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Going Green

POLICY OPPORTUNITIES AND CHALLENGES FOR EARLY RETIREMENT OF OVERSEAS CHINESE-FINANCED COAL PLANTS

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EXECUTIVE SUMMARY

In recent decades, China has built and financed a large number of coal plants abroad, predominantly in low- and middle-income countries in Asia and Africa. However, many of these plants will need to be retired before reaching their intended lifetimes given the required emission reductions to comply with the Paris Agreement. Once again, China has the opportunity to play a crucial role in supporting these countries in the development of their energy systems, this time in their efforts to retire coal plants.

Next to the obvious advantages from coal plant retirement for the host countries, there are significant benefits for China as well. With several Western-backed institutions like the World Bank already engaging in retirement initiatives, China can strengthen its role as a global climate leader and a partner in sustainable development by following suit. Additional benefits extend to the economic realm, such as reduced financial risks for Chinese companies and banks amid coal transitions, as well as green investment opportunities for Chinese renewable companies following coal plant closures.

This policy brief discusses the benefits and challenges that could arise when China assists countries in retiring their coal plant fleet early, identifying plants that should be targeted first and concrete next steps that can be undertaken.

Several financial mechanisms are available to enable the early retirement of coal plants that can be grouped into three sets. The first set of mechanisms brings down the cost of debt through approaches such as modifying the terms of existing outstanding debt held by asset owners or offering new, lower-cost loans or bonds. The second set aims at bringing down the cost of equity by transferring ownership of the plant. Asset management companies (AMCs) or funds, including managed transition





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vehicles (MTVs), are viable options to execute such transactions. The third set builds on maximizing future cash flows. Additional or alternative revenue can be generated through monetization mechanisms including for health benefits or carbon dioxide emissions mitigation through carbon credits.

Next to the question of *how* plants can be retired, it is essential to decide *which* plants should be decommissioned. Here, it is promising to examine the countries with the largest Chinese-financed coal capacity and to rank the individual plants that were financed with debt from Chinese development finance institutions (DFIs) and those that received foreign direct investment (FDI) from Chinese companies. This approach suggests that units in Indonesia and Vietnam can be priorities for early retirement, and both countries appear to be promising candidates, given their entry into Just Energy Transition Partnerships (JETPs) for clean energy transition.

Policy recommendations:

- Explore options to support coal plant retirement abroad with Chinese state-owned enterprises (SOEs) such as plant owners and operators, the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) and Chinese financial stakeholders.
- Engage in bilateral and/or multilateral dialogues with governments and utilities to assess their need for support in energy transitions in general and specifically in coal plant retirement.
- Provide assistance in prioritizing plants for retirement and developing practical solutions for individual plants taking potential barriers into account.
- Establish long-term bilateral agreements with governments on sustainable development and energy transition, incorporating provisions for early coal plant retirement.

Following these recommendations, Chinese DFIs can leverage their distinctive advantages in terms of experience and coordination to support host countries in their transition endeavors. Funding early coal plant retirement through financial initiatives not only enhances China's standing as a global climate leader, but also solidifies its position as a key partner in sustainable development.

INTRODUCTION

Over the last two decades, Chinese banks and state-owned enterprises (SOEs) have provided loans and technology for a large number of coal-fired power plants abroad. With estimated emissions of 245 Mt carbon dioxide (CO₂) annually and a median age of seven years (Springer et al. 2022), this overseas coal fleet is increasingly incompatible with host countries' and global climate goals. In order to limit warming to below 1.5°C (2°C), global coal consumption needs to decrease by around 95 percent (85 percent) by 2050 (IPCC 2022). Hence, many coal units will have to be retired early, i.e. before reaching their typical lifetime of around 40-50 years (Global Energy Monitor 2023).

China has a unique advantage in terms of adopting policies for early retirement of overseas coal plants, as many of these plants are debt-financed by state-owned Chinese financial institutions and a large share is owned and/or operated by Chinese energy companies (Benoit 2022). In addition, Chinese institutions are well-poised to coordinate between foreign financiers and SOEs at the individual project level, more so than Western-backed financial institutions (Chin and Gallagher 2019).

In this policy brief, we explain benefits and challenges that could arise when China assists countries in retiring their coal plant fleet early, identifying plants that should be targeted first and concrete next steps that can be undertaken. This brief builds on a report published by the Boston University Global Development Policy Center on the role of development finance institutions (DFIs) in the early retirement of coal-fired power plants (Manych et al. 2024).



BENEFITS OF EARLY RETIREMENT

Assisting countries in the early retirement of their coal plants offers various potential benefits for China.

First, it could strengthen China's role as a global climate leader and partner in sustainable development. Countries and energy companies are adopting increasingly ambitious emissions reduction targets. To achieve these, they often seek international support from development finance institutions (DFIs).

Consequently, several DFIs have commenced early retirement initiatives. Notably, the Climate Investment Funds has established the Accelerating Coal Transition program to support early retirement efforts with blended finance (Climate Investment Funds 2021). Currently, the Asian Development Bank is piloting the Energy Transition Mechanism to acquire coal plants for early retirement (Asian Development Bank 2022). In addition, the private sector arm of the Inter-American Development Bank (IDB) Group, IDB Invest, supported coal plant closures and the construction of wind farms in Chile (Carrillo et al. 2023). Lastly, the World Bank funds coal plant repurposing in South Africa (World Bank 2023).

Led by the United States, a group of countries called the International Partners Group has established four Just Energy Transition Partnerships (JETPs) with South Africa, Indonesia, Vietnam and Senegal. Early coal retirement is a potential agenda within these JETP frameworks. China could match or exceed these partnerships by establishing itself as an ambitious and effective partner for countries' sustainable development and energy transitions, especially along the Belt and Road Initiative (BRI). This could, for example, be explicitly incorporated into the recently announced Green Investment and Finance Partnership (GIFP) platform (Zhang and Gallagher 2023).

Second, retiring coal plants in an orderly fashion based on techno-economic criteria would reduce financial risks from coal transitions. Disorderly closure of plants would likely result in unexpected stranded assets and unpaid debt impacting lenders and equity investors – in China and elsewhere (Cui et al. 2023; Semieniuk et al. 2022). In addition, the financial situation for countries that already experience debt distress could be exacerbated by disorderly and late plant retirement, with potential repercussions for Chinese financial institutions. For those countries, China's engagement could be a means to avoid governments and companies defaulting on Chinese loans, providing economic incentives.

Third, Chinese companies could gain green investment opportunities from the early retirement of coal plants. Countries need to replace the retired coal capacity with alternative sources of electric power, potentially provided by Chinese renewable energy companies. One potential option is to install renewable energy sources on the sites of the retired power plants while taking advantage of the grid services the retired generator can provide (Chattopadhyay et al. 2021). Such arrangements could be directly incorporated into the early retirement agreements.

Fourth, the early retirement of coal facilities yields significant environmental and social benefits at both the local and the global level. Reduction in local air pollution results in a significant decrease in the number of local respiratory diseases and pre-mature deaths. Globally, the retirement of coal plants mitigates greenhouse gas emissions and reduces the negative effects of climate change, including for China. In addition, by engaging in early coal retirement overseas, China can continue to claim the global mantle of climate leadership.

CURRENT BARRIERS TO RETIREMENT

Various barriers need to be considered when engaging in early coal plant retirement initiatives. They can be grouped into financial, legal, socio-economic and political challenges, all of which are explained hereafter.



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Financial Barriers

Coal plants that retire before their envisaged lifetime are likely to have loans that have not yet been amortized and equity that has not yet reached the expected financial return. Naturally, both factors depend on the age of the unit and the underlying financial planning. The operator and/or owner of the plant might not be able to pay off outstanding debt after the closure due to foregone earnings on their side. These defaulted loans and foregone profits would affect banks and investors that will likely only approve early retirement if they are fully or partially compensated for their losses. Here, an external actor could come in to reduce companies' losses. To overcome these financial barriers, the involved actors would have to agree on financing schemes that are satisfactory for all.

Legal Barriers

However, it might not always be possible to find solutions that are agreeable to all, given legal risks. There are typically many additional non-Chinese lenders, investors and controlling shareholders involved in a given overseas plant, such as the local firm running the plant, transmission and distribution companies, external private investors and the government of the host state, who may have diverging interests.

Based on our assessment, host countries may bear the brunt of legal risks from early retirement of coal plants. In some cases, host country governments have issued guarantees for power purchase from Chinese-financed plants for a fixed price through power purchase agreements (PPAs). If a plant is retired early and government action was the proximate cause of that retirement, the host government would not be able to meet those guarantees and could be legally liable for them. Private investors could bring a 'fair and equitable treatment' complaint in which an investor asserts that the regulatory change undermines their legitimate expectations of Return on Investment (ROI) or put forth a claim for expropriation or indirect expropriation. This could be the case in Pakistan, where the government has introduced increasingly high ROI levels in guarantees for coal-fired power plants in order to incentivize investment that will help the country meet energy security goals. Guaranteed returns on equity per unit of energy are, in some cases, double what they would be for a unit of renewable energy (Bhandary and Gallagher 2022).

There are some precedents in the broader energy sector for such legal risks materializing for host countries. In *Union Fenosa Gas v. Egypt*, the host government was found to be on the hook for lost profits when the Egyptian SOE did not supply enough gas to Union Fenosa Gas, a Spanish company, under a guaranteed supply arrangement (*Union Fenosa Gas v. Egypt* 2018). Spain (*Foresight v. Spain* 2018) and the Czech Republic (*Antaris v. Czech Republic* 2014) have also faced multiple investor-state dispute settlement (ISDS) cases when they had offered guaranteed energy prices for renewable energy companies, but later had to roll back those guarantees when the electricity market became unstable.

China may also directly bear the risks of private investors' complaints for a case wherein a Chinese-financed coal plant has other private equity investors. China has 89 investment treaties in force with countries all over the world, 86 of which have ISDS as an option, which strengthens investors' claims for compensation (Tienhaara and Cotula 2020). Ordinarily, ISDS claims involve a territorial link to the defendant state; however, bilateral investment treaty (BIT) language may permit some flexibility to that rule. The UK-China BIT, for example, suggests that direct and indirect expropriation could happen where a firm is incorporated under the laws of the BIT partner, without specifying that it must be in the territory of that partner (Art. 5(2) (Her Majesty's Stationery Office 1986)). A breach of contract claim between a foreign firm and a Chinese project funder may also be brought under the umbrella of BIT jurisdiction in an ISDS case (see, e.g., China-Korea BIT Article



9 (Department of Treaty and Law 2007)). Taken together, these legal risks for host countries and China must be considered in the design of any early coal plant retirement programs.

Socio-economic Barriers

Host countries additionally might have to face social and economic issues arising from coal plant closures, such as layoffs, an increase in consumer electricity prices or energy insecurity. Here it is particularly important to not overburden disadvantaged groups, but facilitate a just transition. Another aspect to consider is that many countries have developed local and nation-wide economic dependencies on coal plants, particularly in the case of captive coal plants providing electricity directly to industrial consumers (Kalkuhl et al. 2019). Early retirements of plants, many of which will occur in low- and middle-income countries, could put the economic development of countries at risk, increasing global inequalities.

Some of these hurdles could be overcome by replacing coal with renewables or repurposing coal plants, where renewables are installed while retaining the coal plant's generator for flexibility services (Chattopadhyay et al. 2021). Others might require profound adjustments coordinated with the government of the host country.

Political Barriers

Retiring China's coal fleet abroad is likely to face political resistance in both host countries and China. Phasing out coal is often hindered by political economy factors in the host country, such as the interests of powerful domestic actors (Jakob and Steckel 2022). Large energy companies have strong economic incentives to build and operate coal plants, and often enjoy close ties to the government, such as in India and the Philippines (Montrone, Ohlendorf and Chandra 2021; Manych and Jakob 2021). In Vietnam, as in many other countries, coal-based SOEs have paved the way for economic growth in line with government goals and are thus held in high favor (Dorband, Jakob and Steckel 2020). In Indonesia, SOEs support coal due to governmental revenues along the coal value chain (Ordonez et al. 2021). Phasing out coal in these countries thus needs to consider the interests of influential actors from the private sector and the government.

At the same time, convincing Chinese decision-makers to support the retirement of coal plants abroad could constitute significant challenges. It might require innovative incentives for Chinese SOEs to consent to the retirement of their plants abroad and face potential losses. In addition, China faces major challenges to coal transitions domestically. China is one of very few countries in the world experiencing growth in coal-fired generation capacity (Centre for Research on Energy and Clean Air and Global Energy Monitor 2023a; 2023b). Reducing the overall coal capacity by retiring domestic plants early is extremely unlikely in China in the near- to medium-term. However, as explained, China could benefit from supporting the retirement of coal plants abroad, which might generate political support for China's global leadership on climate change and sustainable development in other countries.

RELEVANT FINANCIAL MECHANISMS FOR RETIREMENT

The literature has identified several financial mechanisms for the retirement of coal assets (Bhat et al. 2023; Bodnar et al. 2020; Calhoun et al. 2021; Buchner et al. 2022; Nedopil, Yue and Volz 2022; Clark et al. 2023). These are contingent on the premise that the owners and/or operators of the plants seek compensation for the early retirement of the respective units. In cases where both the companies and their parent companies are Chinese entities, China would offer compensation to their own SOEs, which could potentially lead to reduced payments. Large energy companies may



have the capacity to absorb losses without requiring compensation. Alternatively, the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) could consider mechanisms for supporting SOEs through a transition.

To ensure efficient and sustainable retirement procedures, it is pivotal to choose the most suitable and feasible financial mechanisms, which can be grouped into three categories: those that reduce the cost of debt, those that reduce the cost of equity and those that maximize future cash flows.

The first two of these financial mechanisms aim at bringing down the weighted cost of capital by lowering either the costs of debt or the cost of equity. Mechanisms to lower the cost of debt are often referred to as 'refinancing' mechanisms. This can be achieved by modifying the terms of existing outstanding debt held by asset owners, debt relief in the fashion of debt-for-climate swaps (Ray 2024) and by offering new, lower-cost loans or bonds. This becomes particularly attractive when Chinese banks are the existing lenders.

Bringing down the cost of equity entails transferring ownership of the plant, referred to as a 'buyout.' In a full buyout scenario, the original owners of the coal plant's equity and debt sell their stakes, valued based on remaining expected cash flows, i.e. the net present value. The new buyer, which could be a Chinese entity, closes the plant immediately or after a stipulated number of years. Asset management companies (AMCs) or funds, including managed transition vehicles (MTVs), are viable options to execute such transactions.

AMCs are adept at providing customized solutions for both debt and equity financing, along with the strategic planning and execution of diverse management, technical and just transition arrangements (Qian 2024). AMCs in China were proactively engaged in the state-owned commerce bank restructuring process and have consequently gained experiences in managing various types of non-performing assets, including coal plants. Public sector AMCs in particular showcase a notable risk tolerance and can actively engage in the early stages of the retirement process for coal-fired power plants. Subsequently, they can present refinancing deals to private sector entities once policy, technical and market risks have been clarified and are deemed manageable for private financiers and investors.

The third group builds on maximizing future cash flows, e.g., delivering alternative or additional revenues. Additional revenue can be generated through monetization mechanisms including for health benefits or CO₂ emissions mitigation through carbon credits. Other options include governmental compensation for coal phase-out such as reverse auctions (assuming that the compensated companies reinvest in low-carbon technologies) or revenue contracts for replacement of energy generation with renewables.

Differences in the compensation of involved companies relate to the following questions:

- *How much does the owner/operator of the plant receive for early retirement?* The value of retiring the plant early can be calculated following different approaches, such as the net present value of the plant or the carbon avoidance following emissions mitigation.
- *How is the money to fund early retirement raised?* Potential options include bond securitization, blended finance or funds that are created specifically for this purpose.
- *Does the ownership of the plant change before retirement?* Options include that the owner either decommissions the plant or that they receive a payout from the new owner who closes down the plant.
- *At what point in time will the plant be retired?* The coal plant could be retired either immediately after financial closure or only after a specific period.



In addition to funding the retirement of a coal plant directly, Chinese DFIs can support affected workers, communities and regions, thereby contributing to a just energy transition. Options like just transition funds can help generate support for early retirement by overcoming socio-economic and political barriers.

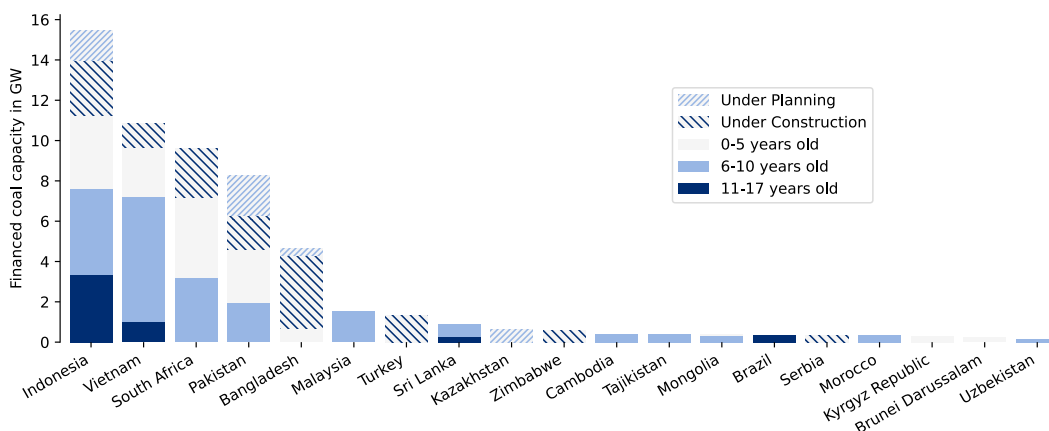
POTENTIAL RETIREMENT FRAMEWORKS FOR CHINESE-FINANCED COAL PLANTS

Developing a retirement framework allows identification of China’s overseas coal plants that should be retired first. It is pivotal to first halt the construction and commissioning of new coal-fired units, which would eliminate expected emissions, and China has made commitments in this regard (Springer 2022). For operating plants, different retirement indices can be used to rank them in order of retirement priority based on different criteria. Two criteria that are considered important throughout the literature are the age of a plant and its size (i.e., electric generating capacity) (Maamoun et al. 2020; 2022; R. Y. Cui et al. 2021; Nace 2018; Oberschelp et al. 2019).

Figure 1 shows the capacity of Chinese-financed coal plants by status, such as under planning and under construction, and by age for operating units. It includes foreign direct investment (FDI) such as greenfield FDI and merger and acquisitions (M&As), and debt finance from China’s two global DFIs, the China Development Bank (CDB) and the Export-Import Bank of China (CHEXIM). Around 12 GW of coal capacity was funded exclusively by commercial banks without co-financing from the DFIs (World Resources Institute 2022).

Countries like Turkey, Kazakhstan and Zimbabwe will be important to consider in the future, but do not have operating plants financed by China just yet. By contrast, countries such as Indonesia, Vietnam, South Africa, Pakistan and Malaysia operate coal plants financed by China that are six years old and older. Few countries, including Indonesia, Vietnam, Sri Lanka and Brazil commissioned China’s overseas coal plants more than ten years ago.

Figure 1: Coal Capacity in GW Financed by China



Source: China’s Global Power (CGP) Database (Boston University Global Development Policy Center 2022).

Note: Capacity per host country is split by status, such as Under Planning, Under Construction and Operating grouped by unit age. The US, Singapore and Australia were excluded.

Next, we shift focus onto the individual coal plants. We identify units for retirement based on their year of commission (older plants first), and, for units that have the same year of commission, on the



capacity (larger plants first). We additionally only consider units that employ less efficient subcritical technology.

First, we focus on units that received debt finance from a Chinese DFI to match the first set of financial mechanisms discussed in the previous section that bring down the cost of debt. The top 10 units can be seen in Table 1, most of which are located in Vietnam and Indonesia. In addition, the table shows the technology, the Chinese DFI providing loans and the borrower for each unit. The identified units were commissioned between 2006-2011 and are almost exclusively situated in Vietnam and Indonesia.

Secondly, we consider units that received FDI from Chinese companies to match the second set of financial mechanisms that aim at reducing the cost of equity. In contrast to Table 1, Table 2 shows the investing companies and their share of ownership for the top 10 plants identified for early retirement. Similar to the units identified in Table 1, almost all of the units displayed in the table are in Vietnam or Indonesia. However, the year of commission is on average five years later, between 2011-2016.

Another decisive criterion to consider when choosing plants is the willingness of the host countries to retire plants ahead of schedule, as discussed previously. Host countries have a distinct political economy in terms of coal, which influences their efforts to phase out coal and retire plants early. Aspects that might indicate if host countries are willing to close coal plants include their dependency on coal, the stringency of climate policies and domestic emissions reduction targets.

The recently announced JETPs demonstrate Indonesia's and Vietnam's eagerness to transition to a low carbon economy, which for both countries require the retirement of operating coal units. Indonesia's JETP aims to retire two coal plants through the Asian Development Bank's Energy Transition Mechanism (JETP Secretariat 2023). It is important to note that JETPs have not yet demonstrated successful deployment of financial resources, and there could be political as well as economic opportunities for Chinese-led mechanisms with a focus on early coal retirement.

Table 1: Coal Units Financed with Debt from Chinese DFIs that were Identified for Early Retirement

Country	Year of Commission	Capacity (MW)	Technology	Plant Name	Unit	Chinese DFI	Borrower
Vietnam	2006	50	Subcritical	Cao Ngan	1	CHEXIM	Government of Vietnam
Vietnam	2006	50	Subcritical	Cao Ngan	2	CHEXIM	Government of Vietnam
Vietnam	2010	300	Subcritical	Quang Ninh	1	CHEXIM	Government of Vietnam
Vietnam	2010	300	Subcritical	Quang Ninh	2	CHEXIM	Government of Vietnam
Indonesia	2011	625	Subcritical	Banten Suralaya	8	CHEXIM	PLN
Brazil	2011	350	Subcritical	Candiota C	5	CDB	Petrobras
Indonesia	2011	330	Subcritical	Indramayu	1	CDB	PLN
Indonesia	2011	330	Subcritical	Indramayu	2	CDB	PLN
Indonesia	2011	330	Subcritical	Indramayu	3	CDB	PLN
Vietnam	2011	330	Subcritical	Uong Bi	8	CHEXIM	Government of Vietnam

Source: Boston University Global Development Policy Center 2022; S&P Global Platts 2021.

Note: The ranking is based on a unit's age and capacity. None of these units received FDI from a Chinese investing company.



Table 2: Coal Units Receiving FDI from Chinese Companies that were Identified for Early Retirement

Country	Year of Commission	Capacity (MW)	Technology	Plant Name	Unit	Investing Company	Investing Company Ownership %
Indonesia	2011	150	Subcritical	Simpang Belimbing	1	Shenhua Group	70%
Indonesia	2011	150	Subcritical	Simpang Belimbing	2	Shenhua Group	70%
Cambodia	2014	135	Subcritical	Sihanoukville	1	Chinaerdos	100%
Vietnam	2015	621	Subcritical	Mong Duong 2	1	China Investment Corp	19%
Vietnam	2015	621	Subcritical	Mong Duong 2	2	China Investment Corp	19%
Indonesia	2015	142	Subcritical	Celukan Bawang	1	China Huadian Corporation	100%
Indonesia	2015	142	Subcritical	Celukan Bawang	2	China Huadian Corporation	100%
Indonesia	2015	142	Subcritical	Celukan Bawang	3	China Huadian Corporation	100%
Cambodia	2015	135	Subcritical	Sihanoukville	2	Chinaerdos	100%
Malaysia	2016	752.5	Subcritical	Jimah	1	China General Nuclear Power Group	100%

Source: Boston University Global Development Policy Center 2022; S&P Global Platts 2021.

Note: The ranking is based on a unit's age and capacity. The investing company is defined as the parent company of the owner/operator of the respective facility. None of the units received debt finance from Chinese DFI.

CONCLUSION

Chinese policymakers and DFIs are well-poised to assist governments in their early coal plant retirement efforts. In the past, they facilitated the construction of numerous coal plants abroad and can now leverage their influence and standing to support their retirement. An orderly phase-out of coal plants reduces financial risks for banks and investors in China and elsewhere, while simultaneously providing green investment opportunities for Chinese companies.

We suggest several recommendations to overcome barriers to retiring coal plants early while reaping considerable economic and political benefits.

Policy recommendations:

- Explore options to support coal plant retirement abroad with Chinese SOEs, such as plant owners and operators, the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) and Chinese financial stakeholders.
- Engage in bilateral and/or multilateral dialogues with governments and utilities to assess their need for support in energy transitions in general and specifically in coal plant retirement.
- Provide assistance in prioritizing plants for retirement and developing practical solutions for individual plants taking potential barriers into account.
- Establish long-term bilateral agreements with governments on sustainable development and energy transition, incorporating provisions for early coal plant retirement.



Following these recommendations, Chinese DFIs can leverage their distinctive advantages in terms of experience and coordination to support host countries in their transition endeavors. Funding early coal plant retirement through financial initiatives not only enhances China's standing as a global climate leader, but also solidifies its position as a key partner in sustainable development.

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