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Chinese Overseas Finance in Renewable Energy in Argentina and Brazil: Implications for the Energy Transition

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Abstract

China began to accelerate the energy transition in the last decade as a strategy for rebalancing its economy and becoming a more influential actor in the global renewable energy market. This article explores to what extent Chinese investment and financing in renewable energy projects in Argentina and Brazil promote these countries' energy transition strategies and sustainable development more broadly. To approach this question, the article provides a reading of Ostrom's postulates of the energy transition as an increasingly relevant driver of certain states' relationships with other countries. General trajectories of Chinese investment and lending in Latin America provide a background to Chinese investment in solar and wind power projects in Argentina and Brazil. The article concludes that China's overseas finance merges with Argentina and Brazil's own goals regarding renewable energy deployment and discusses future challenges in the context of the COVID-19 pandemic and its aftermath.

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Keywords

Chinese Foreign Direct Investment, lending, renewable energies, Argentina and Brazil, international relations

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Introduction

The rise of China as a key global economic and financial has turned it into the second largest economy in the world (González Jáuregui, 2018; Myers and Ray, 2020) and the largest official creditor. Furthermore, China's construction projects amounted to nearly USD 66 billion between 2005 and 2021 (Congressional Research Service, 2022). China's outstanding economic performance, with an average annual growth of 9.34 per cent over three decades (World Bank, 2020), has placed the country as a major consumer of foodstuffs, minerals, and energy globally. In this context, China has sought to develop commodity-based trade and investment relationships with a select group of countries in South America, notably Argentina, Brazil, Chile, and Peru.

In consequence, China has become and will continue to be a major driver of the world's energy consumption being the main consumer in 2020 with 145.46 exajoules which is far more than was consumed by the United States (87.79 exajoules) which ranks second (Sönnichsen, 2021). The increase in income and industrial activity is continuously demanding higher energy resources. Besides, China stands as the largest global importer of oil, carbon, and lignite, and the second largest importer of gas (Clemente, 2019). Rapid economic growth has also affected the rise of China's CO2 emissions per capita from 2.15 kiloton in 1990 to 6.9 kiloton in 2019 (World Bank, 2020).

In recent years, China has embraced climate change and sustainable development goals, setting ambitious objectives to deploy renewable energy. Renewable energy can be understood as the energy that is derived from a supply that is constantly and naturally replenished over a relatively short time (Coburn and Farhar, 2004). After peaking coal consumption in 2013, China has set fuel-mix transition targets to promote the use of low-carbon and renewable energies (Brookings Institution, 2020). In 2020, Beijing set specific goals: to reduce its dependence on fossil fuels – which accounts for almost 90 per cent of China's current fuel mix – by increasing the share of non-fossil fuels in primary energy to around 20 per cent by 2030 and to accomplish the goals of the Paris Agreement on Climate Change to show its global leadership.

During the 2020 UN General Assembly, Chinese President Xi Jinping announced Beijing's pledge to have CO2 emissions peak before 2030 and reach carbon neutrality before 2060. As the world's leading emitter of heat-trapping gases – China accounted for 30.7 per cent of global carbon dioxide emissions in 2020 – China has a long way to achieve these goals. At the same time, China has become the global leader in solar, wind, hydroelectric, and geothermal power generation, as well as in lithium-ion batteries production and the largest market for electric vehicles. This is reflected in China's priorities and strategies: China stands as the major investor in renewable energy capacity domestically, committing to USD 758 billion between 2010 and the first half of 2019 (IISD, 2019).

Since the turn of this century, China has gained a leading role through overseas finance in areas where the G7 members typically play a key role but are less accessible to developing countries (Wise, 2020). Though the onset of China's relations with countries in Latin America dates to post-World War II, engagement has progressed substantially

over the last two decades, and economic ties have strengthened through trade, investment, and, more recently, lending and aid (Gélvez and Gachúz, 2020). In this framework, renewable energy has become an important focus of Chinese investment and finance in the region. This phenomenon provides a new scenario for countries in Latin America where it is important to understand the evolution of the investment flows as well as the potential consequences of this new trend.

However, in the strategic rivalry between China and the United States, the US officials and experts point out China's influence in Latin America and the role it has gained as a relevant trade partner, investor, and lender in the region. The topic also gains significant relevance as criticism from the United States has focused on the underlying strategies of China's engagement with the region, and the extent to which these countries have opportunities to benefit from this partnership. Based on this context, this article examines Chinese investment and financing in the solar and wind power sectors in Argentina and Brazil.

This article provides a contribution to the social science by analysing novel trends of changes in the renewable energy sector and addresses the question of whether and how Chinese investment and loans in renewables are promoting Argentina and Brazil's goals and priorities towards energy transition. Also, it reaches some preliminary conclusions about the challenges ahead, considering the economic recovery from the COVID-19 crisis. The Argentinian and Brazilian cases have been selected for various reasons. First, these countries are among the largest economies in South America, but also the major regional recipients of Chinese investment and finance in renewables. Second, although having a profound economic relationship with China, they received investment and financing from China in renewable energy without yet being part of the Belt and Road Initiative (BRI) which Argentina only officially joined in February 2022.

Theories on energy economic transformation have analysed several causes of the process. In this group, Ostrom (2007, 2008) proposes a multi-layer complex system to understand energy transition in a process of co-evolution affected by several actors and nodes of change occurring simultaneously. China's energy transition strategy provides an adequate scenario to evidence how this type of relationship takes place as the country advances towards the deployment of renewable energies and increases its international presence to materialise some energy transformation node projects.

The structure of the article is as follows. The subsequent section presents the theoretical approach. The third section addresses China's domestic and global climate priorities serving as background to comprehend Chinese investment and finance in renewables in Latin America. The fourth section contributes to literature by providing a detailed outline of the core features of China and Latin America's economic cooperation, focusing on the main trajectories of Chinese foreign direct investment (FDI) and lending in the region. This section also introduces Argentina and Brazil's policies towards renewable energy, enumerates the countries' major objectives towards energy transition, and analyses how these countries have attracted Chinese investment and loans in renewables. Then, it digs into the most relevant industry cases while surveying the prevailing actors. The conclusion summarises the findings and discusses the challenges ahead in the context of economic recovery from the COVID-19 pandemic.

Institutional Framework and Energy Transitions: A Theoretical Background

Energy transitions result from social transformations, including socio-economic development (Norgaard, 1994) and technological revolutions (Freeman and Louçã, 2001), with political motivations and institutional framework providing the most prominent theoretical perspectives (Kern, 2011; Meadowcroft, 2009; Schreuer et al., 2010). According to Cherp et al. (2018), countries experiencing economic and technological progress shape energy innovations and changes in policies. The authors claim these transitions require an evolution in three systems: energy flows and markets, energy technologies, and energy-related policies.

Among several theories of energy transitions, Ostrom (2007, 2008) has been a salient contributor. According to Ostrom, energy transition is a complex system, which co-evolves in nodes that change autonomously and independently of each other, in several dimensions and projects that gradually adapt and mesh within a plan. In this process, domestic and external factors are intertwined. Eventually, the behaviour of one country or actor will affect transitions in other countries in a multi-tier socioecological system. However, as shown in Figure 1, in real life, the energy transition process can locate a country in several parallel stages at the same time.

Economists have shown that wealthier societies use higher-quality energy (Bashmakov, 2007; Burke and Csereklyei, 2016). According to Ostrom, techno-economic transformations include the reforms of a country designed to change their production systems from fuel, coal, and other non-renewable resources into cleaner technologies, and these

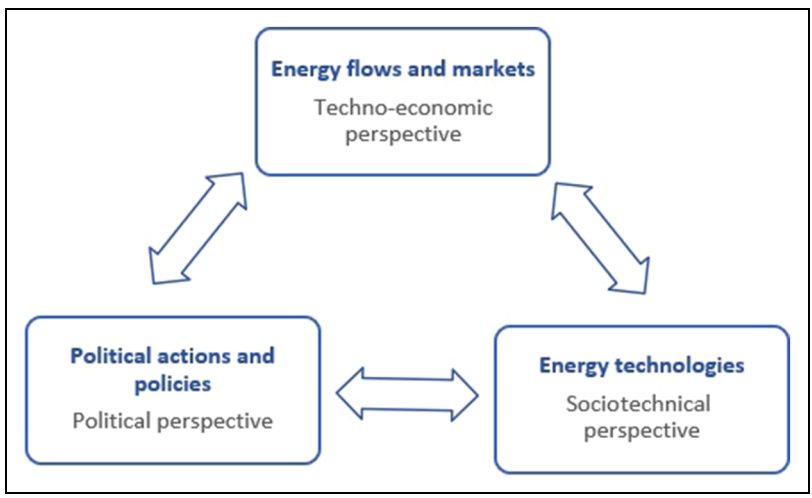

Figure 1. Co-Evolving Systems from Ostrom's Theory.
Source: Own elaboration based on Cherp et al. (2018).

conversions will occur as a historical change that requires economic development, thereby enabling households, factories, and the government to materialise those changes into a plan of action. For example, the electricity substitution process from hydroelectric or coal-intensive power into solar power through panels requires a substantive investment that can only be met under good economic conditions.

Technological innovations also affect the pace of techno-economic transformations. In this process, Ostrom highlights that the market itself will create incentives for the transition. For Ostrom (2007), the market is a catalyst of the change and will facilitate the decision-making of the transition process.

Ostrom also sees the process from a political perspective, claiming it requires changes to meet new legal frameworks and standards at the domestic and international levels and significant support from the government to leverage the policy and expand it by acquiring or negotiating with other countries the frameworks needed to implement energy transformation related projects. Regarding this idea, Hall (1993) distinguishes between state-centric and state-structural approaches, if states' policies reflect the result of a conflict between several political actors, taxes, and subsidies for projects and programmes.

Socio-technological changes are affected by learning and diffusion as key nodes of change. In this process, old technologies become obsolete and new ones replace them. The authors including Markard et al. (2012) use the term Technological Innovation Systems to explain the mechanism that spreads new technologies. This idea is further developed by Turnheim et al. (2015), who claim that there is a set of routines in the interaction with energy that changes over time.

Based on this theoretical approach, this article focuses on policies aimed at mitigating climate change and advancing to energy transition through overseas investment and finance as increasingly relevant drivers of certain states' relationships with other countries. This node of change is relevant for two reasons. First, world economic interdependency leads to interactions with other nations as one country cannot respond to a gargantuan task such as technological change within an isolated process because of resource and capability constraints.

Thus, through the formulation and implementation of energy policies, states interact not only with domestic actors but also with other states and move towards energy transition within a co-evolutionary process (Cherp et al., 2018). Second, commitment to international initiatives can foster domestic support in implementing policies and programmes. For instance, climate change conventions and pacts create a sentiment of national responsibility within the international system. Figure 2 summarises the relationship between these two variables.

China's Energy Transformation: A Co-Evolutionary Process

In recent years, China has started climate change mitigation and energy transition based on targets established by the central government and associated with carbon intensity, energy intensity, total energy consumption, and the share of renewables in the country's energy mix. Most of these indicators are set in the context of the five-year plans that

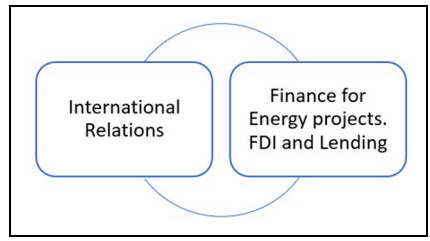

Figure 2. Political International Relations and Foreign Direct Investment (FDI) and Lending.
Source: Own elaboration based on Ostrom's (2007) postulates of political actions in the energy transition.

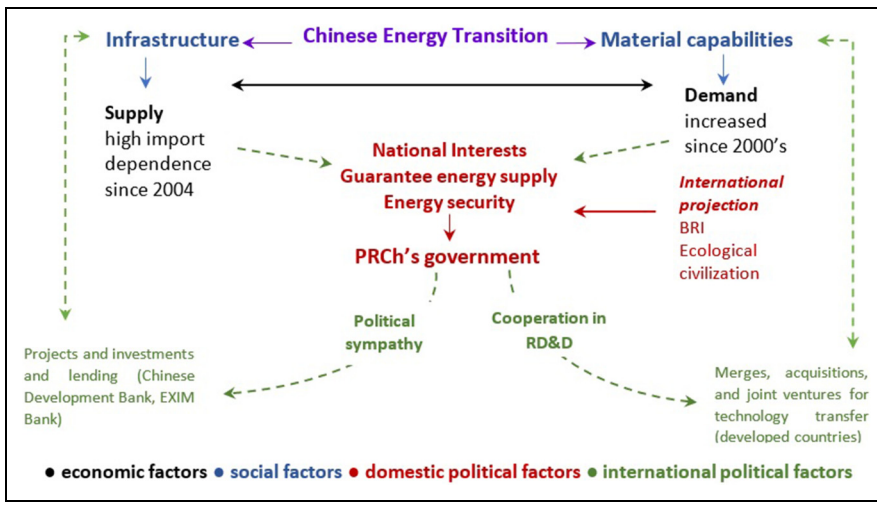

Figure 3. Co-Evolutionary Process of the Chinese Energy Transition.
Source: Own elaboration based on Cherp et al. (2018).

govern China's macroeconomic trajectory and have an impact on its overseas finance portfolio. The evolution of China's energy transition strategy is explained in subsection 3.1.

Hence, the Chinese energy transition reflects several key factors of Ostrom's (2007) co-evolutionary theoretical framework. As shown in Figure 3, the international relations established by China are compatible with its energy transition strategy: with the rise in per capita income, alongside China's industrial growth, energy demand has increased since 2000, pressing for a large scale of energy supply from abroad.

This situation has led China to become a net importer of energy since 2004, enhancing incentives for the government to move towards national projects and initiatives to guarantee energy security for both the Chinese population and the Chinese industry.

For instance, the so-called socialism with Chinese characteristics has strengthened market liberties and higher income levels for their citizens (Gélvez and Defelipe, 2016).

Increasingly, Beijing invests and provides loans to develop renewable energy projects worldwide, though its focus is on developing countries: both companies and policy banks are looking overseas for opportunities in renewable energy development, expanding mainly into African, Asian, and Latin American countries. As examined below, Chinese companies are already highly active, and expanding rapidly, in the solar and wind power sectors in Argentina and Brazil.

In 2019, according to REN21 (2020), the amount of new renewable power capacity that was added around the world (excluding large hydroelectric projects) was the most significant ever; this meant a continuation of several trends in renewable energy investment that had been underway since 2015. Large hydro projects (those that generate more than 50MW) exceed the aim of this article for three reasons. First, they use a long-established technology, which does not share the same technologies used for "new renewables" such as solar, wind, and biomass. Second, as addressed by IEA-ETSAP and IRENA (2015), large-scale hydropower projects can be controversial concerning both environmental and social aspects, as they may not only adversely affect water availability over large geographic regions, but also inundate valuable ecosystems, and even force the relocation of local populations against their will, and/or require a large electricity transmission infrastructure. Third, investment is hard to estimate as extensive projects unfold over many years.

Though the COVID-19 pandemic has intensively impacted energy markets, renewable energy has continued to grow, with solar and wind power sectors recording their largest-ever increase to 238 GW in 2020, 50 per cent larger than any time in history. China was the largest individual contributor to renewables growth in 2020, accounting for roughly half of the global increase in wind and solar capacity, followed by the United States (BP, 2021).

China's Climate Priorities: An Overview

To achieve modernisation at home, Chinese bureaucrats and corporations have embraced globalisation, looking beyond China's shores to secure resources, markets, and technologies (Kong, 2019). This imperative of modernising China through globalisation helps explain why Beijing is providing development finance to countries like Argentina and Brazil.

As explained by the co-evolutionary theory, which claims that domestic and external factors evolve together, part of China's push has included efforts to internationalise its development strategy, especially through two complementary policies, the so-called Going Global strategy, and the BRI. The Going Global strategy was launched in 2001 to encourage Chinese firms to invest overseas. The unveiling of the BRI helped accelerate the implementation of this strategy. Launched in 2013, the BRI is Beijing's attempt to globalise its financing as a major source of capital around the world through offshore loans for governments and investment channeled through Chinese companies, principally

state-owned enterprises (SOEs) in the energy sphere and other strategic sectors. Two major policy banks – the China Development Bank (CDB) and the Export–Import Bank of China (CHEXIM) – have steered this development financing.

However, only a small fraction of the financing provided by China's two policy banks for energy projects worldwide is being allocated for renewable power – namely wind, solar, and small-scale hydropower facilities.

According to Gallagher (2021), both the CDB and CHEXIM have provided USD 245.8 billion for energy projects globally since 2000, with solar and wind projects representing 1.5 per cent of the total; meanwhile, oil and coal account for 51.8 per cent of the total, while large-scale hydropower projects make up 18 per cent. In terms of the geographic distribution of Chinese energy finance, Latin America represents 18.7 per cent, while Europe and Central Asia represent 32 per cent, Asia 27.7 per cent, and Africa 21.6 per cent. In the renewables sector, Chinese lenders provide loans for projects that align with China's climate policy and facilitate the development of low-carbon energy sources. These loans also help Chinese enterprises to export the energy products and services they produce, such as photovoltaic equipment, wind turbines, energy efficiency technologies, batteries, and geothermal power plants. China's so-called "Made in China 2025" industrial policy plan became intertwined with its outbound investment strategies. Thus, the Chinese case shows how, according to Ostrom, techno-economic transformations include changes in the production systems. In this framework, technological innovations are key.

Though Beijing has participated in international talks on climate change for decades, it has assumed a more prominent leadership role in recent years. As a developing country, China had no formal obligations to reduce emissions and did not establish climate targets under the original UN Framework Convention on Climate Change or the Kyoto Protocol. China's first formal targets to support international negotiations on climate change were proposed in Copenhagen in 2009; however, that summit did not achieve the consensus needed to establish a new treaty. In 2014, Beijing established targets through the US–China Joint Announcement on Climate Change, targets that were later embodied in the Paris Agreement. For the first time, China announced that it would limit its emissions of heat-trapping carbon dioxide and strive to reach peak emissions around 2030.

During the Eleventh Five-Year Plan (2006–2010), a national energy-intensity target was set – a 20 per cent reduction in the country's energy consumption levels starting in 2006, with the aim of reaching that goal by 2010. China's emissions intensity had begun to rise during the Tenth-Five Year Plan period because of increased output from heavy industry and manufacturing. Yet, many of the country's provinces failed to achieve those energy efficiencies and environmental goals. The Twelfth Five-Year Plan (2011–2015) was the first to introduce a national strategy for climate adaptation.

The Thirteenth Five-Year Plan (2016–2020) further advanced the country on a path towards intensive environmental reforms, for example, setting the target of achieving at least 15 per cent of the country's primary energy supply from non-fossil fuels by 2020. To achieve this goal, the government promoted the expansion of hydroelectric, nuclear, solar, and wind power plants. During this period, the concept of "ecological

civilization" was launched as central to the realisation of the Chinese Dream, which refers to attaining the Chinese government's two centenary goals through a two-stage development plan. The first stage, spanning from 2020 to 2035, and the second stage, from 2035 to 2050, are concerned with the revitalisation and modernisation of the Chinese nation and with its positioning as a leading world power (NRDC, 2016).

China's effort to advance towards energy transition can be seen in the shift of its energy matrix into renewable energy generation. At present, China's primary energy supply is coal, which represents 64 per cent, oil and gas, which provide 19 per cent and 7 per cent, respectively, while renewables represent 8 per cent, and nuclear power 2 per cent (IRENA, 2020). Between 2018 and 2019, China's renewables installed capacity increased by 9.1 per cent to advance towards energy transition.

In this endeavor, China has increased its renewable energy consumption and decreased its per capita CO2 emissions since 2005; these advances also show the increase in the installed capacity and generation of electricity through renewable energies, especially since 2010 (Figure 4).

The Fourteenth Five-Year Plan (2021–2025) deepens many of the policies already initiated during earlier periods. According to this Plan, efforts will focus on technological innovation and what the Chinese government calls "neo-infrastructure construction." Among others, these include electric vehicle recharging points and efforts to drive sustained economic growth. These initiatives show how needs are transformed into political actions and policies, as explained by the co-evolutionary theory.

Finding ways to foster low-carbon energy and reduce emissions are equally important, as the new plan contains binding targets to reduce energy intensity by 13.5 per cent, lower carbon intensity by 18 per cent, and reach a 20 per cent share of no fossil fuels in primary energy use by 2025. These targets came after Xi's September 2020 announcement that

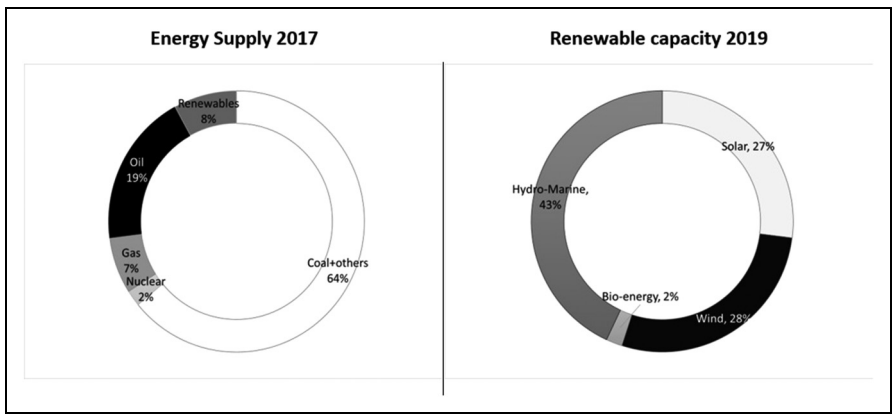

Figure 4. Energy Supply and Capacity China 2017 and 2019.
Source: Own elaboration based on the energy profile of China (IRENA 2020).

China aims to reach carbon neutrality by 2060. Later, at the UN's Climate Ambition Summit in December 2020, China updated its national determined contributions for 2030 (its commitments under the Paris Agreement), the originals of which had been submitted to the UN Framework Convention on Climate Change in 2015. In this update, Beijing set the goals of enlarging its installed capacity of wind and solar power to 1,200 gigawatts (GW) by 2030 (Climate Action Tracker, 2020).

Wind and solar power deployment have advanced considerably in China, with almost three times as much capacity as any other country in the world (IRENA, 2020; Sandalow, 2020). As shown in Figures 5 and 6, China has become the largest consumer worldwide since 2015 and the third largest investor in renewable energies as a percentage of GDP, and a significant application for patents as shown in Figures 7 and 8.

China's Energy Transition Within the BRI

The BRI has become a broad framework for certain Chinese green development policies, including an emphasis on the construction of energy projects around the world. In these projects, relevant participants have not only been Chinese policy and commercial banks but also SOEs and private energy companies. Chinese SOEs predominate when it comes to coal-fired power and hydroelectric projects, while the leading Chinese enterprises for renewable power that are competing globally tend to be smaller, privately owned firms (Kong and Gallagher, 2020). FDI in the form of greenfield ventures as well as mergers

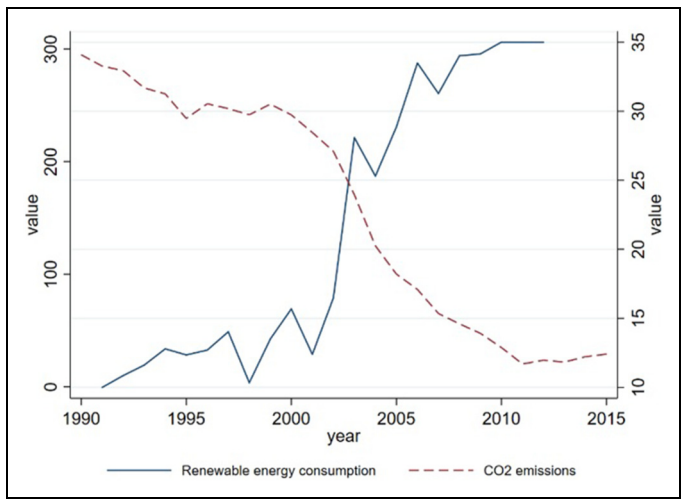

Figure 5. China's Renewable Energy Consumption and CO2 Emissions.
Source: Own elaboration based on the World Bank (2020a) Climate Change Indicators.
Note: Renewable energy consumption (per cent of total final energy consumption) and CO2 emissions (metric tonnes per capita).

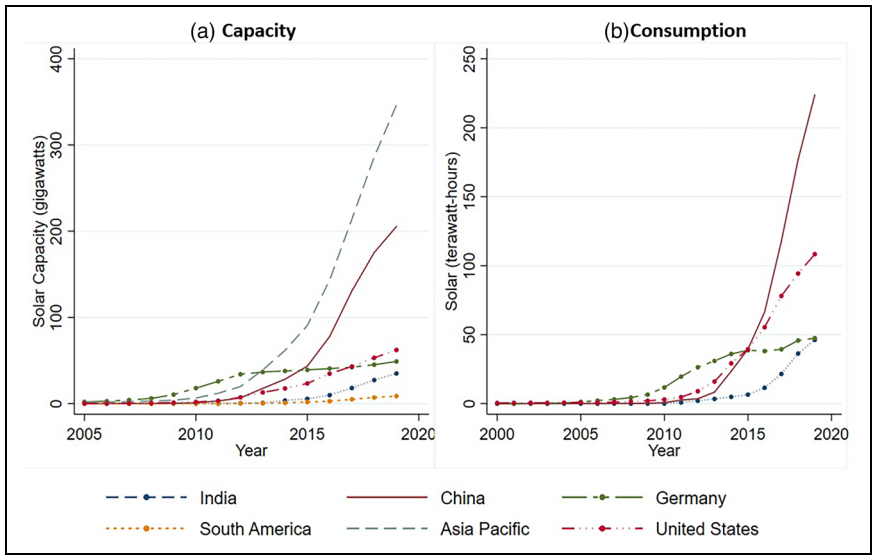

Figure 6. Installed Capacity and Consumption of Solar Energy in Selected Countries.
Source: Own elaboration based on the BP Statistical Review of World Energy (2020).
Note: Electricity generation from solar, measured in terawatt-hours (TWh) per year.

and acquisitions (M&A) account for most of the overseas, low-carbon energy projects that Chinese actors have invested in. China's policy banks provide loans for these projects through the BRI, while Chinese companies are offering both types of FDI to bankroll renewable energy projects around the world (IRENA, 2019).

Like in other parts of the world, Chinese projects across Latin America have been criticised for their adverse environmental and social impacts. Three such projects are the China-funded Coca Codo Sinclair Dam project, a hydroelectric dam east of the Ecuadorian capital of Quito; the Rositas Dam project, a controversial dam that was meant to be a joint venture between the Bolivian energy agency and a Chinese consortium; and the Kirchner and Cepernic hydropower dams in Argentina (González Jáuregui, 2021). In these and other countries, protesters have mobilised to exert pressure on Chinese investors to strengthen their compliance with host countries' laws and regulations on environmental protection.

In response, a variety of Chinese actors and institutions have strived to implement this top-level policy guidance. For instance, in 2020, the BRI International Green Development Coalition convened a group of Chinese and international advisers and experts that proposed a system to categorise China's overseas investments, to consider their impacts in terms of pollution, the climate, and biodiversity. Furthermore, according to Ma and Gallagher (2021), more than thirty central SOEs have set targets and action plans in response to climate change, while the State-Owned Assets Supervision and Administration

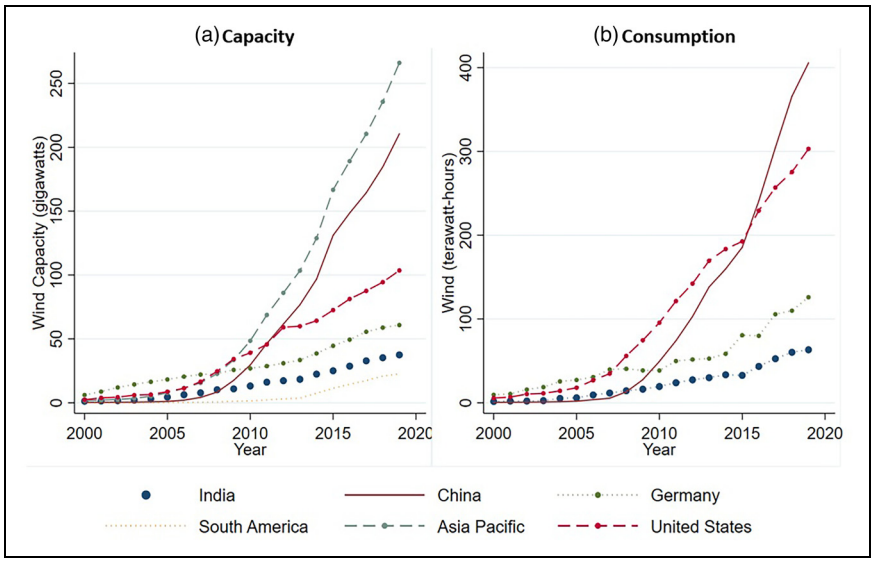

Figure 7. Installed Wind Energy Capacity and Consumption in Selected Countries.
Source: Own elaboration based on BP Statistical Review of World Energy (2020).
Note: Cumulative installed wind energy capacity including both onshore and offshore wind sources, measured in gigawatts (GW).

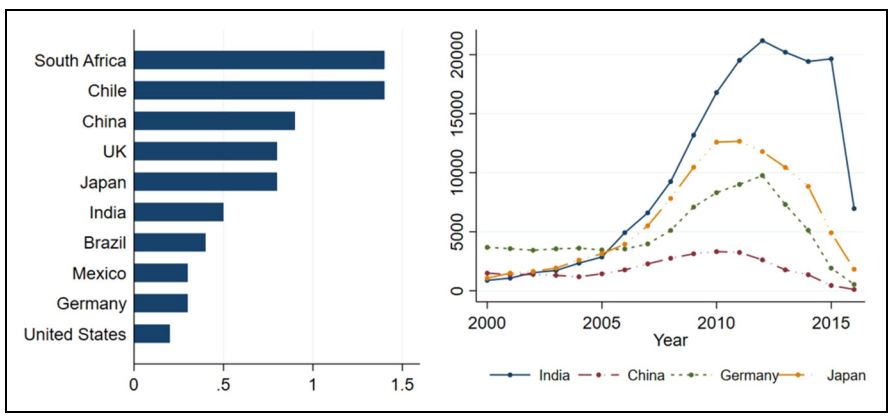

Figure 8. Investment in Per Cent of GDP and Patents in Renewable Energies in Selected Countries.
Source: Own elaboration based on BloombergNEF (2019) and the World Bank Indicators and patents data from IRENA (2019) Resource Database.

Commission is expected to provide policy implementation guidance for these firms soon. China has also updated its 2015 catalogue of eligibility terms for green bonds and has restricted projects classified as "clean coal" from applying for these bonds.

Sino–Latin American Economic Relations: Trajectories of Chinese FDI and Finance

The demand for fuels, energy, foodstuffs, and basic products has been a key driver of China's engagement in Latin America in the twenty-first century. As natural-resource-rich countries, Latin American countries emerged as significant providers of these resources and products for China, but also important destinations for China's industrial products and, more recently, of its investment and lending (ECLAC, 2018).

Trade between China and Latin America has grown in the past two decades, from USD 12 billion in 2000 to around USD 315 billion in 2020 (Ray et al., 2021). Most of South America's exports to China have been of raw commodities, while the region mainly imports industrial products. As a result, most Latin American countries show negative merchandise trade balances with China – except for Brazil, Chile, and Peru. China ranks as a leading source of these countries' imports and is also one of their top export markets (González Jáuregui, 2018; Laufer, 2019). Amid US–China trade tensions, China's demand for South American commodities has accelerated since 2017, especially for beef and soybeans (Ray et al., 2021).

Moreover, Latin American nations have become sizeable recipients of Chinese global investment too, accounting for nearly USD 160 billion between 2000 and 2020 (Dussel Peters, 2021). Consider the case of the Community of Latin American and Caribbean States (CELAC), a regional cooperation forum that China has prioritised to enhance its relations with Latin American countries and advance their engagement with the BRI. In Beijing, at the first ministerial meeting of the China-CELAC Forum in 2015, Xi ambitiously pledged that, between 2015 and 2025, Chinese firms would aim to invest USD 250 billion in Latin America. According to Dussel Peters (2021), Chinese investments in Latin America totaled USD 79.8 billion between 2015 and 2020.

The drop in international prices of raw materials due to lower demand in China, together with the economic recession of 2015 and 2016 in Latin America (mainly in Brazil), adversely affected the trajectory of Chinese capital flows to Latin America. In 2016, Chinese investment registered its lowest level in some time, accounting for 4.7 per cent of the region's total investments. By 2019, this figure had rebounded to 10.8 per cent of Latin American total investments. However, in 2020, because of the pandemic and its economic fallout, Chinese investments fell again, accounting for an estimated 9.8 per cent of the region's total investments (Dussel Peters, 2021).

Meanwhile, announcements of Chinese companies' greenfield investments in Latin America fell dramatically due to the pandemic-triggered economic downturn, from more than USD 13.4 billion in 2019 to USD 2.5 billion in 2020. From a sectoral perspective, extraction and processing represented USD 1.4 billion, infrastructure accounted for USD 700 million, and manufacturing comprised a good share of the remaining amount (Ray et al., 2021). Of late, Chinese investment has begun to be concentrated in M&A, or brownfield investments, a trend that reflects changes in ownership as Chinese firms have increasingly bought existing assets outright around the world, including in Latin America.

Between 2010 and 2014, Argentina and Brazil accounted for 61.2 per cent of Chinese investment in Latin America, but this figure fell to 17.6 per cent in 2020. Conversely, Chile, Colombia, Mexico, and Peru have gained relevance since 2017, with Chile, Colombia, and Mexico accounting for 76.9 per cent of Chinese investment in the region in 2020. Between 2005 and 2009, Chinese investment flows to Latin America and the Caribbean concentrated in raw materials, accounting for 94.7 per cent of the total amount, but this figure plummeted to 58.9 per cent between 2015 and 2020. Notably, the proportion of Chinese investment that went to services and domestic-oriented ventures rose from 1.3 per cent from 2005 to 2009 to 25.8 per cent from 2015 to 2020 (Dussel Peters, 2021). Between 2000 and 2020, Chinese investment in energy, telecommunications, automotive parts, and electronics vaulted ahead of Chinese investment in metals, minerals, and mining in Latin America. Nonetheless, infrastructure projects continue to dominate both M&A as well as greenfield deals, particularly in the electricity sector (Baigorri, 2020). Regarding investment in renewable energy in the region, more than 15 per cent of the Chinese investment in the energy sector between 2000 and 2020 went to renewables. Argentina, Brazil, Bolivia, and Chile have been the main recipients; meanwhile, China has developed projects in Cuba and Peru but to a lesser degree (Albe and Phillips, 2021).

As part of its new global strategy, China has also become a leading source of financing for Latin American countries. Between 2005 and 2019, CDB and CHEXIM have provided the region with more than USD 137 billion in loans, exceeding the combined financing of the World Bank, the Inter-American Development Bank (IDB), and the CAF-Development Bank of Latin America. These Chinese loans focus mainly on energy, mining, and infrastructure projects. Chinese policy banks provide loans to different countries in the region but a specific subset of nations, Argentina, Brazil, Ecuador, and Venezuela, have been the focus of Chinese financing since 2005 (Myers and Ray, 2021). However, in 2020, for the first year since 2006, neither the CDB nor the CHEXIM committed new loans or credit lines with Latin American countries. Instead, the Chinese focus was on the renegotiation of existing debts, particularly with Ecuador and Venezuela (Ray et al., 2021). As for Argentina, a bilateral currency swap agreement worth USD 18.2 billion was renewed in August 2020.

Though state-to-state financing to the region has been decreasing, China has begun to expand and test other sources of bilateral and regional lending (Myers and Ray, 2021). Additionally, China's four major commercial banks – the ICBC, the Bank of China, the Agricultural Bank of China, and the China Construction Bank – have also become relevant players in Latin America, as they provide commercial and trade financing as well as retail banking services. Unlike Chinese policy banks' activity, commercial banks have mainly concentrated in providing finance to develop renewable energy projects (Myers and Ray, 2021).

The launch of China's BRI in 2013 has intensified this new era of economic engagement with Latin American countries. Twenty-one Latin American countries have signed BRI-related memorandums of understanding (MOUs) as of March 2022, no longer after Beijing formalised Latin America and the Caribbean as a "natural extension" of BRI's

maritime route in 2017 (Wang, 2017). Brazil, Colombia, and Mexico have not yet formally signed such MOUs. Jointly, these three countries along with Argentina, Chile, and Peru make up the six largest economies in Latin America. Argentina was the last Latin American country to join the BRI, during the presidential state visit to China in February 2022. Between 2019 and 2021, Argentina, Brazil, Ecuador, and Uruguay also became members of the Beijing-backed Asian Infrastructure Investment Bank, a multilateral development bank that formally opened for business in 2016. As addressed below, Argentina and Brazil's non-engagement with BRI did not impede an increase in Chinese investment in renewable energy projects in these countries in recent years.

Chinese FDI and Loans in Renewable Energies: Argentina and Brazil

China's climate change policies and its position as a global leader in renewable energy investment, manufacturing, deployment, and innovation, alongside Argentina and Brazil's public policies, have had implications for the development of solar and wind power sectors in these countries. Based on Ostrom's co-evolving system, the following subsections address the cases of Argentina and Brazil, explaining the extent to which China's investments and loans merge with these countries' own objectives regarding renewable energy deployment, and showing how their engagement has had implications for the energy transition in a multi-tier socioecological system.

Argentina. Though Argentina's efforts to embark on an energy transition began in the late 1990s, this push has become a major priority in the twenty-first century and especially since 2015. Argentina has set specific policies to shift its energy usage by seeking foreign investments in its renewable energy sectors, as well as the development of alternative energies, such as nuclear plants, large hydropower facilities, and hydrogen power.

The promotion of renewables in Argentina began in 1998 with the adoption of Law 25.019, which stated that it was in the national interest for the country to generate electric power through solar and wind energy. Later, based on the compromises brokered at the 2004 International Conference for Renewable Energies in Bonn, Germany, the Argentinian government enacted Law 26.190 in 2006, creating a regime to promote the use of renewable energy.

According to a report issued by the Secretariat of Energy (2009), Law 26.190 again declared a national interest in the generation of electric power using renewable sources and promoted research on technological development and the local manufacture of equipment designed for harnessing these sources. Law 26.190 set the additional goal of achieving a contribution of 8 per cent of the country's total electric power consumption through renewables by the end of 2017. To accomplish these ambitious goals, the government established a new national programme "Generación por Energías Renovables" (GENREN), to encourage the provision of electricity from renewable sources through supply contracts involving a complex array of state administrative bodies and companies. In 2006 and 2007, three additional laws related to renewable energy were enacted: Law 26.093, implemented by Decree 109/07 Biofuels Law; Law 26.123 "Promotion of

Hydrogen Energy"; and Law 26.334 "Regime for the promotion of bioethanol production."

By 2015, the Argentinian government had enacted Law 27.191, creating a national regime for promoting electricity generation from renewables and introducing important changes to the regulations enshrined in Law 26.190. The purpose of this new energy regime was to ensure that energy generation from renewable sources accounted for 20 per cent of Argentina's total national energy consumption by the end of 2025, with intermediate targets of 8 per cent by the end of 2017, 12 per cent by the end of 2019, 16 per cent by the end of 2021, and 18 per cent by the end of 2023, respectively.

Based on Argentina's commitments under the Paris Agreement, which the government ratified through Law 27.270 in 2016, the country pledged to adopt measures against climate change and further advance the country's overall energy transition through renewables. Argentina launched the RenovAr Program – a national programme involving regular, open calls for auctions in several rounds through which national and multinational corporations could present investment proposals for renewable energy projects.

The share of renewables in Argentina's total energy generation has increased since 2015. Even so, 61.4 per cent of the country's total electricity generation is still derived from fossil fuels, while 21.7 per cent comes from large hydropower stations, 7.5 per cent from nuclear power, and 9.5 per cent from renewable sources (including wind, solar, bioenergy, and small hydropower facilities) (CAMMESA, 2021). The above-mentioned laws, particularly the last one, opened the door for Chinese investment in renewables in Argentina.

Argentina is in the top five investment destinations of China in Latin America: between 2015 and 2019 the outflow of FDI was USD 2.513 million (Table 1). As shown in Figures 9 and 10, the flows peaked in 2017 and have been relatively steady since then. Based on an increasingly relevant Chinese presence in the country, Argentina has become more assertive in trying to harness China as a counterpart for its energy transition strategy through cultivating a multiple engagement level. As addressed below, at the national level, the auctions for renewable projects launched by the national government served as the main means of attracting foreign investment to those sectors. At the subnational level, both policymakers and entrepreneurs have also sought Chinese investment; to further encourage this engagement, the Argentinean embassy in China has set up a Subnational Federal Program to promote links based on resource endowments and production profiles (González Jáuregui, 2021).

According to data published by Argentina's Secretariat of Energy (2021), a diverse range of Chinese companies participated in the official calls for auctions under RenovAr in 2016, in rounds 1 and 1.5. Chinese firms were awarded 29 per cent of the total renewable energy projects in these rounds. the Chinese enterprise Envision Energy was awarded with contracts to construct the wind farm Los Meandros in Confluencia, Neuquén province; this farm would generate 75 MW and would be later expanded. Envision were also granted contracts to construct the wind farms García del Río in Bahia Blanca, Buenos Aires province (with a 10 MW power capacity, inaugurated

Table 1. Chinese Foreign Direct Investment (FDI) in Argentina.

Year	Transactions	Amount (USD million)	Employment
2000–2005	0	0	0
2006–2009	1	4	200
2010–2019	30	12,880	17,266
2000–2019	31	12,884	17,466
2017–2019	15	2,297	10,130

Source: Own elaboration based on Dussel Peters (2020).

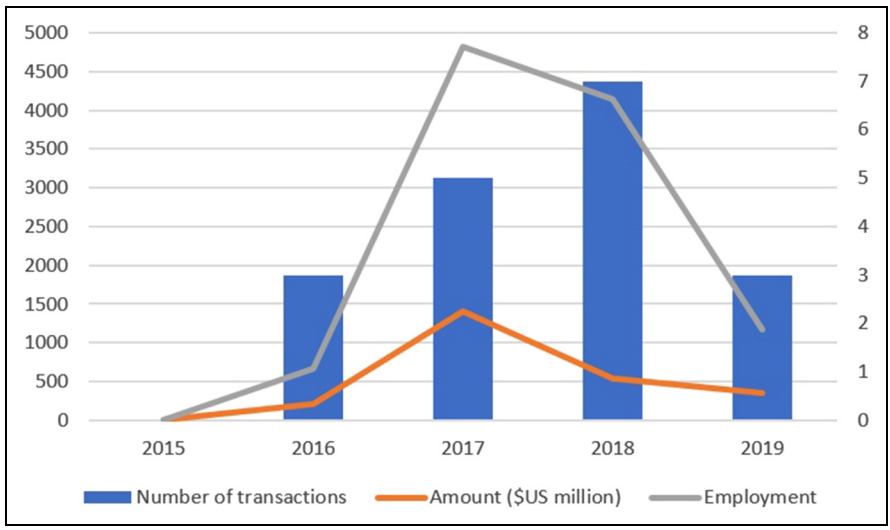

Figure 9. Chinese Flows of Foreign Direct Investment (FDI) from China to Argentina 2015–2019. In million USD.
Source: Own elaboration based on Dussel Peters (2020).

in December 2019); Vientos del Secano, in Villarino, Buenos Aires province (with a 50 MW power capacity, inaugurated in November 2020); and the Cerro Alto wind farm in Pilcaniyeu in Río Negro Province (with a 50-megawatt power-generating capacity). Originally, the Cerro Alto project was supposed to be co-financed by the IDB, but (as addressed below) it was later merged with Los Meandros. Additionally, in round 1.5, the Sinohydro Corporation was awarded the bid to construct the Pampa wind farm in Buenos Aires Province (with a 100-megawatt power-generating capacity).

Out of the total of 1,472 megawatts in wind power contracts awarded in rounds 1 and 1.5 of the RenovAr auctions, two Chinese companies captured 285 megawatts (19 per cent). However, this enthusiasm was short-lived: by 2018, Envision Energy had suspended the Cerro Alto project and merged it with Los Meandros. Although this increased

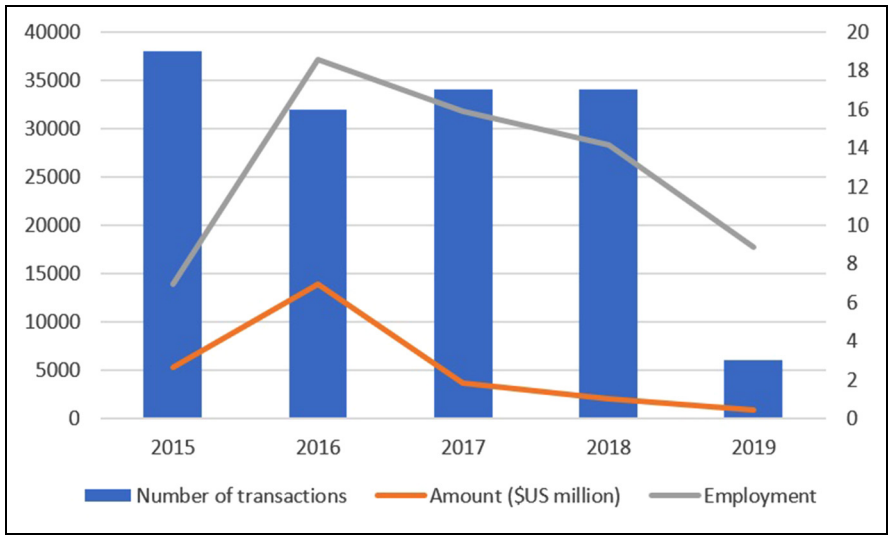

Figure 10. Chinese Foreign Direct Investment (FDI) in Brazil by Industry 2003–2016. In Million USD. *Source*: Own elaboration based on Dussel Peters (2020).

the project's size to 125 megawatts of power capacity and while construction began in February 2019, it has not yet been inaugurated (Observatorio Petrolero Sur, 2020). Meanwhile, Argentina canceled the project it had awarded to Sinohydro because of non-compliance with commitments assumed in the contracts stemming from delays in the start of the construction phase (Energía y Negocios, 2020).

As for Argentina's foray into solar power, various Chinese companies have participated in rounds 1 and 1.5 of the RenovAr auctions. In the first round, an Argentinian state-owned firm called Jujuy Energía y Minería Sociedad del Estado (JEMSE) was awarded the tender to construct a three-part solar park complex in Cauchari in Jujuy Province, with a total power-generating capacity of about 315 megawatts. And while JEMSE is the designated contractor on this project, the design, construction, and operation of the park is slated to fall to two Chinese companies, the Power Construction Corporation of China (also known as PowerChina) and the Shanghai Electric Power Generation Group (also known as Shanghai Electric), with Talesun providing the panels.

A temporary group of enterprises including JEMSE, PowerChina, and Shanghai Electric was selected to develop the park. A total of USD 331.5 million was financed by the Exim Bank of China, while the provincial government additionally issued a green bond for USD 210 million. The total cost of the Cauchari solar park was calculated to be around USD 540 million. The park was inaugurated in October 2019, with commercial operations beginning in September 2020; it is the biggest solar project in all of South America. In April 2021, JEMSE announced the signing of a pre-contract with PowerChina and Shanghai Electric to expand the Cauchari solar park to 500 megawatts.

In round 1.5 of the solar auction, Jinko Solar was awarded a contract to construct the Iglesia Estancia Guañizuil solar park in San Juan Province (with 80 megawatts of power-generating capacity), a project that was inaugurated in May 2019. For this project, IDB Invest provided about USD 10.8 million, while other international lenders granted loans for around USD 39.4 million (IDB Invest, 2018). Out of the 916.2 total megawatts awarded in rounds 1 and 1.5 of the solar power auctions, Chinese enterprises through direct and indirect participation captured 45 per cent of the projects for constructing solar parks in the country. It is important to note that in rounds 1 and 1.5, 97 per cent of the projects awarded were for solar and wind power generation, while the remaining 3 per cent was distributed between biogas, biomass, and small-scale hydroelectric power projects. Of the 97 per cent of projects awarded for solar and wind power generation, China accounted for 29 per cent, followed by Spain, which garnered 17 per cent; the remaining 54 per cent was distributed among sixteen firms from Argentina and other countries (Federici and Ennis, 2020).

In Argentina's wind power sector, Chinese firms have focused on not just tenders but M&A too. In 2017, the private Chinese firm Goldwind acquired the Loma Blanca I, II, and III wind farms (with 50 megawatts of power-generating capacity each), as well as the Loma Blanca VI wind farm (with 100 megawatts of power-generating capacity). These parks are in Rawson and Trelew in Chubut Province. Goldwind's acquisition streak has extended to other projects too, such as the Miramar I wind park (with 96 megawatts of power-generating capacity) in Buenos Aires Province. Goldwind contracted with Power China on an engineering, procurement, and construction contract to build the facilities of the five plants. In April 2021, the three wind farms of the Loma Blanca complex, as well as Miramar I, were inaugurated.

In 2015, the Argentinian enterprise CAMMESA; the then Ministry of Federal Planning, Public Investment, and Services (now called the Ministry of Public Works); and the Chinese government signed an agreement with Sinowind Technologies for the development of the El Angelito wind park (with a 200-megawatt power-generating capacity) in Chubut Province, a project that would be entirely financed by Chinese entities (although this project has not been executed nor has it moved beyond the aspirational phase). Likewise, Canadian Solar, the owner of Argentina's Cafayate solar park (with 100.1 megawatts in power capacity) in Salta Province, contracted with PowerChina as well to make the Chinese firm the engineering, procurement, and construction partner on its project. This park was inaugurated in July 2019.

China's expanding investment and finance for renewable energy projects in Argentina has led to a much larger corporate footprint in the sector over the last five years. Chinese firms are now core investors in the country's renewable power plants. Even when Chinese entities are not the principal financiers, many renewable projects in Argentina rely on the deployment of innovative Chinese technologies, such as wind turbines, photovoltaic cells, and modules. This shows how the co-evolutionary process has materialised in the case of Argentina.

Chinese energy companies, through the Going Out strategy, have merged their expansion interests with Argentina's own aim of advancing towards a more diversified and sustainable energy mix. Unlike many other countries where China has invested in renewable

power, Argentina had attracted all this investment without yet formally joining the BRI, not only by cultivating ties involving national decisionmakers but also by developing extensive local linkages with Chinese entities.

Argentinian policymakers and entrepreneurs at the subnational level – such as those in the provinces of Chubut, Jujuy, and Salta – have sought out Chinese financing in their renewable energy sectors (González Jáuregui, 2021). Jujuy stands out as a prime example since local interactions – such as those promoted by Governor Gerardo Morales and entrepreneurs – with Chinese counterparts have been a key driver of China's growing presence in the province, including partnerships and deals with Chinese companies to build, and expand the Cauchari solar park. Jujuy's local actors have visited China to advance collaboration in energy projects, while several Chinese delegations returned the visit to the province. In Chubut province, Governor Mariano Arcioni has sought Chinese investment in the wind sector through the signature of a letter of intent with China Gezhouba Group for the construction, installation, and operation of the El Escorial wind park. According to Argentina's ambassador to China, this project would be financed by China, based on the terms negotiated during Argentina's state visit in February 2022 (Dinatale, 2022). Local collaboration has also been vital to strengthening the Chinese presence in Salta's solar sector, for example, through several mutual visits that prompted cooperation, and the formalisation of Salta and Xuzhou's sister city relationship in 2021.

As for Argentina and China's cooperation on the energy transition, Argentina's recent official inclusion in the BRI could enhance the presence of Chinese actors in the Argentinian renewable energy sector. Furthermore, the promotion of Chinese investment in Argentina through the BRI has the potential to facilitate an economic recovery from the pandemic based on goals for sustainable development and the energy transition. According to Argentina's ambassador to China, during Argentina's state visit to China in February 2022, agreements were signed to expand Chinese investment and financing in the renewable energy sector (Dinatale, 2022).

That said, Argentina must determine how much its role in the BRI and cooperation with China will align with Argentinian policymakers' vision for the energy transition, adhere to its domestic standards and capabilities, and enhance China's participation in the country's renewable energy sector in ways that allow Argentina to harness Chinese know-how, to innovate, and to develop technological capacities of its own.

Brazil. Brazil pushed forward on renewable energy in 1997 with Law 9478, which established the use of renewable energy sources as a pillar of the country's energy policy. The country's medium-term energy policy is reflected in the Ten-Year Energy Expansion Plans (PDE), which include specific renewable energy targets, for example, the PDE 2023 set the goal of 86.1 per cent of the energy matrix to be represented by renewables by 2023. Brazil's power generation includes a wide presence of hydropower energies. However, extreme droughts that led to energy shortages (e.g. 2001–2002 major drought and power crisis), and delays in finalizing large energy projects have functioned as important drivers for diversifying the electricity mix away from hydropower.

Table 2. Chinese Foreign Direct Investment (FDI) in Brazil.

Year	Transactions	Amount (USD million)	Employment
2000–2005	6	3,565	6,303
2006–2009	9	667	6,407
2010–2019	114	44,469	169,835
2000–2019	129	48,701	182,545
2017–2019	37	6,677	77,787

Source: Own elaboration based on Dussel Peters (2020).

In 2002, to boost non-hydro power renewables deployment, the government launched the Program of Incentives for Alternative Electricity Sources (PROINFA), which promoted the development of wind, biomass, and small hydropower. In 2008, a procurement process of auctions of power purchase agreements (PPAs) replaced the PROINFA system. The Electricity Law of 2004 had created a process scheme via reverse auctions for long-term PPAs, which was then applied to renewables, and it has been the principal instrument to enhance new renewable electricity in Brazil. Brazil's electricity regulatory agency (ANEEL) launches and controls auctions.

Since 2009, Brazil has carried out specific auctions to capacity and become a pioneer in competitive auctions. In 2009, the government approved the National Policy on Climate Change. A drought in 2014–2015 further enhanced the need for diversification of the electricity mix and the promotion of renewable energy deployment.

Thus, Brazil's necessity to expand its renewable power capacity has coincided with China's Going Global strategy and its expansion as a global provider of investment and loans in renewable energies' deployment. As shown in Table 2, Chinese FDI in Brazil amounted to USD 25.9 billion between 2015 and 2019. In alternative energy, wind power represented 15 per cent of Chinese M&A, and 57 per cent of greenfield investments, while solar generation received 2 per cent and 40 per cent, respectively; after Brazilian firms, which own 71 per cent of the country's power generation sector, Chinese companies come second, with 10 per cent (Barbosa, 2020).

According to Climatescope 2019, a report yearly published by *BloombergNEF*, Brazil became the leading recipient in Latin America of Chinese investments in renewable energy (32.2 per cent) (*BloombergNEF*, 2020). Regarding Chinese firms' installed capacity, their plants account for almost 12 per cent of Brazil's operational wind power and 5 per cent of its solar power. Like Argentina, Brazil has attracted all these investments not only by cultivating ties involving national decisionmakers – through auctions launched by the national government – but also through engagement pulled by the Northeastern region's officials (Nascimento et al., 2021).

As Barbosa (2020) remarks, after State Grid purchased the total shares of Companhia Paulista de Força e Luz (CPFL) in 2017, the Chinese firm became the company with the highest wind power capacity (1,494 MW), along with the most individual farms in Brazil, with 51 in total; most of them are in the Northeastern region. Most of the plants were

developed before State Grid gained CPFL; the firm continued its expansion after the Chinese buyout, especially through successful participation in ANEEL's bids.

Since the acquisition of three wind farms from Italian Enel, and the Brazilian company Atlantic Energias Renováveis in 2019, China General Nuclear Power Group (CGN) is the second most relevant Chinese company in Brazil's wind power sector: it owns forty wind plants in total (with 950 MW power capacity). The third most important Chinese company in the Brazilian wind power sector is China Three Gorges (CTG), which has forty-one projects (with 385 MW power capacity) controlled directly by this enterprise, or indirectly through Energias de Portugal Renováveis (EDPR). The latter has taken part in ANEEL's auctions since 2013 and has won several projects. State Power Investment Corp. (SPIC) is the fourth most relevant Chinese company in Brazil's wind power sector: after acquiring Pacific Hydro Brazil in 2017, it became the owner of eleven farms in Paraíba (with 58 MW power capacity).

Brazil's wind power sector has also received Chinese policy bank loans. In 2012, the CDB provided a USD 56 million loan to the Brazilian company Desenvix Energias Renováveis to build the wind farm Barra dos Coqueiros in Sergipe; the Chinese company Sinovel provided the turbines.

As for solar power generation, four Chinese firms are major players in the country: Canadian Solar, CGN, CTG, and State Grid. Canadian Solar started participating in ANEEL's auctions in 2014. Although it won auctions to build eleven solar farms in Minas Gerais, it sold them to the French firm EDF. The company also sold projects to Nebras, from Qatar; however, it kept 80 per cent of the assets in the farms. At present, it owns twenty-three solar farms with 288 MW power capacity in total.

In 2017, Canadian Solar announced a USD 20 million loan from the China-Portuguese-Speaking Countries Fund (CPSC Fund) that would be used in the recently acquired Pirapora solar farms in Minas Gerais. In 2018, the company announced a USD 373 million loan from the Brazilian Development Bank (BNDES), the IDB, and the Northeast Bank of Brazil (BNB) for the Pirapora project. In 2019, the BNB opened new credit lines of USD 79 million to finance solar farms in Jaiba and Lavras. In 2020, Canadian Solar announced a USD 30 million loan from the CPSC Fund to develop and build new solar projects in Brazil (Sánchez Molina, 2020).

In the case of CGN, the company owns ten solar farms with a 300 MW power capacity in Bahía and Piauí. These farms are part of two solar parks (Nova Olinda, with 292 MW power capacity, in Ribeira do Piauí; and Lapa, with 158 MW power capacity on two farms in Bahía) that the company purchased from Enel Green Power in 2019; after this acquisition, it became one of the most important firms in Brazil's solar power sector. As for CTG, it owns, through EDPR, twelve solar farms of 90 MW power capacity in total. With State Grid/CPFL, it has a small-scale project in Sao Pablo.

The Northeast Consortium, which brings together nine provinces of Brazil's northeast region, has been key in seeking engagement with China at the local level. Governors and decisionmakers in this region have pushed for a more prominent Chinese presence in their localities to help promote economic development and aid their energy transitions by harnessing their renewable resource endowments (Nascimento et al., 2021). As

noted, most of the Chinese investments in renewable energy in Brazil has been in Brazil's northeast region.

Brazil is one of the few Latin American countries that has established relations of research, development, and deployment (RD&D) with China in the renewable energy sector. Though scientific collaboration between Brazil and China dates to the 1980s, research and development cooperation in renewable energies was enhanced through the Joint Action Plan (2010–2014), which aimed at promoting cooperation in the sector. In 2009, the two countries co-established the Brazil–China Center for Climate Change and Energy Technology Innovation, which serves as the flagship of their technology partnership.

The Chinese have become the key players in Brazilian renewable energy sectors; in fact, Brazil's renewables sector is a core recipient compared to Chinese overseas investments in other countries, where their primary focus are coal-based energy projects (Gallagher, 2021). The case of Brazil is also distinct based on the establishment of relations of RD&D in renewable energy. This cooperation shows that advances towards energy transition in Brazil are taking place in the framework of a co-evolution process with China. Like Argentina, Brazil has attracted all these Chinese investments without joining the BRI. Also, in Argentina, even when Chinese entities are not the principal financiers, most of the solar energy projects in Brazil rely on the deployment of Chinese technologies, such as photovoltaic modules.

As for challenges ahead, given the COVID-19 pandemic alongside Brazilian's economic crisis in the past decade, the country's situation is complex. Brazil has an opportunity to further enhance Chinese investment and finance in renewable energy to contribute to its economic recovery through sustainability. As Erthal et al. (2021) point out, Chinese investors have had to adapt to a highly dynamic Brazilian context, and mutual learning with Brazilian counterparts has been key in several infrastructure projects. However, those trajectories show that mutual adaptation must be further enhanced, not only in infrastructure construction in general but in new renewable projects. Like in Argentina, more efforts are needed to incorporate technology transfer into bilateral cooperation with China.

Conclusion

China's presence in Latin America has exhibited notable progress since the turn of this century. Through different ways of rapprochement, Chinese companies and policy banks have become relevant actors in the region. Cited data reveals an emphasis on those strategic sectors that contribute to China's aim to create new business opportunities and boost its modernisation strategy, providing access to food, energy, and raw materials.

As China continues to deepen its economic ties with Latin American countries like Argentina and Brazil, it is also internationalizing its strengths in renewable energy, as the co-evolutionary theory remarks. To some extent, Chinese energy companies, through the Going Out strategy and the BRI, have merged their expansion interests with Argentina and Brazil's own aims of making their energy mix more diversified and sustainable. Engagement has been prompted both at the national and local levels to promote their respective energy transitions.

In line with the co-evolutionary theory, economic cooperation with China has been relevant for Argentina and Brazil to advance towards energy transition in the framework of a process where domestic and external factors evolve together. Chinese investment in Argentina and Brazil's renewables has been a result of both China seeking to invest in these sectors, and these countries' aim to advance to energy transition. Unlike many other countries where China has invested in renewable power, Argentina and Brazil had attracted all this investment without yet formally joining the BRI. Now that Argentina has joined, investment is expected to be expanded in the renewable energy sector.

The long-term approach of Chinese companies along with Chinese policy banks' financing in these two countries have seized the opportunity following the space left by the United States, which has gradually abandoned its historically close relations with the region in recent years. The backdrop of the strategic rivalry between China and the United States has intensified this tendency.

Notwithstanding the benefits regarding advances towards energy transition that Chinese investment in renewable energy projects have brought to Argentina and Brazil, these countries still face the challenge of ensuring that the Chinese engagement continues to grow in their renewables' sectors, to further boost energy transition and contribute to a green economic recovery from the COVID-19 crisis. These countries also face the challenge of incorporating technology transfer in future bilateral cooperation with China.

The COVID-19 pandemic crisis could be a stimulus when designing sustainable-oriented economic recovery plans in Argentina and Brazil, providing an opportunity to attract foreign finance and redirect it towards renewable energy projects. China is already playing a relevant role, and this might be the scenario to strengthen this process. However, future engagement with China must continue to ensure further adaptation, support these countries' specific needs for economic growth and sustainable development, guarantee compliance with local laws, regulations, and industrial policies, and adhere to Argentina and Brazil's standards and capabilities.

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Juliana González Jáuregui, holds a PhD in Social Sciences, and a M.S. in International Relations. Currently, she is an assistant researcher at Argentina's National Scientific and Technical Research Council (CONICET) and at the Latin American Faculty of Social Sciences (FLACSO-Argentina), where she leads the Chair on China Studies at the Department of International Relations. She was selected to participate in doctoral training experiences in China (Fudan University, 2012), and Chile (Pontificia Universidad Católica de Chile, 2014), and in postdoctoral training in the United States (Brown University, 2018). More recently, she was a visiting scholar at ILAS-Columbia University, during the fall semester 2021. Her research topics cover the International Political Economy of China on a global scale, with special emphasis on the economic and financial links with Latin America and Argentina.