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THE GLOBALIZATION OF CHINA'S COAL INDUSTRY: THE ROLE OF DEVELOPMENT BANKS

Abstract
This article examines the political economy of Chinese overseas development finance for coal fired power plants. In just over a decade China's two major policy banks provide more financing for overseas coal-fired power plant expansion than any other public financier in the world economy. We show how China's overseas surge in public financing for coal fired power plants is a function of a number of domestic push and foreign pull factors. Excess capacity, environmental regulation, and structural change are push factors that converge with rising demand for energy, pockets of coal abundance, and the lack of financing in Western capital markets for coal fired power plants. Fragmentation across the Chinese system and the demand for coal outside China's borders allow for a decline sector on the mainland to become a global Chinese powerhouse.

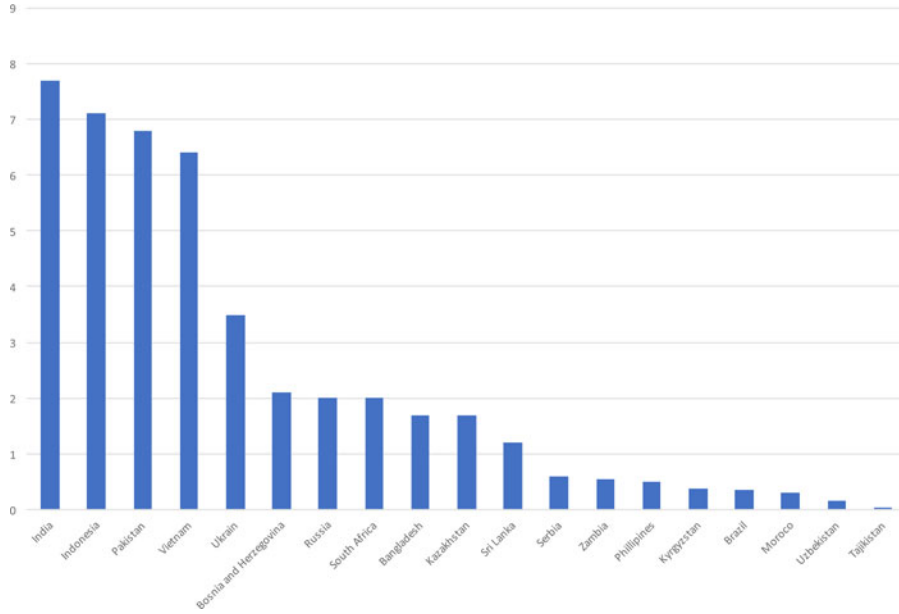
Keywords
China, development finance, development studies, energy, climate change

INTRODUCTION

Coal use in China has plateaued for close to a decade. At that same time, China is fast becoming the world's largest financier of overseas coal-fired power plants (CFPPs). China's role in international coal finance turns out to be much larger than previously thought. Indeed, from 2001 to 2017, China provided a total of $45 billion worth of official development finance (ODF) for CFPPs worldwide through its two policy banks: the China Development Bank (CDB) and China Export and Import Bank (CHEXIM). Figure 1 shows the country distribution of Chinese policy bank financing for CFPPs during this period. This scale of public financing simply dwarfs contribution from any other country or the multi-lateral development banks (MDB) (Gallagher et al. 2018). There thus arises the question for analysis: what accounts for this bifurcating action on coal in China and, more specifically, what drives the globalization of China's ODF for CFPPs?

Drawing on in-depth interviews and field work in China and host countries, analysis and compilation of data, and analysis of literature, we present a structural analysis of what animates the globalization of China's ODF for CFPPs worldwide. We determine that China's ODF for coal power, through its policy banks, fundamentally aims to shift abroad the burden of the country's adjustment to an efficient, sustainable, and balanced economy that is decoupled from energy, curtails environmental pollution and cuts carbon

FIGURE 1 Country Distribution of Chinese Policy Bank Lending for CFPP (US$ billion)



Data source: Gallagher 2019

emissions, and eliminates excess capacity in the coal power sector. To unveil the logic, we will trace the two sets of variables that contribute to the globalization of China's ODF for coal power worldwide: domestic drivers that push Chinese coal financing overseas and foreign demand that pulls Chinese coal finance to their nations.

We find that while the domestic pressure for China to decouple its economy from energy, combat its environmental/climate challenge, and eliminate excess industrial capacity has resulted in the shrinking of development space for its coal power at home, the growing demand for power in emerging economies, the withdrawal of the MDBs from coal power financing, and the comparative advantage of the Chinese coal power sector have combined to expand the development space for the Chinese coal power sector abroad. Thus, against the backdrop of the 2008 global financial crisis (GFC) that has intensified the pressure for China to make the structural adjustment, the Chinese government has turned to its policy banks to globalize the country's ODF for coal power worldwide; and this, in turn, has promoted the globalization of the Chinese coal power capacity, boosted domestic demand, and shifted the burden of adjustment overseas.

These findings are yet another example of fragmentation across the 'tri-block' phenomenon discussed throughout this special issue. Whereas the Chinese leadership (Block 2) and other Chinese institutions work toward a more consumption-based and less carbon-intensive based economy, commercial actors (Block 3), which have significant ties with the Party (Block 1), are able to graft themselves through alliances with global policy banks to shift their production overseas. China's economy continues to

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benefit from increasing growth of its coal industry, but can shift to a more demand-led and lower carbon economy at the same time. This fragmentation is not as surprising at it might seem at first, as the globalization of the coal industry facilitates domestic adjustment without harming growth. That said, growing pressure from climate change advocates and local communities concerned with air pollution and jobs may slow the overall global expansion of China's coal industry.

Further, this paper is among the first to examine the political economy of what drives the Chinese state to deploy policy banks for overseas coal expansion. It calls into question the two broad explanations about the globalization of the Chinese CFPPs that have emerged in the limited literature. First, Chen and colleagues (2016, 12), when discussing the role of leading G20 economies in international coal finance, assert that "China promotes coal finance because Chinese companies win an increasing share of the construction and equipment contracts," and that "given the overcapacity of coal power within China, overseas projects provide international business opportunities for coal-plant equipment manufacturers and state-owned enterprises doing engineering, procurement, and construction overseas." Second, Hervé-Mignucci and Wang (2015, 10) hold that China's engagement in coal power worldwide "helps it strengthen strategic political ties and increase its sphere of influence," and in pursuit of positive "strategic externalities" accruing to its growing economic presence around the world (Norris 2016). Our research shows that the first explanation follows an economic reductionist approach and fails to capture the political logic for Chinese state to produce the necessary conditions behind the expansion of the Chinese public financing for CFPPs around the world. It also reveals that the second explanation exaggerates the dividends associated with the so-called "strategic externalities" that often turns out to be ambiguous at best in reality.

There are four more sections after this brief introduction. Section II presents our analytical framework of the "push" and "pull" factors of Chinese ODF for CFPPs. Section III analyzes the "push" factors within China that lead China's policy banks to help Chinese firms go abroad. Section IV evaluates the "pull" factors that drive Chinese coal finance to host countries. Section V offers a discussion of our conclusions and their implications.

THE PUSH AND PULL OF CHINA'S COAL PRODUCT CYCLE: ANALYTICAL FRAMEWORK

To understand the particular outcome of why China has globalized its ODF for CFPPs through its policy banks, we will adopt the research method of process-tracing as illuminated by Beach and Pedersen (2013), which calls for the identification not only of the causal mechanism that links the independent and dependent variables but also of the contextual conditions that trigger the causal mechanism. The dependent variable in this case is the relative expansion in Chinese ODF for CFPP. The independent variables are the sum of domestic "push" factors and the sum of foreign "pull"' factors that combine to explain why China has become a leading financer of CFPPs worldwide. Figure 2 depicts our two-step process-tracing framework.

The two causal mechanisms consist of a set of factors at home and abroad that have altered the development space for the Chinese coal power sector. On the one hand, since the beginning of the twenty-first century, Beijing has launched three interconnected

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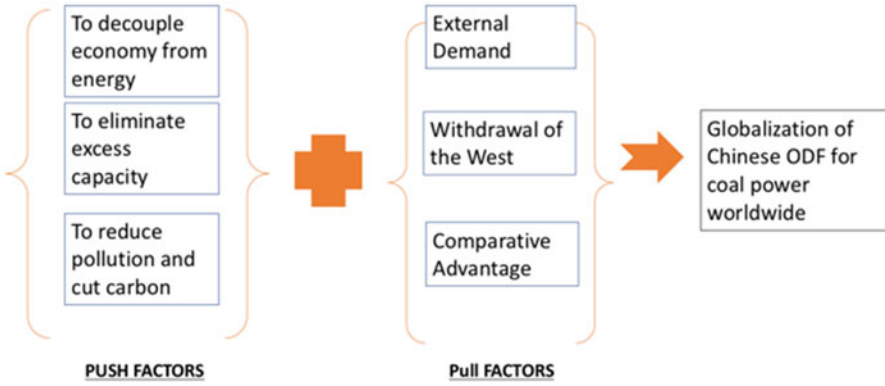
FIGURE 2 The Push and Pull of China's Coal Product Cycle



Note: Authors' formulation

policy priorities—energy conservation and emissions reduction, environmental protection, and industrial de-capacity—to make a domestic structural adjustment. The ultimate goal of this adjustment is to transition toward to an economy that is decoupled from intensive energy consumption, deteriorating environmental pollution, and excess capacity. These three policy priorities together form the first causal mechanism that mounts downward pressure on the development space for the Chinese coal power sector. On the other hand, three factors, including the pressing demand for power in emerging economies, the withdrawal of MDBs and Western financial institutions from infrastructure finance, especially coal power finance, and the comparative advantage of the Chinese coal power sector, have converged to present to the Chinese coal power sector an opportunity for expansion beyond the Chinese shores. In other words, these three factors constitute the second causal mechanism that together provide the Chinese coal power sector, which struggles at home, with a shot in the arm in terms of its development space. In light of this bifurcation of shrinking development space at home and expanding development space abroad, it is natural that the Chinese government has turned to globalization as a means to facilitate its domestic adjustment.

Our work also also shows that de facto role of fiscal policy function CDB and CHEXIM serve in stimulating the Chinese economy constitutes a contextual condition that helps explain the divergence between the decline of coal in China and the country's growing finance for coal power at the same time. Specifically, these two policy banks rely on the bond markets in China and occasionally overseas to raise funds to finance the Chinese state priorities and stimulate demand at home. It is this fiscal stimulus function that allowed the Chinese government to use its policy banks as an antidote to the downward pressure facing its coal power sector's development space at home and simultaneously as an accelerator for the coal power sector's upward expansion abroad. This also suggests that, against the backdrop of the 2008 Global Financial Crisis, Beijing has turned to its two policy banks, CDB and CHEXIM, to push for its domestic adjustment toward an efficient, sustainable, and balanced economy that is decoupled from energy, curtails environmental pollution and cut carbon emissions, and eliminates excess capacity in the coal power sector.

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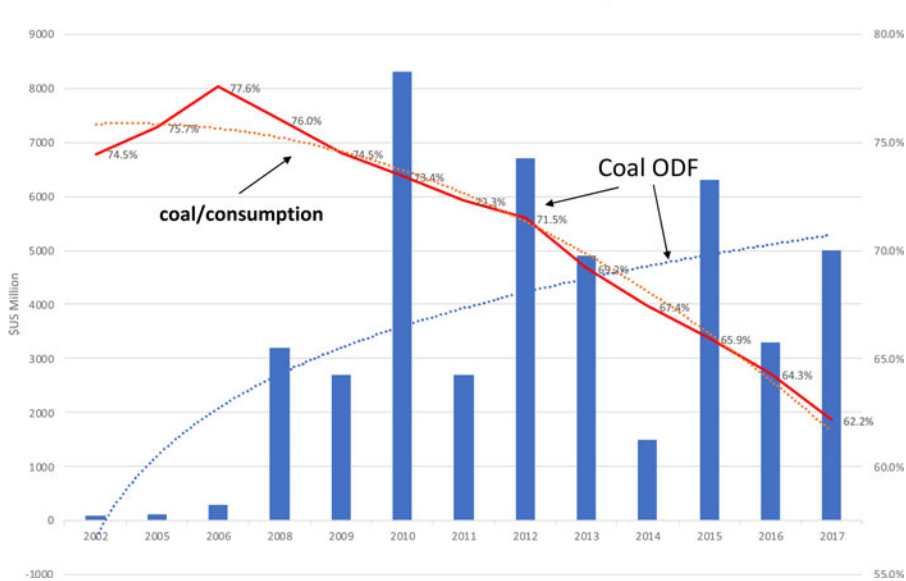
Figure 3 plots data on the primary vertical axis as the amount of overseas coal finance from China's policy banks from 2002 to 2017, with the trend line over this period as the dotted line. The red line on the secondary axis is the amount of coal electricity consumption as a percent of total energy consumption in China with the trend line as the red dotted line. In the analysis that follows, we find that a basket of domestic push and foreign pull factors form the political economy of China's surge in ODF for CFPPs. Indeed, the two lines cross in 2013, the year when China's coal limits went into place and the year when excess capacity became most acute.

I. THE BIG PUSH: THE CHINESE COAL POWER SECTOR AT HOME

The strength of China's coal has deep roots. Increasingly however, coal is falling out of favor in mainland China due to excess capacity and, especially, environmental concerns. The fragmentation of the Chinese state has been exploited by China's coal industry. Whereas coal has been singled out to be slowed and even phased out on the mainland, there is not a consistent policy with respect to China's global economic policy. Coal firms have seized this window and have flocked overseas with the help of China's global policy banks: the CDB and CHEXIM.

Since it first emerged as a modern fuel in China over 150 years ago, coal has always been considered as essential for the nation's quest for modernization and its standing in the international system. Shellen Xiao Wu documents how the late Qing Dynasty, while struggling to adopt and adapt modern European geology and mining technologies to exploit its coal resources in the late nineteenth century, came to the realization that

FIGURE 3 Globalization as Domestic Adjustment



Data source: Author's calculations based on Gallagher (2018) and China Statistical Yearbook 2018

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coal was not only essential for the Chinese drive for modernization and but also for imperial China to achieve parity with modern European powers in the world (Wu 2015).

After fueling the Chinese Communist Party's (CCP) drive for industrialization for nearly half a century in China, coal found itself front and center of three adjustments the Party made to the triangular relationship amongst the country's "3Es"—economy, energy, and environment—at the beginning of the twenty-first century. These adjustments took place during President Hu Jintao's two five-year terms in office between 2003 and 2013 and President Xi Jinping's first term in office between 2013 and 2018. However, two factors contribute to their continuity and overlap over the past 15 years. First, these adjustments mirror the evolution in the country's dominant discourse over its 3Es, constructed by the CCP on the basis of its assessment and response to some of the country's most fundamental problems and their associated public pressures, both domestically and internationally. "Produced, reproduced, and transformed in a particular set of practices," a discourse, as defined by Hajer (1995, 45), boils down to the "specific ensembles of ideas, concepts, and categorization" that give meaning to the "physical and social realities." Once generated, the meanings generated by the discourse tend to be sticky, because, as Stern (2006, 181) notes, they "delimit the realm of understanding, action, and imagination within a certain framework." Consequently, the new meanings arising from the dominant discourses transcend the political offices and governing mantras of individual leaders. Second, President Xi Jinping was already promoted to the Politburo Standing Committee of the CCP and Vice President during President Hu's second term and thus was intimately involved in major decisions during his predecessor's last five years in office.

The first adjustment to the 3Es in China at the beginning of the twenty-first century took place after the CCP pledged to quadruple the country's GDP by 2020 on the basis of the level in 2000 at its 16th National Congress in 2002. To fulfill this pledge, President Hu Jintao put forward "a scientific development approach" that creates harmony between human beings and nature in 2003. How would China follow the "scientific development approach" in accomplishing this development goal? When outlining China's outlook at the 2005 Beijing Fortune Global Forum, Vice Premier Zeng Peiyan proposed quadrupling China's GDP while only doubling its energy consumption in 2000–2020, on the basis of the same success China scored in the last two decades of the twentieth century. However, the reality clashed with Zeng's vision. While China experienced a 5 percent average annual reduction in its energy intensity, the ratio increased an average of 5 percent per year in 2002–2005. This surge in energy intensity not only put the Chinese economy under strains but also exposed the weaknesses embedded in its energy-intensive growth. As the problems expanded and led to a cascade of complications, it became clear that coal turned out to be weakest link in the energy chain. Overwhelmed by the runaway demand for electricity, power shortages spread across two thirds of China, which then led to a scramble to build CFPPs and secure coal for power across the country, resulting in rapid expansion of coal power and coal price spikes and coal transport bottleneck, which then forced some local economies to turn to oil products for power generation, spurring a sudden growth in oil imports in face of oil product shortages and intensifying concerns about energy security (Kong 2005).

Meanwhile, the surge in coal use for power generation led to a sharp jump in the country's CO2 emissions. Whereas the country's GDP grew at an average rate of 10 percent in

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2002–2005, its CO2 emissions galloped at 14 percent on average during the same time period (World Bank 2018). As a consequence, this chain reaction not only helped create the first energy crisis for China in the twenty-first century, but also led to questions from some leading thinkers, such as He Zuoxiu of the Chinese Academy of Sciences and Wang Yinan of the Development Research Center of the State Council (He and Wang 2004), about the extent to which China can quadruple its GDP by doubling its energy consumption in 2000–2020. Determined to decouple its economy from energy, the Chinese government launched a public campaign of energy conservation and emissions reduction (ECER) since 2006. Speaking about the significance of this campaign, Xie Zhenghua, Deputy Director of NDRC, defined it as a very important yardstick against which the execution of Hu Jintao's "scientific development approach" ought to be measured. But the reality is that, thanks to the co-benefits of the campaign for energy security and climate change, this campaign has outlived President Hu's two terms and become institutionalized through the country's macroeconomic planning. In fact, as the discussion below shows, it would soon find itself folded onto the second adjustment the CCP made to the country's 3Es.

At the heart of this ECER campaign is a reduction target responsibility system embedded in the country's overall five-year plans (FYPs) for social and economic development. Specifically, every five years the National Development and Reform Commission (NDRC), the country's macroeconomic management agency, coordinates and consults with different central bureaucracies, local governments, state-owned enterprises (SOEs), and research institutes to set the national, local, sectoral, and even organizational target for energy intensity and emissions reduction, to establish the appropriate evaluation procedures, and to institute a centralized verification program to ensure compliance and accountability. These targets then become legally binding after the National People's Congress approves the FYPs. On the basis of the overall FYPs, designated central bureaucracies then replicate the above-mentioned process to draft FYPs for specific sectors. Table 1 lists the specific target for ECER over the 11th, 12th, and 13th FYPs

TABLE 1: Major Energy Conservation and Emissions Reduction Target, 2006–2020

	energy conservation target	emissions reduction target
11th FYP for Energy Development (2006–2010)	reduce energy intensity by 20% below the 2005 baseline year	reduce SO2 emissions to 10% below the 2005 baseline year; reduce COD by 10%
12th FYP for Energy Development (2011–2015)	reduce energy intensity by 16% below the 2010 baseline year	reduce SO2 emissions to 8% below the 2010 baseline year; reduce NOX emissions by 10% reduce CO2D by 8% reduce ammonia nitrogen by 10% reduce carbon intensity by 17% below the 2010 baseline year
13th FYP for Energy Development (2016–2020)	reduce energy intensity by 15% below the 2015 baseline year	reduce carbon intensity by 18% below the 2015 baseline year

Data source: Gallagher and Qi 2018

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for energy development. Different from the previous aspirational targets set in the 8th, 9th, and 10th FYPs so far as total emission control is concerned, the energy intensity and emissions reduction targets issued have become binding agreements with local governments and SOEs since the 11th FYP (Zhang 2017).

Through an aggressive and continuous campaign of ECER, the first adjustment the CCP made to the 3Es led to improvement in sustainability, as the economy grew with less energy and fewer emissions. For instance, while its economy grew at an average rate of 9.8 percent over the 11th and 12th FYPs (National Bureau of Statistics of China 2018), the country succeeded in cutting both its energy intensity and carbon intensity, measured as the amount of CO2 emissions per unit of GDP, by 38 percent in 2015 from the 2005 level. However, this adjustment also carried a price for coal in China. As a matter of fact, it contributed to the shrinking of the development space for coal in China through three primary channels: cutting coal use per unit of electricity generation, phasing out small CFPPs, and trimming the ratio of coal in the country's total primary energy consumption (TPEC). First, as part of the campaign to meet the mandated reduction energy intensity by 20 percent during the 11th FYP (2005–2010), 16 percent during the 12th FYP (2011–2015), and 15 percent during the 13th FYP (2016–2020), China kept driving down the amount of coal use per unit of electricity generation at a faster rate than before. Because of this improvement in conversion efficiency, to generate one kilowatt hour of electricity in 2015, China needed about 14 percent less coal than was used in 2005 (China Electricity Council 2018). Second, while part of the reduction in coal use per unit of electricity generation came out the adoption of better technologies, such as supercritical or ultra-supercritical technologies, a big driver was the closure and phasing out of small CFPPs as mandated by the ECER campaign.

According to the Ministry of Industry and Information Technology (MIIT), as part of the ECER campaign, the country managed to phase out small CFPPs totaling 76.8 gigawatts (GW) during the 11th FYP. Even after the low-hanging fruit had been picked, the country, according to its leading energy regulating agency the National Energy Administration (NEA, 2016), still managed to shut down another 28 GW of CFPPs during the 12th FYP. In total, through the ECER campaign, China has phased out about 105 GW of coal power generation capacity, which is equivalent to the entire power generation capacity of South Korea at the end of 2016. Finally, the ECER campaign also mandated reduction of coal in the country's TPEC. For instance, both 12th and 13th FYP for energy development contain a specific binding target constraining the role in the country's TPEC, with the former targeting a ratio no more than 65 percent and the latter a ratio under 58 percent. While other factors, such as the adjustment to be discussed below, have played a role, the ECER campaign certainly was a driver behind the decline of the coal/TPEC ratio during the 12th FYP. In fact, at the end of 2016, the ratio of coal in the country's TPEC already dropped to 62 percent, ahead of the targeted reduction (National Bureau of Statistics of China 2018).

Carried by the momentum of the ECER campaign, the CCP initiated a second adjustment to the country's 3Es in 2007. This adjustment took place against the backdrop of growing international and domestic pressure on China to tackle its environmental crisis. Internationally, while China began to participate in the international climate negotiations in 1990, it did not treat, and was not under external pressure to treat, climate change as a priority at home throughout the 1990s. However, the international pressure

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mounted as the country's total CO2 emissions surpassed the level of the United States and its per capita emissions exceeded the world average in 2005 (World Bank 2018). Domestically, environmental pollution has emerged as one of the leading factors contributing to public discontent and social instability. For instance, the number of environmental petitioning and environmental complaints has been rising at a rate of 29 percent per year since 1996 while the mass protests over environmental pollution have been on a steady rise since 2001 (China Council for International Cooperation on Environment and Development 2014, 44). Meanwhile, China's participation in the international climate negotiations facilitated dissemination of international climate science, prompted dedicated research on climate change, and helped raise awareness of climate impacts in China, all of which helped to generate a sense of the country's growing ecological vulnerability as evidenced by the assessment in the country's first white paper on climate change: China's National Climate Change Programme (National Development and Reform Commission 2007). In response, the top CCP leadership put forward a new development mantra of building "ecological civilization," in parallel with the above-mentioned "scientific development," to galvanize public action required for this adjustment. This mantra dates back to President Hu Jintao, who first mentioned it in his report to the 17th CCP National Congress in 2002 and brought it up again in his report to the 18th CCP National Congress in 2007. It was then embraced by President Xi Jinping, who championed the construction of "a beautiful China" at home where "lucid waters and lush mountains are invaluable assets" and advocated China's leadership in the global cooperation on climate action and its participation, contribution, and stewardship in building global EC abroad (Xi Jinping 2017).

While one could lump many initiatives under the ecological campaign, we primarily draw attention to three interrelated efforts—China's climate action, clean energy expansion, and "war" on pollution—that altered the triangular relationship of the 3Es in two fundamental ways. On the one hand, they enhanced the integration between energy and environment in the triangular relationship amongst the 3Es. This integration has two primary manifestations. To begin, the State Council's creation of the National Leading Small Group (LSG) for Work on Climate Change and Energy Conservation and Emissions Reduction, headed by the country's Premier and composed of top leaders from relevant central bureaucracies (The State Council of People's Republic of China 2007), facilitates integration between the country's energy and climate policy. Initially, this LSG had two separate offices embedded at NDRC overseeing the work on climate action and ECER separately but then merged these two offices in 2013. With the above-mentioned LSG leading work on both climate change and the ECER campaign, it thus comes as little surprise that the voluntary commitments China makes in international climate negotiations and the ECER targets are consistent with each other. For instance, the pledge China made at the 2009 Copenhagen Climate Conference overlaps with the ECER targets issued by the 11th and 12th FYP for Energy Development while its pledge at the 2015 Paris Climate Conference dovetails with the ECER targets in the 13th FYP for Energy Development. Next, China's active promotion of clean energy since the country's passing of the Renewable Energy Law in 2007, together with the identification of energy conservation and environmental protection, new energy (including nuclear, wind, solar, and biofuels), and new energy vehicles as industrial priorities under the 12th FYP for the Development of National Strategic New

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Industries goes a long way to foster growth through non-fossil fuels while cutting local and global pollution. Because of this aggressive push, China has emerged as a global leader in clean energy investment both at home and worldwide.

On the other hand, the ecological civilization campaign substantially elevated the preeminence of environment among the 3Es. A case in point is the crackdown on environmental pollution that has gained momentum under President Xi. This crackdown began with Premier Li Keqiang's declaration of war against pollution in March 2014. To fight the war, the Chinese government blended three approaches. It adopted a command and control approach to pollution control that is underpinned by a target responsibility system similar to the ECER campaign (Wong and Karplus 2017, Zhang 2017), a legalist approach that depends on a revised and beefed-up environmental law as a way to enhance environmental compliance through fines and litigations (Rooiji et al. 2017), and a market approach that aims establish property rights over the country's natural resources and expand its carbon markets.

While it elevated the preeminence of environment and enhanced the integration between environment and energy in general, this campaign to build "ecological civilization" spells trouble for coal. In fact, it has put a further squeeze on coal and locked in a momentum that will guarantee the further shrinking of the development space of the fuel in China in the twenty-first century through two channels. First, in a manner that is more dramatic than the ECER campaign, China's increasing climate action and war on pollution have led to direct restrictions on coal consumption in absolute terms. These restrictions take two forms: a cap on total national and local coal consumption and cancellation or postponement of CFPPs. Second, after over a decade of consistent and dedicated government support dating back to 2007, clean energy has become a force to be reckoned with in China's energy supply mix. The rise of clean energy, however, has come directly at the expense of coal. For instance whereas the proportion of coal power in the country's total installed power generation capacity dropped by 15 percent from 2006 to 2017, renewable power experienced a 16 percent increase during the same time frame, more than offsetting the decline of coal power (National Bureau of Statistics of China 2018). Thus, the campaign to advance ecological civilization has further eroded coal's dominance and demarcated its peak use in China.

However, neither the ECER campaign nor the campaign to advance ecological civilization is sufficient to inflict immediate and real pain on coal as an industry, given the role it has played in driving the country's quest for industrialization, fueling its economy, generating tax revenues, and sustaining jobs, especially at the local level. Instead, what really threatened coal was nothing but its own excess capacity, which emerged as part of the country's scramble to address the power shortages in 2003–2005 and subsequently expanded after the 2008 Global Financial Crisis. While our study focuses on coal, it is worth noting excess capacity transcends coal and is structurally linked the political economy of China's growth model in the twenty-first century. Recent studies (Chen and Sun 2013, Fan 2015) reveal the centrality of the following three factors in contributing to systematic excess capacity in the Chinese economy over the past decade: 1) the country's dependence on investment, especially in the manufacturing and real estate sectors, as a driver for economic growth, 2) the distorted investment incentives for local officials and SOEs in a political system characterized by "fiscal federalism under a unitary system" (Yang 2014), where officials are promoted primarily on the

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basis of economic growth and SOEs enjoy monopoly, subsides, and favorable financial support, and, 3) the stimulus program China implemented after the 2008 Global Financial Crisis. The same factors are also behind the excess capacity in the coal industry (Zhang et al. 2017, Yang, Hou, and Zhang 2018). According to some recent estimate, the excess capacity in the country's industry was at least 1.5 billion metric tons at the end of 2015 (Yang, Hou, and Zhang 2018). As Table 2 shows, the overwhelming majority of the investment in coal comes from local governments. Similarly, overinvestment on the part of power utilities and local governments has also led to excess coal power capacity across China. In fact, a large number of new CFPPs have been approved and built since the central government devolved to local governments the approval right over CFPPs and then the approval right over environmental impact assessment of CFPPs in 2014 and 2015 respectively. One estimate puts China's coal power excess capacity in the neighborhood of 140–160 GW in 2015 and 210–260 GW in 2020 (Feng et al. 2018). To put these numbers in perspective, the total installed electricity generation capacity in Canada is 140 GW. This enormous excess capacity against the backdrop of China's economic slowdown in the aftermath of the 2008 Global Financial Crisis put the country's coal industry and coal power industry under great strains. For instance, by the end of 2015, more than 90 percent of large- and medium-sized coal enterprises suffered a loss (Zhang et al. 2017). Similarly, all of the top five leading power generating corporations incurred losses in 2017 while the average hours of operation for CFPPs dropped by more than 16 percent from 5,021 to 4,216 hours on an annual basis (China Electricity Council 2018).

In response to this systematic excess capacity problem, which goes beyond coal and the coal power industry, the Chinese government has adopted a two-pronged strategy. On the one hand, it has launched a command and control approach to the de-capacity campaign at home. As a testimony to the importance the top CCP leadership attaches to this campaign, the Central Economic Work Conference of the CCP Central Committee launched the so-called Supply-Side Structural Reform (SSSR) in December 2015 and defined capacity reduction as the top priority (Chen, Ding, and Mano 2018). Under

TABLE 2: Fixed Assets Investment in Coal in China (Unit: billion yuan)

	local investments	central investments	Total Investments	share of local investments	share of central investments
2004	62.34	6.699	69.039	90.3%	9.7%
2005	108.21	8.08	116.29	93.1%	6.9%
2006	131.53	14.37	145.9	90.2%	9.8%
2007	160.77	19.68	180.45	89.1%	10.9%
2008	214.88	25.05	239.93	89.6%	10.4%
2009	276.74	28.96	305.7	90.5%	9.5%
2010	347.77	30.7	378.47	91.9%	8.1%
2011	452.19	38.53	490.72	92.1%	7.9%
2012	441.4	27.04	468.44	94.2%	5.8%
2013	484.42	36.84	521.26	92.9%	7.1%
2014	496.95	40.7	537.65	92.4%	7.6%

Data source: Zhang et al. 2017

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this campaign, the Chinese government has set specific targets for capacity reduction in both key priority regions and nationwide. On the hand, the Chinese government promoted the linkage between the country's "going out" strategy and excess capacity at home. As an illustration of this thinking, He Yafei, Vice Minister of the Overseas Chinese Affairs Office of the State Council, advocated in an op-ed in *the South China Morning Post*, that China should move out this overcapacity on the basis of the country's development strategy abroad and foreign policy so as to share its development dividends with other developing nations for common prosperity (He 2014). This thinking is confirmed by the *Guiding Opinions of the State Council on Promotion of International Production Capacity and Equipment Manufacturing Cooperation*, issued in May 2015, which calls on the country's financial institutions, especially its policy banks, to facilitate the exportation of industries, especially in the twelve designated sectors as pertinent to production capacity and equipment manufacturing.

II. THE BIG PULL: EXPANDING DEVELOPMENT SPACE FOR THE CHINESE COAL POWER SECTOR ABROAD

There is also a big pull for coal in some pockets of the world economy, where coal remains abundant and capital to exploit those resources is increasingly scarce. In contrast with its experience at home, the Chinese coal power industry finds itself faced with an expanded market abroad because of three factors (see Figure 2).

First, despite the growing concerns about climate change worldwide that were behind the success of the Paris Climate Conference, many developing economies in the global south are still primarily preoccupied with development. Further, the political urgency for their incumbent leaders to bring about development as soon as possible in order to stay in power, to a large extent dictates their preferences for the type of energy they choose to adopt and develop to fuel their growth. Frequently, these incumbent leaders choose CFPPs simply because their technologies are a known commodity and they provide base-load power that is compatible with their grid infrastructure. To the extent that coal resources are available, the incumbent leaders are more likely to build CFPPs, as they add to their existing infrastructure, appeal to their local coal interests, and stimulate their economy by creating jobs and generating tax revenues in addition to providing reliable electricity. As a result, these political economy concerns often trump the environmental issues associated with CFPPs. A look at new CFPPs worldwide that have been built for the past decade suggest that the buildout mainly occurs in emerging economies.

As Figure 4 shows, excluding China, which accounts for 70 percent of the world's newly built CFFPs, over one fifth of the global buildout has taken place primarily in ten emerging economies between 2006 to 2016. Notwithstanding some fluctuations, these ten countries as a group have seen their CFPP buildout growing at 10 percent per year on average during the same time frame, pointing a robust demand for coal power in the developing economies. Further, a comparison of the list of these ten countries to a list of countries to which China has provided ODF for CFPPs during the time frame also shows a nice overlap, suggesting not only have these countries built more CFPPs than others but they have also turned to China for financing and construction.

Gallagher and colleagues (2021) come to similar conclusions on the demand-side pull factors, after conducting a number of case studies on the drivers of Chinese overseas coal

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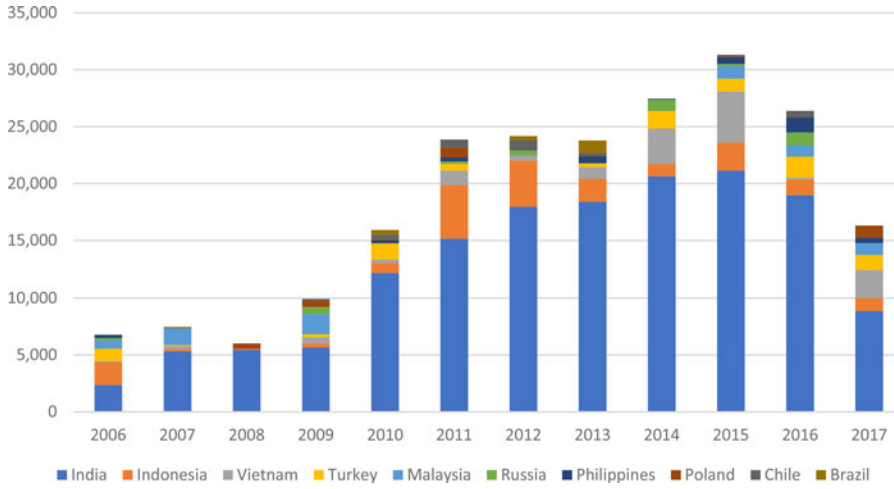
FIGURE 4 CFPP Buildout 2006–2017 (MW)



Data source: Global Coal Plant Tracker 2019

finance for India, Indonesia, Vietnam, and Bangladesh. In these countries the demand for new energy is further tilted toward CFPPs because

> Recipient countries seek financing and technology for coal-fired power plants because of strong and seemingly relentless demand for electricity as their economies grow rapidly, familiarity and comfort with coal technology, energy security concerns that make coal seem attractive, a lack of explicitly supportive policies for renewable energy, perceived higher costs of cleaner alternatives, perceived or actual lack of land availability for renewables, highly protective federal or central government policies for coal, and the prevalence of financially distressed state-owned electricity monopolies (Gallagher et al. 2021, 4)

A second factor is the lack of finance from the traditional financiers of CFPPs in the developing world—MDBs such as the World Bank. In a recent article in *Nature Energy*, Steffen and Schmidt (2018) compiled a dataset of 841 projects from ten major MDBs from 2003 to 2015 and found that MDBs play a significant role in financing power plants in the developing countries, but have a decreasing share of finance for fossil fuels —with close to a complete halt in CFPPs. As Chin and Gallagher (2019) note, the MDBs backed by the West are guided by new growth theories that emphasize interventions in human capital, health, and the environment, as well as institutional theories that focus underlying institutions. For environmental reasons most of the MDBs also have strong restrictions against financing CFPPs (see Table 3). Even the Asian Infrastucture Investment Bank, where China is the largest shareholder, has a limited ability to fund CFPPs, if at all. Indeed, regardless of the policies outlined above, most of the MDBs have shied away from financing coal altogether over the past half decade (Gallagher and Qi 2018).

The third key factor is that China has gained a comparative advantage in CFPPs, and thus—especially with the vacuum in available financing just described—emerges as one of the most competitive coal-fired power provider in the world economy. Drawing on

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TABLE 3 MDB Policies for Overseas Coal Financing

MDB	Conditions for Coal Financing
World Bank	lack of feasible alternatives to coal or a lack of financing for coal power
Asian Development Bank	if cleaner technologies are adopted and adequate mitigation measures are incorporated into project design
African Development Bank	strong development impact and, at the same time, environmentally responsible
European Bank for Reconstruction and Development	rare and exceptional circumstances where there are no feasible alternative
Inter-American Development Bank	supports plants that are designed to use high-efficiency and low-emissions technologies
European Investment Bank	no lending to coal

Data source: Piccio 2016

Balassa (1965), economists calculate a sector's "revealed comparative advantage" to examine the extent to which a particular sector in a particular country has a relative comparative advantage over others. Usually, analyzing international trade, the comparative advantage that is "revealed" is identified by calculating the share of a country's exports in a particular sector relative to the share of total exports and countries in that sector. This becomes a proxy for relative productivity levels, which determine comparative advantage in international trade. A similar exercise is performed and exhibited in Figure 5. Rather than exports—given that CFPPs are not exported from country to country—we calculate the share of a particular country's installed capacity in CFPPs relative to world total installed capacity from 2000 to 2018. Of the top twenty countries installing CFPPs over this period the largest are the USA, India, Russia, Germany, South Africa, China, Poland, and Indonesia. But installed capacity in CFPPs as a share of all CFPPs installed capacity over this period is dominated by China.

Figure 5 shows that China had just over 20 percent of world installed capacity in coal-fired power in 2000 but by 2018 had climbed 30 percentage points to 54 percent. Interestingly, the USA had been close to 35 percent and declined to 15 percent. All other countries in the world either declined in share or remained neutral over this period, except for India which moved from 8 percent to 14 percent. Analagous to "revealed comparative advantage," China has become the most productive on offer for developing countries.

CONCLUSION: IMPLICATIONS AND AREAS FOR FURTHER RESEARCH

This article has shown that China has become among the most active players in global coal-fired power markets because of a unique converge of a set of push and pull factors inside and outside of China. For many industries, such a convergence and the subsequent successful globalization of national firms could be seen as win win—for Chinese firms to export capabilities and for host country to gain access to technology and electricity. Given that the sector in question for this paper is coal however, the social costs of production and consumption jeopardize such benefits.

On the push side, China is seeking to decarbonize its domestic economy, to eliminate excess capacity, to address localized air pollution, all while maintaining growth in the

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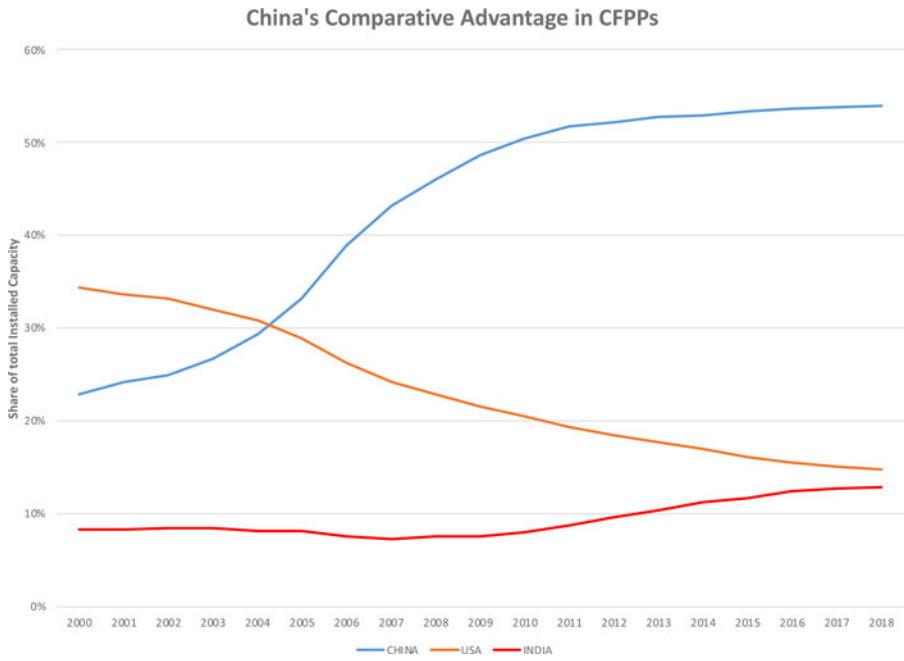
FIGURE 5 China builds largest market share of CFPPS



Data source: Author's calculations from Platts 2020

economy. This leaves China's CFPPs as the 'losers' of domestic policy adjustment but their productivity, technological sophistication, and tight relationships within the CCP poise them to be the 'winners' of a 'going out' policy where policy banks finance firms specialized in coal-fired power to go abroad as a means of domestic adjustment and growth, and to globalize their operations at the same time. China's Big Coal exploits the fragmentation and lack of consistency between domestic objectives and foreign economic policy in order to turn from being a domestic 'loser' to a global 'winner.'

On the pull or demand side—foreign governments have enormous energy demand as a result of demographic change and a general lack of investment in infrastructure over decades. Secondly, many countries, such as India, Indonesia, Vietnam, Bangladesh, South Africa and others, have a particular abundance in coal deposits that make CFPPs relatively cheaper even though in most markets renewable energy is now price competitive. A third factor is that virtually all of the Western-backed multilateral development banks and the AIIB have significant restrictions over the financing of CFPPs and conventional capital markets are increasingly seeing CFPPs as riskier because of their potential for turning into stranded assets.

These supply and demand factors are brought together by China's policy banks—CDB and CHEXIM. These banks coordinate credit spaces that provide lines of credit and loans to host country governments, to Chinese firms specialized in CFPP. These coordinated credit spaces, coupled by the fact that Chinese firms specialized in CFPPs are now at

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the global technological frontier, have facilitated the global dominance of Chinese coal firms with relative ease.

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