Carbon Emission Permit Trading' (碳排放权交易管理暂行办法), 10 December 2014, available at <http://qhs.ndrc.gov.cn/zcfg/201412/t20141212_652007.html>, at chapter 1, section 1; and, more recently, State Council, *Working Plan on the Control of Greenhouse Gas Emissions during 13th Five Year Plan* ("十三五"控制温室气体排放工作方案), 27 October 2016, available at <http://www.gov.cn/zhengce/content/2016-11/04/content_5128619.htm>, chapter 6.

¹¹ See Anatole Boute, 'The Impossible Transplant of the EU Emissions Trading Scheme: The Challenge of Energy Market Regulation,' 6(1) *Transnational Environmental Law* 59 (2017).

¹² See Alex Y. Lo, 'Challenges to the development of carbon markets in China' 16(1) *Climate Policy* 109 (2016).

¹³ See ZHAO Xin-Gang et al., 'How to Improve the Market Efficiency of Carbon Trading: A Perspective of China' 59 *Renewable and Sustainable Energy Reviews* 1229 (2016).

¹⁴ See YU Xiang and Alex Y. Lo, 'Carbon Finance and the Carbon Market in China', 5(1) *Nature Climate Change* 15 (2015), at 16, noting that Chinese SOEs 'concentrate on complying with regulatory requirements and have ... low interest in trading emission credits as a form of financial investment.'

¹⁵ See e.g. MO Jianlei et al., 'The impact of Chinese carbon emission trading scheme (ETS) on low carbon energy (LCE) investment,' 89 *Energy Policy* 271 (2016), noting that 'other policy measures will be needed to promote low-carbon energy development in China.' For an overview of the climate action that China intends to implement in the coming years, see *Working Plan on the Control of Greenhouse Gas Emissions during 13th Five Year Plan*, *supra* note 10; and China's INDC, *supra* note 6.

¹⁶ State Council, *13th Five-Year Plan for the National Economic and Social Development of the People's Republic of China* (国民经济和社会发展第十三个五年规划纲要), 17.

March 2016, chapter 46, section 1, first sentence. See also *12th Five-Year Plan for the National Economic and Social Development of the People's Republic of China* (国民经济和社会发展第十二个五年规划纲要), 16 March 2011, chapter 21, section 1, first sentence, calling for 'structural adjustments' in industrial, energy and other key systems'.

ownership or other means.¹⁷ In China, SOEs are firmly embedded in the ‘political, economic, and social matrix’ of state capitalism and exert a ‘tremendous influence’ in the country’s political economy.¹⁸ Of course, they are not unique to China. Many states maintain a strong share of ownership in key economic sectors, such as fossil-fuel extraction, power generation, and transportation.¹⁹ In Western countries, however, SOEs are generally kept at arm’s length to ensure a level-playing field between SOEs and private companies,²⁰ thus significantly reducing opportunities for actively using SOEs as tools for a public-policy objective such as climate change mitigation. By contrast, in the Chinese context, the greater degree of formal and informal interaction between government authorities and SOEs has made SOEs an obvious tool for climate change mitigation. This point has generally been overlooked in the literature.²¹

Our attempt to explore the role of SOEs in climate change mitigation in China faces many difficulties. An obvious one has to do with the lack of transparency and openness of Chinese institutions in general, but even more where SOEs are concerned. Even in Western countries with well-functioning legal systems, SOEs are often able to negotiate

¹⁷ There is no universally agreed definition of an SOE. Instead, many conflicting national and international criteria coexist. As an example, the United Nations Conference on Trade and Development (UNCTAD) defines SOEs as companies where the State has ‘a stake of 10 per cent or more of the voting power,’ whereas the Organisation for Economic Co-operation and Development (OECD) opts for a stricter standard when understanding ‘control of the state’ to ‘the state being the ultimate beneficiary owner of the majority of voting shares or otherwise exercising an equivalent degree of control’. See UNCTAD, *World Investment Report 2011*, available at <<http://www.unctadocs.org/files/UNCTAD-WIR2011-Full-en.pdf>>, at 28; and OECD, *Guidelines on Corporate Governance of State-Owned Enterprises (2015 Edition)*, available at <<http://www.oecd.org/daf/ca/OECD-Guidelines-Corporate-Governance-SOEs-2015.pdf>>, at 15-16. Due to SOEs’ central role in Chinese economy, definitions that rely solely on equity ownership are often misleading. See Curtis J. Milhaupt and Wentong Zheng, ‘Beyond Ownership: State Capitalism and the Chinese Firm’ 103 *Georgetown Law Journal* 665 (2015).

¹⁸ FENG Deng, ‘Indigenous Evolution of SOE Regulation’ in Benjamin L. Liebman and Curtis J. Milhaupt (eds.), *Regulating the Visible Hand?: The Institutional Implications of Chinese State Capitalism* (Oxford: Oxford University Press, 2016) 3 at 4.

¹⁹ In the EU, for example, SOEs accounted roughly 40% share in total energy turnover and close to 88% in the railway sector between 2008-2012. European Commission, ‘State-Owned Enterprises in the EU: Lessons Learnt and Ways Forward in a Post-Crisis Context (July 2016)’ (European Commission Institutional Paper 031, 2016), at 8-9. For a recent review of global trends, see William L. Megginson, ‘Privatization, State Capitalism, and State Ownership of Business in the 21st Century’ *Foundations and Trends in Finance (forthcoming)*, available at <<http://ssrn.com/abstract=2846784>>.

²⁰ This is exemplified, for instance, in various best practices on SOE governance. See e.g. OECD, *supra* note 17, at 20-23 and World Bank, *Corporate Governance of State-Owned Enterprises: A Toolkit.*, at 25-64. Moreover, numerous national, regional and international legal frameworks regulate the relationship between States and their SOEs. See e.g. Benjamin A. Templin, ‘The Government Shareholder: Regulating Public Ownership of Private Enterprise’ 62 *Administrative Law Review* 1127 (2010).

²¹ For a notable exception, see Alex L. Wang, ‘Chinese State Capitalism and the Environment’ in Benjamin L. Liebman and Curtis J. Milhaupt (eds.), *Regulating the Visible Hand?: The Institutional Implications of Chinese State Capitalism* (Oxford: Oxford University Press, 2016) 251. Moreover, State ownership is increasingly realized as an important policy entry point in the context of climate activism by sovereign wealth funds. See e.g. Danyel Reiche, ‘Sovereign Wealth Funds as a New Instrument of Climate Protection Policy? A Case Study of Norway as a Pioneer of Ethical Guidelines for Investment Policy’ 35 *Energy* 3569 (2010); Norges Bank Investment Management, ‘Climate Change Strategy. Expectations to Companies 2015’, available at <<http://www.nbim.no/contentassets/27ce1a7cbf0b4bba9d4d94bd23165e46/climate-change-strategy-document.pdf>>.

both the content of the law imposed on them and how it is implemented. Such two-way influence is considerably more pervasive in a country where what belongs to the individual, the enterprise, the state, or the Communist Party of China is not always clearly delineated and where legal provisions are often bypassed by policies, informal understandings, or interpersonal connections.²²

The following section provides a general background on state ownership in the context of a socialist market economy. Section 3 highlights efforts made by supervisory institutions in China to encourage SOEs to reduce their greenhouse gas emissions. Section 4 documents trends in relevant economic sectors of the Chinese economy.

2. Background: State Ownership in the Context of Socialism with Chinese Characteristics

China's progressive turn to a socialist market economy, initiated in 1978, has led to a considerable development of private enterprise.²³ Nevertheless, it is not an accident that the Constitutional provision on 'public ownership of the means of production'²⁴ has remained in place. The Chinese government has wanted to keep a tight control over the economy.²⁵ Many of the economic units (单位) belonging to the state or to collectives were formally transformed into limited-liability corporations following the enactment of the 1988 Law on Industrial Enterprises Owned by the Whole People,²⁶ and, above all, the 1993 Company Law,²⁷ yet their privatization was carried out slowly and cautiously.

In 1996, as part of the Ninth Five-Year Plan, the government adopted a policy of 'grasping the big while letting go of the small' (抓大放小).²⁸ Accordingly, while many small SOEs were sold off to the private sector, the state maintained ownership in economic sectors of strategic importance. These comprised 'national security-related industries, natural monopolies, sectors providing important goods and services to the public, and important enterprises in pillar industries and the high-technology sector'.²⁹

²² See Lei Zheng, Curtis J. Milhaupt and Benjamin L. Liebman, 'SOEs and State Governance: How State-Owned Enterprises Influence China's Legal System' in Benjamin L. Liebman & Curtis J. Milhaupt (eds.), *Regulating the Visible Hand?: The Institutional Implications of Chinese State Capitalism* (Oxford: Oxford University Press, 2016).

²³ See e.g. WANG Jianguo, *Company Law in China Regulation of Business Organizations in a Socialist Market Economy: Regulation of Business Organizations in a Socialist Market Economy* (Cheltenham, UK: Edward Elgar, 2014) at 1; Nicholas R. Lardy, *Markets Over Mao: The Rise of Private Business in China* (Washington, DC: Peterson Institute for International Economics, 2014).

²⁴ *Constitution of the People's Republic of China*, 1982, art. 6.

²⁵ For a brief historical exposition, Li-Wen Lin and Curtis J. Milhaupt, 'We Are the (National) Champions: Understanding the Mechanisms of State Capitalism in China,' *65 Stanford Law Review* 697 (2013), at 712-16, 735-36.

²⁶ Law on Industrial Enterprises Owned by the Whole People (全民所有制工业企业法), 1998.

²⁷ Company Law (公司法), 1993. See generally WANG, *supra* note 23.

²⁸ State Council, 'Ninth Five-Year Plan for the National Economic and Social Development' (国民经济和社会发展 '九五' 计划), 17 March 1996, para. 7.1.2. See also SHENG Hong and ZHAO Nong, *China's State-Owned Enterprises: Nature, Performance and Reform* (Singapore: World Scientific, 2013) at 97.

²⁹ Donald C. Clarke, 'Corporate governance in China: An overview,' *14(4) China Economic Review* 494 (2003), at 496-97. See also SHENG and ZHAO, *supra* note 28, at 322.

In 2009, the government responded to the global financial crisis with a massive investment, mostly through the public sector.³⁰ Additionally, SOEs are an integral component of the ‘Going Out’ (走出去) strategy through which the Chinese government encourages its enterprises to invest abroad.³¹

In sectors of strategic importance, state ownership was frequently reorganized into a complex net of state-owned holding enterprises intermediating between the state and the companies themselves. For instance, in 1988, China National Petroleum Corporation (CNPC) was created through the corporatization of an entire administration in charge of petroleum exploration and mining. CNPC is now an integrated multinational company with numerous subsidiaries (PetroChina being the best known) specializing in particular activities and geographical sectors in China and abroad.³² Other such large groups with listed subsidiaries throughout the world include China Power Investment Group, a leader in power generation, and State Grid Corporation of China, whose ownership and management of electrical grids is not limited to China. SOEs are usually nested in complex corporate groups and interlinked in networks of cross-ownership and personnel movement.³³ It is not always clear how SOEs are supervised by the state, especially when they are owned by intermediary holding companies.

Although often mentioned in policy documents, SOEs (国有企业) do not have any special legal status under Chinese law. The 2003 Company Law, as revised in 2013, contains special provisions on ‘wholly state-owned companies’ (国有独资公司), defined as limited-liability corporations that are entirely and directly owned by the state (whether the central, provincial, municipal, or county government).³⁴ A characteristic of Wholly State-Owned Companies is the right of elected employee representatives to join the board of directors.³⁵

SOEs (whether fully or partly state-owned) that are directly controlled by the central government are called ‘central enterprises’ (中央企业), whereas those directly controlled by a provincial, municipal, or county government are called ‘local enterprises’ (地方企业).³⁶

³⁰ CHEN Zongshi, *The revival, legitimization and development of private enterprise in China: empowering state capitalism* (New York: Palgrave Macmillan, 2015) at 3.

³¹ See CPC Central Committee, ‘Recommendations for the Tenth Five-Year Plan for Economic and Social Development’ (关于制定国民经济和社会发展第十个五年规划的建议), 11 October 2000, available at <<http://cpc.people.com.cn/GB/64162/71380/71382/71386/4837946.html>>, Chapter 12. See also Dong Junfang and Dong Wei, ‘SOEs are Still Main Force in “Going Out”’ (国企仍是‘走出去’的主力军), *China Youth Daily*, 3 June 2013, available at <<http://www.sasac.gov.cn/n1180/n1271/n20515/n2697206/15353880.html>>.

³² See Julie Jiang and Jonathan Sinton, ‘Overseas Investments by Chinese National Oil Companies’ (IEA Information Paper, 2011); and Janet Xuanli Liao, ‘The Chinese Government and the National Oil Companies (NOCs): Who Is the Principal?’ 21 *Asia Pacific Business Review* 44 (2015) at, 45-46.

³³ Li-Wen Lin and Curtis J. Milhaupt, ‘We Are the (National) Champions: Understanding the Mechanisms of State Capitalism in China,’ 65 *Stanford Law Review* 697 (2013), at 704-728.

³⁴ Company Law, *supra* note 27, art. 64(2).

³⁵ *Ibid.*, art. 67(1).

³⁶ Thus, all wholly state-owned companies are either central enterprises or local enterprises, whereas the latter two categories include also companies that are not wholly State owned.

The relationship between these various concepts is summarized in Table 1.

Table 1. Definitions of key concepts.

Original	English translation	Definition	Policy/legal context
国有企业	State-owned enterprise	Any enterprise that is majority-owned by the state, directly or indirectly	Development planning
国有独资公司	Wholly state-owned company	Limited-liability company owned entirely and directly controlled by the central or by a local government	Corporate law
中央企业	Central enterprise	Any enterprise directly controlled by the central government	Supervision by SASAC
地方企业	Local enterprise	Any enterprise directly controlled by a local government	Supervision by local branches of SASAC

About a hundred central enterprises, most of which are fully state-owned, control key economic sectors, often in monopolistic or oligopolistic situations; they also often realize huge foreign investments.³⁷ By contrast, local enterprises are usually of a modest size, only partly state-owned, and face competition (including from other local enterprises).

The State-Owned Assets Supervision and Administration Commission of the State Council (国务院国有资产委员会) was created in 2003 to supervise central enterprises and, through its local branches, local enterprises.³⁸ A ministry-level agency in the government's organizational chart, SASAC is a key actor in the world of China's SOEs. While it acts as a controlling shareholder over central enterprises and exerts control over key SOE assets and cash flows, SASAC also has other functions.³⁹ For example, SASAC facilitates intra- and inter-organizational movements of top SOE managers.⁴⁰ Thus, SASAC has emerged as the official link between China's government and SOEs.

Despite the transformation of government units into corporations under the supervision of SASAC, authority and control, or at least influence, over central enterprises continues to be exercised by other government agencies, officials, and the Communist

³⁷ See also FAN Gang and Nicholas C. Hope, 'The Role of State-Owned Enterprises in the Chinese Economy,' in *US-China Economic Relations in the Next Ten Years Towards Deeper Engagement and Mutual Benefit*, available at <<http://www.chinausfocus.com/2022/wp-content/uploads/Part+02-Chapter+16.pdf>>; Katy N. Lam, *Chinese State-Owned Enterprises in West Africa: Triple-embedded globalization* (New York: Routledge, 2017).

³⁸ See the website of the National People's Congress, 'Clarifications on the Reform Plan of the State Council Organs' (关于国务院机构改革方案的说明), 6 March 2003, available at <http://www.npc.gov.cn/wxzl/gongbao/2003-04/04/content_5312163.htm>. See also Law on the Assets of Central Enterprises (企业国有资产法), 28 October 2008, art.1; and Company Law, *supra* note 27, art. 66(1).

³⁹ Lin and Milhaupt *supra* note 28, at 734-46. SASAC has been characterized as 'the world's largest controlling shareholder'. See Marcos Aguiar and others, 'SASAC: China's Megashareholder' (BCG Perspectives, 2007).

⁴⁰ Li-Wen Lin, 'State Ownership and Corporate Governance in China: An Executive Career Approach' 3 *Columbia Business Law Review* 743 (2013).

Party of China (CPC).⁴¹ To ensure preferential treatment, SOE managers must constantly develop and maintain interpersonal relations (*guanxi*) with governmental and party officials, on which these authorities may also rely to advance their own objectives.⁴² In addition to this relational system, SOE managers—like other public officials—are strongly expected to be members of the CPC and to attend regular lectures on neo-Marxist ideology. Political loyalty and correctness play key roles in SOE managers' career paths, effectively aligning the management of SOEs with the ideology of the CPC.⁴³ Thus, executive-level 'political integration diverges from the principle of separating SOEs from the government that many Chinese corporate governance reform laws have purportedly declared'.⁴⁴ SASAC, SOEs, and SOE managers operate in the shadow of Party control.⁴⁵

In opinion columns and articles published in the *People's Daily*, the official newspaper of the CPC, SOEs are commonly described as institutions which 'fiercely promote national modernization and promote the interests of the people',⁴⁶ and, through pioneering in technological innovation, are 'a powerful driver of sustainable development.'⁴⁷ Such expressions of the fact that SOEs must serve the Party may be expected to have an influence on the actual conduct of SOEs. Many articles in the *People's Daily* further contend, in typical revolutionary prose, that 'following the CCP's leadership and strengthening the Party's authority is a glorious tradition and unique role of SOEs—their "root" and their "soul".'⁴⁸ In his vision of socialism with Chinese characteristics, Xi Jinping, the General Secretary of the CPC and President of the People's Republic, has time and again affirmed a vision of SOEs as a lever of Party rule.⁴⁹ In the context of ongoing debates about the need to reduce or retool state

⁴¹ See e.g. GUO Yidi, Quy Nguyen Huy and XIAO Zhixing, 'How middle managers manage the political environment to achieve market goals: Insights from China's state-owned enterprises,' 38(3) *Strategic Management Journal* 767 (2016); Arthur R. Kroeber, *China's Economy: What Everyone Needs to Know* (Oxford University Press, 2016) at 96.

⁴² See e.g. Kjeld Erik Brødsgaard, 'Politics and Business Group Formation in China: The Party in Control?' 211 *The China Quarterly* 624 (2012).

⁴³ Lin *supra* note 40, at 773-777.

⁴⁴ *Ibid.*, at 773.

⁴⁵ See e.g. WANG Jiangyu, 'The Political Logic of Corporate Governance in China's State-Owned Enterprises' 47 *Cornell International Law Journal* 631 (2014).

⁴⁶ ZHANG Deyong, of the Chinese Academy of Social Sciences Institute of Finance and Economics, cited in WANG Junling, 'SOEs Must Make Full Use of "Party Building"' (国企必须用好"党建"这张王牌), *China Daily*, 26 October 2016, available at <http://paper.people.com.cn/rmrbhwb/html/2016-10/26/content_1721534.htm>.

⁴⁷ BAO Dan, 'Innovation: The Backbone of China' (创新: 挺起国家脊梁), *China Daily*, 27 May 2013, available at <<http://politics.people.com.cn/n/2013/0527/c1001-21619868.html>>.

⁴⁸ SHI Ying, 'The Leading Role of the Party in SOEs Deepening Reform Cannot be Absent' (国企深化改革党的领导不能缺位), *People's Daily*, 17 October 2016, available at <http://opinion.china.com.cn/opinion_26_153126.html>. See also LI Xiuping, 'Build the Party in a Proper Way' (下好国企党建这盘棋), *People's Daily*, 20 January 2017, available at <<http://opinion.people.com.cn/n1/2017/0120/c1003-29037025.html>>, claiming that 'not properly serving the party amounts to dereliction of duty.'

⁴⁹ See for instance XI Jinping's speech at the National State-Owned Enterprises Party Construction Work Conference (习近平在全国国有企业党的建设工作会议上的讲话), Beijing, 10-11 October 2016, as reported by Chinese official news agency Xinhua on 11 October 2016 at <http://news.xinhuanet.com/2016-10/11/c_1119697415.htm>.

ownership to counter slowing economic growth,⁵⁰ SOEs are under additional pressure to justify their utility by significantly contributing to the implementation of the government's policies.⁵¹

State ownership policies are thus clearly motivated by objectives beyond profit or growth maximization.⁵² China has maintained substantial ownership in enterprises in order to pursue diverse public-policy objectives ranging from supporting urban employment to controlling sensitive industries.⁵³ The 1988 Law on Industrial Enterprises Owned by the Whole People provided that such enterprises must pursue safe production systems, improve working conditions, protect labor and the environment, and thus realize the goals of 'safe' and 'civilized production'.⁵⁴

The objectives that different interest groups expect SOEs to fulfil are inevitably conflicting.⁵⁵ In some cases, interpersonal relationships may be expected to lead to public support for enterprises that fulfil no tangible public interest. There is also no doubt that profit maximization or other considerations have occasionally led SOEs, in particular local enterprises, to cause serious environmental damage.⁵⁶ The privileged position of large SOEs can also be used to hinder law enforcement and influence forthcoming legislation and bureaucratic targets.⁵⁷ However, these environmental violations have more to do with the definition of priorities by central or local authorities than with an inherent contradiction between state ownership and environmental protection.⁵⁸ As China rapidly develops, and as environmental concerns steadily grow, these environmental concerns become increasingly prominent in the list of priorities imposed on SOEs.⁵⁹

It is noteworthy that SOEs tend to be concentrated in economic sectors particularly relevant to climate change mitigation, such as fossil-fuel extraction, power generation, metals industries, and transportation. There is a strategic interest in controlling these sectors. They comprise the superstructure of a carbon-based economy. For China, they

⁵⁰ See Decision of the CPC Central Committee on Deepening the Reform of Several Major Issues (关于全面深化改革若干重大问题的决定), 15 November 2013. For reports in English, e.g. Ben Bland, 'China Plans Shake-up of State-Owned Enterprises to Boost Growth', *Financial Times*, 13 September 2015; Gabriel Wildau, 'China's State-Owned Zombie Economy', *Financial Times*, 29 February 2016.

⁵¹ See FENG, *supra* note 18.

⁵² Lin and Milhaupt *supra* note 25, at 746, for instance, see State ownership as a way 'to maximize a range of benefits extending from state revenues to technological prowess and from soft power abroad to regime survival at home'.

⁵³ See Wang ('The Political Logic of Corporate Governance'), *supra* note 45, at 660-69; Clarke, *supra* note 29, at 495.

⁵⁴ 1988 Law on Industrial Enterprises owned by the Whole People, *supra* note 26, art. 41.

⁵⁵ See Lin and Milhaupt *supra* note 25, at 703; Clarke, *supra* note 29, at 495. Compare with OECD *supra* note 17, at 19.

⁵⁶ A series of examples are cited in SHENG and ZHAO, *supra* note 28, at 255-258.

⁵⁷ See e.g. QIN Tianbao and ZHOU Chen, 'Introduction,' in QIN Tianbao (ed.), *Research Handbook on Chinese Environmental Law* (Cheltenham, UK: Edward Elgar, 2015) 1 at 10 and Zheng, Milhaupt and Liebman *supra* note 22.

⁵⁸ Wang ('Chinese State Capitalism'), *supra* note 21, at 265-67.

⁵⁹ *Ibid.* 267-68.

are of central importance to promoting a particular vision of economic development.⁶⁰ Now, however, the prevalence of state ownership in these sectors gives China's government a tool with which to implement climate change mitigation by pressuring some of the most instrumental actors of the carbon-based economy to turn to more sustainable operations through incremental efforts to promote energy efficiency or through radical departures from their lines of business. In heavily consolidated sectors such as oil-and-gas production or power generation, reform by just a few large SOEs could go a long way toward developing and deploying new technologies to trigger a transition to renewable energy, among other sustainable outcomes. As Bergsager and Korppoo have suggested, several climate-change-mitigation policies launched by China's government have relied on SOEs for the implementation stage.⁶¹ Accordingly, SOEs emerge as proxies for innovative climate policies in China which go beyond the mere transplantation of policies developed in other parts of the world.

3. Mitigation Concerns in the Supervision of SOEs

Once China's government committed itself to strengthening environmental protection and limiting its greenhouse gas emissions, state ownership provided a natural entry point. The relevance of SOEs to environmental protection was emphasized already in a speech pronounced in 2007 by Li Rongrong, SASAC's director at the time. Li argued that central enterprises, as instruments for furthering the interests of the people, should play 'an exemplary role in energy conservation and emission reduction'.⁶² He also emphasized the prevalence of central enterprises in economic sectors relevant to environmental protection and their instrumental role in energy conservation and emission reduction. Li noted the 'obvious advantages' of central enterprises in this respect, in particular their technological innovations, skilled personnel, and advanced equipment and management systems. Contending that central enterprises 'are not only ordinary enterprises, but are also engaged to support a rapid national economic development',⁶³ SASAC's director took an unequivocal position in favour of top-down implementation of energy-saving and emission-reduction measures through central enterprises.

In a Guidance Note on the Implementation of Social Responsibility of the Central Enterprises, issued in December 2007, SASAC affirmed a long list of duties binding central enterprises to the edification of socialism with Chinese characteristics, including through the promotion of sustainable development. The document also stated that central enterprises should 'strengthen resource conservation and environmental protection' by 'conscientiously implementing their responsibility' and 'taking the lead

⁶⁰ China has remained the world's leading coal producer since 1985 and the largest consumer since 1987. See International Energy Agency, *Coal Information 2016* (Paris: International Energy Agency, 2016) at xi-xii, xvi-xvii.

⁶¹ Henrik Bergsager and Anna Korppoo, *China's State-Owned Enterprises as Climate Policy Actors: The Power and Steel Sectors* (Copenhagen: Nordic Council of Ministers, 2013), at 57.

⁶² Speech by Li Rongrong made at the working conference on energy saving and emission reduction in central enterprises, 29 August 2007, available at <<http://www.sasac.gov.cn/gzjg/xcgz/200708290164.htm>>.

⁶³ *Ibid.*

in saving energy and reducing emissions’—and in general by promoting a ‘low emissions and high efficiency development path’.⁶⁴

Three years later, in 2010, SASAC issued a set of Interim Measures for the Supervision and Administration of Energy Saving and Emission Reduction in Central Enterprises.⁶⁵ Through these Measures, SASAC, as an organ of the State Council, imposed on all central enterprises obligations to formulate specific plans,⁶⁶ determine internal responsibilities,⁶⁷ introduce environment- and energy-related considerations in the managerial reward system,⁶⁸ and develop training programs for energy conservation and emission reduction,⁶⁹ among other measures.

Although the Measures’ focus is on local air pollution, their attempt to reduce energy consumption appears also to be a deliberate step to limit greenhouse gas emissions. Thus, they require all central enterprises to ‘closely integrate energy conservation and emission reduction with enterprise development strategies and structural readjustments’, including through optimizing industrial structures and production processes and eliminating inefficient or highly polluting technologies and processes with a high energy consumption.⁷⁰ Under the instrument, central enterprises are directed to ‘promote the development and utilization of renewable energy’⁷¹ while also contributing to associated research and development.⁷² They are also to develop and improve monitoring and reporting systems to measure energy use and emission levels⁷³ and submit a summary report to SASAC on at least an annual basis.⁷⁴

The 2010 Measures further classified all central enterprises into three categories, comprising 32 ‘key’ central enterprises responsible for substantial levels of pollution, 51 other entities ‘of concern’, and 45 entities in a ‘general’ category (expanded in Table 2).⁷⁵ ‘Key’ central enterprises and those ‘of concern’ were assigned additional obligations, including having to report to SASAC on a quarterly and biannual basis, respectively.⁷⁶

Table 2: Classification by sector of the 32 ‘key’ central enterprises, as defined in SASAC’s 2010 Measures.

⁶⁴ SASAC, ‘Guidance on the implementation of social responsibility by central enterprises’ (关于中央企业履行社会责任的指导意见), 29 December 2007, available at <<http://www.sasac.gov.cn/n1180/n13307665/n13307681/n13307724/13333515.html>>.

⁶⁵ SASAC, ‘Interim Measures for the Supervision and Administration of Energy Saving and Emission Reduction in Central Enterprises’ (中央企业节能减排监督管理暂行办法), 26 March 2010, available at <<http://www.sasac.gov.cn/n85881/n85921/n85936/c358206/content.html>>.

⁶⁶ Ibid. art. 6.

⁶⁷ Ibid. arts. 7(3) and 8.

⁶⁸ Ibid. art. 9.

⁶⁹ Ibid. art. 10.

⁷⁰ Ibid. art. 11(1).

⁷¹ Ibid. art. 11(2).

⁷² Ibid. art. 12.

⁷³ Ibid. arts. 14-18.

⁷⁴ Ibid. art. 17(2).

⁷⁵ Ibid. Annex 1.

⁷⁶ Ibid. art. 7(1).

Sector (number of entities)	Enterprises
Oil and gas (3)	China National Petroleum Corporation; China Petroleum and Chemical Corporation; China National Offshore Oil Corporation
Power generation and distribution (7)	State Grid Corporation of China; China Southern Power Grid; China Huaneng Group; China Datang Corporation; China Guodian Corporation; China Huadian Corporation; China Power Investment Corporation
Metals (7)	Anshan Iron and Steel Group Company (Ansteel Group); China Baowu Steel Group (Baosteel); Wuhan Iron and Steel Group; Aluminum Corporation of China; Panzhihua Iron and Steel Group; Xinxing Pipes International Development Corporation; China Minmetals Corporation
Coal (2)	China Shenhua; China Coal Energy Company
Cement and construction (2)	China National Building Materials Group; China National Materials Group (Sinoma)
Airlines (2)	China Eastern Airlines; China Southern Airlines
Shipping (2)	China Shipping Group; China Ocean Shipping Group
Other (7)	China North Industries Corporation (mostly vehicle and machine manufacturing); China Aviation Group (aircraft manufacturing); China National Travel Service Group; China National Chemical Corporation (ChemChina); COFCO Group (food processing); China Resources Holdings (non-specialized holding company); State Development and Investment Corporation (non-specialized holding company)

In addition, the 2010 Measures declared that energy saving and emission reduction would become part of the performance-evaluation system of central enterprises.⁷⁷ Each central enterprise must accordingly define ‘reasonable targets’ of energy conservation and emission reduction based on scientific criteria, taking into account relevant national policies, the characteristics of the sector and the feasibility of energy conservation and emission reduction.⁷⁸ These targets are to be reviewed and adopted by SASAC, which is also to assess their implementation.⁷⁹

The performance-evaluation of central enterprises is related to career incentives to encourage enterprise managers to take all relevant measures,⁸⁰ as well as to a system of awards which commend ‘Excellent Enterprises for Energy Conservation and Emission Reduction’.⁸¹ In 2011, a SASAC decision bestowed this award on no fewer than 32 central enterprises, including 18 ‘key’ central enterprises (with CNPC ranked first).⁸² This decision reiterated the role of central enterprises in ‘advancing, in an exemplary fashion, pioneering steps and innovations to overcome challenges in enhancing energy efficiency’.⁸³ There are anecdotal reports of another set of awards bestowed in 2016⁸⁴ but, as of April 2017, SASAC had yet to publish a corresponding decision.

⁷⁷ Ibid. art. 19.

⁷⁸ Ibid. art. 21.

⁷⁹ Ibid. art. 22-24.

⁸⁰ Ibid. arts. 19 and 22.

⁸¹ Ibid. arts. 25-29 (‘节能减排优秀企业奖’).

⁸² SASAC, ‘Decision on the Eleventh Five-Year Excellent Enterprise for Energy Conservation and Emission Reduction Award’ (关于表彰‘十一五’中央企业节能减排优秀企业的决定), 25 May 2011, available at <<http://www.sasac.gov.cn/n1180/n1566/n257060/n257188/13603251.html>>.

⁸³ Ibid, para. 2.

⁸⁴ See State Grid, ‘State Grid Has been Awarded A in Performance Assessment by SASAC in Twelve Years and Four Terms consecutively’ (公司连续十二年和连续四个任期荣获国资委经营业绩考核 A 级), 15 June 2016, available at <<http://www.sgcc.com.cn/xwzx/gsyw/2016/07/334666.shtml>>; Datang

SASAC has adopted a series of steps to complement the 2010 Measures. For instance, it claims to have allocated CNY200 billion (US\$30 billion) of state-owned capital to support energy conservation and emission reduction through central enterprises between 2011 and 2014.⁸⁵ We have not been able to obtain more detailed information on what this figure includes. In November 2013, SASAC organized a conference on the role of central enterprises in energy saving and emission reduction, with the purpose of raising awareness and sharing good practices.⁸⁶ A committee of experts on energy saving and emission reduction by central enterprises was established at the meeting, and sixty-nine experts were appointed to it. A third example is that, in 2016, energy-saving and emission-reduction achievements were integrated into a revised and systematic approach to career incentives.⁸⁷

Of course, SASAC's initiatives in this respect were not isolated events. The mobilization of central enterprises for environmental protection was not only approved but also encouraged by the State Council. The latter has constantly promoted the role of SASAC in supervising and assessing SOE efforts toward energy saving and emission reduction, for instance through the Comprehensive Working Plans on Energy Conservation and Emissions Reduction that it issued in connection with the implementation of the Twelfth Five-Year Plan in 2011 and the Thirteenth Five-Year Plan in 2016.⁸⁸ These instruments endorse SASAC's initiative to include energy-saving and emission-reduction objectives in the performance-assessment of central enterprises and their managers.⁸⁹

The role of SOEs in respect of environmental objectives has also been promoted by the National Development and Reform Commission. In a 2011 action plan to encourage

Power Fuel, 'Datang Power Fuel Has Successfully Fulfilled the Target of Obtaining Double A and Was Awarded with Outstanding Performance in Enterprise Operation and Energy Conservation and Emissions Reduction' (集团公司圆满实现“保双A”目标并荣获任期经营业绩, 节能减排优秀企业奖), 21 July 2016, available at <<http://www.cdt-rl.com/index.php?c=article&id=1637>>.

⁸⁵ See NDRC, 'China's Policies and Actions on Climate Change 2015' (中国应对气候变化的政策与行动 2015 年度报告), November 2015, available at <<http://en.ccchina.gov.cn/archiver/ccchinaen/UpFile/Files/Default/20151120095849657206.pdf>>, at 49.

⁸⁶ Expert conference on SOEs energy conservation and emissions reduction, organized by SASAC, held on 12 See report by SASAC, 'SASAC meeting of members of the central enterprises of energy conservation and emission reduction' (国资委召开中央企业节能减排专家库成员第一次会议), 14 November 2013, available at <http://www.cnacgc.com/t_second/index.aspx?nodeid=360&page=ContentPage&contentid=3109>.

⁸⁷ SASAC, 'Measures for the Assessment of Business Performance of Personnel in Charge of Central Enterprises' (中央企业负责人经营业绩考核办法), 8 December 2016, available at <<http://www.sasac.gov.cn/n85881/n85921/c2504293/content.html>>, art. 43.

⁸⁸ State Council, 'Comprehensive Working Plan on Energy Conservation and Emissions Reduction under the 13th Five-Year Plan' ('十三五'节能减排综合工作方案), 20 December 2016, available at <http://www.gov.cn/zhengce/content/2017-01/05/content_5156789.htm>; and 'Comprehensive Working Plan on Energy Conservation and Emissions Reduction under the 12th Five-Year Plan' ('十二五'节能减排综合性工作方案), 31 August 2011, available at <http://www.gov.cn/zwgk/2011-09/07/content_1941731.htm>, para. 4.

⁸⁹ See State Council (2016, energy working plan), *supra* note 88, para. 41; and State Council (2011, energy working plan), *supra* note 88, para. 33.

corporations to protect the environment, the NDRC emphasized the responsibility of SOE managers in central as well as local enterprises.⁹⁰ When updating this document in 2014, the NDRC stated that central enterprises should play an ‘exemplary role’ in meeting energy-saving and emission-reduction objectives, and indeed that all SOEs ‘should strive to complete the energy-saving objectives of the Twelfth Five-Year Plan ahead of schedule’.⁹¹ The following year, the NDRC reported that nearly half of the central enterprises and units (i.e. their subsidiaries, etc.) had managed to reduce energy consumption beyond their objective—compared with only 31 per cent of all public and private enterprises.⁹² At a press conference in January 2017, officers of the NDRC and Ministry of Environmental Protection reiterated the importance of the accountability of SOEs and their management to the achievement of the Thirteenth Five-Year Plan’s energy-conservation and emission-reduction objectives.⁹³

While policies and targets set by SASAC are not always implemented or met,⁹⁴ it is clear that environmental and climate concerns have progressively been upgraded in the overall hierarchy of SOEs’ objectives. Energy saving, emission mitigation, and other green policies have penetrated deeper into the regulatory labyrinth of China’s state capitalism.⁹⁵ This interaction between political and regulatory bodies, SASAC, and SOEs, lays the ground for an innovative endogenous policy on climate change mitigation.

4. Relevant Sectoral Trends

The general regulatory and supervisory framework described in the previous section is complemented by sectoral regulations and guidelines and their implementation by some of the largest and most influential Chinese SOEs. The importance of decisions made by colossal SOEs in key sectors cannot be overemphasized. Just a handful of SOEs control most of the exploration, extraction, refining, and distribution of oil, gas, and coal. They also dominate power generation, metals, cement, construction, and transportation. Some of them—especially central enterprises—have taken important environmental initiatives in recent years and are likely to become increasingly engaged in efforts towards climate change mitigation.

⁹⁰ NDRC, ‘Action Plan on Energy Conservation and Low Carbon Operation for Tens of Thousands Enterprises’ (万家企业节能低碳行动实施方案), 12 November 2011, available at <<http://www.sdpc.gov.cn/zcfb/zcfbtz/201112/W020111229589358952455.pdf>>.

⁹¹ State Council, ‘2014-2015 Energy-Saving Emission Reduction Low-Carbon Development Action Programme’ (2014-2015 年节能减排低碳发展行动方案), 15 May 2014, available at <http://www.gov.cn/zhengce/content/2014-05/26/content_8824.htm>, para. 29.

⁹² NDRC, ‘Announcement of the National Development and Reform Commission of the People’s Republic of China’ (国家发展和改革委员会公告), 2015, available at <http://www.ndrc.gov.cn/zcfb/zcfbgg/201601/t20160107_770722.html>. While this suggests that central enterprises have done greater efforts than other enterprises, no definitive conclusion can be drawn without a more thorough analysis to eliminate a range of possible biases.

⁹³ Press Conference of the NDRC and the Ministry of Environmental Protection on the 13th Five-Year Plan, 5 January 2017, available at <http://www.sdpc.gov.cn/xwzx/xwfb/201701/t20170105_834503.html>.

⁹⁴ Milhaupt and Zheng *supra* note 17, at 681-82.

⁹⁵ Wang (‘Chinese State Capitalism’), *supra* note 21, at 269-77.

4.1. Fossil Fuels

As a general global phenomenon, state-owned enterprises dominate the oil, gas, and coal industries the world over. Victor et al. attribute 61 per cent of global oil production and 52 per cent of global gas production to SOEs,⁹⁶ while the International Energy Agency estimates that 66 per cent of coal production in non-OECD countries is controlled by SOEs.⁹⁷ China stands out, however, with a much higher share of state ownership in this sector. China's government considers oil and gas to be a strategic sector to be kept under its absolute control,⁹⁸ while the largest actors in the coal sector are either central or local (provincial) enterprises. By and large, fossil fuels have remained the preserve of SOEs.

Oil and gas are managed by a few giant central holding enterprises,⁹⁹ notably CNPC (owner of PetroChina), China Petroleum and Chemical Corporation (CPCC, owner of Sinopec), and China National Offshore Oil Corporation (CNOOC).

The coal sector is not as consolidated.¹⁰⁰ Coal production is split among central enterprises (such as China Shenhua and China Coal Energy Company), local enterprises (such as Shaanxi Coal and Chemical Industry Group, controlled by the province of Shaanxi, and Yankuang Group, controlled by the province of Shandong), and even some private companies.

In 2010, the fossil fuel produced by PetroChina alone resulted in the emission of 614 Mt CO₂ eq.¹⁰¹ This is as more than the total greenhouse gas emissions of a middle-sized developed country such as Australia or the United Kingdom, and around 6 per cent of China's total greenhouse gas emissions that year.¹⁰² A rough calculation suggests that the emissions from the combustion of the coal produced by China Shenhua in 2016 are ever slightly higher.¹⁰³ Aggregating the operations of all Chinese SOEs in the coal and

⁹⁶ David G. Victor, David R. Hults and Mark C. Thurber, 'Introduction and Overview' in David G. Victor, David R. Hults and Mark C. Thurber (eds.), *Oil and Governance: State-Owned Enterprises and the World Energy Supply* (Cambridge, UK: Cambridge University Press, 2012) 3 at 3. Consistently, the US Energy Information Administration attributes 58% of global oil production to SOEs.

⁹⁷ International Energy Agency, *World Energy Outlook 2014* (IEA Publications), at 56-57.

⁹⁸ See Mikael Mattlin, 'The Chinese Government's New Approach to Ownership and Financial Control of Strategic State-Owned Enterprises' (BOFIT Discussion Paper No.10, 2007), available at <http://www.suomenpankki.fi/bofit_en/tutkimus/tutkimusjulkaisut/dp/Documents/dp1007.pdf>, at 16. See also Monique Taylor, 'China's Oil Industry: "Corporate Governance with Chinese Characteristics"', in XU Yichong (ed.), *The Political Economy of State-Owned Enterprises in China and India* (Basingstoke, UK: Palgrave Macmillan, 2012), at 69-93.

⁹⁹ See e.g. JIANG Binbin, 'China National Petroleum Corporation (CNPC): A Balancing Act between Enterprise and Government', in Victor, Hults and Thurber (eds.), *supra* note 96, at 382.

¹⁰⁰ See e.g. International Energy Agency, *World Energy Outlook 2016* (IEA Publications), at 229.

¹⁰¹ Richard Heede, 'Tracing Anthropogenic Carbon Dioxide and Methane Emissions to Fossil Fuel and Cement Producers, 1854 – 2010,' 122(1) *Climate Change* 229 (2014).

¹⁰² Australia and the United Kingdom emitted respectively 562 Mt CO₂ eq and 572 Mt CO₂ eq in 2010, while China emitted 10,108 562 Mt CO₂ eq, according to the World Resource Institute CAIT Climate Data Explorer (Total GHG emissions excluding land-use change and forestry).

¹⁰³ The coal production by the whole Shenhua group was estimated to 395 million tonnes in 2016, according to China Shenhua 2016 Annual Report (中国神华能源股份有限公司 2016 年度报告), 19 March 2017, available at <<http://www.shenhuaChina.com/shenhuaChina/1382682910387/dqbg.shtml>>, at

cement sectors, Heede estimated that their products and operations emitted 7,898 Mt CO₂ eq in 2010, or about 80 per cent of China's emissions that year—more than the total emissions from the United States.¹⁰⁴

Efforts have been made by SOEs, in particular central enterprises, to reduce their greenhouse gas emissions. They have tried to do so through research and development, deployment of innovative technologies, and operational reduction of greenhouse gas emissions. The NDRC has added its support to joint efforts by CPCC and PetroChina, as well as by the coal giant China Shenhua, to launch a large-scale, integrated, pilot project on carbon capture, utilization, and storage (CCS).¹⁰⁵ Pursuant to the 2010 Measures, these and other companies have been engaged in efforts to account for greenhouse gas emissions, improve operational efficiency, and innovate in technology. Going beyond their obligations under domestic law, CPCC and CNOOC joined the UN Global Compact's 'Caring for Climate' initiative, whereby they committed to 'becoming ... active business champion[s] for rapid and extensive climate action'¹⁰⁶ and to publicly communicating their progress on implementation on an annual basis.

To document the action of hundreds of central and local enterprises would go beyond the scope of this article. Instead, we have selected one example of a major central enterprise, CPCC (Sinopec's owner). As one of the largest central enterprises, CPCC clearly recognizes that its role is different from that of a private enterprise. In 2009, the group adopted as its funding principle the mission of 'developing the enterprise, contributing to the country, rewarding shareholders, returning to the society, benefiting employees.'¹⁰⁷ In public statements, the chairman of the board of directors, Wang Yupu, has reiterated that Sinopec should pioneer by developing a low-carbon and energy-saving production model.¹⁰⁸

The group highlighted several key projects in its reports to the Caring for Climate initiative. In 2012, Sinopec began exploiting the largest shale gas field in the world outside the United States. It is located in Fuling, Chongqing Province. By 2015, it accounted for two-thirds of China's shale-gas extraction. Sinopec portrayed this

1. The combustion of a ton of coal results in approximate 2 tCO₂e greenhouse gas emissions, according to Intergovernmental Panel on Climate Change (2006) *2006 IPCC guidelines for National Greenhouse Gas Inventories*. This suggests, as a rough estimate, that the combustion of the fuel produced by China Shenhua causes around 790 MtCO₂e greenhouse gas emissions.

¹⁰⁴ See the complementary online data of Heede, *supra* note 101. As benchmarks, we used the data from the World Research Institute CAIT Climate Data Explorer (Total GHG emissions excluding land-use change and forestry).

¹⁰⁵ See NDRC (2015), *supra* note 85, at 37.

¹⁰⁶ See 'Caring for Climate: The Business Leadership Platform' A Statement by the Business Leaders of the Caring for Climate Initiative (2007), available at <http://caringforclimate.org/wp-content/uploads/C4C_Statement.pdf>, para. 7.

¹⁰⁷ See Sinopec Corp., '2015 Communication on Progress for Sustainable Development', 29 March 2016, available at <https://www.unglobalcompact.org/system/attachments/cop_2016/275661/original/Sinopec2015COP.pdf?1460255766>, at 10.

¹⁰⁸ See e.g. Sinopec, 'Conference on Energy Conservation and Environmental Protection' (11 March 2016), available at <http://slof.sinopec.com/slof/csr/save_redu/20160315/news_20160315_283317748995.shtml>.

initiative as a cleaner alternative to coal.¹⁰⁹ Since 2009, the company has also been investing in research on biofuel for aircraft. Sinopec's bio-jetfuel was used for a commercial flight from Shanghai to Beijing in 2015.¹¹⁰ To reach out to other Chinese enterprises, the company launched the 'Initiative of China's Business Community on Caring for Climate' in 2013 and has organized an advocacy workshop each year.¹¹¹

Such efforts could of course be dismissed as window-dressing by a giant oil-and-gas producer whose core interests are in direct conflict with a shift to a green economy.¹¹² The company's mission of 'fueling a better life'¹¹³ may indicate an internal tension—although perhaps not as serious a contradiction as in the case of Shaanxi Coal and Chemical Industry Group, whose motto is to promote 'a carbon intensive industry with a low-carbon and green model.'¹¹⁴

Incremental improvements through energy saving or through a turn to more efficient operations could nevertheless contribute significantly to climate change mitigation in the short-to-medium term. In the longer term, the options raise difficult questions. A radical strategic shift would be required for oil-and-gas SOEs to refocus their operations on biofuel production, geothermal energy, or CCS.

4.2. Power Generation

Power generation is the largest source of greenhouse gas emissions in the world, responsible for more than a third of current emissions.¹¹⁵ The IEA estimates that 'nearly half of the world's power generation assets' are owned by state enterprises.¹¹⁶ State ownership in the power sector is more prevalent in emerging economies than in the European Union (45 per cent) or the United States (20 per cent).¹¹⁷ In China, most thermal, nuclear, and hydroelectric power-generation infrastructure belongs to central enterprises, whereas private enterprises are entering the sector through investments in renewable energy.

China's State Power Corporation, which used to control the production and distribution of electricity in the country, was dismantled in 2002. The management of the national power grid was entrusted to two new central enterprises, the State Grid Corporation and

¹⁰⁹ See Sinopec (2016 Communication), *supra* note 107, at 25, noting that 'the completion of first phase development of Fuling shale gas can reduce 6 million tonnes of carbon dioxide emission per year' in addition of reducing local air pollution.

¹¹⁰ *Ibid.* at 28.

¹¹¹ *Ibid.* at 32.

¹¹² Compare with aggressive push of corporate social responsibility programs on SOEs, see e.g. Li-Wen Lin, 'Corporate Social Responsibility in China: Window Dressing or Structural Change?' 28 *Berkeley Journal of International Law* 64 (2010).

¹¹³ *Ibid.* at 10.

¹¹⁴ See 'Low Carbon Development Mode in Carbon-Intensive Industry: Let Us Be Surrounded by Green' (高碳产业、低碳发展, 让绿色伴随你我他), *Shanxi's Daily* (25 October 2013), available at <<https://www.shccig.com/newshow.php?id=122807>>.

¹¹⁵ Ottmar Edenhofer et al. (eds.), *Climate Change 2014: Mitigation of Climate Change* (Working Group III Contribution to the IPCC Fifth Assessment Report), at 516.

¹¹⁶ International Energy Agency, *World Energy Investment Outlook* (IEA, 2014), at 33.

¹¹⁷ *Ibid.* at 95.

China Southern Power Grid. Power-generation operations were distributed among five new central enterprises: China Datang, China Huadian Corporation, China Huaneng Group, State Power Investment Corporation, and China Guodian Corporation. In a 2013 document on the implementation of the Twelfth Five-Year Plan in the energy sector, the State Council reiterated its adherence to ‘the dominant position of State ownership in essential energy sectors which are closely linked to national security and economic development’.¹¹⁸

This central control accords great importance to the priorities formulated by the State Council and implemented through SASAC. Under the Thirteenth Five-Year Plan, emphasis was placed on ‘reducing and eliminating over-production in the coal power sector’,¹¹⁹ specifically through ‘strictly controlling the assessment and permission of starting new coal production projects’.¹²⁰ The Thirteenth Five-Year Plan also called for investment in renewable energy and in a grid to support it,¹²¹ as well as in the large-scale deployment of so-called ‘green coal industries’ through ‘clean and highly efficient coal-fired power’.¹²²

While Central enterprises are placed under the supervision of SASAC, they have proven particularly difficult to control in the power sector, given their significant economic and political power. Thus, for a long time, national authorities failed to curb the construction of coal-fired plants, which constituted a power generation capacity largely exceeding the demand.¹²³ It was not until April 2016 that the NDRC announced its intention to ‘promote the orderly development of China’s coal-fired power’,¹²⁴ and another eight months would pass before eighty-five coal plant projects were suspended.¹²⁵

Under the 2009 amendment to the Law on Renewable Energy, wind, solar, hydroelectric, and other forms of clean energy are to be encouraged through subsidies

¹¹⁸ State Council, ‘Energy Development under the 12th Five-Year Plan’ (能源发展‘十二五’规划), 1 January 2013, available at <http://www.gov.cn/zwggk/2013-01/23/content_2318554.htm>, chapter IV, section II, first paragraph. This position does not seem to have evolved under the 13th Five-Year Plan currently in place.

¹¹⁹ See State Council (13th Five-Year Plan, 2016), *supra* note 16.

¹²⁰ See State Council, ‘Energy Development under the 13th Five-Year Plan’ (能源发展‘十三五’规划), 26 December 2016, available at <<http://www.ndrc.gov.cn/zcfb/zcfbghwb/201701/W020170117350627940556.pdf>>, at 23.

¹²¹ See *ibid.* at 58.

¹²² See State Council (13th Five-Year Plan, Energy development, 2016), *supra* note 120, at 25.

¹²³ The Chinese authorities have been strongly criticized by environmental groups for authorizing a build-up of coal plants inconsistently with China’s mitigation commitments. See for instance Edward Wong, ‘“Irrational” Coal Plants May Hamper China’s Climate Change Efforts’, *New York Times*, 7 February 2017.

¹²⁴ NDRC and NEA, ‘Promote the Orderly Development of China’s Coal-Fired Power’ (关于促进我国煤电有序发展的通知), 17 March 2016, available at <http://www.sdpc.gov.cn/gzdt/201604/t20160425_798991.html>.

¹²⁵ See ‘National Energy Administration Issued an Order to Stop the Construction of Newly-Built Thermal Power Units in 13 Provinces and Cities’ (能源局下发 13 省市新建火电机组停建清单), 16 January 2017, available at <<http://news.bjx.com.cn/html/20170116/803648.shtml>>. See also National Energy Board, *Circular on Further Regulating and Controlling the Planning and Development of Coal-fired Power Projects* (关于进一步调控煤电规划建设的通知), 10 October 2016.

and the imposition of a quota of support for renewable energy by grid companies.¹²⁶ No particular provision concerns SOEs, whereas private investment is strongly encouraged. Yet, between 2002 and 2007, all five major central power-generation enterprises acquired or created subsidiary companies specializing in renewable energy.¹²⁷

Growth in renewable energy has also been facilitated by the two grid companies. Most energy consumption in China occurs in the eastern and southern provinces, where China's population is concentrated and where development has been driven by international trade. However, hydroelectric, solar, and wind energy are more readily exploited in the less densely inhabited areas of the country in the north and west. The distances between potential production and consumption of renewable energy make it virtually impossible to develop a reliance on renewable energy without significant further investment in the national grid. This was recognized in the 2009 Law on Renewable Energy, which required 'power grid enterprises'—i.e. the State Grid Corporation and China Southern Power Grid—to 'strengthen the construction of power grids, expand the scope of renewable energy power distribution, develop and apply smart grid, energy storage and other technologies, improve the operation and management of power grids, improve the ability to absorb renewable energy and provide Internet services for renewable energy'.¹²⁸ New technologies were developed by the two grid companies for 'Ultra High Voltage' lines as one of the elements of a smart grid able to convey electrical power over great distances.¹²⁹

Over all, the contribution of China's power-sector SOEs to climate change mitigation has been ambivalent. The five power-generating central enterprises certainly exercise a strong lobbying pressure that has hindered the development of renewable energy. Reports suggest that pressure was exercised on grid companies to buy coal-generated electricity rather than available wind power, as well as on local governments not to implement the subsidies provided under the 2009 Law on Renewable Energy.¹³⁰ The present overcapacity of coal-based electricity generation is certainly not totally unrelated to the power these central enterprises are able to exercise over public authorities.¹³¹ On the other hand, the fact remains that such interests have not been able to stop a massive deployment of renewable energy. Of great importance is that each of

¹²⁶ See Law on Renewable Energy (可再生能源法 (修正案)), revised on 26 December 2009, art. 22.

¹²⁷ Thus, China Datang established Datang Renewable Power Company in 2004; China Huadian Corporation established Huadian New Energy Development Company in 2007; China Huaneng Group established Huaneng Renewables Corporation in 2002; State Power Investment Corporation established China Power New Energy Development Company in 2006; and China Guodian Corporation acquired China Longyuan Power, incorporated in 1993, which is now the largest wind-producer in Asia.

¹²⁸ See Law on Renewable Energy, *supra* note 126, art. 14(3). See also Energy Conservation Law (节约能源法), revised in 2016, art. 32.

¹²⁹ See e.g. State Grid Corporation of China, *Corporate Social Responsibility Report* (February 2016), available at <<http://www.sgcc.com.cn/images/ywlm/socialresponsibility/brief/2016/08/24/2F6590C1495CD544B95B193DC0982F8D.pdf>>, at 5.

¹³⁰ JIANG Fei, 'Five New Energy SOEs Submitted A Joint Letter to the NDRC Criticizing the Curtailment of Wind Power' (五大新能源国企上书发改委直指弃风限电), *News Week*, 16 February 2016, available at <<http://finance.china.com.cn/industry/energy/nyyw/20160216/3585930.shtml>>.

¹³¹ See discussion in Wang ('Chinese State Capitalism'), *supra* note 21, at 251.

the five groups is developing economic interests in renewable energy and could become increasingly interested in national policies in support of such alternatives.

4.3. Other Relevant Sectors

The economic leadership of SOEs in China's shift to a green economy is in no way limited to the fossil-fuel and power sectors. SOEs contribute to advancing China's climate-change-mitigation objectives through initiatives in other sectors, including the metals industry, construction, transportation, and manufacturing. While a comprehensive study of the role of SOEs in all these sectors would go well beyond the scope of this article, some key developments are worth a brief mention.

The steel and aluminum industries have made a significant contribution to China's economic growth.¹³² Given their strategic importance, they are still dominated by a few large central enterprises, such as Ansteel, Baosteel, Wuhan Steel, and the Aluminum Corporation of China. Steel and aluminum production are energy-intensive sectors.¹³³ Efforts to increase their energy efficiency have economic as well as environmental motives. A 2016 State Council decision on the implementation of the Thirteenth Five-Year Plan in the iron-and-steel industry highlights the importance of reducing energy consumption and the emission of pollutants in the sector.¹³⁴ Emphasis is put, in particular, on large enterprises—most of them central enterprises—and on their ability to innovate in technology and reach more stringent standards of efficiency. Similar provisions were part of a State Council decision on the implementation of the Thirteenth Five-Year Plan in the non-ferrous metals industry.¹³⁵

Transportation is also dominated by SOEs, with all major domestic airlines and all train operations controlled by central enterprises. Like elsewhere, national decisions on infrastructure development have been instrumental to the development of particular modes of transportation in China. In particular, the development of a high-speed railway network contributed to diverting an increasing inter-city transportation need away from aviation.¹³⁶ In addition, SOEs have been tasked to achieve energy efficiency and emission reduction. Thus the decision of the State Council on the implementation of the Thirteenth Five-Year Plan in energy conservation and emission reduction emphasizes

¹³² See e.g. Intergovernmental Panel on Climate Change, *Climate Change 2014: Mitigation of Climate Change (Working Group III Contribution to the IPCC Fifth Assessment Report)* (Cambridge, UK: Cambridge University Press, 2015) at 757, noting that China produces 46 % of the world's steel.

¹³³ See *ibid.*, at 757-758 and 761.

¹³⁴ Ministry of Industry and Information Technology of the People's Republic of China, 'Plan on Upgrading and Restructuring Steel Industry between 2016 to 2020' (钢铁工业调整升级规划 (2016 — 2020 年)), 28 October 2016, available at <<http://www.miit.gov.cn/n1146295/n1652858/n1652930/n3757016/c5353943/content.html>>.

¹³⁵ Ministry of Industry and Information Technology, 'Plan on the Development of Non-ferrous Industry between 2016 to 2020' (有色金属工业发展规划 (2016 — 2020 年)), 28 September 2016, available at <<http://www.miit.gov.cn/n1146290/n4388791/c5288773/content.html>>.

¹³⁶ YANG Jing, 'The Era of High-Speed Railway' (高铁时代), *Chinese National Geography*, 7 April 2010, available at <<http://mobile.dili360.com/tbch/2010/04071193.shtml>>; ZHAO Dan, 'Chinese High-Speed Railway, the Symbol of Speed' (中国高铁, 高铁速度), *China Equipment*, 30 December 2013, available at <http://www.chinaequip.gov.cn/2013-12/30/c_133005866.htm>.

that airlines must take appropriate measures, such using auxiliary power units or availing themselves of new sources of energy.¹³⁷ The 2012 Opinion of the State Council on Promoting the Development of Civil Aviation noted, moreover, the responsibility of civil aviation authorities in monitoring air-transportation SOEs, including in relation to their contribution to building a ‘green low-carbon aviation.’¹³⁸

5. Conclusion

In order to limit or reduce greenhouse gas emissions, each state adopts its own unique strategy, largely influenced by its economic, political and even cultural circumstances. This article has argued that China’s strategy has come to rely in a significant part on SOE conduct. Important initiatives have been undertaken by about two or three dozens of giant central enterprises in the key emission sectors of fossil fuels, power, metals, and transportation. These initiatives are rarely the direct result of legal or regulatory provisions laying down rights and obligations; rather, they originate in vague administrative provisions implemented through political tools, company supervision, personnel rotation, and other modes informal influence. Due to a lack of transparency and documentation, the role of Chinese SOEs is often ignored, with most foreign and even domestic commentators focusing instead on the much more visible development of a market-based mitigation mechanism. This preference for market-based modes of climate advocacy may reflect a deep concern about China’s state capitalism and its potentially distortive effects.¹³⁹ Just as China’s ‘national champions’ are often viewed as threats to a level playing field within international trade and investment regimes,¹⁴⁰ SOEs are easily portrayed as the chief culprits behind rampant pollution and environmental damage.¹⁴¹

This article has taken a different approach. Instead of viewing SOEs as fundamentally irredeemable due to their inefficient governance structures, rent-seeking abilities, and strong bargaining power,¹⁴² we have suggested that they could also serve as proxies for climate change mitigation, as this policy objective moves up the agenda of China’s government. Giant SOEs in key economic sectors play an instrumental role in developing and deploying new technologies, benefiting from economies of scale that

¹³⁷ See State Council (2016, energy working plan), *supra* note 88, para. 3.8.

¹³⁸ See State Council, ‘Opinion on Promoting the Development of Civil Aviation’ (国务院关于促进民航业发展的若干意见), 8 July 2012, available at <http://www.gov.cn/zwggk/2012-07/12/content_2181497.htm>, paras. 11 and 16.

¹³⁹ For an illustrative US perspective, see e.g. US China Economic and Security Review Commission, ‘Report to Congress 2016’, available at <https://www.uscc.gov/sites/default/files/annual_reports/2016%20Annual%20Report%20to%20Congress.pdf>, at 91-137. See also Przemyslaw Kowalski and Kateryna Perepechay, ‘International Trade and Investment by State Enterprises’ (OECD Trade Policy Paper No. 184, 2015), available at <<http://dx.doi.org/10.1787/18166873%0A>>.

¹⁴⁰ See e.g. Ming Du, ‘When China’s National Champions Go Global: Nothing to Fear but Fear Itself?’ 48 *Journal of World Trade* 1127 (2014) and Daniel C. K. Chow, ‘How China Promotes Its State-Owned Enterprises at the Expense of Multinational Companies in China and Other Countries’ 41 *North Carolina Journal of International Law* 455 (2016).

¹⁴¹ See e.g. Hua Wang and Yanhong Jin, ‘Industrial Ownership and Environmental Performance: Evidence from China’ 36 *Environmental and Resource Economics* 255 (2007).

¹⁴² Peter Lorentzen, Pierre Landry and John Yasuda, ‘Undermining Authoritarian Innovation: The Power of China’s Industrial Giants’ 76 *The Journal of Politics* 182 (2014).

few private companies can achieve, and allow the Chinese government to lead by example. In the short-to-medium term, SOEs provide China's government with an important, complementary, climate-policy entry point. Here, the role of SASAC is crucial. As a supervisory agency, SASAC stands at a critical juncture where it aligns SOEs' action with the priorities set by the CPC and pursued by China's government—priorities that now include transition to a green economy.

There is also a darker side to this story. SOEs with vested interests in the fossil-fuel economy may seek to hinder climate-change-mitigation policies. In a large country with persistent enforcement difficulties, this can be done not only through open political lobbying or more discrete support for disinformation campaigns, but also through pressure on local officials not to implement national policies. In this context, China's government has understood the need to diversify the operation of key central enterprises, for instance through investment in renewable energy, in order to transform them into sectoral leaders in the shift to a greener economy. Altering the vested interests of powerful fossil-fuel SOEs is a necessarily preliminary step towards further mitigation action.

Finally, we are aware that this article is only a preliminary mapping of a complex field of research. It gives a fleeting overview of a complex trend of legislation, regulation, and informal influence that the national and local governments use to constrain or influence the conduct of SOEs. Not all of this phenomenon can be documented through desk-based research alone. Taking the full measure of the contribution of Chinese SOEs to climate change mitigation—the steps taken, those which may still be taken, and the opportunities and challenges along the way—would require a multidisciplinary research team, including expertise in economics, socio-legal studies, political science, and perhaps even anthropology, among others. Even if this article raises more questions than it answers, we hope that it sheds some light on an important aspect of China's strategy on climate change mitigation and, thus, whets the appetite for further research.