

ICSC/315 SEPTEMBER 2021

THE BELT AND ROAD INITIATIVE: THE ROLE FOR COAL

STEPHANIE METZGER



INTERNATIONAL CENTRE FOR
SUSTAINABLE CARBON

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ICSC REPORT NUMBER

ICSC/315

ISBN

978-92-9029-638-6

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SUSTAINABLE CARBON**

PUBLICATION DATE

SEPTEMBER 2021

PREFACE

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ABSTRACT

The Chinese Belt and Road Initiative (BRI), launched in 2013 by Chinese President Xi Jinping, is a worldwide infrastructure building initiative that aims to connect China and its allies with energy, transport, communications, and cultural links. Nearly half of BRI investment to date has gone to the energy sector, including both fossil fuel and renewable projects. Coal projects have secured a significant amount of BRI funding. Considering divestment decisions from international financial institutions and many large private banks, China's willingness to support coal mines and power plants is increasingly important. However, the BRI has been criticised by some as promoting a highly polluting model of growth. This investigation of the structure and implementation of the BRI, includes an in-depth review of the Chinese approach to concessional lending, the impact of the increasingly strict global environmental targets, and the effects of Covid-19. Chinese financing is key for BRI projects, but loans often lack transparency and use risk management mechanisms, such as collateral, that are not usually used by western or multinational financial institutions. Furthermore, increasing concern about climate change has led both China and some BRI partner countries to re-evaluate their energy systems. The Covid-19 crisis has accelerated this trend, as lower than expected power demand has reduced the pressure to rapidly increase electricity supply. Chinese investments in the coal sector are reviewed on a country-by-country basis to put these trends in context. Case studies include Bangladesh, Egypt, Indonesia, Kenya, Pakistan, Bosnia and Herzegovina, Serbia, Turkey, the United Arab Emirates, Vietnam, and Zimbabwe. The case studies illustrate how power sector investments are driven by a variety of factors, including but not limited to, cost, demand forecasts, system stability requirements, domestic fuel availability, political incentives, and environmental concerns. China is still willing to finance large coal projects, but the local political, economic, and social situation of the host country determines their success.

ACRONYMS AND ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
BiH	Bosnia and Herzegovina
BoC	Bank of China
BRBR	Belt and Road Bankers Roundtable Mechanism
BRI	Belt and Road Initiative
CDB	China Development Bank
CFB	circulating fluidised bed
ChExIm	Export-Import Bank of China
CPEC	China-Pakistan Economic Corridor
DFI	development finance institution
EIA	environmental impact assessment
ESP	electrostatic precipitators
EU	European Union
FGD	flue gas desulphurisation
G20	Group of 20, 19 member countries and the EU
GDP	gross domestic product
HELE	high efficiency, low emissions
ICBC	Industrial and Commercial Bank of China
ICSC	International Centre for Sustainable Carbon (formerly IEA Clean Coal Centre, IEACCC)
IMF	International Monetary Fund
IPP	Independent Power Producer
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KDB	Korea Development Bank
KExIm	Korea Export Import Bank
MDB	multinational development bank
MENA	Middle East and North Africa
MoU	memorandum of understanding
NDC	Nationally Determined Contribution
NDRC	National Development and Reform Commission
NGO	non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
OPEC	Organisation of the Petroleum Exporting Countries
RMB	Renminbi
ROI	return on investment
SDGs	Sustainable Development Goals
Sinosure	China Export and Credit Insurance Corporation
SOE	state owned enterprise
SPVs	special purpose vehicles
SRF	Silk Road Fund

UAE	United Arab Emirates
UN	United Nations
USC	ultrasupercritical
WTO	World Trade Organization

Note: all monetary values are in United States Dollars (\$) unless otherwise stated.

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EXECUTIVE SUMMARY

The Belt and Road Initiative (BRI) is China's flagship foreign policy that aims to foster economic cooperation between China and countries across the world. Over 130 countries have signed up, representing over two-thirds of the global population. The main goal of the BRI is to strengthen infrastructure and trade links across a variety of sectors, including energy, transport, communications, and manufacturing. Projects are usually led by Chinese companies and have access to favourable Chinese finance, while partner countries determine the development agenda. Coal has featured heavily in the BRI: China invested in 68 GW of coal power plants in BRI countries from 2014-19. While finance is an important enabler, China's development of coal plants abroad is also facilitated by its expertise and innovation in coal-fired power design and manufacturing.

ROLE OF CHINESE FINANCING

Chinese state and commercial banks play a key role in financing BRI projects:

- Many national and international financial institutions are restricting coal investments. China is the largest source of funding remaining.
- Projects receive concessional loans and other favourable terms. Chinese banks are willing to lend to countries with low or no credit ratings, but they often use resource-backed loans to ensure return on investment.
- BRI partner countries drive investment decisions; the Chinese government maintains a principle of 'no intervention in local politics'.

However, the dominance of Chinese finance has consequences:

- The Chinese government emphasises mutual aid and cooperation when providing development aid, but some countries, such as the USA, are concerned that it also gains geopolitical influence through its investments.
- There have been transparency issues in BRI projects. Chinese banks are not required to disclose information about projects, so they are often difficult to track accurately.

IMPACT ON UN SUSTAINABLE DEVELOPMENT GOALS AND CLIMATE CHANGE

Chinese officials emphasise the role the BRI can play in promoting development in line with the UN Sustainable Development Goals:

- The programme promotes international cooperation and the sharing of best practices, as encouraged in Goal 17 – Partnerships.
- BRI projects contribute directly to Goal 4 – Energy, Goal 8 – Economic Growth, and Goal 9 – Industry, Innovation, and Infrastructure.

However, there are also concerns about the environmental impact of Chinese investments, especially in the coal sector:

- By financing coal power plants and other energy-intensive industrialisation projects, China may be promoting an emissions-intensive model of growth.
- Although the trend is towards a greater role for high efficiency, low emissions (HELE) coal plants, Chinese investors have supported the construction of subcritical coal units at a higher rate than other international financiers.
- In response to increasingly strict climate goals, Chinese President Xi Jinping announced at the UN General Assembly on 21 September 2021 that China would not build new coal power projects abroad. Details are not available but funding of coal plants under the BRI in the medium to long term appears less likely.

PREDICTORS OF NEW COAL UNDER THE BRI

Under the BRI, the decision to build a coal plant depends on many factors. Analysis of eleven countries (Bangladesh, Bosnia, Egypt, Indonesia, Kenya, Pakistan, Serbia, Turkey, the United Arab Emirates, Vietnam, and Zimbabwe) has produced the following set of questions that can help determine the likelihood of a country choosing Chinese-sponsored coal for its energy supply.

- Does the country in question have local coal deposits? Countries with local coal deposits may want to exploit these resources for a secure, reliable, and affordable energy supply.
- What type of technology is being used? Chinese manufacturers have expertise in all thermal power technologies but are the only major international financier of subcritical technology.
- What is the rate of power demand growth? If they face rapidly growing power demand, governments are likely to seek large baseload power sources.
- What are the project costs? Large projects with high capital costs may be a deterrent for financially conscious utilities, although Chinese financing often offers comparatively lower costs.
- Are there local environmental concerns? Local environmental opposition has been an increasingly important factor in preventing the construction of coal plants.

KEY MESSAGE: ADAPTABILITY OF THE BRI

Despite its importance within China and around the world, the BRI is quite an amorphous concept in reality. While some projects are explicitly labelled as BRI initiatives from their inception, others may rotate on or off the list depending on whether they are contributing to the current goals of the Chinese government. As a result, almost any international projects involving Chinese companies can be labelled as part of the BRI.

Partner nations are equally important to the success of the initiative. China's policy of non-intervention in local politics means that local priorities are usually the driving force behind BRI strategy, and this results in a significant variation in the types of projects chosen and the ease of their implementation. This trend is the same in the coal sector.

Some countries have been successful in building many new coal plants, while others have failed to complete projects because of economic, social, environmental, and bureaucratic barriers. Ultimately, China wants to engage with BRI countries on trade and development generally, not coal specifically. It is likely to continue to support the local infrastructure plans of each country regardless of their choice of energy technology because Chinese companies have manufacturing, engineering, and construction capacities across the spectrum of energy products.

1 INTRODUCTION

The Belt and Road Initiative (BRI) is China's flagship foreign policy. Debuted in 2013 by Chinese President Xi Jinping, the BRI aims to further China's economic and strategic agenda by fostering economic cooperation between China and countries across the world. The programme is loosely based on the idea of reviving the historic Silk Road, which promoted mutual growth and prosperity through trade. China supports infrastructure development, including in the power sector, to accomplish this goal. Over 130 countries have signed agreements to participate in the BRI since its inception; the majority are low- and middle-income countries (Economist, 2020).

The BRI has come at a crucial time for many nations. There is growing demand for infrastructure, especially in developing countries, to spur economic growth. Accordingly, transportation, communications, energy and electricity, mining and extraction, and industrial development are the major areas of focus for the BRI (Eder and Mardell, 2019). It is estimated that current BRI projects could total over \$1 trillion of investment (OECD, 2018). However, this type of international investment is not new for China. Many of the initiatives that now fall under the BRI were active before 2013. The creation of the BRI was more intended to unite many of China's international economic and foreign policy goals into one overarching strategy (Mardell, 2019a).

Coal has featured heavily in BRI projects in the power sector. Chinese manufacturers, contractors, and financiers have considerable experience with coal projects. Furthermore, many developing countries have rapidly growing energy demand and are turning to coal as a secure source of baseload power. These overlapping interests have resulted in a large pipeline of coal power projects in BRI countries. However, despite some predictions that coal would experience a boom under the BRI, the situation has not been as straightforward. Whilst some coal projects have been successfully executed, many others have faced delay and even cancellation as countries reconsider their energy strategies. There have also been increasing concerns about the environmental impact of the BRI, particularly investments in coal. President Xi Jinping announced at the UN General Assembly on 21 September 2021 that China would not build new coal power projects abroad, raising questions about the future outlook of the BRI (BBC, 2021). As yet, no further details are available (September 2021).

This report delves into the context, structure, and execution of the Belt and Road Initiative in general with a focus on the coal sector. There is an emphasis on the role of Chinese financing for BRI projects; China has a unique approach to foreign development assistance that informs its willingness to bankroll large infrastructure investments. Environmental impacts are considered, as well as current and future approaches for a sustainable BRI. The role of the Covid-19 pandemic is discussed, as it has caused disruption and delay to many Chinese projects.

Some issues more specific to BRI coal projects are also covered. First, there is an examination of the type of technology used in Chinese-backed coal plants, followed by the possible reasons for the many

delays and cancellations prevalent in BRI projects. Finally, there is an examination of major BRI countries with coal projects. In addition to analysing each country's power sector and relationship with China, there are examples of coal projects which illustrate the nuances of implementation of the BRI.

The report concludes with a discussion of the trends that influence the use of coal under the BRI. These factors may help assess the value of coal projects developed under the programme, as well as the likelihood of future investment in the sector. There is an emphasis on using country-by-country assessments to truly understand the direction and impact of China's Belt and Road Initiative.

2 BELT AND ROAD INITIATIVE OVERVIEW

The Belt and Road Initiative (BRI) was established in 2013 as a programme to build economic and diplomatic relationships with countries around the world. Its full title is the Silk Road Economic Belt and the 21st-Century Maritime Silk Road, but it is usually referred to as the BRI, or Yi Dai Yi Lu – 帶一路 (One Belt, One Road) in Chinese. The Chinese government released a policy plan for the BRI in 2015. Its goals included:

- Improving intergovernmental communication to better align high-level government policies like economic development strategies and plans for regional cooperation.
- Strengthening the coordination of infrastructure plans to better connect hard infrastructure networks like transportation systems and power grids.
- Encouraging the development of soft infrastructure such as the signing of trade deals, aligning of regulatory standards, and improving financial integration.
- Bolstering people-to-people connections by cultivating student, expert, and cultural exchanges and tourism (China Power, 2020).

China aims to deepen its ties and increase its leverage with BRI countries mainly through building infrastructure projects. The BRI encompasses a wide range of areas, including energy, transportation, communication, and industrial development. In addition to promoting Chinese companies for such projects, Chinese state and commercial finance is available for BRI initiatives. The government claims that this approach will help increase economic development across participating countries, resulting in mutual trade benefits and cooperation. So far, over 130 countries have signed some sort of agreement or memorandum of understanding (MoU) endorsing part or all of the BRI. Of these, over 70 countries have signed formal participation agreements, representing two-thirds of the global population, 30% of total GDP, and three-quarters of the world's estimated energy reserves (Hilton, 2019; Economist, 2020).

The land route of the BRI roughly mimics the historic Silk Road that ran through Asia, the Middle East, and Europe. The Chinese government has identified six economic corridors that it wants to target with BRI projects, although they are not exclusive. The corridors are named after the main countries or regions of focus: Bangladesh-China-India-Myanmar, China-Central West Asia, China-Indochina Peninsula, China-Mongolia-Russian Federation, China-Pakistan, and the New Eurasian Land Bridge. Each corridor includes more countries than those which are in the name, however; they are merely broad signifiers of areas that are considered important for the BRI. There is also the Maritime Silk Road aspect of the BRI, which includes various countries but has an emphasis on Africa, the South Pacific, and Latin America (see Figure 1) (Hilton, 2019; OECD, 2018).

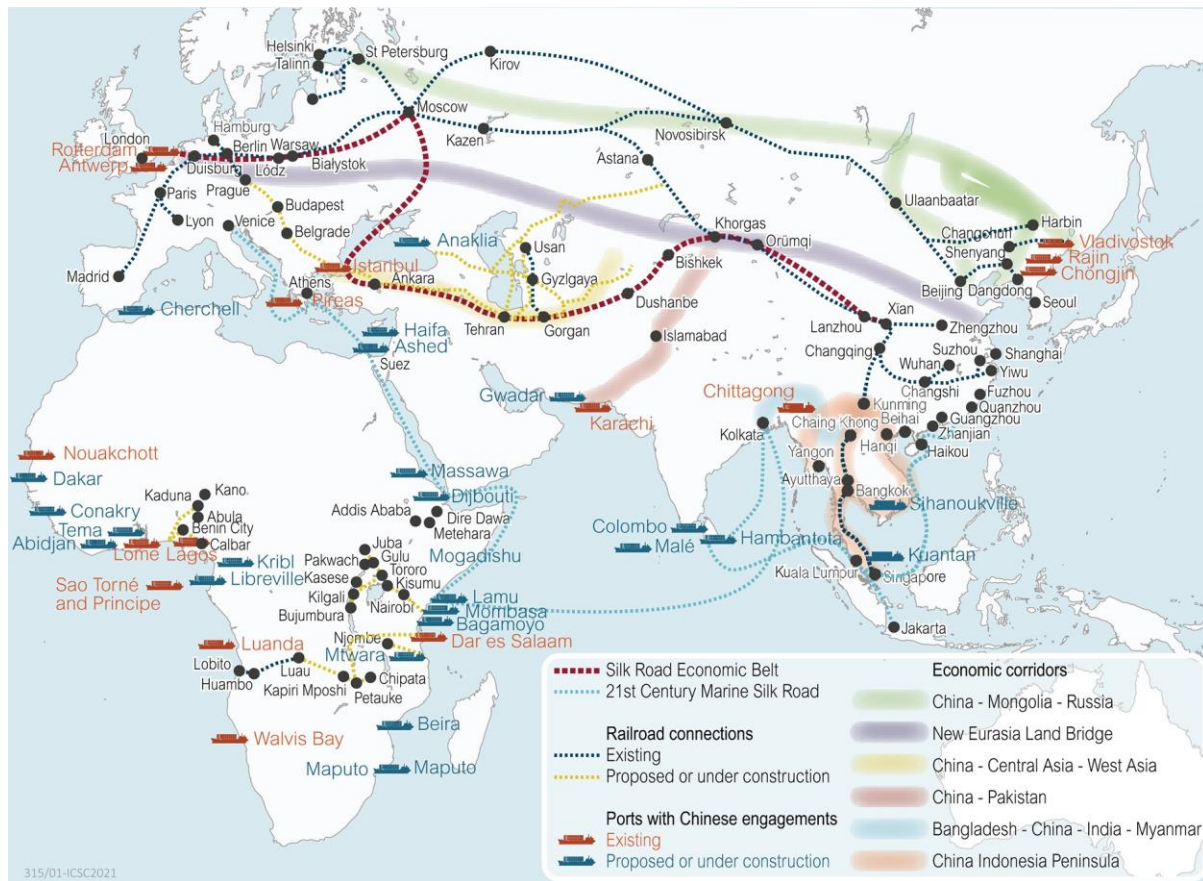


Figure 1 Map of the BRI (OECD, 2018)

Strategic management of the BRI is overseen by the National Development and Reform Commission (NDRC), in conjunction with other government agencies such as the Ministry of Commerce and the Ministry of Foreign Affairs (OECD, 2018). However, BRI developments are not always strictly defined. Despite being politically important in China, the BRI is quite an amorphous concept in reality. The scope is large and official documents only outline the broad categories of engagement. Individual projects are not determined by the central government, but rather the host countries, and there is no official list of projects (Mardell, 2019a). While some projects are explicitly labelled as BRI initiatives from their inception, others may rotate on or off the list depending on whether they are contributing to the current goals of the Chinese government. As a result, almost any international project involving Chinese companies can be labelled as part of the BRI, even if there were no pre-existing arrangements with the host country (Economist, 2020). This approach allows the Chinese government to highlight successful projects as they arise, rather than having to abide by strict predetermined goals.

High level meetings have expanded further on the role of the BRI. There have been two Belt and Road Forums to date, held in 2017 and 2019. These events have brought together senior officials from BRI-affiliated countries, as well as delegates from non-affiliated countries who want to influence discussions about the Initiative. Attendees at the Second Belt and Road Forum for International Cooperation included 'Russian President Vladimir Putin, Italian Prime Minister Giuseppe Conte, UK Chancellor Philip Hammond, Pakistan's Prime Minister Imran Khan and the heads of state of the

10 ASEAN (Association of Southeast Asian Nations) states' (Kuo, 2019). The Forums have been used as a chance to garner international input on guidance for environmental standards, financing agreements, new areas for cooperation, and more. They have also given Chinese President Xi Jinping a platform for expounding on the government's policy goals for the programme, as well as a chance to network with other world leaders.

2.1 MOTIVATION FOR THE BRI

The Chinese government has expressed its motivation for creating the Belt and Road Initiative as a desire to forge stronger economic and trade links with its neighbours (Stanway, 2019). In his speech to the 19th National Congress of the Communist Party of China, President Xi Jinping summarised the goals of the BRI as follows: "China will actively promote international co-operation through the Belt and Road Initiative. In doing so, we hope to achieve policy, infrastructure, trade, financial, and people-to-people connectivity and thus build a new platform for international co-operation to create new drivers of shared development" (Xi, 2017).

However, some countries, such as the USA, view the BRI more sceptically, questioning whether the Chinese government is more motivated by self-interest than helping others. There is concern that the BRI could be a geopolitical tool for China to increase its international presence. The BRI could create a network of countries that are tied to China economically, but also with transport links, Chinese technology, and diplomatic ties, that could help China rival the USA for influence (Hilton, 2019; Zhou and Esteban, 2018). Further, as the path of economic growth in China slows and begins its transition away from a reliance on heavy industry, the government has become concerned about overcapacity in domestic industry and with maintaining demand for Chinese goods. The BRI could be seen as an opportunity to increase demand abroad for Chinese manufacturing, especially in heavy industries such as steel and construction which are crucial for infrastructure development (Institute for Energy Economics and Financial Analysis, 2019).

Three of the main motivations for the BRI are examined further in order to understand the context behind it.

1. Growing geopolitical influence

China's rapid economic dominance since the turn of the 21st century has raised concern, especially in the west, about its global geopolitical ambitions. The country now plays a major role in international political systems in addition to its growing economic influence, presenting a challenge to the status quo in which the USA is the dominant global power (Flint and Zhu, 2018). The BRI is the capstone of this shift; it embodies China's desire to expand outward, especially to neighbouring Asian regions (Chen and Ho, 2019). Some argue that China hopes to use the BRI to create a new Sino-centric political and economic order (Tekdal, 2018; Callahan, 2016). However, it is unclear if this is an explicit goal of the Chinese government or merely a welcomed side effect of BRI cooperation. Several scholars have

described the BRI as the Chinese version of the Marshall Plan, in which the United States government provided loans and assistance to help European nations rebuild in the aftermath of World War II. The Marshall Plan faced similar critiques of its intentions: the United States and its allies claimed that the project aimed to promote mutual growth and development, while critics claimed it was a blatant effort by the USA to expand its hegemony into Europe against the Soviet Union (Shen and Chan 2018; Yu, 2017).

Just like the Marshall Plan, the Chinese government's goals for the BRI are likely more nuanced than either the government's propaganda or critics' doomsday proclamations (Ndzendze and Monyae, 2019). While China may not be striving for overt domination of BRI partner countries, it is certainly cultivating a diplomatic network of nations that are economically and culturally inclined to support China's increased role in the global community (Zhou and Esteban, 2018; Callahan, 2016). China may look upon such a network as beneficial to its national security interests as well, as closer economic ties could help to prevent military conflict in sensitive regions such as the South China Sea (Leverett and Bingbing, 2016).

Regardless of the Chinese government's intentions, the BRI's broad and transformative development ambitions mean that it is bound to have an effect on the balance of power in Asia and beyond. However, as the BRI is still a relatively new initiative, it will take time to observe any long-term and substantial effects on international geopolitics.

2. Promoting growth in developing countries

The Chinese government has described the BRI as a programme that will help other countries in the developing world to pull themselves out of poverty and jumpstart economic growth (Winn and Kanthor, 2020). China views the BRI as critical to overcoming what the OECD (2018) calls 'a large infrastructure gap constraining trade, openness and future prosperity.' An OECD analysis of global investment trends reveals that future infrastructure development will require an annual investment of \$2.9–6.3 trillion. However, they have estimated that by 2030, investment will fall short of this total by around \$5.2 trillion, which is a huge discrepancy. Energy and transport infrastructure are considered at heightened risk of underinvestment, as these two sectors account for approximately 60% of the world's investment needs (OECD, 2018).

The Chinese government believes it has unique expertise in using development finance to spur on infrastructure projects and economic growth. This confidence stems from its experience in opening China to world markets – and simultaneously shepherding massive and rapid infrastructure development – to transform the country's economy at the end of the 20th century and in the first decades of the 21st century. The government relied on a development finance model for much of this construction, providing direct assistance and concessional loans (loans below the market rate) to its companies to fund large projects. Based on the country's track record of economic success, the

government believes that this method will also work for spurring development in other countries (Liu and others, 2020; Liu and Dunford, 2016).

It also views the BRI as aligned with the United National Sustainable Development Goals (UN SDGs) (Liu and others, 2020). The main areas of investment, and focus on promotion of economic growth, support several SDGs. The most obvious parallel is *SDG 4 – Energy*, as a significant portion of BRI funding is dedicated to energy and electricity projects. Furthermore, Goals 8 – *Economic Growth* and 9 – *Industry, Innovation, and Infrastructure* are both fundamental to the BRI. Finally, *SDG 17 – Partnerships* stresses the need for international cooperation on implementing sustainable development projects. The BRI facilitates collaboration between Chinese and host national businesses and financial institutions, which could be said to uphold the ideals of SDG 17.

3. Alleviating Chinese companies' overcapacity

China's impressive economic growth in the 21st century has been underpinned by state investment in industry. However, uneconomic investments have led to lower efficiency in some state-owned enterprises (SOEs). Under a market system, inefficient firms with a lower return on investment (ROI) would exit the market. In China, however, these businesses have been able to continue operation with a heavy reliance on debt financing from the state. The government has noted the need for structural reform in many industries to alleviate overcapacity, but it also looks to the BRI for opportunities to expand the market for SOEs (Chen and Ho, 2019; Tekdal, 2018; OECD, 2018; Tan, 2018).

This situation is particularly true in the power and coal sectors. Chinese engineering and construction companies that supply products for coal-fired power plants are experiencing overcapacity at home. Although China is still building some coal plants domestically, the government is encouraging its companies to find new investment opportunities elsewhere, with financial support from state-controlled banks (Eder and Mardell, 2019). Already, many SOEs depend on international contracts for a large part of their operations (The Herald, 2020). The BRI network is thus intended to create new markets for Chinese companies (Hilton, 2019; Xiong and others, 2019).

The issue of overcapacity and lack of domestic demand may become increasingly relevant in light of China's pledge to achieve net zero emissions by 2060. China has already placed efficiency regulations on new electricity generation. Its Large Substituting Small programme prioritised larger, more efficient high efficiency, low emissions (HELE) coal plants that provide the benefit of lower emissions of CO₂, SO_x, NO_x, and particulates (Zhu, 2016). It is likely that China will curb coal power plant construction even further to reach net zero emissions of CO₂, compared to the period of rapid growth from 2005-15. Accordingly, Chinese companies will be in search of new markets in which to expand their operations (Watts, 2019). The BRI, with its focus on infrastructure development, provides a roadmap to future business opportunities in the energy sector.

2.2 AREAS OF INVESTMENT

The BRI covers a broad range of infrastructure initiatives, including but not limited to energy, transportation, and industrial development. Estimates of funding vary, partly due to whether pending projects are included.

According to the Refinitiv BRI Database, which includes projects explicitly designated as BRI as well as general Chinese infrastructure projects, 3164 international Chinese projects were planned or underway up to the first quarter of 2020, with a combined value of \$4 trillion. Of these, 1590 projects valued at \$1.9 trillion were BRI projects, while 1574 projects with a combined value of \$2.1 trillion were classified as projects with Chinese involvement. In value terms, 83%, or \$3.3 trillion, are active, with another \$593 billion in completed projects. The remaining are either on hold (\$64.3 billion), delayed (\$14.8 billion) or cancelled (\$12.8 billion) (Refinitiv, 2020).

This clarification is important because it is not always evident what is and what is not part of the BRI. However, it is worth understanding the context of overall Chinese investment, since the BRI designation is flexible and can be assigned or removed from a project at any time (Watts, 2019). As of April 2019, the People's Bank of China reported that Chinese banks have provided over \$440 billion in funding for BRI projects (Hielscher, 2019).

Regardless of the exact amounts, it is agreed that the energy sector has received the largest amount of investment, estimated by Nakano (2019) at 44% of funding, followed by transport at 30%. The Mercator Institute for China Studies BRI database indicates that of completed BRI projects, the majority of spending has gone to the energy sector. In total, over \$50 billion has been spent on energy projects, while transport and digital infrastructure followed with \$15 billion and \$10 billion of spending on completed projects (Eder and Mardell, 2019).

Asian countries have been the largest recipients of BRI funding: investment into ASEAN nations rose from around \$3.5 billion in 2010, prior to the introduction of the BRI, to about \$11.3 billion in 2017 (Jusoh, 2018). Comparatively, from 2013 to 2018, Africa ranked second for Chinese investment. African countries received around \$21.4 billion in investment during the period. The Middle East received \$10.6 billion from 2013-18, the third largest amount of Chinese investment. Countries in South and Central America received \$9.3 billion in Chinese investment during this time (*see* Table 1) (Economist Corporate Network, 2019). Difficulties in tracking BRI projects may mean that these estimates are even lower than the actual investment to date.

TABLE 1 BRI INVESTMENT BY REGION 2013-18 (JUSOH, 2018; ECONOMIST CORPORATE NETWORK, 2019)	
Region	Investment (billion \$)
Southeast Asia	55.3
Africa	21.4
Middle East	10.6
South and Central America	9.3

2.3 SUMMARY

- The BRI is a global infrastructure initiative worth nearly \$2 trillion by some estimates. Chinese banks and companies are involved in projects in the transportation, communications, industrial, and energy sectors.
- The BRI could help expand the market for Chinese companies, some of which are experiencing overcapacity at home. It also aims to promote economic growth in partner countries, many of which are still considered developing nations.
- In addition to economic benefits, the BRI will bolster China's geopolitical influence. As the initiative is still relatively new, it is not clear what effect this will have on international politics in the long term.
- The largest amount of investment to date has been in the energy sector. By region, Asia has received the most funding, followed by Africa.

3 BRI ENERGY INVESTMENTS

This chapter reviews the types of energy investments being made under the BRI, including the coal sector and renewable energy sources. It illustrates the scope of the BRI in the energy sector in both monetary and capacity terms.

3.1 COAL INVESTMENTS

Chinese banks and companies are the biggest players in the global coal sector, and BRI-related investment has extended their reach around the globe. Chinese state and commercial banks, engineering and manufacturing companies, construction firms, and other experts are involved in all levels of the process of procuring, building, financing, and operating coal projects. Many of these projects fall under the auspices of the BRI, but Chinese players are also active in other areas of the world. As discussed in Chapter 2, the government takes a flexible approach to designating projects as part of the BRI. Therefore, it is difficult to pin down exactly how much money is being directed to coal projects as part of the BRI specifically, as compared to overall Chinese investment. While the focus of this report is on BRI countries, it is useful to examine the overall trends in Chinese energy finance first to put the BRI in context.

The world's top five underwriters of coal plant developers are all Chinese institutions (*see* Table 2). From January 2017 to September 2019, Chinese banks accounted for 69% of underwriting for coal plant developers (Bingler, 2019). Not all of this investment is in BRI countries – much of it is domestic as China continues to expand its coal power capacity.

TABLE 2 TOP FIVE COAL PROJECT UNDERWRITERS (BINGLER, 2019)	
Bank	Investment (billion \$)
Industrial and Commercial Bank of China	33
Ping An Insurance Group	27.4
China International Trust and Investment Corporation	25.7
Bank of China	24.1
Shanghai Pudong Development Bank	22.4

However, Chinese banks play a significant role in international projects. Estimates of the full amount of funding for coal projects vary. According to Nakano (2019), Chinese investment in international coal projects totalled \$15 billion from 2013-16. Chinese companies also acquired stakes in coal assets through mergers and acquisitions. Chen and others (2019) explain: 'Chinese companies' direct overseas greenfield investments and acquisitions in the power sector in BRI countries from 2015-17 included only \$5.5 billion for wind, \$7 billion for solar, but about \$33.5 billion for coal, oil, and gas-fired power plants (with coal being the majority)'. In capacity terms, China invested in around

68 GW of coal power plants in BRI countries from 2014-19 (Stanway, 2019). As of 2020, it is estimated that over one-quarter of coal plants under construction outside China have received Chinese investment, amounting to 102 GW across 27 countries. These plants have netted \$35.9 billion in funding thus far (Bloomberg News, 2020; Institute for Energy Economics and Financial Analysis, 2019). BRI investments have built upon the historical trend of Chinese financing for coal plants abroad. Top recipients of Chinese investment since 2000 include many countries that later joined the BRI (see Table 3). For example, Indonesia has received at least \$9.3 billion in funding for coal power plants since the turn of the century.

TABLE 3 TOP TEN RECIPIENTS OF COAL POWER FINANCE FROM CHINA, 2000-19 (GALLAGHER AND OTHERS, 2021)	
Country	Investment (billion \$)
Indonesia	9.3
India	7.7
Vietnam	7.0
Pakistan	5.6
South Africa	4.5
Ukraine	3.5
Bangladesh	2.1
Russia	2.0
Kazakhstan	1.7
Turkey	1.4

3.2 RENEWABLES AND OTHER ENERGY SECTOR INVESTMENTS

Whilst energy investments under the BRI are viewed by some as focused on fossil fuels, there has also been an increasing interest in renewable energy projects. China usually takes a technology-neutral approach when working with BRI countries, so the host nation determines its own priorities and the types of projects which fulfil them. Hence, if a country prefers renewable energy projects over fossil fuel-based ones, China will oblige. Certainly, renewable energy projects also benefit Chinese companies: over one-third of the world's wind turbines and over 70% of solar photovoltaics are produced by Chinese companies (Ladislaw and Tsafos, 2020). In addition to the large portion of the manufacturing market in wind and solar, Chinese engineering and construction companies have also gained expertise in developing large-scale renewable projects at home (Standaert, 2019). These newer technologies are in addition to China's historical experience with hydropower. China is therefore well prepared to carry out large renewable energy projects in BRI countries.

Chinese international investment in renewable power, namely wind and solar, increased significantly after the introduction of the BRI. From 2014-19, it invested in 12.6 GW of wind and solar power, compared to 0.45 GW prior to 2014 (Stanway, 2019). However, the distribution of renewable energy projects funded by Chinese banks illustrates their concerns about ROI: development of renewables has been more focused in developed countries, such as the non-BRI countries of Australia and the USA, and more developed nations within the BRI such as Brazil and the United Arab Emirates (UAE) (Chen and others, 2019). However, it appears that this pattern is beginning to shift as more countries have shown an interest in developing renewable sources of energy. China's commercial banks have funded the majority of these projects, as renewables have become more profitable in recent years (Chen and others, 2019).

In particular, interest in renewable energy has risen in Africa. While China is involved in various coal projects on the continent, some countries have also awarded renewable energy contracts to Chinese companies (see Table 4). For example, the China Energy Engineering Corporation was awarded a contract for a 500 MW solar farm in Uganda in February 2020. Chinese company Sinohydro won a contract in March 2020 in Guinea-Bissau to build a 20 MW solar plant. Furthermore, China's Sany Heavy Industries arranged a contract for a 600 MW wind farm in December 2019. These projects all come on the heels of two completed projects in Kenya, the 50 MW Garissa solar plant and the 310 MW Lake Turkana wind farm (Nicholas, 2020a).

TABLE 4 TOP 5 BRI SOLAR PROJECTS (REFINITIV, 2020)		
Project	Country	Investment (\$)
2 GW Integrated PV Power Project	Egypt	3500 million
800 MW Al Kharasah Solar PV Power Project	Qatar	467 million
500 MW Renewable Energy Power Project	Bangladesh	500 million
200 MW El Aromo Solar PV Project	Ecuador	200 million
178 MW RioZim Solar Power Plant Project	Zimbabwe	200 million

3.3 SUMMARY

- China has invested heavily in the coal sector in BRI countries: from 2014-19, China financed around 68 GW of coal power plants.
- There has been an increasing interest in renewable energy since the beginning of the BRI: from 2014-19, China invested in 12.6 GW of wind and solar power.

4 BRI FINANCING

This chapter examines the role of Chinese financial support for the BRI. The types of financial institutions involved in the initiative and their unique lending practices are both reviewed. Then, there is a discussion of the potential pitfalls of the Chinese approach, including issues of transparency and the Chinese rhetoric of mutual aid. Finally, Chinese support of coal is compared to international trends in coal financing.

4.1 CHINESE FINANCE INSTITUTIONS

Chinese financial institutions fall into two main categories, state policy banks and commercial banks. State policy banks are run for the purpose of financing projects that are sanctioned by Chinese government policy. The main institutions of this type are the China Development Bank (CDB), the Export-Import Bank of China (ChExIm), and the China Export and Credit Insurance Corporation (Sinosure). Of these, the China Development Bank is a traditional development finance institution (DFI), which means that its mandate focuses on projects that promote domestic or international development. DFIs tend to provide finance on a bilateral basis – from the bank to the recipient country or entity. The other two banks, ChExIm and Sinosure, are export credit agencies, which are ‘official or quasi-official agents of the government that provide government-backed credit, insurance, guarantees, and loans for the international operations of corporations from their home country’ (Tucker and others, 2020). All three can be considered DFIs due to their large portfolios of development projects. These organisations together account for a significant amount of BRI funding (Chen and others, 2019; Tucker and others, 2020).

Chinese commercial banks, on the other hand, operate with standard banking practices, making lending decisions based on factors such as ROI. Notably, many of these banks are also partly or fully state-owned. The Bank of China (BoC), the Industrial and Commercial Bank of China (ICBC), and the China Construction Bank are the three largest commercial banks that are heavily involved in BRI lending (Chen and others, 2019; Hilton, 2019). The final main Chinese player in BRI finance is the Silk Road Fund (SRF). This investment fund was created in 2014 for the express purpose of financing BRI projects. The original investment in the fund amounted to \$40 million and contributions were provided by the government’s China Investment Corporation, the CDB, the ChExIm Bank, and government foreign reserves. An additional 100 million RMB (around \$15 million) was added to the fund in 2017. The Silk Road Fund is more targeted toward multilateral action: ‘SRF cooperates with international development institutions and domestic and foreign financial institutions in establishing investment funds, investment companies and other types of investment entities to co-finance projects’ (Liu and others, 2020).

4.2 CHINESE LENDING PRACTICES

One unique aspect of Chinese lending is that Chinese banks will provide loans to countries with low or no international credit rating. As of 2018, China had invested in ‘29 economies rated below investment grade and 14 with no rating at all’ (OECD, 2018). Some BRI countries also lack mature domestic financial markets. Both of these factors can dissuade private investment. As a result, China’s willingness to provide loans has been critical in such nations. In addition to financing the majority of project costs, underwriting by state-owned or state-backed financial institutions helps to de-risk projects and encourage potential private investment (Liu and others, 2020).

However, there are still risks in lending to countries that have less stable financial histories. According to an analysis by OECD (2018), BRI projects accounted for \$101.8 billion of troubled assets, which are defined as projects:

- where the collateral value of the investment is below its liabilities;
- where loans are not performing (due to benefit/cost outcome); or
- where the deal has been cancelled for delays in reviews or political opposition.

This final situation is not limited to countries that are below investment grade; increasingly, political opposition or changing policy priorities have led to delays and cancellations of many projects in the energy sector across the BRI.

Because ROI is more important to Chinese commercial banks, they may prefer to fund less risky projects, which in the energy sector has historically meant fossil fuels. According to Chen and others (2019), financial restrictions, inadequate electricity markets, and a lack of policy support all inhibit renewable energy development in many BRI countries. Comparatively, fossil fuel projects, such as large coal plants, receive more institutional support and financing from local energy utilities. Thus, they have been considered to provide a higher ROI to Chinese commercial banks. Many Chinese SOEs also prefer to undertake large-scale power projects – usually fossil fuel or hydroelectric plants – because they provide better economies of scale. Ng (2019) notes that ‘bidding and contract preparation work involved in developing a power project typical requires similar effort, whether for a \$40 million renewable project or a \$1 billion thermal power project.’

Resource-backed loans are another tool used by Chinese banks to guarantee ROI. These loans take two forms. The first option is for the loan repayment to be tied to the revenue from services provided by the completed project. For example, a power plant would earn income from the sales of electricity once the project was completed. The local partner involved in the project would secure Chinese loans by guaranteeing a portion of the plant’s revenue for repayment. This model works well for power projects, which are often supported by long-term power purchase agreements. The guaranteed contract and price for power gives lenders confidence that the project will make money, and therefore be able to repay loans.

The second type of resource-backed loan is one that links the provision of loans to sales of the host country's natural resources. China itself benefited from this type of financing agreement in the past: beginning in the 1970s, Japan provided loans to China for the development of its natural resources, such as oil and coal, on the condition that Japan would be repaid through exports of said resources. The success of this arrangement led China to adopt the practice for its own development assistance programmes, especially in Africa. It is now described as resources for infrastructure. One example of this type of loan was Ghana's Bouvet Hydropower Project, which used the profits from cocoa bean exports as collateral (Liu and others, 2020).

Use of collateral is another aspect of Chinese lending that differs from other international banks. Chinese banks often require collateral when lending to developing nations, up to around 60% of the value of the loan. Doing so allows them to claim the property or goods held in escrow if countries cannot make payments. Collateral has become an issue during times of crisis, such as during the ongoing Covid-19 pandemic, when many countries have asked to delay repayment. According to Gelpern and others (2021), contracts often contain confidentiality clauses and clauses that prohibit the borrower from restructuring debts with the help of western sovereign lenders. Instead, Chinese banks prefer to renegotiate loans on a bilateral basis, rather than through a larger organisation like the G20, allowing them to use the collateral as leverage for securing favourable terms even in a renegotiation. However, China is likely to exercise caution about seizing assets it holds in collateral, as it could make recipient countries less willing to accept Chinese projects and damage the reputation of the BRI (Gelpern and others, 2021; Acker and others, 2020; Hurley and others, 2019). It could also raise the suspicions of western countries about the geopolitical goals of the BRI.

4.3 TRANSPARENCY IN THE BRI

There are issues with transparency in Chinese finance. Guidance for the BRI from the Chinese government suggests that their banks follow the best practices used by international finance institutions and multinational development banks. For example, all OECD members are required to report the details of 'loans, guarantees, and insurance provided by their export credit agencies or their aid agencies,' but China does not have to follow such rules as it is not a member of the OECD (Nakano, 2019). In addition, the procurement process for BRI projects does not always follow international norms, such as the World Trade Organization (WTO) General Procurement Agreement which requires open, internationally competitive bidding processes for large government-run projects (OECD, 2018). As a result, it is difficult to determine the true magnitude of the debt burden owed to Chinese lenders (Hurley and others, 2019).

There has been a transition away from the project model where all parts are controlled by Chinese entities, to one that has more local participation. Consortiums of local actors, including utilities, government entities, and private companies, work with Chinese companies and lenders through joint ventures called special purpose vehicles (SPVs). Establishing SPVs or independent joint venture

companies for individual projects helps to pool risk and insulate each of the partners' other business interests from potential losses (Liu and others, 2020). In addition, the newer model, which partners more closely with local companies, allows greater access into the regional market, and can facilitate a better relationship with the area government. Indigenous labour also gets developed more, which is beneficial to the host country (The Economist Corporate Network, 2019). Increasingly, these partners are also coming from China's private sector: as of the beginning of 2020, the private sector owned \$1.03 trillion worth of projects, representing nearly 26% of Chinese overseas investments (Refinitiv, 2020).

This approach can raise further transparency issues, however. Development finance institutions often work with a variety of financial intermediaries including, but not limited to, microfinance institutions, traditional banks, private equity funds, and insurance companies (see Table 5). DFIs provide money to such organisations which in turn fund development projects directly. There is a lack of transparency concerning what funds end up earmarked for which projects, making it difficult to track the true impact of DFI spending (Tucker and others, 2020). This problem is present in the BRI, as the multitude of international partners and lack of consistent reporting requirements can make it hard to trace capital flows. As a result, determining the true magnitude of BRI spending, and the exact areas to which money is committed can be difficult.

TABLE 5 FINANCIAL INSTITUTIONS INVOLVED IN THE BRI (DEVONSHIRE-ELLIS, 2019)	
Multilateral financial institutions	The World Bank, the Asian Development Bank, the Asian Infrastructure Investment Bank, the (BRICS) New Development Bank, the European Bank for Reconstruction and Development, the Silk Road Gold Fund, the China, Central & Eastern Europe Investment Co-Operation Fund, the Eurasian Development Bank, and the Investment Facility for Central Asia
Bilateral funds	The China-Russia RMB Cooperation Fund, the Russia-China Development Fund, the China-India Development Fund, the China-Africa Development Fund and the Russia-India Investment Fund
Sovereign wealth funds and institutions	The China Investment Corporation, the China Life Insurance Company, the China National Social Security Pension Fund, the Silk Road Fund, the Russian Direct Investment Fund, and the China Development Bank
China's state-owned commercial banks	The Industrial and Commercial Bank of China, the China Construction Bank, the Agricultural Bank of China, and the Bank of China
Other Chinese financial institutions	The Export-Import Bank of China, the China Export and Credit Insurance Corporation (Sinosure), and various Chinese provincial state-owned banks

4.4 CHINESE JUSTIFICATION FOR FINANCING THE BRI

There is a range of opinions on the benevolence or otherwise of the BRI, but China maintains that the initiative has positive goals and is aligned with the country's historical approach to foreign aid.

Therefore, it is important to understand the context of Chinese development aid in the past, as well as the government's justification for the BRI and other international development work.

China has a history of using foreign aid as both a political tool and as a method for mutual economic development. In the 1950s, when the People's Republic of China was still a new country, it used foreign aid as a diplomatic tool to gain allies and international legitimacy for its regime. It also attempted to court countries in Africa that were becoming independent in the 1950s and 1960s, both in order to build an anti-colonial coalition and to combat the growing power of the Soviet Union. Based on these goals, the government developed the 'Eight Principles for Economic and Technical Assistance to Other Countries' for equality and mutual benefit. These principles laid the foundation for China's approach to development aid.

Chinese projects in other developing countries are therefore not a phenomenon that began with the BRI. In fact, China has invested in infrastructure projects since the 1960s. For example, in 1975 China helped to construct a \$500 million railway between Tanzania and Zambia. China also provided \$391 million in aid to Pakistan in 1974. Notably, both these countries are also part of the BRI. Vieira (2019) believes that these projects are examples of China's attempt to 'define a new model of co-operation between periphery states that would be capable of producing positive economic and social outcomes without causing dependence.' This model was supposed to contrast with western lending habits, which emphasised a donor-recipient relationship where money often came with many conditions attached.

After China began to open up and modernise in the mid-1970s, it started to receive development aid from western institutions such as the International Monetary Fund and the World Bank. Becoming more integrated into international institutions precipitated a move away from its former stance as an anti-western, anti-Soviet lender in its own operations. Rather, the focus shifted from a politically dominated strategy to an economic one. The original 'Eight Principles for Economic and Technical Assistance to Other Countries,' were broadened into a new strategy for international affairs based on 'Independence, Complete Equality, Mutual Respect, Non-interference in Others' Internal Affairs.' This approach was viewed as the most beneficial to both China and recipient countries. Since the 1980s, international development assistance from China has focused on economic cooperation, and the word 'aid' is rarely used because it implies a one-way relationship (Vieira, 2019).

The BRI is built upon the same principles that China has espoused since the 1980s. Liu and others (2020) note that the language used by China about the BRI is a continuation of this approach; the Chinese government rarely uses the word *aid*, preferring terms such as *economic and technical cooperation*. The Chinese government presents itself as a partner to the recipient country, working together on an equal footing without interference in the recipient country's politics or financial institutions. China's 2014 Foreign Aid White Paper makes the principle of non-intervention clear:

‘When providing foreign assistance, China adheres to the principles of not imposing any political conditions, not interfering in the internal affairs of the recipient countries and fully respecting their right to independently choosing their own paths and models of development. The basic principles China upholds in providing foreign assistance are mutual respect, equality, keeping promise, mutual benefits, and win win’ (Clini and Marieni, 2019).

This method is different from the traditional donor-recipient model of international development aid practised by western countries (Liu and others, 2020; Liu and Dunford, 2016). While the government’s focus is on presenting the BRI as mutually beneficial, some critics believe that this is an overly benign view of the initiative (Brautigam and Rithmire, 2021; Green, 2019; Hilton, 2019).

Many BRI-affiliated countries in Asia, Africa, and Latin America have a colonial past. The legacy of colonialism in such countries may shape their perspectives on the opportunities presented in the BRI (Ndzendze and Monyae, 2019). Throughout the second half of the 20th century, developing countries – often called the Global South – began to push for stronger cooperation with each other to promote socioeconomic development. This South-South cooperation concept emphasises the sharing of knowledge and technical expertise, as well as mutual aid and support, in pursuit of shared developmental goals. As a developing country itself, Chinese aid through the BRI is usually considered an example of South-South cooperation.

In the realm of energy, this hands-off approach means that China takes a technology-neutral approach. The government and banks do not believe that it is their role to dictate which power generation technology or fuel that BRI countries use. Instead, each country can determine its own priorities. Chinese banks, manufacturers, and engineering and construction companies have expertise in all types of energy projects and are willing to work with host countries regardless of their approach. Accordingly, if a BRI country wants to expand its coal power generation capacity, Chinese companies are willing and able to take on such projects (Winn and Kanthor, 2020). This approach is in contrast to the increasingly restrictive financial assistance from international financial organisations and western banks for fossil-based projects.

4.5 SHIFTING TRENDS IN INTERNATIONAL FINANCE FOR COAL

Many international finance institutions are moving away from coal investments, as concerns about their effect on climate change, negative public opinion of coal, and the risk of asset stranding increases. Asian banks have become the main lenders in the coal power sector, as Western finance organisations, such as the World Bank, have begun to divest from coal power (Institute for Energy Economics and Financial Analysis, 2019; The Herald, 2020; Watts, 2019). Multinational development banks (MDBs), such as the European Investment Bank and the European Bank for Reconstruction and Development, also no longer allow direct financing of coal projects. Furthermore, many individual countries are placing restrictions on financing for coal projects. For example, thirteen members of the G20 have full

or partial restrictions on public financing of coal. OECD members also have restrictions on how their export credit agencies can support coal plants (Tucker and others, 2020). For example, the Japanese government has indicated that it may support new coal developments ‘if recipient countries commit to long-term decarbonisation and support only the highest-efficiency plants’ (Lee, 2021).

Overall, Chinese DFI financing in the power sector surpassed that of the major MDBs in 2013, corresponding with the introduction of the BRI. Chinese, Japanese, and Korean DFIs funded more power projects than major MDBs from 2013-15. After 2015, Japanese and Korean contributions have plateaued, while Chinese contributions have continued to increase. Throughout the 2010s, MDBs began to shift more toward financing renewables, while Asian DFIs have remained mostly focused on coal. However, the governments of Japan and South Korea have stated that they are beginning to phase out public financing for overseas coal plants (Chen and others, 2020). As Japanese and South Korean DFIs and banks begin this transition, the gap will likely be filled by Chinese and possibly Malaysian banks (Ng, 2019). Although President Xi Jinping’s recent announcement that China would not build new coal power projects abroad (BBC, 2021), implies that Chinese funding may be time-limited.

4.6 SUMMARY

- Chinese state and commercial banks are involved in BRI lending.
- The Chinese government emphasises mutual support and cooperation when providing development aid, but there are concerns that it also gains geopolitical influence through its investments.
- BRI partner countries drive investment decisions; the Chinese government maintains a principle of ‘no intervention in local politics.’
- There have been transparency issues in BRI projects. Chinese banks are not required to disclose information about projects, so they are often difficult to track accurately.
- Many national and international financial institutions are restricting coal investments. China is the largest remaining source of funding.

5 ENVIRONMENTAL CONCERNS

There has been international concern over the impact that the BRI may have on the environment. Infrastructure building is an energy-intensive process in and of itself, considering the large inputs of steel, cement, chemicals, and more required to build roads, railways, ports, and power plants. Many of these projects also occur in countries with more lax environmental standards (Hilton, 2019).

5.1 EMISSIONS INTENSIVE GROWTH MODEL

Economic development has historically been an energy-intensive process. From the industrial revolution in Western Europe and the USA to China's recent emergence as a globalised economic power, coal energy has underpinned industrialisation. Countries undergoing this process in the 21st century, however, face new environmental constraints as concern about climate change calls into question this traditional path of development. There are concerns that the BRI, by financing coal power plants and other energy-intensive industrialisation projects, may be exporting the emissions-intensive model of growth that China and other industrialised countries have followed (Gallagher and others, 2021; Liu and Dunford, 2016).

There are various reasons why this growth model could be a cause of concern. Increasing emissions in developing countries from new fossil fuel projects could undermine progress towards meeting Paris Agreement targets and containing global warming to 1.5°C. Rapid growth in BRI countries means that they are estimated to contribute over half of global CO₂ emissions by 2050 (Jingjing and Wang, 2020). In fact, some estimates suggest that lower environmental standards in BRI countries could result in 2.7°C warming, even if all other countries meet their emissions reduction goals (Shepherd, 2020). This projected temperature increase includes the 1.09°C warming that has already occurred, according to the Intergovernmental Panel on Climate Change report *Climate Change 2021* (IPCC, 2021). While these past emissions were mainly caused by developed countries, global action will be required to meet Paris Agreement goals.

At the country level, expanding the role of fossil energy could add significant emissions in opposition to the Nationally Determined Contributions (NDC) set out under the Paris Agreement (Hilton, 2019). However, some countries have accounted for coal in their NDCs in advance. Mills (2021) reports:

NDCs outline each country's plan to reduce its GHG emissions, whilst taking into account its domestic circumstances and capabilities. Countries that identified a role for HELE coal power plants in their NDCs include Afghanistan, Bangladesh, Bosnia and Herzegovina, China, Egypt, Georgia, Ghana, India, Indonesia, Japan, Kazakhstan, Kenya, Mongolia, Montenegro, Myanmar, Nigeria, North Korea, Pakistan, Philippines, Macedonia, South Africa, South Korea, Turkey, UAE and Vietnam. Combined, they account for more than half of global CO₂ emissions from coal power (Mills, 2021).

Many of these countries are partners in the BRI. Therefore, there may be room for additional coal investments if they are in line with approved NDC plans.

Chinese financial support for coal projects may also lead to future debt issues and financial instability for utilities, governments, and even consumers (Hilton, 2019). Coal projects require large amounts of debt financing with long-term payback times. Projects must maintain a regular income and profitability to properly service their debts. While these conditions are theoretically ensured before the project is authorised, the situation on the ground can change after the fact, rendering some projects less profitable than expected. For example, as the cost of building renewable energy has decreased significantly, it has sometimes become competitive with coal on a levelised cost of electricity basis, reducing the operating hours and revenues of coal plants. Some countries are already having difficulty paying back the debts incurred from BRI projects, especially as the Covid-19 pandemic slows economic growth (Economist, 2020).

Finally, the opportunity cost of building large coal power projects may mean that newer energy technologies are ignored. Some BRI coal-based projects are using outdated subcritical technology, rather than newer HELE technology. Locking in long-term contracts for electricity supply based on new coal plants could prevent governments and utilities from taking advantage of new innovations in the future that may be cheaper or more efficient (Hilton, 2019; Watts, 2019). The opportunity cost becomes even more stark when comparing projects in BRI countries to what is currently occurring domestically in China. China is promoting the construction of renewable energy and has placed greater restrictions on coal-fired power plants, all in anticipation of its Paris Agreement goal to reach peak carbon emissions by 2030 (Jingjing and Wang, 2020). The government has also recently pledged that China will become carbon neutral by 2060. Whilst the government makes strong pledges about the country's commitment to be environmentally responsible at home, it does not have the same standards for the assistance it provides to other countries (Watts, 2019).

5.2 ‘GREENING’ THE BRI

Chinese officials have indicated that they support efforts to make the BRI more environmentally conscious, which they call ‘greening’ the BRI. At the Second Belt and Road Forum in April 2019, President Xi Jinping announced that infrastructure projects built under the BRI must be green and sustainable, adding that there would be a focus on transparency and zero tolerance for corruption to ensure high-quality growth (Ng, 2019). This discussion of environmental concerns was not new, however. The Chinese Ministry of Ecology and Environment has stated that China is eager to be seen as a leader in global environmental governance, and it wants to incorporate green principles into the BRI and promote a green development strategy that aligns with international climate goals (China Ministry of Ecology and Environment, 2017). At the first Belt and Road forum in May 2017, the Chinese government released three guidance documents laying out its strategic vision for environmentalism within the BRI: Guidance on Promoting Green Belt and Road, Belt and Road Ecological and Environmental Cooperation Plan, and Vision and Actions on Energy Cooperation in Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road. These papers acknowledged the importance of the Paris Agreement and the UN Sustainable Development Goals, and they stressed that Chinese investments should be used to promote sustainable development (Chen and others, 2019; China Ministry of Ecology and Environment, 2017).

There have been international efforts to develop green development principles for the BRI. One such initiative is the Belt and Road International Green Development Coalition, which is the Chinese government’s effort to engage international stakeholders to align the BRI with the UN Sustainable Development Goals (Nakano, 2019). The second Belt and Road Forum was another opportunity for international discussions about environmental standards, and it led to the development of some green finance mechanisms. The Chinese Ministry of Foreign Affairs reports that:

The Industrial and Commercial Bank of China issued the first Belt and Road Bankers Roundtable Mechanism (BRBR) green bond, and jointly released the Belt and Road Green Finance Index with relevant members of the BRBR mechanism including the European Bank for Reconstruction and Development, the Credit Agricole Corporate and Investment Bank and the Mizuho Bank, to further enhance Belt and Road cooperation on green finance (China Ministry of Foreign Affairs, 2019).

Green bonds are seen to be a growth area for Chinese financiers. Whilst there are no standardised green finance rules for Chinese banks, some are starting to issue green bonds, which are a method of raising money that is earmarked for environmentally friendly projects. For example, the aforementioned BRBR green bond was first released in April 2019 at a value of \$2.2 billion (Shepherd, 2020).

In December 2020 the BRI International Green Development Coalition published its Green Development Guidance for BRI Projects Baseline Study Report. The release of the report was supported by the Chinese Ministry of Ecology and Environment. It categorises coal and other fossil investments as *red investments*, meaning that they are considered to have a negative impact on the environment. While a *red* rating does not automatically disqualify a project, the guidance suggests that extra steps must be taken to mitigate the environmental harms for it to move to a *green* rating. The report provides the following examples for energy projects:

‘Coal and fossil fuel projects due to their negative climate impacts are *red projects*, while solar power is a *green project*. Hydropower, due to its risk for biodiversity would be *red* – but if sufficient safeguards are applied – it would be *red/green* due to its contribution to an emission-free energy system’ (Green BRI Center, 2020).

It is unclear if these rules will be adopted in any official capacity, but it does indicate that Chinese officials may be beginning to shift their mindset about international investment priorities.

Despite these efforts, there are currently no united and mandatory environmental standards for projects under the scope of the BRI. Guidelines such as those in the Guidance on Promoting Green Belt and Road are non-binding and not yet widely used (Hilton, 2019; Jingjing and Wang, 2020). Additionally, 2017 guidance from the Ministry of Ecology and Environment set a timeline of 3–5 years for the formulation of policies on the *green BRI*, again suggesting that the transition to stronger environmental standards will take time. There is also a likelihood that new rules will also still be voluntary. And, as yet there are no details as to China’s future funding of new coal power abroad, following President Xi Jinping’s 2021 announcement (BBC, 2021).

Ultimately, the BRI’s impact on emissions and the environment will be determined mainly by the national environmental policies of each BRI country (Coenen and others, 2020; Yin, 2019). China’s policy of non-intervention in the domestic politics of other countries means that it does not dictate the type of technology that is used in BRI energy projects. Thus, it is up to each national government to decide the standards, if any, to apply when deciding which projects to pursue. As a result, 21% of coal plants financed by Chinese DFIs from 2013–17 were built using subcritical technology. For this number to change, recipient countries will have to select HELE technologies in the future. It is possible that this shift will occur as countries try to achieve their Paris Agreement commitments and re-evaluate their energy sources. Chinese banks may have to pay closer attention to environmental concerns as they remain high on political agendas globally. For Chinese commercial banks and international companies, prioritising environmental issues will help to ensure a good ROI, so they are likely to become more important (Xiong and others, 2019). However, shifting to a *green BRI* approach

will not happen overnight. Even if commitments are being made now, it could be years until there is a substantial change in patterns of investment (Ng, 2019).

5.3 SUMMARY

- There are concerns that the BRI is promoting an emissions-intensive growth model by encouraging the use of fossil energy.
- There have been efforts to make the BRI more environmentally conscious, including devising rules for sustainable investing. However, to date, any guidelines are voluntary.

6 IMPACT OF COVID-19 ON THE BRI

The Covid-19 pandemic, which originated in late-2019 in China, is having a significant impact on the global economy. The slowdown in China's growth is particularly stark: China's economy only grew 2.3% in 2020, as compared to its average 6% yearly economic growth so far in the 21st century (Refinitiv, 2020). While the economy has started to rebound in early 2021, the Chinese government and banks have shifted their short-term focus to boosting the domestic economy. China's banks have enough capacity to continue BRI lending at pre-pandemic levels, but they will likely rein in their international spending temporarily until the pandemic is fully under control (Economist, 2020). Investment data from 2020 illustrates this trend: there was a 16% decrease in the number of new projects announced in the first quarter of 2020, as compared to the same time in 2019. Even more starkly, the value of those new projects declined by 64% from the previous year to \$137 billion (Refinitiv, 2020).

The Covid-19 pandemic and resulting economic contraction has also raised questions for Chinese lenders about the potential for financial losses. Some projects are funded through the proceeds from commodities exports, such as mining or agricultural products, but the economic slowdown has reduced this trade. Reduced national income comes on top of already high levels of sovereign debt for many countries, putting them at risk of defaulting on loan payments. Chinese banks may face a choice of providing temporary loan forgiveness, delaying the terms of repayment, or acquiring strategically important resources instead of a direct financial return (Economist, 2020).

The impact of the pandemic on energy demand has also led many countries to reconsider their approach to energy investment. Demand for electricity decreased during the Covid-19 lockdown: the IEA reports that countries experienced an average 18–25% fall in energy demand, depending on if the lockdown was partial or full. Even as some countries opened up through the beginning of 2021, the timeline for a full recovery remains uncertain. Accordingly, some governments have begun to re-examine their plans for expanding electricity capacity, questioning whether large-scale, capital-intensive investments are necessary or worth the financial risk. Instead, there may be a shift in preference toward smaller projects, which require less up-front capital and promise quick delivery. Shorter investment cycles may be preferable for cash-strapped governments struggling to emerge from the Covid-19 crisis (IEA, 2020b). Changing priorities does not mean that the BRI will become irrelevant, however. The BRI may become even more valuable to recipient countries as the world attempts to promote recovery from the economic fallout from Covid-19 (Jingjing and Wang, 2020).

Lockdowns in China and in many BRI countries have also affected construction schedules, as Chinese workers and staff could not travel to project locations. Similarly, coronavirus restrictions have affected Chinese manufacturing, hindering their ability to produce and ship machinery around the world. In

particular, Chinese-built coal plants rely on Chinese equipment and engineering, so supply chain delays can prove to be a big setback to these projects (Zhai and Tostevin, 2020).

Some countries have faced fewer interruptions than others. Chinese and Pakistani partners announced that they were confident that Covid-19 would not impact their projects severely. Conversely, Bangladesh has experienced delays in power projects, such as in the late commissioning of the Payra coal plant. The Payra plant was mainly staffed by Chinese construction workers, around 800 of whom returned to China for the 2020 Lunar New Year celebrations. China's lockdown prevented them from returning to work in February when the plant was due to be commissioned (Zhai and Tostevin, 2020). It is possible that travel restrictions have resulted in a greater reliance on local labour, however. For example, Pinggao Group pushed forward on energy grid projects in early 2020 by hiring more Polish workers, since China entered a quarantine before any European nation. The use of Chinese workers, rather than local ones, has been a source of contention in past BRI projects, so this change may be welcomed by some host governments (Refinitiv, 2020).

The Covid-19 pandemic also highlights how the BRI can be a shapeshifting concept. While the crux of the BRI is still focused on building physical infrastructure, the onset of the global pandemic has necessitated international cooperation in healthcare. In light of this situation, China is promoting a new concept called the Health Silk Road to promote medical and humanitarian projects (Refinitiv, 2020). This Road is being used to provide medical assistance to countries fighting the coronavirus. As the first country to be struck by the virus, China feels that it can provide expertise, equipment, and assistance to other nations that are experiencing peak infectivity later in time. In addition, China is exporting supplies of its Covid-19 vaccine to developing countries, which have been largely unable to access vaccines developed by western countries. This effort highlights how the Chinese government can change the concept of BRI to fit its will and needs of the time (Economist, 2020, 2021).

7 SETBACKS AND CANCELLATIONS

The massive amount of spending and number of planned projects across BRI nations can make the BRI look extremely successful at face value. However, in reality, many projects have been delayed, postponed, or even cancelled. This phenomenon is partly to be expected, as the BRI is a broad foreign policy programme, not a specific plan for project implementation. As a result, there has been a tendency to propose many projects in the name of publicising China's commitment to cooperation, as well as to have extra options in case any given project fails to materialise (Olinga-Shannon and others, 2019). Still, this propensity for quantity over quality has meant that plenty of serious projects have ultimately not come to fruition. There are many reasons why a BRI project could face setbacks or cancellation, and it is not always possible to predict which projects might encounter problems. However, there are a few main factors that can explain the majority of cases.

First, and most obviously, financial problems are a significant factor in the delay and cancellation of BRI projects. While the BRI is designed to increase access to Chinese funding, it is not a guarantee of financial success. Chinese banks – especially commercial ones – still evaluate projects based on projected ROI. ROI predictions can change during a project's planning process, whether due to changing input prices, demand, or other factors. This variability is especially the case for large energy projects, which require significant upfront debt financing, have long payback times, and often face rapidly changing cost and revenue predictions. This issue can be mitigated with government-backed, long-term power purchase agreements, but governments are not always willing to take on the risk associated with such contracts. Accordingly, some projects that were initially announced as part of the BRI have not been able to reach financial close after further consideration.

Furthermore, even if there is Chinese financial support, there can be issues with local partners or host governments. BRI projects are partnerships between Chinese and local actors, with at least some equity investment required to secure debt financing. If a local company or government cannot supply its share of funding, then the project could fall through. Since the energy sector in most developing countries is heavily state-controlled, large energy projects can struggle with funding issues because of a lack of private capital investment. However, financial problems are not exclusively responsible for project setbacks – some cancellations occur long after contracts are signed and funding is secured, which shows that finance is not the only factor that can affect the outcome of a project (Rogers, 2019).

Second, corruption and government instability can undermine BRI projects (OECD, 2018). Sometimes projects are chosen because government officials want to give a boost to a certain sector or set of companies. Bribery is not unheard of; this practice may be prevalent because some contractors believe that bribes can help to smooth the application and selection process, either with other local companies or government agencies. For example, a 2017 study of Chinese investment in eight African countries by Jayaram and others found that over 60% of Chinese companies paid bribes. Projects can be

announced by one government and then overturned as soon as a new government comes to power, especially if it has different constituencies to satisfy. Moreover, there is often a lack of transparency and competition in bidding and procurement processes, which sometimes results in inefficiencies, budget overruns, and project delays. Loose regulations and poor business practices can also result in projects that do not live up to expectations. These issues can be quite difficult to tease out, as BRI project development and funding processes are not transparent. Additionally, Chinese lenders do not always have the same disclosure requirements as other international banks, which can allow any corruption or inefficiencies to remain hidden until it is too late (Gelpern and others, 2021; Hillman, 2019; Hurley and others, 2019).

System overcapacity is another concern that has impacted the pace of project development. Most BRI countries are developing nations and have rapidly growing electricity demand. Accordingly, one of their priorities has been to expand power generation capacity to combat electricity shortages. However, some countries have had trouble balancing supply and demand, which sometimes leads to overcapacity. Usually, this imbalance is caused because electricity demand growth has not lived up to expectations. Infrastructure planning strategies generally run in 5–10 year increments, and there is always a time lag in the available data on which policymakers base future plans. As a result, by the time of implementation, plans may not match the situation on the ground. Egypt, Pakistan, and Bangladesh are all examples of countries that have faced this problem. While there is always a need for some extra capacity to meet peak electricity demand, too much can be a burden on the system. In addition, governments that provide capacity payments to idle plants are left responsible for financially supporting any unused capacity. For developing electricity markets, capacity payments can prove to be a large burden on the budgets of governments and utilities. Moreover, it is important to consider power plant construction in the context of wide infrastructure development. There have been instances where new plants have been unable to operate because they lacked the necessary transmission infrastructure to connect to the grid. All these issues have contributed to a growing wariness in BRI countries of overinvesting in electricity capacity.

Finally, increasingly strict attitudes toward environmental regulations have resulted in a changing attitude toward coal investments, especially after the onset of the Covid-19 pandemic. Some governments, such as Bangladesh, seek to promote a so-called ‘green economic recovery’ (Hasina, 2020). It is still unclear how this situation will develop, and there is no guarantee that coal will lose its place. Yet it is important to note that even developing countries, such as Pakistan, seem to have taken a harsher stance against coal, at least rhetorically, during 2020 and early 2021 (Gul, 2020). China is also facing mounting pressure from both domestic and international NGOs to abandon projects that they consider bad for the environment (Shepherd, 2020; Watts, 2019). The influence of local environmental groups that fight against proposed coal plants is also growing. In addition to coalescing community opposition, these groups can use legal methods to challenge coal plants in court (Hillman, 2020). These efforts have led to delays and cancellations of coal plants in countries including Turkey

and Kenya. Further discussion of these and other examples can be found in the country studies in Chapters 10–19.

The Refinitiv BRI database, which includes BRI-specific projects as well as other large Chinese investments, attempts to quantify the value of projects that have encountered setbacks. They assess that around \$92 billion worth of projects are either on hold, delayed, or cancelled, compared to \$593 billion worth of projects that have been completed (Refinitiv, 2020). A 2021 study by the Green BRI Centre found that since 2015, 23 BRI coal plant projects were shelved and 14 were cancelled, at a value of \$65 billion (Wang, 2021).

8 TECHNOLOGY TYPE

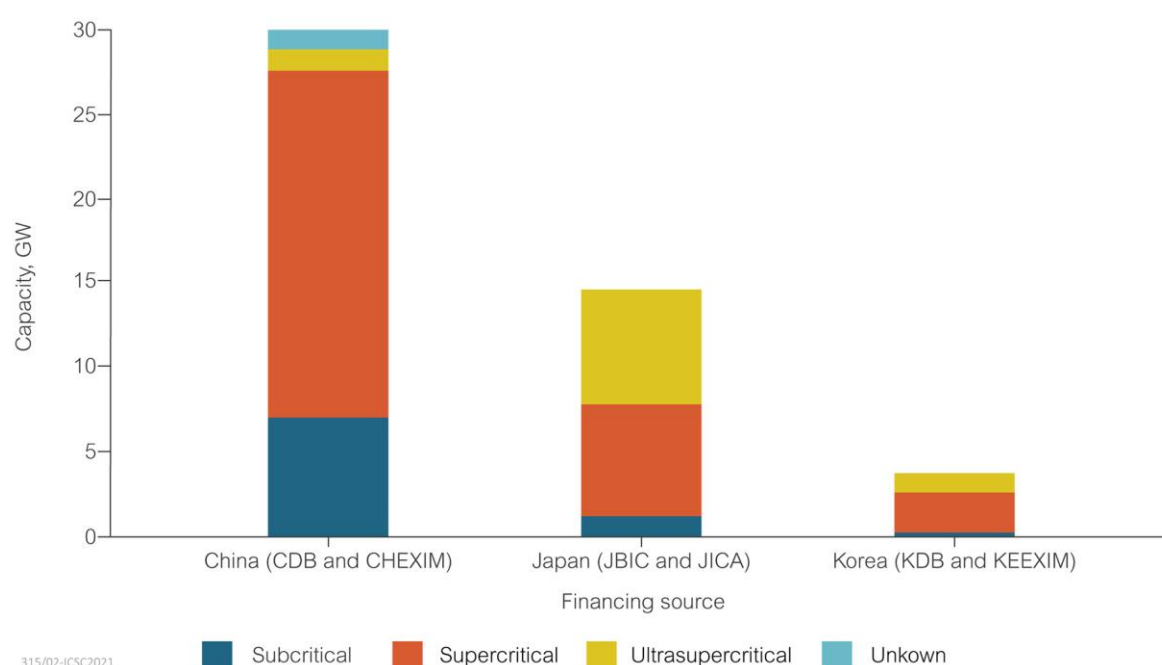
Chinese manufacturers and engineers are on the cutting edge of coal technology, and the country is home to some of the world's most advanced coal power systems. After backlash over high levels of air pollution, the Chinese government began to shift its approach to electrification, closing smaller, older, and less efficient coal plants during the mid-2010s and investing in large HELE plants that cause less air pollution (Zhu, 2020). More generally, the government's domestic focus is on sustainable development. However, it does not enforce these same rules for BRI projects, which could allow Chinese companies to make up for decreased domestic demand for coal products through projects in other countries (Hilton, 2019).

China has faced criticism over the subcritical coal projects it has supported under the BRI. They are seen as somewhat hypocritical, considering that such plants would not meet China's domestic emissions standards (Stanway, 2019; Watts, 2019). However, as previously discussed, China's agnostic approach to technology allows each country to choose the energy sources it uses and the type of power plants it builds. As a result, Chinese banks have financed more subcritical plants in recent years than other banks that have adopted technology standards as a lending condition.

This issue can be illustrated by comparing new plants financed by Chinese DFIs versus other national DFIs. Chen and others (2020) compared the technology and pollution control systems used in coal plants financed by Chinese, Japanese, and Korean DFIs from 2013-17. China's DFIs include the China Development Bank and the Export-Import Bank of China. They found that only 4% of Chinese-financed plants used ultrasupercritical (USC) technology, while 60% used supercritical and 21% used subcritical technology. Japanese-backed plants were 47% USC, 45% supercritical, and only 8% subcritical, while Korean-financed plants were 32% USC, 63% supercritical, and only 5% subcritical (see Figure 2). Korean plants had higher rates of installed pollutant control technology than both Chinese or Japanese plants, on average (see Table 6) (Chen and others, 2020). The uptake of HELE technology is key to reducing the environmental impact of the coal power sector, so it is concerning that Chinese state policy banks have continued to support the construction of subcritical plants without pollution control technologies.

TABLE 6 SUMMARY OF TECHNOLOGY AND POLLUTION CONTROLS OF COAL POWER PLANTS FINANCED BY NATIONAL DFIs, 2013-17 (GW) (CHEN AND OTHERS, 2020)

	China (CBD and ChExIm)	Japan (JBIC and JICA)	Korea (KDB and KExIm)
Total coal power capacity, GW, (%)	34.0 (100)	14.7 (100)	3.8 (100)
USC, GW (%)	1.3 (4)	6.9 (47)	1.2 (32)
Supercritical, GW (%)	20.5 (60)	6.6 (45)	2.4 (63)
Subcritical, GW (%)	7.1 (21)	1.2 (8)	0.2 (5)
SO ₂ control, GW (%)	19.9 (58)	8.4 (57)	2.6 (68)
SO ₂ control, excluding compliance fuel, GW (%)	11.1 (33)	4.4 (30)	2.6 (68)
NO _x control, GW (%)	10.0 (29)	1.9 (13)	1.2 (32)
PM control, GW (%)	19.6 (58)	11.0 (75)	2.4 (63)

**Figure 2 Coal plant financing by major DFIs, 2013-17 (Chen and others, 2020)**

There are two main reasons why subcritical technology may be chosen for a new plant.

First, HELE technology is usually not used when the unit size is small. Units under the 300–350 MW range are nearly always subcritical. Lockwood (2021) explains that of all coal plants commissioned from 2010-19, all units of 300 MW or less in size were subcritical, as the small size renders these more advanced steam cycles technically and economically unsuitable. There have been efforts to develop the technology for small HELE units, but it is not yet commercially available. While the overall trend

in coal plant construction is toward larger units that provide higher efficiencies and economies of scale, such plants are not suitable for every situation. Lockwood (2021) continues:

REGARDLESS OF ECONOMIES OF SCALE, LARGE UNITS STILL REPRESENT A MASSIVE TOTAL CAPITAL COST WHICH CAN BE A DETERRENT IN A POWER SECTOR WITH LIMITED FINANCIAL RESOURCES AND WITH CONSTRAINED OPERATING HOURS FOR THERMAL UNITS. LASTLY, SMALLER UNITS MAY BE MORE SUITABLE FOR GRID AREAS WITH LIMITED LOCAL DEMAND, SUCH AS ISLANDS, OR INDUSTRIAL OPERATORS WITH FINITE REQUIREMENTS FOR CAPTIVE UNITS.

Many BRI countries face such financial constraints, so smaller subcritical units may represent a more appealing option in the short term. Similarly, questions over the accuracy of power demand growth projections have led to the cancellation of a number of the BRI's large HELE coal projects. Some countries may prefer to invest in a smaller plant to prevent overcapacity, especially if the energy market requires capacity payments for excess supply.

Second, the type of fuel that is available for a new plant can affect the type of technology that is chosen. State-of-the-art HELE plants run best when high quality coal is used. However, many BRI countries have domestic coal resources that are of poorer quality, such as lignite and high-ash or high-moisture coals. HELE units will not be as efficient or cost-effective when using lower-quality resources, so it may be considered an unnecessary or uneconomical choice to make (Lockwood, 2021).

Many BRI countries, such as Turkey, seek to prioritise the development and use of domestic coal resources. Some countries, such as Pakistan, have even banned the construction of new plants that would rely on imported coal. Both of these countries' coal deposits are primarily lignite. Bosnia and Serbia also rely on domestic lignite resources to fuel their coal plants. This situation does not automatically mean that they will choose to build subcritical units in the future – in fact, there are new BRI-sponsored supercritical plants being built in all four countries. Yet, extra care must be taken to design these plants to suit the local resources, which can drive up costs; otherwise, the future economic and emissions reduction benefits of HELE technology may not be realised.

Table 7 and Table 8 illustrate the range of Chinese-sponsored projects that are featured in the upcoming case studies, from small subcritical units to large state-of-the-art USC plants.

TABLE 7 SUPERCritical/USC BRI POWER PLANTS			
Plant	Country	Size, MW	Status
Chittagong	Bangladesh	1224 (2 x 612)	Construction
Cilacap Sumber	Indonesia	660, 1000	Completed
Emba Hunutlu	Turkey	1320 (2 x 660)	Construction
Hamarawein	Egypt	6600 (6 x1100)	Cancelled
Hassyan	UAE	2400 (4 x 600)	Completed
Hema Amasra	Turkey	1320 (2 x 660)	Cancelled
Kostolac B	Serbia	350	Construction
Lamu	Kenya	1050	Cancelled
Payra	Bangladesh	1320 (2 x 660)	Completed
Port Qasim	Pakistan	1320 (2 x 660)	Completed
Rahim Yar Khan	Pakistan	1320 (2 x 660)	Cancelled
Thar Block-1	Pakistan	1320 (2 x 660)	Construction
Tuzla Blok 7	Bosnia	450 MW	Construction

TABLE 8 SUBCRITICAL BRI POWER PLANTS			
Plant	Country	Size, MW	Status
Duyen Hai 1	Vietnam	1245 (2 x 622.5)	Completed
Duyen Hai 2	Vietnam	1200 (2 x 600)	Construction
Duyen Hai 3	Vietnam	1245 (2 x 622.5)	Completed
Engro Thar Block II	Pakistan	660 (2 x 330)	Completed
Pangkalan Susu	Indonesia	840 (2 x 220 and 2 x 200)	Completed
Sumsel-1	Indonesia	600 (2 x 300)	Construction

9 INTRODUCTION TO THE COUNTRY STUDIES

The following chapters explore various countries' experiences of the BRI by considering their power systems, relationship with China, and examples of coal projects. The countries covered are:

- Bangladesh
- Egypt
- Indonesia
- Kenya
- Pakistan
- Southeastern Europe
- Turkey
- United Arab Emirates
- Vietnam
- Zimbabwe

10 BANGLADESH

10.1 POWER SYSTEM

Bangladesh wishes to diversify its energy mix and increase energy security. The country currently uses natural gas to generate around 70% of its electricity, 15% comes from oil, and only 3% is from coal. Another 10% of its electricity is imported from surrounding countries, including India, Myanmar, and Bhutan. Increasing the amount of coal power in the system was considered an essential part of this diversification effort. According to its *Revisiting Power System Master Plan 2016*, the government aimed to quadruple generation capacity by 2041. Coal was supposed to supply 32% of the country's electricity under this plan, so the government of Bangladesh aimed to develop at least 20 GW of new coal power plants (Market Forces, 2019; Rystad Energy, 2020).

The government of Bangladesh has signalled its openness to foreign investment to achieve these goals. In addition, its *Speedy Supply of Power and Energy Law*, passed in 2010, permits the government to circumvent the competitive procurement process and directly grant contracts for power projects (Rahman, 2014). This law has made it easy for foreign companies to secure contracts for large energy projects in the country. As a result, there have been thirty-six proposed coal projects in Bangladesh from 2010 to 2020.

However, reduced economic growth and slower than expected power demand growth, especially during the Covid-19 pandemic, has meant that following the 2016 national energy plan may lead to 58% more capacity than is needed to meet demand (Nicholas, 2020b; Nicholas and Ahmed, 2020). In fact, the Power Development Board is already responsible for capacity payments to existing power plants. In 2018-19, coal power was only utilised at 43% capacity, resulting in \$1.1 billion in capacity payments. For the 2020-21 financial year, the energy ministry has allocated one-third of its budget to capacity payments. The government anticipates that the cost of these subsidies will only rise in the future (Baxter, 2020). There are also concerns about the rising costs of coal imports and plant equipment.

As a result, the country has been reconsidering its power development plans. Now it is expected that the country will only install up to around 5–7 GW of coal capacity by 2025, roughly one-third of the original target (Rystad Energy, 2020). New capacity includes coal plants that are currently under construction. All other plants in the pipeline – 26 out of 29 – are being reviewed by the Bangladeshi government. According to the Hon. Nasrul Hamid, State Minister for the Ministry of Power, Energy & Mineral Resources, Bangladesh is aiming to source around 12% of the country's electricity from coal, or 5 GW out of approximately 40 GW total capacity (Baxter, 2020). This goal would be a significant cutback from the current pipeline of 33.2 GW of planned coal capacity. As of July 2021, the energy ministry has announced that 10 of the plants under review have been officially cancelled (Karim,

2021). The remaining confirmed coal plants under construction are at Rampal, Matarbari, Payra, and most recently Azsalaam.

There is some interest in developing renewable sources of energy for Bangladesh, but the current Master Plan does not anticipate a significant expansion immediately. If the demand for renewables grows, China will likely be at the forefront of that activity as well: Power China has already signed a contract to build 500 MW of solar and wind (Baxter, 2020). Instead, the Bangladeshi government will probably focus on improving transmission and distribution infrastructure in order to better utilise current capacity. The new Payra coal plant has already suffered from this issue; it received capacity payments for half of its capacity that has remained idle because of delays in the construction of a new transmission line (Nicholas and Ahmed, 2020).

10.2 RELATIONSHIP WITH CHINA

Bangladesh has been a member of the BRI since 2016 and has become a major centre of investment under the initiative. As China's southern neighbour and a country bordering the Indian Ocean, China has a strong interest in developing deeper ties with Bangladesh. Similar to its goals in Pakistan, it views its presence in Bangladesh as key to countering Indian soft power in South Asia. Bangladesh also sees China as a counterweight to Indian attempts to exert influence over its internal affairs. This relationship dates back to the 1970s after Bangladesh gained independence. More recently, though, Bangladesh has become very interested in Chinese investment in infrastructure. China is already Bangladesh's largest trade partner and foreign investor since the initiation of the BRI (Mardell, 2020b; Ramachandran, 2019).

Bangladesh needs significantly more investment in infrastructure development, and China has been a forthcoming partner that seems willing to follow the government's priorities, as long as they can utilise Chinese manufacturing and expertise. Chinese banks and companies have also taken on projects that were turned down or cancelled by other international or western financial institutions, but which are still priorities for the Bangladeshi government. Furthermore, the government has indicated that it is not concerned about the potential of a 'debt trap' resulting from Chinese loans. The Ministry of Finance has reported that the country's external debt burden is low and that Chinese loans have favourable repayment terms. They also have a more diversified loan portfolio, with funding for projects coming from India, Japan, and others in addition to Chinese sources (Brewster, 2019; Ramachandran, 2019). However, as of February 2021, China announced that it will not fund any new coal projects in Bangladesh (Shepherd, 2021).

Nevertheless, some issues have plagued the China-Bangladesh relationship. There have been concerns that Chinese financiers are slow to disburse the agreed-upon loans, which may delay the implementation of projects. Moreover, as in many BRI countries, Chinese nationals have been the dominant workforce on BRI projects. There have been a few conflicts between Chinese and local

workers, such as an incident at the Payra Coal Power Plant construction site in June 2019 (Ramachandran, 2019). Clashes between Bangladeshi and Chinese workers at the Payra site resulted in a death and a number of injuries, as well as damage to plant equipment. As a result, the plant commissioning was delayed by around a year.

10.3 CHITTAGONG POWER PLANT

The Chittagong (Banshkhali) coal power plant, located in Banshkhali outside the city of Chittagong, is a 1224 MW (2 x 612 MW) supercritical plant. It is a joint venture between Bangladeshi S Alam Group (70%), China's SEPCOIII Electric Power Construction Corp (20%), and China's STG Development Group (10%). SEPCOIII is a subsidiary of Power China. The project is expected to cost \$2.4 billion, with around 70% (\$1.75 billion) of the funding coming from the ChExIm. The plant originated from an agreement between S. Alam Group and SEPCOIII, signed in 2013, to build a 1320 MW plant for \$1.8 billion. Chittagong experiences regular power cuts, so the project was considered essential for stabilising the power supply to this industrial, coastal city.

The project was initially supposed to be completed within 45 months, according to talks with the Bangladesh Power Development Board. However, the government did not approve the plans until 2016, at which point the project was revised to be a 2 x 612 MW unit plant. In 2016 and 2017 there were large-scale protests against the proposed plant from local citizens due to concerns about losing land, demolition of towns and graveyards, and local pollution. By 2018, the project had still not reached financial close, and the Power Development Board threatened to annul the power purchase contract if the project did not proceed in a timely manner. Construction finally began in 2019, with a proposed commissioning date of December 2020, but because of the government's changing energy policies, the plant is now under review. However, early indications from the Bangladeshi government suggest that this project will receive approval to continue (Global Energy Monitor, 2020g; Roy, 2020; Quadir, 2017; Vidal, 2016).

10.4 PAYRA POWER PLANT

Contracts for the 1320 MW Payra plant were signed in March 2017. The original plan set out a timeline for the commissioning of two 660 MW USC units in April and October 2019 (Power Engineering International, 2017). The project is owned by the Bangladesh-China Power Company Limited, which is a joint venture between the China National Machinery Import and Export Corporation and Bangladesh's state-owned utility North West Power Generation. It also involves the China Energy Engineering Group, the Northeast Electric Power Construction Co Ltd, the China National Energy Engineering & Construction Co Ltd. Funding comes from the Chinese Export Import Bank (Bangladesh Sangbad Sangstha, 2020; Power Engineering International, 2017). The cost of the project is around \$2 billion, funded by a loan from the ChExIm bank (NS Energy, 2020a; Rystad Energy, 2020).

Ultimately, Payra Unit 1 began commercial operation in May 2020 and Unit 2 in October 2020 (Bangladesh Sangbad Sangstha, 2020). The plant has a maximum net efficiency of 48%, achieved through its single reheat system. It uses imported coal, mainly sourced from Indonesia and Australia (NS Energy, 2020a; Rystad Energy, 2020). These two units complete Phase 1 of the Payra project. The same consortium has plans for a second phase at Payra, which would include another 1320 MW (2 x 660 MW unit) plant for the same estimated cost. Even though the government is significantly scaling back its plans for coal power, it seems possible that Payra Phase 2 could proceed, as a \$1.5 billion loan has already been agreed (Power Engineering International, 2017; Rystad Energy, 2020).

11 EGYPT

11.1 POWER SYSTEM

The policy of the Egyptian government has been to use all types of energy sources available, as it has attempted to expand electricity output during the last decade after widespread power shortages in the early 2010s. The government wanted to diversify its gas-dominated energy system by adding coal, nuclear, and renewable power options. However, it only became legal to use coal for power in 2015. At that time, it was determined that coal should make up 20% of the future electricity mix. Furthermore, Egyptian currency reserves and financial markets were quite unstable in the mid-2010s, so the government and utilities were concerned about their ability to attract foreign finance for energy investments. The government began to reform and liberalise the electricity market in 2015, and it raised tariffs in an attempt to attract international development financing (APICorp, 2016).

As of 2016, Egypt's electricity demand growth still outpaced capacity additions. It was estimated that the country would need to increase its capacity by 20 GW, from 34 GW to 54 GW, to meet rising demand and to prevent the widespread power outages that were occurring. To solve this shortage, the government aimed to increase renewable capacity by 4.3 GW by 2020 and to add 12 GW of coal power. While there have been plans to build multiple plants since the legalisation of coal power in 2015, no projects had been successfully completed by 2020. In fact, the cancellation of the Hamarawein plant in February 2020 means that there are no more active coal projects planned. In total, 15 GW of planned plants have been shelved or cancelled (Nicholas, 2020b).

11.2 RELATIONSHIP WITH CHINA

Egypt and China have a long relationship dating back to the establishment of the People's Republic of China. As El Dahshan (2021) notes, 'Egypt was the first Arab and African country to establish direct diplomatic relations with the People's Republic of China in 1956'. Egypt also received China's first foreign grant for \$4.5 million, provided during the Suez Crisis. Chinese investment in, and trade with, Egypt has grown since the introduction of the BRI, with large industrial and energy projects dominating the agenda. China is the largest foreign investor in Egypt, with deals for around \$18 billion in future projects already signed (El Tawil, 2019; Mohamed and others, 2019; Xinhua, 2020b).

Egypt is considered a key nation in the BRI because of its location at the confluence of Asia, Africa, and Europe (Nicholas, 2020b). Egypt controls the Suez Canal, which is a key aspect of the maritime trade route from Asia to Europe. It is a gateway to African supply chains spanning the continent. China also views Egypt as a bridge to the rest of the Arab world. As a historic leader amongst the Arab nations in the Middle East and North Africa (MENA), China believes that cooperation with Egypt can help enhance its relationship with similar countries. This region is especially important to China because of

its vast oil and gas reserves. Cultivating relationships with the MENA region will be crucial as China seeks to diversify its sources of energy (Mohamed and others, 2019).

11.3 HAMARAWAIN POWER PLANT

The government of Egypt focused on the construction of the 6.6 GW Hamarawein IPP Coal Project from 2016, when the tender process for the project began with bids from Japanese, American, and Chinese companies. The Egyptian Electricity Holding Company (Egypt's state-run power company), in partnership with Shanghai Electric, the Dongfang Electric Corporation, and Hassan Allam Construction, won the bid to build the Hamarawein coal plant for \$4.4 billion. The planned plant comprised six 1100 MW supercritical units. The final deal was signed in September 2018. As of March 2019, the CDB offered to fund \$3.7 billion of the project. Other funders included the ICBC and the ChExIm. The Egyptian Electricity Holding Company was expected to repay the loans over 15 years. However, in February 2020, the project was postponed indefinitely, as the government opted to consider renewable energy projects instead. This decision was made due to concerns about overcapacity: Egypt currently has enough electricity capacity to meet power demand, especially in light of the current global economic downturn and depressed demand due to Covid-19 (Nicholas, 2020b).

This cancellation is also notable because other potential coal projects have been put aside in favour of this one. First was the Marsa Matruh power station, a 4000 MW plant that would proceed in two stages of 2000 MW each. The Egyptian government signed an MoU in 2016 with Marubeni (Japan) and El Sewedy (Egypt) to complete feasibility studies, and in January 2017 there was an offer from Sumitomo (Japan) to build a 2000 MW supercritical coal plant. However, the plans were shelved in November 2017 when the government decided to focus on the Hamarawein project. The second cancelled project was the Ayoun Moussa power station, which was planned for construction in Suez, Egypt. In 2014, the government signed an MoU with Al Nowais Investments (Abu Dhabi) and the Egyptian Electricity Holding Company (EEHC) to investigate the possibility of building a 3960 MW coal plant. An agreement was signed between the partners in 2015 to construct a 2460 MW plant for \$4.5 billion. However, negotiations over the contract continued, and by 2017 the project was delayed until the mid-2020s due to concerns about overcapacity in the power market. Despite reaching a final agreement on power purchase contracts in July 2019, the Egyptian Electricity Holding Company decided to postpone the project because of the continuing energy surplus and high costs of building a coal terminal to feed the plant. Finally, the Egyptian Ministry of Electricity cancelled the project, and instead aims to renegotiate with Al Nowais to provide renewable power plants in the future (Shearer, 2019).

While not all the proposed coal power plants in Egypt were in partnership with China, it is significant that the BRI-affiliated Hamarawein project was ultimately prioritised over other options. This choice was likely due to economies of scale – Chinese contractors were proposing to build a 6.6 GW plant at

Hamarawein for around the same cost as the 2.5 GW Ayoun Moussa plant that was agreed a few years earlier. This example underscores the advantage that Chinese companies have in being supported by concessional finance from Chinese banks. However, the fact that this plant was ultimately shelved illustrates the problem currently faced by many developing countries that are trying to predict future power demand growth and build out their power systems accordingly. Demand growth has not always lived up to expectations – especially after the onset of the Covid-19 pandemic – and large baseload power projects may require too much capital upfront. In Egypt’s case, the government may prefer smaller renewable projects that require lower levels of investment and can more closely match lower levels of electricity demand growth (Nicholas, 2020c). For example, in April 2021 the Egyptian government signed a 25-year power purchase agreement with ACWA Power for a 200 MW solar PV plant. The project also comes with a \$114 million financing package from a consortium of international development banks. It will contribute to the Egyptian government’s *Integrated Sustainable Energy Strategy* goal of producing 42% of the country’s electricity from renewable sources by 2035 (ACWA Power, 2021; Zgheib, 2021).

12 INDONESIA

12.1 POWER SYSTEM

As a developing country with lower than average electrification rates and frequent power cuts, Indonesia is rapidly expanding its electricity capacity. PLN, the state electricity company, is spearheading this initiative, but there is also ample room for independent power producers, both local and foreign, to participate in the growing electricity market. PLN's Power Supply Business Plan 2018-27 projects that the country will expand its electricity capacity by 56 GW during this period, mostly through additions of coal power plants. As a result, coal is expected to represent 54% of Indonesia's energy supply by 2025 (Tritto, 2021). Coal's dominant role is underpinned by the country's vast coal reserves, which are already being developed and mined for both domestic use and export (see Table 9).

TABLE 9 INDONESIAN COAL PRODUCTION AND EXPORTS, 2019 (IHS MARKIT, 2021)	
Coal production, Mt	563
Coal exports, Mt	407

12.2 RELATIONSHIP WITH CHINA

China has been involved in Indonesia's electricity sector since before the BRI. China provided \$13.4 billion in funding for coal plants from 2000-16. Beginning in 2006, Chinese companies built many coal plants through the Fast Track Programme, which sought to rapidly expand Indonesia's electricity capacity. China's involvement in the Indonesian power sector has continued with the introduction of the BRI, as the goals of the initiative fit well with Indonesia's desire to prioritise infrastructure development. However, the government does have concerns about the terms of BRI projects, especially considering that pre-BRI Chinese investment in Indonesia was not always successful or long lasting, according to Parameswaran (2019).

Chinese companies and banks have successfully bid for many of Indonesia's pipelined coal projects. Environmental and construction regulatory standards are not strong in Indonesia, and the most important factors in the bidding process are project cost and construction time. Thus, Chinese companies that are willing to use subcritical technology can have an advantage when bidding for coal projects. Both Yao and others (2018) and Tritto (2021) show that Chinese investors have built significantly more subcritical coal plants in Indonesia compared with other foreign investors. Subcritical technology is especially common in captive industrial plants in Indonesia. These small units are built to provide power to an adjacent industrial installation. Chinese companies are involved in many projects of this nature, and they are willing to finance and build subcritical units for this purpose (Tritto, 2021).

The Indonesian and Chinese governments are in talks to establish a new bilateral fund under the BRI to support Indonesian infrastructure projects further. In addition to securing future funding commitments, Indonesian officials hope that a new fund could provide them with greater influence and oversight over new projects (Parameswaran, 2019). Already, the process in Indonesia for authorising new projects is relatively complex, resulting in the slower implementation of BRI projects than in some other countries. However, it seems that the projects that do get approved tend to be more successful: ‘the prolonged process of land acquisition, licencing and lawsuits have acted as important checks and balances on these projects and enabled a pre-emptive resolution of the kind of problems that have blighted the BRI in other regions’ (Lai, 2019). The Indonesian government has stated that future projects must abide by stricter requirements, including using environmentally friendly technologies and local labour, increasing technology transfer to local partners, and helping the country transition away from extractive industries (Rahman, 2019). These guidelines contrast with past trends in Chinese coal investment in the country.

12.3 CILACAP SUMBER POWER STATION (JAWA-8)

The Cilacap Sumber power plant is a four unit coal plant located in the Central Java Province of Indonesia owned by the Indonesian company Sumber Segara Primadaya. The original project consisted of 2 x 300 MW subcritical units that were financed by Chinese banks and use Chinese technology. Units 1 and 2 were commissioned in 2006. Two more units, one supercritical and one ultrasupercritical, have been added since the beginning of the BRI, both with Chinese backing. In 2013, the China Development Bank funded a \$700 million loan for the creation of a third 660 MW supercritical unit at the plant. Construction started in 2014, and it began operation in 2016. Then, in 2015, the owners signed contracts with the Chengda Engineering Company for a fourth 1000 MW ultra-supercritical unit. This unit is also called Jawa-8. The project was funded by a combination of loans from Chinese and Indonesian banks. The Bank of China provided the largest loan at \$1 billion, while the China Development Bank provided a \$98 million loan. Bank Rakyat Indonesia also supplied \$300 million in financing. Construction of Unit 4 began in 2016, and it was commissioned in 2019 (AidData, 2017a; Global Energy Monitor, 2020d; World Bank, nd-a).

12.4 PANGKALAN SUSU POWER PLANT

The Pangkalan Susu power plant is an 840 MW (2 x 220 MW and 2 x 200 MW) plant located in the North Sumatra Province of Indonesia. The first two units were commissioned in 2014 and 2015, while units 3 and 4 became operational in 2019. All four units use subcritical technology. The first two units were planned before the BRI, but PLN contracted Guangdong Power Engineering to construct the plant. The expansion of the plant occurred after the start of the BRI, with Chinese financing and contractors continuing to work on the project. In 2013, PLN signed contracts with Sinohydro to build the additional units. The parties reached financial close in 2014; the expansion was financed by the

ChExIm with a loan of \$373 million. The Indonesian government contributed another \$65.5 million to the project (AidData, 2017b; Global Energy Monitor, 2020e).

12.5 SUMSEL-1 (SOUTH SUMATRA 1) POWER PLANT

Sumsel-1 is a 600 MW (2 x 300 MW) subcritical power plant located in South Sumatra, Indonesia. In 2015, the state electricity company PLN proposed the project with an estimated commissioning date of 2020. China Shenhua Energy was awarded the project in 2016, and financial close was reached in 2017. The project has been financed by a \$520 million loan from the Bank of China, the China Construction Bank, and the ICBC. The total cost is expected to be \$700 million. The project is being carried out by an SPV consisting of China Shenhua Energy and PLN subsidiary PJB Investasi. The plant has a 25-year power purchase agreement with PLN. Construction has been delayed due to Covid-19 and the associated travel restrictions, but the sponsors still aim to complete the plant in 2021 (Global Energy Monitor, 2020b; Hamdi, 2019; World Bank, nd-c).

13 KENYA

13.1 POWER SYSTEM

The Kenyan government has an ambitious infrastructure and industrialisation strategy, with the goal to become a middle-income country by 2030. Rapid energy expansion is key to this plan, using an ‘all-of-the-above’ approach. The government believes that coal has an important role to play, especially as its current hydropower resources have become more unreliable. As hydro makes up a third of the total generating capacity, reliability issues have a large impact on the availability of electricity (Rosen, 2017). There has also been increased interest in renewable energy, but these sources are viewed as complementary to coal power.

Kenya has experienced a massive increase in demand for electricity in the last 30 years. In 1990, power consumption was 2.93 TWh. It rose to 7.98 TWh in 2016, representing a 272% increase. Accordingly, the government of Kenya has indicated that it wants to increase the country’s generation capacity significantly. Current capacity stands at 2.8 GW. Originally, the energy ministry aimed to add 10 GW of capacity by 2030, because of projections of rapid demand growth. According to the country’s 2011 Least Cost Power Development Plan, issued by Kenya’s Energy Regulation Commission, Kenya was expecting ‘a 13.4% annual energy demand load growth and a 11.4% average annual peak demand load growth’ (Wang, 2020). However, revised projections have lowered the estimate to 7–9% annual growth. As a result, the government has revised its plan to 7.2 GW of additional capacity due to slower than expected demand growth (Reuters, 2019c). The Kenyan government is concerned about balancing the system, as too much excess capacity could result in increased consumer prices in order to cover capacity payments for idle plants. However, they are still anticipating increased demand far into the future as the remaining 25% of the population without access to electricity becomes connected, in addition to increased use by public services and industry (Kamau, 2021).

13.2 RELATIONSHIP WITH CHINA

Kenya is a key point along the Maritime Silk Road aspect of the BRI. Its ports at Mombasa and Lamu are important gateways to trade across the African continent. China also sources many raw materials from Kenya. The government of Kenya has welcomed Chinese investment, both before and after the creation of the BRI, as a way to boost economic development. Major sectors of cooperation include transportation, such as railways and ports, and energy and mining. China has expressed interest in all types of energy projects, such as the recently constructed Garissa solar plant and the Lake Turkana wind farm (Nicholas, 2020a). Chinese companies have also begun to explore the Mui coal basin in Kitui County (Ullman, 2019).

However, multiple BRI projects in Kenya have faced legal hurdles. According to Yoeli (2021), the courts have overturned contracts and construction permits because of environmental and corruption

concerns. The Lamu coal plant suffered this fate in 2019. There is also increasing concern in Kenya about the debt burden from Chinese projects: China currently holds 72% of Kenya's bilateral debt (Ullman, 2019). Moreover, some projects, such as a new shipping railway from the port of Mombasa to the capital Nairobi, have been unprofitable. This situation has contributed to the difficulty in servicing Chinese loans, raising the threat of default or the seizure of collateral (Yoeli, 2021).

13.3 LAMU POWER PLANT

The Lamu Coal Power Plant is a proposed 1050 MW plant on Lamu Island on the north Kenyan coast. It would be the first coal plant in the country. The developers intended to use coal imported from South Africa and Zimbabwe, as well as local reserves. In 2014, AMU Power Company Limited won the bid to construct the Lamu coal plant. This group comprised two Kenyan-owned companies - Centum Investments, owning a 51% stake, and Gulf Energy, with 49%. Chinese companies were contracted for engineering and construction, including two subsidiaries of PowerChina – Sichuan Electric Power and Design and Consulting, and Sichuan No. 3 Power Construction Company – and China Huadian Corporation Power Operation Company (Wang, 2020).

Expected to cost \$2 billion, the project was financed through 75% debt and 25% equity. The ICBC is the debt financier, providing two loans worth \$1.5 billion. Two other organisations, the African Development Bank and South Africa's Standard Bank, also considered contributing finance to the project. However, both decided against the investment; Standard Bank withdrew in October 2017, while the African Development Bank confirmed that it was not interested in November 2019 as part of its wider decision to not finance any new coal power plants (BankTrack, 2020a).

AMU Power Company had to carry out an environmental and social impact assessment before signing a power generation license. This process was intended to help projects align with the UN SDGs, as well as to protect the local UNESCO World Heritage Site. The Kenyan Energy Regulatory Commission approved the assessment in 2017, despite some concerns from local community organisations. These local groups then instigated a lawsuit alleging that the environmental impact assessment (EIA) was unlawfully approved (Wang, 2020). Kenya's National Environmental Tribunal ruled in June 2019 to stop construction of the Lamu coal plant. Although the plant had been approved by the National Environmental Management Authority, the court ruled that the approval was granted without proper environmental impact assessments in place (BBC, 2019). The AMU Power Company has appealed this decision, but it will probably need a new permit if it wants to proceed with the project.

At the end of 2020, it was reported that the ICBC had rescinded their funding offer due to environmental and social concerns, and the Chinese embassy in Kenya signalled that Chinese companies were no longer involved in the project (Muchangi, 2020). The Kenyan government then cancelled plans for the plant, as they felt it was unlikely to attract other financiers (Yi, 2021).

14 PAKISTAN

14.1 POWER SYSTEM

Pakistan has an electricity shortage; it has experienced consistent power outages since the mid-2000s. In 2012, the year before the launch of the BRI, the country had a generation deficit of 6758 MW. The electricity system was also dominated by fuel oil and natural gas, in addition to hydroelectric power: as of 2017, oil accounted for 26% of generation, gas for 40%, and hydro for 27%. High oil prices in the 2000s and 2010s resulted in expensive electricity, hurting consumers and utilities who could not cover their costs (Downs, 2019; Unwin, 2019). Against this background, the government of Pakistan has pushed to develop indigenous coal resources to provide a cheaper source of electricity. The extensive Thar coalfield, located in the southeast of Pakistan, is over 9000 km² and has 175 billion tonnes of inferred coal reserves (Ford, 2020). Most of the upcoming coal power plant additions will be in this region: 2.6 GW of new capacity fuelled by Thar lignite should come online from 2021 to 2023 (Argus Media, 2021).

However, at the December 2020 UN Climate Ambition Summit, Pakistan's Prime Minister, Imran Khan, stated that the country would begin to transition away from coal power and source 60% of its energy from renewables by 2030. Pakistan only had one coal plant before 2016, but there are now at least 10 plants in the country. While this announcement will not impact any recently built coal plants, nor those in the pipeline, he did confirm that the Chinese-affiliated Muzaffargarh and Rahim Yar Khan coal projects would be cancelled. These cancellations were also in line with an earlier announcement that Pakistan would not build any plants that would rely on imported coal. The 2600 MW of capacity lost from these plants is supposed to be replaced with 3700 MW of new hydropower, according to contracts recently signed by the Pakistani government. However, it is also possible that some Chinese coal projects have been shelved because of overcapacity concerns (Ebrahim, 2020; Gul, 2020). The government is currently responsible for Rs 850 billion (Pakistani rupees) (\$5.5 billion) in annual capacity payments, which has been a burden on the debt-laden electricity system (Rana, 2020).

14.2 RELATIONSHIP WITH CHINA

China-Pakistan economic cooperation was evident before the BRI. As early as 2013, the governments of the two nations were laying the groundwork for an 'economic corridor.' The original plan involved transportation and pipeline infrastructure development to connect the Chinese border at the northeast of Pakistan to the port of Gwadar, on the southwest coast. The project was expected to take five years with planned investment of around \$10–20 billion. The China-Pakistan Economic Corridor (CPEC), the current name of China and Pakistan's cooperation programme, was officially created in 2015. This new plan included a greater emphasis on power projects. While costs for this plan originally were estimated at \$46 billion, the *Long Term Plan* that was rolled out in 2017 expanded the scope even further and increased investment levels to at least \$62 billion. The Long Term Plan covers most of the

current and planned Chinese projects in Pakistan, and the timeline spans from 2017 to 2030. China sees Pakistan as an important economic and geopolitical ally, acting to balance the influence of India in South Asia. It also provides a direct trade route to the Arabian Sea (Mardell, 2020a).

Pakistan has welcomed Chinese assistance in its power sector, which has long suffered from electricity shortages. Under the CPEC, over half of the committed funding is for energy projects, and 75% of electricity generation projects are coal power plants (see Figure 3). Coal investments were deemed attractive for both Pakistan and China: Pakistan needed rapid electricity expansion and wanted to use domestic fuel sources, while Chinese companies realised an opportunity to export excess power generation equipment (Downs, 2019).

However, Chinese companies have faced more local political obstacles to construction than expected. For example, planning permissions for the construction of the Gwadar coal power plant took three years to be approved, despite regular power outages in the Balochistan province. Furthermore, Pakistan's economy is vulnerable, especially due to the Covid-19 related economic crisis. The country has faced multiple periods of financial instability, including having to request a \$6 billion bailout from the International Monetary Fund (IMF) in 2019. The government has also asked China to relax the terms of its power agreements because it has been struggling to service its loans (Mardell, 2020a). It is possible that Pakistan's debt troubles may result in a more cautious approach to CPEC development in the future.

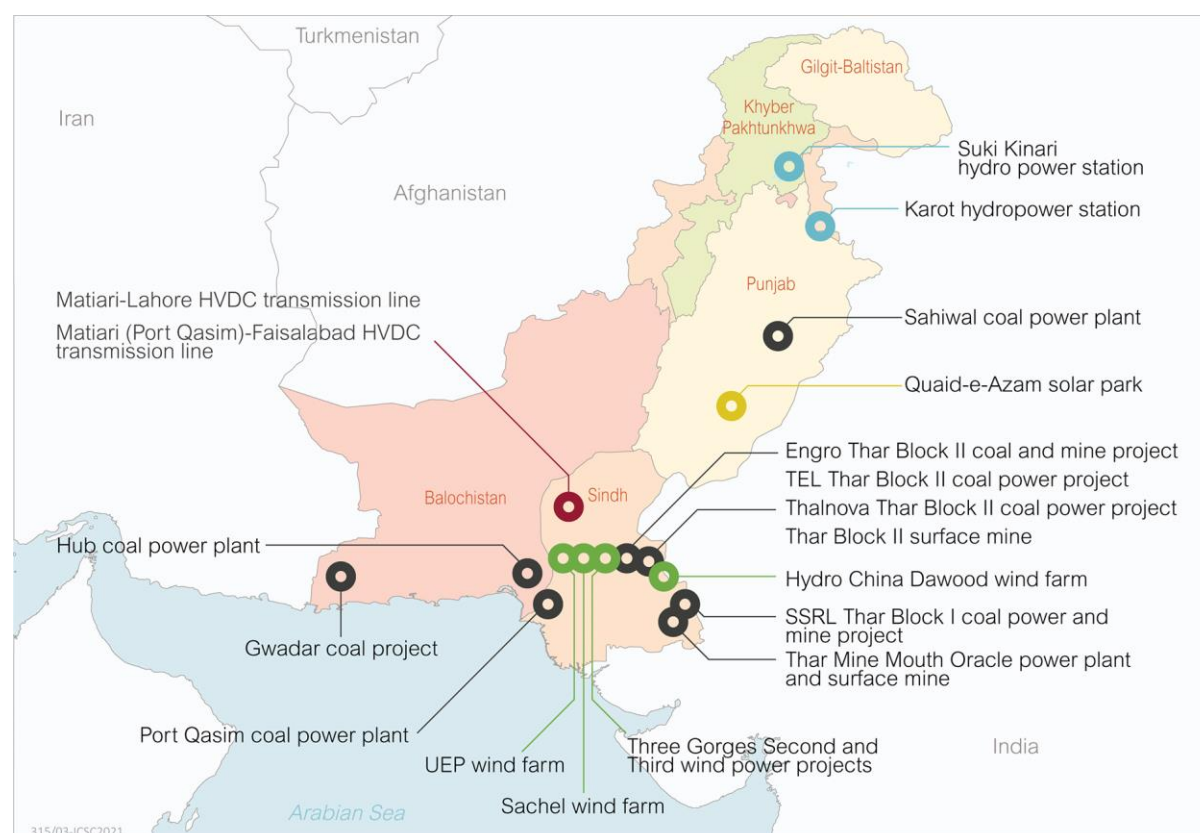


Figure 3 Map of CPEC projects (Downs, 2019)

14.3 ENGRO THAR BLOCK II

Engro Thar Block II is a 660 MW (2 x 330 MW) subcritical circulating fluidised bed (CFB) coal power plant located in the Thar Block II coalfield. It is the first power plant to use the lignite coal mined at the Thar fields. The project, a part of the CPEC, is a collaboration between Pakistan's Engro Powergen Thar and the China Machinery Engineering Corporation. It cost \$995 million and was financed by a consortium of banks led by the CDB and Sinosure. Other investors include the Construction Bank of China, the ICBC, and a group of Pakistani banks (Power Technology, 2021). Construction began in April 2016. The first unit at the Engro Powergen Thar plant began to supply power to the grid in March 2019, and both units were fully commissioned by July 2019 (Power Technology, 2018b; The Nation, 2019).

14.4 PORT QASIM POWER PLANT

The Port Qasim coal power plant is a 1320 MW (2 x 660 MW) supercritical plant located outside Karachi, the largest city in Pakistan. Construction began in 2014, and the two units were commissioned in November 2017 and April 2018. The project was considered a top priority for the CPEC. The plant is owned by China Power Construction Co (51%) and Al-Mirqab Group (49%). Both entities invested \$521 million into the project. The ChExIm Bank also provided \$1.56 billion in debt financing for the project. It runs on imported coal from Indonesia, South Africa, and Australia (Power Technology, 2018a). Port Qasim was built before the government announced a ban on plants that rely on imported coal.

14.5 RAHIM YAR KHAN POWER PLANT

The Rahim Yar Khan coal power plant was a planned 1320 MW (2 x 660 MW) supercritical plant located in the Punjab province of Pakistan. Huang Shandong Power Generation Co Ltd, a subsidiary of China Huaneng Group, was the main sponsor of the project. Planning began in 2016, after the project was announced in a 2016 list of CPEC projects. It had a projected cost of \$1.6-2 billion. The plant was supposed to be fuelled by imported hard coal (CPEC Secretariat, nd-a; Global Energy Monitor, 2019).

Originally, the Rahim Yar Khan plant was planned in order to expand electricity generation from coal before the Thar coalfields were fully developed. With the project agreements signed in 2016, it had a projected completion date of 2021. There were concerns from the beginning about the project providing too much new electricity capacity, especially from the Ministry of Water and Power. However, once the Minister for that department was replaced in 2017, the project was treated as a higher priority. Ultimately, though, the government reversed course again in January 2019, when plans for the plant were officially cancelled. The Pakistani government felt that there was already enough capacity in the system without the Rahim Yar Khan plant; constructing it could have overburdened the system with unnecessary costs and capacity payments. Furthermore, the development of the Thar coalfields had progressed far enough that the government announced a ban on new plants that would

use imported coal (Kiani, 2019). This and other cancellations prompted China to suggest that the two countries carry out a study of Pakistan's power system to optimise future planning.

14.6 THAR COAL BLOCK 1 MINE AND POWER PLANT

Thar Coal Block-I Project is a 7.8 Mt/y open pit coal mine and an affiliated 1320 MW (2 x 660 MW) USC plant. The mining preparatory work is currently 40% done, with a completion date estimated at the end of 2021. Thar Coal Block-1 Power Generation Company (an SPV of Shanghai Electric Group), as well as the Sino-Sindh Resources Limited (a subsidiary of Chinese company Global Mining) are the two main companies involved in the project. They signed an implementation agreement with the Pakistani government in December 2019, and financial close was reached in February 2020. The project is expected to cost around \$1.9 billion, with 75% covered by loans from the ICBC, ChExIm, and China Development Bank. The power plant should come online in 2022-23. Construction of the mine and plant has encountered some delays due to Covid-19, but Shanghai Electric arranged extra workers and supplies to be dedicated to the project in the latter half of 2020 to make up for lost time (CPEC Secretariat, nd-b; NS Energy, 2020b; Siddiqui, 2021).

15 SOUTHEASTERN EUROPE

Southeastern Europe is an important region for the BRI, as it represents a gateway into the rest of Europe and an opportunity for China to grow its influence in the West. The region, primarily consisting of the Western Balkans (see Figure 4), is part of China's 17+1 initiative, which seeks to unite the countries of central and eastern Europe in cooperation with China. While some of these nations are members of the EU and others are not, the group is united in that they all used to be part of the Eastern Bloc under the influence of the Soviet Union. As a result, many of these countries have a significant amount of legacy infrastructure from the Soviet era and are dealing with the problems of underinvestment in an ailing infrastructure system (Kavalski, 2019). This is especially true in the energy sector: many countries in southeastern Europe still rely on coal for a significant portion of their electricity production. In particular, Serbia and Bosnia and Herzegovina both use coal for over 70% of their electricity generation and have many ageing coal plants that were built in the Soviet era (Jahns and others, 2020).



Figure 4 Map of the Western Balkans (UK Select Committee on International Relations, 2018)

Balkan countries may be interested in the BRI because China provides ‘no strings attached finance and no political interference’ (Mardell, 2019c). Conversely, money from the EU is often difficult to access or comes with too many conditions. This impression is especially the case in the energy sector, as European lenders such as the European Bank for Reconstruction and Development and the European Investment Bank have stopped funding new coal projects. For countries such as Bosnia and Serbia,

which consider coal as key for protecting their energy security, China has become the best new partner for such projects (Rose, 2020).

Against this backdrop, many nations in the Western Balkans have applied for membership of the European Union. Prospective members have to align with EU rules and regulations across many sectors of the economy and the political sphere for their application to be approved. In the areas of energy and the environment, countries must devise a national energy and climate plan that shows how they will meet the EU's 2030 climate targets. Current goals include 'at least 40% cuts in greenhouse gas emissions (from 1990 levels), at least 32% share for renewable energy, and at least 32.5% improvement in energy efficiency' (European Commission, nd). This document must lay out how countries will deal with sustainable energy planning and investment, as well as address the future of coal in the energy system. While countries would be able to access Just Transition funding after joining the EU, the Just Transition programme requires that the money be used to assist the transition away from fossil fuel use. However, current energy strategies in the Western Balkans do not anticipate a surge in renewable energy, nor do they have strong policy incentives to change the energy mix (Jahns and others, 2020).

15.1 BOSNIA AND HERZEGOVINA (BiH/BOSNIA)

15.1.1 Power system

Bosnia's electricity supply comprises 40% hydropower and 60% coal power (Reuters, 2019a). The country is currently a net electricity exporter, but that may change in the next decade unless there are large investments in new generating capacity. Around half of the country's coal and lignite plants were built in the 1960s-70s and are nearing the end of their lives. Existing plants are also largely not compliant with EU emissions standards. BiH has indicated that in the next decade, it would like to build four new lignite plants and one gas-fired plant to expand its generation capacity (Nikolakakis and others, 2019). Coal is considered essential for maintaining the security and affordability of electricity supplies.

Bosnia applied for membership of the EU in 2016, but it has not yet achieved all the reforms required to complete the process. BiH is in the process of reforming and liberalising its energy markets to bring it in line with EU rules but has some way to go. The government is highly decentralised, and the central government has limited powers, which has made it difficult for the country to update its energy laws (Energy Community Secretariat, 2020a). Two other major areas of conflict with EU statutes are environmental regulations and state aid rules. Bosnia plans to build more coal power plants using state guarantees for Chinese loans, which may be in violation of EU rules (Reuters, 2019a).

15.1.2 Relationship with China

BiH has been a recipient of Chinese investment in the coal sector since 2010. The introduction of the BRI indicated China's willingness to continue a partnership with Bosnia, especially as other European sources of funding for coal have disappeared. There are currently around \$4.3 billion in

Chinese-backed projects in Bosnia, the highlight of which is the Tuzla Blok-7 project (Reuters, 2019b). However, implementing BRI projects, especially in the coal sector, has not been easy in Bosnia. There have been a number of coal plant projects with MoUs signed that were ultimately cancelled. In some cases, construction permits have been denied or revoked because of environmental concerns; for others, financing was unclear, or partners dropped out of the project. China has remained committed to building ties with Bosnia, but cooperation in the coal sector will likely not dominate their relationship.

15.1.3 Tuzla Blok 7

The Tuzla Blok 7 project was originally planned for Japanese investment, but the companies involved withdrew in 2014 after their feasibility study indicated that it would be unprofitable (Rose, 2020). However, the Bosnian government wanted to go ahead with the project, so it awarded the contract to Chinese SOE Gezhouba. The ChExIm provided a \$681 million loan to the Bosnian state power utility EPBiH for the construction of the new unit (Timsit, 2020).

Tuzla Blok 7 will be a 450 MW supercritical unit, firing lignite like the rest of the plant. Bloks 3, 4, and 5 will be retired in 2023, and Blok 7 is expected to come online in 2024. Thus Blok 7 will replace the 500 MW capacity being retired. The new unit is expected to reduce coal input and emissions compared to the older units at the plant. Construction began on Tuzla Blok 7 in November 2019 but has experienced delays due to Covid-19. The expected completion date is 2022 (CSIS, nd). This is the first thermal power unit being built in Bosnia and Herzegovina since 1988 (Sarajevo Times, 2019).

The government has provided a state-backed guarantee for 100% of the loan value, which is likely to be in violation of EU state aid rules. While Bosnia is not yet a member of the EU, it does participate in the Energy Community Treaty, which applies EU state aid rules in the energy sector (Energy Community Secretariat, 2019). There is a pending legal case regarding this potential violation, but other past court cases with the Energy Community regarding emissions standards have been resolved (Rogelja, 2020).

15.2 SERBIA

15.2.1 Power system

Serbia relies on coal for over 70% of its power generation. The Serbian government wants to continue using domestic lignite which it considers key to maintaining a secure and affordable electricity supply (Stojanovic, 2018). Although Serbia has taken steps to reform and liberalise its energy markets in line with EU directives, EPS (Elektroprivreda Srbije), the state-run power company, remains the dominant electricity supplier. Prices are still regulated for small customers and households, and there are large subsidies for coal power producers. In 2019 alone, the Serbian government provided £41 million (\$50 million) in subsidies to coal power generators (Energy Community Secretariat, 2020b). Momentum for renewable energy is growing, but Serbia does not have any support schemes in place

to support renewables deployment. The country had a target of 27% renewable energy by 2020, but this goal was not met. The government has stated that coal will continue to be an important part of the electricity mix even after renewables begin to be introduced, as it is key for output stability (Hope, 2020).

15.2.2 Relationship with China

Serbia looks positively on Chinese investment in the country. Chinese-Serbian cooperation dates back to 2009 when the two countries signed an agreement to enhance cooperation on the economy and to promote investment in Serbian infrastructure. The strength of this relationship is indicative of Serbia's underlying mistrust of the EU, especially regarding the issue of Kosovo's independence in 2008, which was supported by the EU but not China. In comparison to Serbia's perception of the EU as demanding, it views China as an agnostic partner that provides investments without preconditions (Mardell, 2019b).

15.2.3 Kostolac B power plant

China is funding an expansion to the Kostolac B coal power plant, as well as upgrades to the existing subcritical B1 and B2 units and the nearby Drmno mine. Elektroprivreda Srbije (EPS), the state-owned electric utility, contracted the China National Machinery Import and Export Corporation for both projects. Talks between the two parties began in 2010 when they signed a preliminary contract for the two projects with a value of \$1.25 billion. However, subsequent negotiations split the project into two phases: Phase 1 would consist of the refurbishment of the existing units, while the new unit B3 would be built during Phase 2 (Global Energy Monitor, 2020c).

The pre-existing Kostolac B plant consists of 2 x 350 MW units. These units were ageing and performing below full capacity, which caused problems for the stability of Serbia's power supply. Plant upgrades were financed by a \$293 million loan from the ChExIm, plus an equity investment of \$42 million from EPS. The completed upgrades, which include desulphurisation technology, will extend their lifetime, make them more efficient, and reduce their emissions (Zawya, 2019). However, the EU has expressed concerns about cross-border emissions from the plant. In particular, sulphur dioxide emissions from Serbia and other Western Balkan nations have exceeded the limits set out in the Energy Community Treaty. Despite the FGD equipment, the Kostolac B plant remains over the emissions limit (Kokkalis and von Cramon, 2019).

Plans for the new 350 MW supercritical unit, Kostolac B3, were agreed in 2014. Feasibility studies conducted at the time were based on low coal prices and a low carbon price in the EU Emissions Trading System (Rose, 2020). EPS says that the new unit will meet all Serbian and EU environmental standards (EPS, 2018). Construction began in 2017, with an expected completion date of 2020. However, progress was delayed by Covid-19 in 2020, due to problems sourcing equipment. As a result, the new expected commissioning date is the end of 2021 (Euracoal, 2020; Reuters, 2017; Zawya, 2019).

The financing agreement for the \$715 million Phase 2 project includes a \$608 million loan from the ChExIm, on top of a \$107 million investment contributed by EPS and the Serbian government. The Serbian government has also provided a state-backed guarantee for the loan (Djereg and Kleis-Walravens, 2020). This guarantee may be in violation of the Energy Community Treaty's rules on state aid.

16 TURKEY

16.1 POWER SYSTEM

Fossil fuels make up the majority of Turkey's primary energy supply, with approximately equal roles for coal (29.7%), natural gas (28.2%), and oil (28.8%). As of 2018, energy imports accounted for 72% of the country's supply. Oil and gas are 93% and 99% imported, respectively. As Turkey relies heavily on imports it is interested in increasing domestic coal production for power generation. In 2017, the Ministry for Energy and Natural Resources made expanding coal power a policy priority in its National Energy and Mining Policy. It promised feed-in tariffs, a 15-year power purchase agreement, and capacity mechanisms to help incentivise the construction of new plants, with a goal to increase capacity from 17 to 30 GW by 2023 (Euracoal, 2020). However, the Turkish government does not want to build plants that use imported hard coal, as it wants to decrease its reliance on imports and improve the country's trade balance (Mann and others, 2019).

While expanding coal capacity has long been important to the Turkish government, there is no track record of successfully building new plants. S&P Global calculated that since 2009, around 70 GW of planned capacity has been cancelled or postponed indefinitely. There is around 33 GW remaining in the pipeline. Currency crises, political uncertainty, increasing opposition from environmental groups, and financing issues have all contributed to the slowdown in construction of new plants (Mann and others, 2019). For example, in 2020, twenty NGOs sent letters to the China Development Bank and Industrial and Commercial Bank of China asking them to stop funding coal power plant construction in Turkey, and specifically the Emba Hunutlu coal plant. The NGOs claimed that the Turkish coal investments go against the *Belt and Road Green Investment Principles* pledge, which the banks signed in April 2019 (Bloomberg News, 2020). This effort has not affected the Emba Hunutlu plant, which is, so far, proceeding as planned.

16.2 RELATIONSHIP WITH CHINA

China considers Turkey to be an important part of the BRI, both for its natural resources and its strategic location at the crossroads of Europe and Asia. Turkey also has a new initiative, called the Middle Corridor, which aims to revitalise the old silk road trade routes through the country. This plan complements the goals of the BRI. China and Turkey agreed to officially link the two initiatives in 2015 (Gündüzyeli, 2020).

Turkey views China as a key partner in its attempts to grow its domestic energy industry, especially as other international financiers turn away from coal. The Emba Hunutlu plant, currently under construction, is considered a success by both parties. This project is also likely to be used as a model for how to proceed with future projects (Mills 2022, in progress). However, there is increasing interest

in developing renewable sources of energy as well, signalling a potential shift in future BRI investments in Turkey (Gündüzyeli, 2020).

16.3 EMBA HUNUTLU POWER PLANT

The Emba Hunutlu power plant is a 1320 MW (2 x 660 MW units) USC coal power plant that is planned to begin service in 2022. It is a joint venture between Shanghai Electric Power (a subsidiary of China's State Power Investment Corporation) and Turkish investors. The companies are investing \$2.1 billion in the project, making it China's largest direct investment in Turkey. Financing, sourced from the State Power Investment Corporation, the China Development Bank, Bank of China, and the ICBC, will be in the form of 20% equity and 80% debt (Global Energy Monitor, 2020h). EMBA Electricity Production Co Inc, the joint venture company created for the project, estimates that the project will provide 4000 jobs during the construction of the plant and employment for 500 people once operation begins.

The EMBA Power website states that 'the design gross efficiency of EMBA Hunutlu Project can both reach to 45.57% with a gross coal consumption rate less than 270 g/kWh (converted to 7000 kcal/kg LHV standard coal)' (EMBA Electricity, nd). There are plans to run the plant on imported hard coal, rather than domestic lignite resources. The quality of the coal will impact whether such high efficiency can be achieved. The developer also asserts that there will be strong pollution controls installed in the new plant, including selective catalytic reduction NO_x control and a flue gas desulphurisation unit (NS Energy, 2019).

Local community and environmental groups have opposed the construction of this plant, especially regarding the destruction of the habitat of internationally protected marine turtles. Their efforts had succeeded in overturning previous projects, for example, the 2015 cancellation of Engie's (French) Ada coal plant project in the same region (BankTrack, 2021). However, the EMBA Hunutlu plant has been allowed to progress, and construction began in 2019. Despite the potential for setbacks due to Covid-19, construction of the Hunutlu plant continued throughout 2020. In August 2020, 455 Chinese workers moved to Turkey to make sure the work continued on schedule. Once the project is complete, it is estimated that it will produce around 3% of Turkey's electricity supply (Xinhua, 2020c).

16.4 HEMA AMASRA MINE AND POWER PLANT

The Hema Amasra coal power plant project is a proposed 1320 MW USC plant (2 x 660 MW units) in the Bartın province of Turkey. The project is being planned by Hema Enerji, a subsidiary of Turkey's Hattat Holding, in conjunction with Chinese companies Datong Coal Mine Group and Harbin Electric International. Contracts between Hattat Holding and Harbin Electric were signed in 2013 for a \$2.4 billion investment. The co-located Amasra B coal mine was intended to supply coal for the proposed plant, but the mine has been inactive since 2005. It was also expected that some imported coal would be necessary to supplement supplies.

The Hema Amasra plant has encountered many barriers in the planning process, ultimately resulting in the project being shelved in 2019 after a court ruling overturned the environmental impact assessment authorisation for the plant. This outcome followed ten years of conflict over the EIA process. Hema Enerj had to submit multiple rounds of EIAs due to missing documentation, and early attempts were rejected due to inadequate consideration of the environmental impacts, especially to a nearby UNESCO world heritage site. After a final EIA was approved in 2015, local groups filed a court case in an attempt to overturn the project. Opposition to the Hema plant was part of a larger effort to prevent the construction of coal plants in the Bartın region, which included another of Hattat Holding's Chinese-backed proposals called the Amasra Bartın power station. Both Amasra plants ultimately had their EIAs overturned and permits cancelled (BankTrack, 2020b; Global Energy Monitor, 2020a; Gündoğan and Turhan, 2017).

17 UNITED ARAB EMIRATES

17.1 POWER SYSTEM

The United Arab Emirates (UAE) has considerable access to energy resources – it is in the top 10 oil-producing countries in the world and a member of the Organisation of the Petroleum Exporting Countries (OPEC). As a result, its energy mix is dominated by oil and natural gas. In fact, natural gas provides 98% of the country's electricity. The UAE government wants to diversify the energy mix, as laid out in the UAE Energy Strategy 2050. The plan stipulates that the country's energy supplies should include '12% clean coal, 38% natural gas, 6% nuclear energy, and 44% clean energy (solar power, wind power, and biofuels)' (US EIA, 2020). All new coal plants will have to use USC technology and be carbon capture ready. Chinese companies are working with the UAE to build new power projects in line with the Energy Strategy 2050, including the Hassyan Coal Power Plant. This plant will be the first coal plant in Dubai, although it will also be able to run on natural gas as a backup fuel. The plant will ultimately provide 20% of Dubai's electricity (Murray, 2020; Xinhua, 2018).

17.2 RELATIONSHIP WITH CHINA

China believes that the Middle East is an important region for the BRI since it connects Asia with Europe and Africa. It is also key for developing oil and gas resources. The UAE has proved an enthusiastic partner in this effort. China and the UAE had cultivated a strong relationship before the BRI, but the initiative has strengthened their cooperation. For example, from 2014 to 2016, China ranked first on the list of the UAE's trading partners (Xinhua, 2018). Dubai hosts the regional headquarters of over 130 Chinese companies, and there is a significant population of Chinese expatriates living in the country.

China has been increasing its BRI investment in the UAE, starting with the establishment of the UAE-China Joint Investment Fund in 2015. This fund began with \$10 billion; contributions came from the UAE's sovereign wealth fund, the CDB, and the Chinese State Administration of Foreign Exchange (Fulton, 2019). Now, China is investing in energy projects in the country. The Hassyan coal power plant in the UAE is the first BRI project in the Middle East, and it is considered a critical component of Chinese plans for expanding cooperation with the region (China Plus, 2019).

17.3 HASSYAN POWER PLANT

The Hassyan power plant is a 2400 MW (4 x 600 MW) USC plant in Dubai. The project was awarded in 2015, began in 2016, and is expected to reach completion in 2023, with \$3.4 billion investment. The plan is for one unit to come online each year starting in 2020 and finishing in 2023. It will be the first coal plant in the region. The developer claims that the plant will have strict emissions control technology that meets the standards laid out in the EU Industrial Emissions Directive and the International Finance Corp. guidelines. These include seawater FGD for SO_x control and ESP for

control of particulates. The project also includes the construction of a substation and coal handling facilities (Power Technology, 2017).

This project is a joint venture between two major partners. First, the Dubai Electric and Water Authority (DEWA), which is Dubai's main provider of electricity, owns a 51% stake. The other 49% share belongs to the project developers, which is a consortium of ACWA Power, Harbin Electric, and the Silk Road fund (Power Technology, 2017). The partners have a 25-year power purchase agreement that stipulates a tariff rate of 5 cents per kWh. (Murray, 2020; Power Technology, 2017) Construction of the Hassyan Power Plant has run on schedule and the first 600 MW unit connected to the grid on 18 May 2020. As of July 2020, the unit scaled up to testing its operational capacity at full load. The project developers do not anticipate any delays due to Covid-19. Construction and testing continued through the year, and the unit began commercial operation in December 2020 (Murray, 2020; Xinhua, 2020a,c).

18 VIETNAM

18.1 POWER SYSTEM

The Vietnamese government views the expansion of its power generation capacity as key to its continued economic growth and vital for energy security. It expects significant energy growth and wants to increase generation capacity rapidly from the current 55 GW to 130 GW in 2030, partly to avoid power shortages which could begin to occur as soon as 2021 (Marques, 2020). Vietnam has been planning to vastly expand its coal capacity to meet demand; however, its energy strategy is under review and the new focus is likely to be on using more renewable sources. Currently, Vietnam sources around 38% of its electricity from coal. Its 2030 goals include a target of 20% renewable energy. It also intends to expand its imports and use of natural gas for power generation (Proctor, 2020).

The shifting strategy has crystallised in Vietnam's new Power Development Plan 8, which lays out the government's plan to guarantee electricity supply for the coming decade and beyond. It prioritises renewables over coal, unlike past power plans. Coal is now expected to make up 37% of the electricity mix (Marques, 2020), in contrast to the 2016 Power Development Plan 7 which projected that the fuel would account for 53% of Vietnam's electricity by 2030 (Tatarski, 2020). The changing strategy may be influenced by a few factors. First, finance for coal plants is becoming more difficult to find, due to commitments by the Japanese and Korean governments, as well as western commercial banks, to restrict or cancel financing for coal projects. Many pipelined plants relied on these sources of funding. Already, over half of the country's 68 coal power projects have experienced some sort of delay, usually caused by corruption or issues with contractors and financiers, according to Tatarski (2020). Second, there is an increasing preference for gas or renewables, both for pollution and cost reasons. Finally, the impact of the coronavirus on energy demand may alter the forecast growth rate, easing pressure for a quick build-out of baseload power. A similar situation was seen in many other countries in 2020 (Marques, 2020).

18.2 RELATIONSHIP WITH CHINA

Vietnam and China have a complicated historical relationship that still has an impact on their cooperation. While they share a border, socialist political ideology, and large trade flows, there has also been growing tension over sovereignty in the South China Sea and the influence of the USA in Southeast Asia (Thu, 2020). Accordingly, Vietnam has been a cautious partner in the BRI. The government has indicated an interest in Chinese investment, but it has also been less willing to follow the typical loan conditions – namely, that Chinese contractors are used on the project. Instead, the Vietnamese government has preferred projects with more diverse stakeholders, including Japan, South Korea, and multinational banks, to hedge the influence of any one actor (Le, 2018). So, while the BRI is present in Vietnam, it is not such a crucial source of investment as it is in some other BRI partner nations.

However, Chinese banks have become increasingly important in Vietnam's coal projects, as other countries and international banks have moved away from coal finance. Historically, South Korea and Japan have been key investors in coal power in Vietnam. However, both countries' financial institutions have indicated that they may forgo further investment in coal. It is still unclear whether projects in progress will continue or be cancelled. In some cases, such as the Nam Dinh 1 project, Chinese banks took over the project when Korean banks decided against participating. However, Chinese projects in Vietnam are not always easy to track. Japanese and South Korean companies disclose their investments in official filings, but Chinese projects are only revealed if they are publicised in the Chinese or Vietnamese media. As a result, estimates of Chinese involvement vary, with as few as five to as many as eight coal plants thought to have Chinese partnerships currently. There were also seven plants with Chinese involvement that were completed from 2014-18 (see Figure 5) (Tatarski, 2020).



Figure 5 Map of China-backed coal projects in Vietnam, 2014 to 2020 (Tatarski, 2020)

18.3 DUYEN HAI POWER PLANTS 1, 2, AND 3

The Duyen Hai power complex consists of three coal-fired power plants (see Table 10). They all have Chinese involvement, as well as Japanese, Malaysian, Vietnamese, and other partners. While plans for the plants were developed before the start of the BRI, they are good examples of the multilateral approach taken toward projects in Vietnam.

Plant	Size, MW	Companies involved	Banks involved	Financing, \$	Completion date
Duyen Hai 1	1245 (2 x 622.5)	Vietnam Electricity Group, Dongfang Group	Société Générale, BNP Paribas, Bank of China, ICBC, and ChExIm Bank	1 billion	2015
Duyen Hai 2	1200 (2 x 600)	Janakuasa (Malaysia), Huadian Engineering	ChExIm Bank and ICBC	1.8 billion	Estimate 2021
Duyen Hai 3	1245 (2 x 622.5)	Electricity of Vietnam, Chengda Engineering, Dongfang Electric, Southwest Electric Power Design Institute, and Zhejiang Electric Power Construction	VietinBank, Bank for Investment and Development of Vietnam, and Vietcombank; CDB, Bank of China, and ICBC	Vietnamese banks: 209 million Chinese banks: 1 billion	2017
Duyen Hai 3 Extension	688	Power Generation Corporation 1, Sumitomo Corporation, and Toshiba Corporation	Japanese Bank for International Cooperation, supported by a consortium of 10 Japanese banks	680 million	2020

All three plants represent multinational coalitions. Duyen Hai 1 has a Vietnamese owner, employed Chinese contractors, and was funded by Chinese and European banks. Duyen Hai 2 is owned by a Malaysian company, has Chinese contractors, and is funded by Chinese banks. Duyen Hai 3 has a Vietnamese owner, Chinese contractors, and Vietnamese and Chinese financiers. There was also a recent extension project at Duyen Hai 3. Construction of a third unit was funded by the Japanese Bank for International Cooperation and a consortium of other Japanese banks. Sumitomo Corporation was the contractor, and Toshiba Corporation provided the turbine for the new unit (Global Energy Monitor, 2020i; NS Energy, 2020c; World Bank, nd-b). Together, these projects illustrate how China is only one of many important partners in the Vietnamese electricity sector.

19 ZIMBABWE

19.1 POWER SYSTEM

Zimbabwe has significant problems with domestic energy security. There is a capacity deficit of about 900 MW of electricity: demand stands at around 2200 MW, while domestic electricity generation and imports can only supply 1300 MW. Load shedding is a common occurrence, causing regular outages for upwards of 18 hours per day. Current shortages have been caused by regular breakdowns at the Hwange coal power plant and droughts that have curbed production at the Kariba hydroelectric plant. Although Hwange is the largest thermal power plant in the country at 920 MW, it regularly only generates one-third of its total capacity (Marawanyika and Latham, 2020; Mazingaizo, 2021).

The government of Zimbabwe wants to expand its power generation capacity and mining operations rapidly, with the aim of ‘achieving a \$12 billion mining economy by 2023 that will make the country self-reliant in power generation and a net exporter of power regionally’ (Mukeredzi, 2020). Coal-fired power plants that use domestic coal are the priority. Zimbabwe has a renewable energy strategy as well, with the goal of establishing 1100 MW of renewable generation capacity by 2025. Much of this will probably be hydroelectric power.

19.2 RELATIONSHIP WITH CHINA

Zimbabwe has been an enthusiastic partner in the BRI. The country has focused on curating its relationship with China for decades. Former President Mugabe initiated a ‘Look East’ strategy, which emphasised cooperation with China over western countries, especially after the EU placed sanctions on Zimbabwe in 2002. China is the largest international investor in Zimbabwe, as well as one of its largest trading partners. While China has supported Zimbabwe since the country’s independence in 1980, there has been increasing concern about the impact of economic instability on Chinese investments. In particular, Zimbabwe has struggled to pay back Chinese loans, defaulting on \$2.2 billion worth from 2000-17 (Nyabiage, 2019; Vines, 2017).

In order to address the supply imbalance, the government of Zimbabwe intends to refurbish existing plants and build additional baseload power plants. Chinese involvement in these activities has been welcomed, especially as Zimbabwe has struggled to finance projects in the past due to its unstable economy. Chinese company Synohydro has already completed an expansion of the Kariba South Hydropower Station, and it is in the process of refurbishing the Hwange coal plant (Mugwara and Yuliang, 2020). There is the potential for more coal power projects in the future, but to date, the proposed plant at Sengwa seems to be the only one progressing (Mills, 2021). Chinese mining companies have also expressed interest in developing Zimbabwe’s coal reserves. However, there has been public outcry over the plans to establish a coal mine in Hwange National Park, and the government ultimately instated a ban on mining in national parks in September 2020 (Mutsaka, 2020).

19.3 SENGWA POWER PLANT

The Sengwa coal power plant is a proposed 2100–2800 MW (3 or 4 x 700 MW units) plant in the north of Zimbabwe. Rio Energy Limited, a subset of Zimbabwe’s RioZim Limited, will partner with Chinese construction company Gezhouba Group Corp, Power China, the Industrial and Commercial Bank of China, and the China Export and Credit Insurance Corp (Sinasure). Rio Energy will supply the coal for the plant from the local Sengwa coalfield. Construction is set to proceed in phases, to allow some units to come online before the overall project is complete. The plans also include building a pipeline to Lake Kariba to secure a reliable water supply. Project costs are estimated to be between \$3–4.3 billion. It is unclear when construction will start due to the Covid-19 pandemic (Marawanyika and Latham, 2020; The Chronicle, 2020; The Herald, 2020).

It has been difficult for Zimbabwe to attract foreign investment in the past, due to a troubled economy and political instability. There have been discussions about building a new coal-fired plant at Sengwa since the beginning of the 2000s, but the plans finally began to crystallise in 2010 when RioZim was granted a licence by the Zimbabwe Electricity Supply Authority to build a new installation. However, RioZim had difficulty attracting financiers and other partners for the project. Over the ensuing decade, they were in talks with groups from South Africa, India, China, South Korea, and possibly others, but nothing was signed until the current contract was agreed in 2020. There is still some opposition to the project, based on local environmental concerns about the ecological impact of the new plant, especially on the region’s already-strained water resources (Global Energy Monitor, 2020f; Matendere, 2020). As of July 2021, sources from Zimbabwe have reported that the ICBC has pulled out of the Sengwa project, although this has not yet been confirmed by the bank itself (Nyabiage, 2021).

20 CONCLUSIONS

The Belt and Road Initiative is the largest international infrastructure building scheme of the 21st century; its size, scope, and aims have been likened to the Marshall Plan of the post-World War II era (Shen and Chan, 2018). While it is too soon to assess the truth of this comparison, there is no doubt that the BRI has already had a significant impact in many of its partner countries. In the power sector, investments in new electricity generation capacity have helped to prevent blackouts and meet growing consumer and industrial demand. Solar, wind, coal, and hydro projects have helped to diversify the energy mix in countries, such as Pakistan, which previously relied mainly on oil and gas for fuel.

In particular, the BRI has enabled many new coal power plant developments. This report reviewed Chinese-affiliated coal projects across Asia, Africa, and Europe. A complex picture of the role for coal has emerged from this investigation. China has sponsored many new coal plants since the inception of the BRI, especially in South and Southeast Asia. However, the pipeline of coal development seems to have been overstated: many projects have been delayed, postponed, or cancelled since their initial announcement. This outcome points to the disconnect between the rhetoric and implementation of the BRI – China wants to publicise the scope and reach of the BRI by announcing many projects, but ultimately some will not occur after closer examination of the local context and economic conditions. However, the vast number of proposed projects leaves scope for change – even if some projects do not come to fruition, Chinese companies are still very active on the international stage.

The fact that BRI plans and outcomes do not always align is an indication that the BRI is not centrally directed. Rather, it is loosely coordinated by Chinese officials through diplomacy and policy bank lending. China's policy of non-intervention in local politics means that local priorities are usually the driving force behind BRI strategy, and this results in a significant variation in the types of projects chosen and the ease of their implementation. This trend is the same in the coal sector. Some countries have been successful in building many new coal plants, while others have failed to complete projects because of economic, social, environmental, and bureaucratic barriers. In general and in the coal sector, the pace of Chinese investment has slowed in 2021. However, it is unclear if this decline is temporary due to the Covid-19 crisis, or if the difficulties in completing projects will lead to China rethinking its investment strategy.

Power sector investments are driven by a variety of factors, including but not limited to cost, demand forecasts, system stability requirements, domestic fuel availability, political incentives, and environmental concerns. Each country has its own unique circumstances, and BRI projects are tailored to their specific needs. As a result, it is difficult to make sweeping assumptions or predictions about the possible future direction of the BRI. Instead, it is important to centre any discussion of the BRI in the context of each individual country, rather than from a global perspective. This is especially true

for the coal sector, as each country has a different position on coal. Considerations that may influence a country towards working with China to build coal plants include:

- **Does the country in question have local coal deposits?** Countries with domestic reserves tend to want to develop coal power to provide reliable, dispatchable power at a reasonable cost, reduce energy imports, and stimulate their mining industry. Many BRI countries highlighted in this report have stated such goals, including Turkey, Pakistan, Bosnia, and Serbia.
- **What type of technology is being used?** The choice of technology is usually influenced by two factors. First, smaller plants tend to be subcritical, while larger installations can use supercritical or USC technology. Second, subcritical plants are often paired with local lignite mines, while hard coal is preferred for state-of-the-art USC plants. China has been the remaining major international financier of subcritical units.
- **What is the rate of power demand growth?** Countries with rapidly increasing electricity demand want to expand supply systems quickly, and large baseload coal plants are a guaranteed way to fulfil their needs. However, many developing countries have experienced slower demand growth than expected. This trend has accelerated due to the lockdowns and economic slowdown caused by Covid-19. Some governments are beginning to reconsider their energy needs, including giving coal a reduced role in national energy plans.

Conditions are changing, however. The post-2020 world has different characteristics and concerns than existed at the start of the BRI in 2013. The most obvious issue is the Covid-19 pandemic and the associated economic downturn. Global lockdowns, travel restrictions, and depressed economic growth resulted in energy demand up to 25% lower than usual in 2020. This benchmark year followed a decade where electricity demand growth did not live up to expectations in many developing countries. As a result of these shocks, many governments are reconsidering their national energy strategies, including the role for coal. There are a few common factors that seem to influence BRI countries' stance on coal in the energy mix:

- **Cost** – Many BRI countries have high debt burdens and are at risk of being unable to pay back their loans. Therefore, they may be wary of taking on additional debt if not strictly essential. There is concern about overcapacity, as cash-strapped utilities and governments cannot afford the burden of large capacity market payments.
- **Environmental concerns** – 2020 marked the five-year anniversary of the Paris Agreement, and there is growing concern among experts that the 1.5°C target will not be met. While some countries have planned for additional coal capacity in their Nationally Determined Contributions, others are moving toward a more renewables-focused strategy. China will likely be interested in energy investments regardless of the source, as it has expertise in both coal and renewable technologies. Growing environmental activism at the local level has also

impacted some BRI coal projects. Despite being supported by the government, coal projects in Turkey and Kenya have been overturned by the courts for inadequate environmental impact assessments.

Ultimately, China wants to engage with BRI countries on trade and development generally, not coal specifically. It is likely to continue to support the local infrastructure plans of each country regardless of their choice of energy technology, because Chinese companies have manufacturing, engineering, and construction capacities across the spectrum of energy products. While the recent announcement from President Xi Jinping that China will not fund any new coal plants signals a potentially drastic change in the scope of the BRI, the lack of detail means that there is still scope for engagement in the coal sector. There are still many Chinese-sponsored coal plants in the pipeline, so coal will surely continue to be a part of the BRI in the near term. The bottom-up nature of the BRI means that until China commits to a clearer policy, the future of coal will be shaped by many international players, particularly the host nations of the BRI.

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