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A dynamic institutional analysis of China's engagement with Africa's renewable energy market: comparing Ethiopia and South Africa

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Abstract

Renewable energy activities have increasingly become the central component of China's proposed green Belt and Road Initiative. Yet, scaling up these activities requires significant institutional changes of the current Chinese state and financial-industrial complex. Informed by a conceptual framework that builds on multi-level institutional analysis, we assess the institutional challenges constraining the scalability of Chinese renewable energy projects in South Africa and Ethiopia. Our study reveals that the institutional fragmentation and vacuum in China have led to the lack of a clear engagement strategy with African markets. In addition, the development of wind and solar energy projects in Africa is often taking place amid the ongoing and fast-changing energy sector governance, which is not yet appreciated by the key Chinese actors. We argue that promoting Chinese-backed renewable energy projects in Africa requires new institutional arrangement that can adapt to competitive and divergent local market conditions and regulatory changes.

Keywords

China, Africa, Renewable Energy Investment, Institutional Analysis, Belt and Road Initiative

Introduction

Electricity generation from renewable energy sources like wind and solar is becoming economically viable and technologically mature in many African countries. Compared to conventional energy generation infrastructure, renewable energy systems are relatively quick to install with much more flexible applications in remote rural areas, and can offer better prospects for local job creation and industrial development (Puig et al., 2021). However, current investment in Africa's renewable energy sector is far from sufficient as it attracts less than 5% of global energy investment (IEA, 2019 and 2022). In the past two decades, China emerged as the largest bilateral financier and contractor for energy infrastructure projects in Africa (Shen, 2020; Chiyemura et al., 2022). Since China launched the Belt and Road Initiative (BRI) in September 2013, energy infrastructure projects are the central component of this ambitious geopolitical agenda. Between 2000 and 2020, China's two major development finance institutions (DFIs)—China Development Bank (CDB) and the Export-Import Bank of China (C-EXIM)—have provided $53.1billion for power projects in Africa, of which only $1.4billion was committed towards wind, solar, geothermal and waste to energy (Gallagher, 2021). The majority of Chinese finance was committed to conventional energy sources that are largely in line with African countries' energy endowment.

In principle, China-Africa cooperation in the renewable energy sector has a promising outlook. From the supply end, China has accumulated massive generation and technological capacity for the wind and solar energy sectors. The total installed renewable generation capacity reached 1063GW in 2021, with wind and solar energy reaching 328GW and 306GW respectively (NEA, 2022). From the demand end, electricity demand in Africa is likely to double by 2040 with renewables accounting for three-quarters of new generation (Lema et al., 2021). The 2021 Forum on China-Africa Cooperation (FOCAC) meeting and declaration of the Chinese and African leaders also confirmed the aspiration from both sides to promote cooperation in renewable energy (MOFA, 2021).

Against this background, previous studies have illustrated multiple obstacles to Chinese investment in renewable energy activities in Africa including Chinese investors' and financiers' corporate strategy, risk appetite, and their perceptions of host countries (Shen and Power, 2017). Yet many of these factors are not scrutinised through the lens of institutional analysis. As Nilsson et al., (2011 p. 1117) argue, an institutional perspective is a missing link in energy transitions, as "system changes and policy paths are conditioned by institutional change processes". In this paper, we focus on the existing and emerging institutional systems and arrangements that promote or frustrate renewable energy activities from the investor (Chinese) and host countries (African). Our key argument is that China's institutional framework that governs its overseas activities, which has played a crucial role in promoting conventional energy projects in Africa, requires an urgent transformation in order to engage with fast-changing institutions within different African countries. We argue that the key to scaling up China's engagement in African wind and solar markets is closely related to how new and more effective institutions can emerge out of the old ones from both ends and how they are compatible in facilitating the development of renewable energy projects. Our analysis in this paper is informed by a conceptual framework that builds on three layers of institutional characterisations, namely (i) norms, ideas, values and beliefs, (ii) institutional context (environment) and dynamics, (iii) and the institutional practices on project level governance (Andrews-Speed, 2016; Williamson, 2000).

We use Ethiopia and South Africa as comparative cases to understand how the Chinese institutional system is engaging with different African institutional contexts. Both Ethiopia and South Africa have

ambitious plans to develop their renewable energy sector and currently host several landmark Chinese wind and solar energy projects. However, these two countries have noticeably different market and political systems. South Africa is a relatively more advanced market economy, whereas Ethiopia is a less-developed economy with a strong state-led governance model that is currently undergoing gradual marketisation reforms. Furthermore, both countries possess a dominant energy source, namely coal power for South Africa and hydropower for Ethiopia, which are largely controlled by incumbent political interests (Baker et al., 2021).

[Insert Table 1 here]

Our research draws on primary data collected through field-based research in China, Ethiopia and South Africa, which were triangulated with grey literature and other secondary sources. Altogether 23 in-depth interviews were conducted between June and October 2020 with Chinese DFIs, export credit agencies (ECAs), commercial banks, Engineering, Procurement and Construction (EPC) contractors, manufacturers and technology suppliers, and other experts from these three countries. Our key finding is that the outcome of Chinese wind and solar energy projects is mainly driven by the institutional interactions (more often indirectly) from both ends. Such interactions, in turn, are further shaping each country's institutional changes and development.

The rest of the paper proceeds in five sections. Section two introduces an analytical framework of multi-layered institutional systems, followed by sections three and four that focus on institutional changes in China and Ethiopia and South Africa. Section five concludes the paper with a discussion of the findings and the key implications.

A conceptual framework of dynamic institutional analysis

Formal and informal Institutions broadly influence, shape, resist and determine transitions to renewable energy systems (Geels, 2014; Andrews-Speed, 2016). An institutional perspective is often applied in analysing the ongoing energy transitions by focusing on system-level changes and policy pathways conditioned by institutional arrangements and changes (Swilling et al., 2022; Nilsson et al., 2011). This paper adopts Scott's (2001 p. 49) definition that considers institutions as multi-faceted, durable, social structures made up of symbolic elements, social activities, and material resources that enable or constrain human agency by creating legal, moral and cultural boundaries. Institutions are often embedded in organisations that are usually (but not always) designed to enhance efficiency. Institutions, therefore, include formal processes and informal practices such as symbolic systems, cognitive scripts, and moral templates that provide the frames of meaning to guide human action.

Rooted in the historical institutionalism perspective, we argue that institutions are products of socio-political, economic and cultural contexts (Lockwood et al., 2017). This means institutions often emerge out of specific settings of political struggles and policy goals, yet once established, are often reluctant to change (North, 1990). In this regard, any successful foreign investment in renewable energy projects requires a set of institutional arrangements from both supply and demand ends. The compatibility of the two institutional systems is crucial to overcoming various challenges and barriers that may arise during project implementation. In the context of China-Africa engagements in renewable infrastructure development, the analysis of institutional arrangements from both ends, and particularly their interactions, remain understudied to date. To bridge this knowledge and practice

gap, we investigate the institutional factors that are responsible for enabling or constraining the scaling of Chinese participation in the African wind and solar market.

We propose a triad concept of the institutional framework to make sense of the institutional engagements and interactions between Chinese and African actors in the renewable energy sector (see Figure 1). The first layer of this framework is made up of institutional norms, ideas, values and beliefs that either promote or frustrate engagement (Andrews-Speed, 2016). This is made up of core ideas and beliefs that are either formal or informal and embraced by the key actors collectively, often serving as guiding principles or internal logic in developing policies or institutional arrangements (Williamson, 2000). These ideas and beliefs are often pervasive and have a constraining or enabling effect for either defending the established institutions or facilitating changes. The dominant ideas and values in societies are normally highly stabilised in an endurable timeframe (North, 1990) and are embedded and implicated in the social and political structures to constitute a political context, and influence decision making processes more broadly. In the context of energy transition in the global South, these ideas and beliefs evidently condition values and normative principles around issues of energy poverty, security and justice (Milchram et al., 2019).

Our second layer of this framework considers the broader institutional political context (environment) and dynamics for energy transitions, which differ from one country to the other. Understanding the political environment within which transition occurs is crucial because it sheds light on how the context facilitates the distribution of material and ideational resources between and among competing political and sectorial interests. This means that stakeholders in this context have competing and at times varying degrees of economic and political power which all influence effective policy formulation and institutional reforms (Power et al., 2016). We consider that the second layer contains both formal and informal regulatory and bureaucratic practices which facilitate or constrain transition processes (Andrews-Speed, 2016). This analysis of institutional arrangements in the context of Africa-China engagements allows us to investigate these regulatory and bureaucratic activities from both sides, including government policies, financial instruments, and organisational strategies that coordinate and guide actors' perceptions and actions (Geels, 2012).

The third layer is institutional practices at project or transactional level governance. Our attention on this layer is to understand how institutional practices emerge and how "rules of the game" are applied and processed at the project implementation level (Jehling et al., 2019). Various players can influence the overall governance process at the project implementation level, possibly creating opportunities for institutional change or continuity (Lockwood et al., 2017). Our analysis shows that both China and African countries' institutional arrangements tend to operate within their own historical context and internal logic that is often unappreciated by the other side and consequently creates challenges for efficient institutional engagement. As African countries are different due to distinctive socio-political and economic configurations, Chinese institutions are therefore expected to adapt to these varying local complexities.

[Insert Figure 1 here]

Among these three layers of institutional arrangement, from both sides, we assume most of the interactions occur at the third layer because this is where most obvious "everyday" negotiations and interactions on various transactional terms occur, in order to successfully implement the project. We also assume that direct exchanges or engagement around political contexts or regulatory systems (second layer) are less frequent because Chinese and African governments are considered

autonomous in setting their agenda or policies in supporting renewable energy activities. Likewise, under normal circumstances, we expect very limited institutional exchanges regarding the core ideas or beliefs (first layer), as they are difficult to be influenced or changed particularly by external actors.

However, this triad institutional and interaction model is highly dynamic for two reasons. First, constant interactions at the project and transactional levels have the potential to feedback to the other two layers of institutional settings. Interactions at the third layer can potentially shape regulatory context or policy making processes, particularly when both parties are struggling repeatedly during the negotiations. This feedback can lead to institutional adjustments or policy changes occasionally. In addition, as both China and Africa are undergoing rapid energy transition, new ideas or beliefs do emerge to reframe the key principles or policy narratives that can lead to institutional changes in level two or three. Our findings suggest that these institutional changes and dynamics are unravelling in all three countries (Ethiopia, South Africa and China), which arguably increases the challenge of effective institutional interactions at the three layers. Hence, we argue that efforts are needed from both parties to establish a more efficient strategy of engagement at all three institutional layers, to further enhance successful project implementation as well as scale up Chinese investment in the renewable energy market in Africa.

The institutional system in China: A State-DFI-SOE complex

China established a highly complex institutional system to support its massive overseas infrastructure investments. This has been led by different government agencies, DFIs and state-owned enterprises (SOEs) in the form of *a State-DFI-SOE complex* (Shen, 2020). By applying the triad concept of the institutional framework, we first identify the core beliefs and values that serve as guiding principles for these activities (see Figure 2). We argue that there are two sets of beliefs that stand out as fundamental tenets. At the outset, China adopted a distinctive neo-mercantilist approach to the expansion of its overseas projects (Mawdsley et al., 2018) and it is never shy to admit its quest for economic gains from overseas activities. Such an approach is typically framed as a "win-win" situation in the Chinese official narratives. China's international cooperation in the mid-20th century was part of the anti-colonial solidarity movements. Chinese support of the economic development of newly independent African countries was in return accompanied by the support of African governments in the United Nations and other multilateral institutions. Africa-China cooperation, therefore, is viewed as a symbol of solidarity of the global South under the policy narrative of South-South cooperation. That said, China is a "catching up" economy and the foreign trade and export sector is a central pillar of its national development strategy. The expansion of overseas markets for Chinese exporters and investment is a credible continuation of its developmental state logic at home (Chen, 2020). As for energy projects, the strong mercantilist logic would inevitably make China focus more on areas where it possesses distinctive comparative advantages, traditionally coal-fired and hydropower technologies, and more recently, renewable energy.

The interviews indicate such mercantilist belief is deeply embedded within supportive government agencies. As one retired ECA officer recalled during the interview:

> *"When we were first introduced to the idea of export credit agency in the mid-1990s and lectured by our European counterparts on how it has been widely applied among major Western countries for decades, we realised such tools must be a crucial part of a grand development strategy for China."*

Therefore, when China learned from the West on how to develop its own institutions like the ECAs and DFIs, they inherited the mercantilist ideas along with these specific organisational arrangements. The central role of promoting Chinese exports and economic benefits is clearly written in the mission statements of these organisations and deeply wired in their mindsets and daily practices. When asked why a project with dubious social and environmental impacts can get approval, one senior DFI manager responded:

> *"Our mission is to support Chinese investors and exporters. Therefore, all eligible applications will be treated equally if they are in line with Chinese and local laws and regulations. We have no reason or authority to turn down an application once it meets eligibility criteria."*

Another long-established value in guiding Chinese overseas activities is the so-called principle of "non-interference" in the internal affairs of the host country, a tenet adopted in the 1950s and then clung tightly in Chinese foreign policy (Verhoeven, 2014). However, China's non-interference in host countries is inconsistent in recent years (Pan & Du, 2013) and there has been debate among Chinese academia and policy makers on whether China should abandon this tenet altogether (Zheng, 2016). Nevertheless, in practice, the non-interference principle is still upheld largely by the Chinese state or quasi-state actors (Gonzalez-Vicente, 2015).

Such a combination has a direct impact on second-tier institutions (see Figure 2). As such, both economic (win-win) and diplomatic (non-interference) interests are considered essential for various state agencies involved in the decision making processes, including the Ministry of Commerce (MOFCOM), the National Development and Reform Commission (NDRC), the Ministry of Finance (MOF), and the Ministry of Foreign Affairs (MOFA). The neo-mercantilist principle requires MOFCOM and NDRC to play a crucial role for developing supportive instruments for achieving commercial benefits, whereas MOFA possesses veto power when projects are in conflict with Chinese diplomatic interests. The MOF would also reject project proposals that are too risky for China's fiscal stability. As a result, the overall governance system has been highly fragmented (Zhang & Smith, 2017; Shen, 2020).

In addition, the mercantilist approach requires a stringent evaluation of the commercial viability of each project, which would certainly empower the DFIs and ECAs, including C-EXIM, CDB and Sinosure that dominate the financing landscape of Chinese overseas energy activities (Kong & Gallagher, 2017). These agencies are often referred to as policy financial institutions (政策性金融机构) and were established at the height of Chinese economic reforms in the late 1990s and early 2000s. In theory, DFIs are given the responsibility for creating policies on project screening standards and risk assessment tools based on mercantilist logic. Yet these DFIs have adopted rather expansionary strategies as a means to accumulate organisational power. Such an expansionary strategy explains their relatively higher risk appetite compared to traditional bilateral or multilateral lenders.

The mercantilist value and the expansionary strategy of Chinese DFIs contribute to their close alliance with key Chinese exporters and contractors, particularly large SOEs who can deliver a large number of project proposals. As a result, most large projects are developed in a bottom-up fashion, driven by both the host governments and leading SOEs jointly. As one SOE manager observed:

> *"We have to trust the host governments' assessment for what they actually need most, as we cannot shove in any project if they don't view them as the best fit for their country. We can make suggestions sometimes, but eventually, they decide what they want, and we deliver it."*

The reliance of the DFIs on SOEs to identify new project opportunities is also reflected in their efforts of establishing local offices in Africa. For example, leading SOEs such as China National Machinery Industry Corporation (SINOMACH) established branches in more than 20 African countries. In some key countries, more than one branch was created for different SINOMACH subsidiaries or project teams. Whereas among DFIs, CDB has only one African branch in Cairo, C-XIM established two offices in South Africa and Morocco. SINOSURE has yet to establish any formal branch on the continent. In addition, Chinese DFI branches in Africa are mainly for liaison purposes rather than specific project development. By contrast, these DFIs have established extensive marketing networks within China to maintain close relations with the key SOEs in different provinces. One provincial marketing manager described their role:

> *"The major task of our marketing department is to support our clients (largely SOEs) and closely monitoring the progress of their potential deals at an early stage. Making sure all their inquiries related to financial terms during the project preparation stage are handled properly and timely."*

Traditionally, the large amount of proposals from the SOEs has been overwhelming for the DFIs, who consequently have little incentive to develop projects independently. As observed by the same manager

> *"Even if we established dedicated overseas arms for new project development, we are unlikely to do a better job than those large SOEs. They have been operating in these countries for decades after all. So why bother?"*

The institutional structure of the State-DFI-SOE complex also affects the third-tier institutions, that govern specific practices at the project level, including project selection and financial implementation model (see Figure 2). At the outset, big decisions, such as approving mega projects, granting large loan facilities or the rescheduling of sovereign debt cannot be made by any single ministry. Decisions are often pushed upwards to the State Council for the final decision. Likewise, since none of the key ministries possesses sufficient sectoral or technical expertise in making detailed planning, project screening and evaluations are largely based on a "first come, first served" principle by the DFIs as long as they are eligible to apply. This institutional arrangement is a stark contrast to the decision making systems on energy infrastructure projects at home where planning is at the centre of governance activities (Shen et al., 2021). For example, China has a sophisticated system for long-term (known as Five Year Plans) and short-term (annual) planning in its energy sector, which specifies various targets for new renewable energy capacities in a different locality. These plans are developed, adjusted and monitored by the National Energy Administration as the sole guardian ministry. However, such institutional arrangements are currently absent in governing overseas energy activities.

The majority of overseas energy infrastructure projects are implemented in the EPC + finance model, whereas SOEs are the construction contractors and DFIs provide buyers or suppliers credit and loan facilities. Such institutional settings can impose detrimental effects on renewable energy projects for several reasons. For one, DFIs are unlikely to revoke their support for conventional energy projects proposed by large SOEs. Renewables such as wind and solar farms are normally less capital-intensive and have a smaller generation capacity compared to conventional energy projects. Hence, DFIs and ECAs are inclined to welcome bigger than smaller projects which often involve higher transaction costs and risks. Bigger projects backed by sovereign guarantees from the host countries are therefore more likely to receive favourable project screening outcomes by DFIs and SOEs as they are

considered “too big to fail”. This means both Chinese and African governments are less likely to endorse smaller projects compared to those landmark projects with important political ‘mileage’ and ‘visibility’ (Terrefe, 2022). In addition, many renewable energy companies, particularly in the solar PV sector, are private enterprises that often face higher barriers to getting concessional loans or export credit insurance support.

[Insert Figure 2 here]

Given China’s fragmented institutional system in governing overseas energy activities, how does it is engage with the host countries’ institutional systems? At the outset, the bilateral interactions are mainly conducted by the Chinese SOEs at the third institutional tier as they are responsible for facilitating communication at projects or transactional level. The hybrid nature of Chinese SOEs means they often employ significant political resources, such as from Chinese embassies or consulates, when nurturing specific projects in the host countries. The state “hue” of SOEs also renders some advantages in engaging with senior government officials in the host countries. These close ties with officialdom from both ends play a crucial role in developing large-scale projects for SOEs. Yet in many cases, Chinese government officers’ support is mainly emblematic. As one local SOE manager mentioned:

> *“In the project preparation stage, they (Chinese officers) would provide some symbolic support. You have to negotiate everything all by yourself with different local government agencies. These officers would appear on the opening ceremony once the project is completed successfully to deliver speeches.”*

This means the Chinese state agencies and DFIs lack the capacity or incentives to establish institutionalised links with energy officials in the host countries and to support their renewable energy policies, planning or institutional reforms. For example, when asked if Chinese ministries and DFIs should be more active in engaging with African governments’ energy planning and sectoral development, one DFI manager responded:

> *“It is beyond our mandate as a financial institution, and I am not sure which government agency should be responsible or will be keen to take this task on.”*

There is a notable gap in sectoral expertise between the Chinese government and DFIs to engage with their counterparts in the host countries. Although high-profile diplomatic communication such as MOFA’s FOCAC has attracted tremendous media and public attention, at the sectoral or project level, the bilateral engagement between officials is relatively scarce. This is particularly notable in the energy sector, as many African countries are in the process of energy sector reforms towards a more efficient and sustainable energy system, during which tremendous capacity building programmes and advisory support are needed from the international community. However, Chinese state agencies are found less engaged in meeting these demands. The non-interference tenet also constrains Chinese government officials from engaging directly in the host countries’ policy processes.

However, since the introduction of the BRI, the Chinese institutional system is undergoing notable changes. Notable destabilising forces emerge from all three levels of institutions. Ideologically, the neo-mercantilist approach has been complemented with values and beliefs that increasingly emphasize non-economic values. Gradual changes are manifested by a series of policy announcements since 2017, with new narratives such as the “green BRI” and “community with a shared future” being developed. Furthermore, the declaration by the Chinese government to stop financing overseas coal-fired power projects and the joint declaration with African countries to

combat climate change after the eighth FOCAC meeting signals an official departure from a pure mercantilist approach.

Meanwhile, new government agencies are joining and destabilising the existing State-DFI-SOE complex. The Ministry of Ecology and Environment (MEE), the National Energy Administration (NEA), and the newly established China International Development Cooperation Agency (CIDCA) are now all playing a complementary but increasingly notable role (see Figure 1). These new policy actors are proposing numerous new guidelines and policies on promoting green investment and enhancing environmental and social impact assessment together with MOFCOM and the NDRC. The changing governance structure and policy actors also influence the transactional level institutions. As mentioned, project screening is the most important regulatory responsibility that has largely been delegated to Chinese DFIs. Most DFIs have now developed new measures to support renewable energy projects (Chen & Shen, 2022). As for large SOEs, although many of them are relatively late movers in the renewable energy market, the majority have now established dedicated departments or subsidiaries to develop wind and solar energy in Africa.

However, Chinese companies' competitiveness in overseas renewable energy markets is often overestimated, possibly due to China's huge success in the wind and solar energy market at home. The interviews indicate that in reality, Chinese companies face typical late-entrant barriers in some African markets, such as low brand and technology recognition, weaker connections with local distributors and partners, and unfamiliarity with the political systems and policy frameworks of host countries. To circumvent some of these barriers, Chinese private solar energy companies are teaming up with large SOEs to secure renewable energy contracts in Africa. For example, CEEC's Gezhouba group and PowerChina are working together on new solar projects in Uganda and Zambia under this "going out jointly" (抱团出海) strategy.

A comparative analysis of institutional arrangement in Ethiopia and South Africa

To understand how the Chinese institutional system is interacting with that of host countries, we focus on Ethiopia and South Africa as these two countries have notable institutional similarities and variances (see Table 2). For one, the deployment of renewable energy capacities in South Africa and Ethiopia is driven by a set of fast-changing ideas, beliefs and norms that shape the decision-making processes and sectoral governance. Both countries have an energy system dominated by inefficient state-owned energy utilities and are heavily dependent on a single energy resource endowment. In South Africa, coal-fired power generation account for around 70 per cent of the total installed capacity, whereas in Ethiopia hydropower accounts for 86 per cent of the total electricity supply (IEA, 2021; IRENA, 2021). In South Africa, state elites have "captured" the state-owned monopoly utility Eskom with the unsustainable costs associated with its capital expenditure programme and operational expenses (Kessides, 2020). Whereas in Ethiopia, state-owned Ethiopia Electric Power (EEP) has monopoly control of power generation and transmission services, which is similarly inefficient and highly indebted. As a result, both countries are witnessing notable shifts of beliefs, ideas and values from the existing state-led and endowment determined energy system towards a more market-based and decentralised model. Consequently, attracting more private investment is touted as the key solution to transit into a more efficient and sustainable energy system.

However, a major ideational difference between the two nations is that South Africa's energy landscape is characterised by a tussle between fossil fuels and an increased commitment towards climate change and energy justice ideals (Todd & McCauley, 2021). The transition pathway in South

Africa is, on one end, shaped by domestic historical factors and the need for energy justice, and on the other, influenced by the international commitment to address and mitigate the effects of climate change (Cock, 2019). In contrast, Ethiopia does not have a fossil fuel lock-in but equally, there is an increasing concern about climate change impacts on its hydropower-based system, particularly the rising fear of persistent draughts, which is the major driver of the changing belief towards a more diversified and sustainable energy future (Wheeler et al., 2020). Furthermore, Ethiopia aims to reach universal energy access by 2025, as its current electrification rate remains just above 50 per cent (IEA, 2021). Therefore, renewables in South Africa can be viewed as a climate mitigation strategy whereas in Ethiopia it is rather an adaptation and development strategy. Yet both countries would pursue wind and solar energy opportunities since these energy resources have the potential not only to reconfigure the national energy endowment but also to destabilise the state-controlled and incumbent energy sector (Baker et al., 2021).

Over the last two decades, the institutional contexts of South Africa and Ethiopia's energy sectors are undergoing several structural reforms. These ongoing reforms have been supported and promoted by international organisations and development agencies geared towards increasing the participation of the private sector in project development, with competitive auctions as the main instrument to procure wind and solar capacity. South Africa plans to decommission 11GW of coal-fired power capacity and add 25.3GW from renewables by 2030 (IRP, 2019). To meet these targets, the South African government also developed a new set of institutional arrangements in 2011, including the Renewable Energy Independent Power Producer Procurement Programme (REI4P). REI4P was jointly established by the Department of Mineral Resources and Energy, National Treasury and the Development Bank of Southern Africa, known as the Independent Power Producers Office. The programme was supported by bilateral and multilateral development agencies who provided funding and technical assistance. It is reported that about 50 advisors provided input into the development of REI4P, with over 100 representatives from 13 professional firms (Baker & Wlokas, 2015). REI4P is an attempt to move away from Eskom, which generates over 90 per cent of the electricity, owns the entire transmission grid and is responsible for 60 per cent of the distribution service in the country.

Similar to South Africa, the government of Ethiopia has announced ambitious targets and introduced several institutional reforms in the energy sector. For example, a dedicated unit under the Ministry of Finance and Economic Development (MoFED) was created to supervise the Public-Private-Partnership (PPP) activities in 2018. Meanwhile, EEP was also assigned as the agency to negotiate with IPPs on renewable energy procurement (Kruger et al., 2019). Moreso, the Ethiopian government is also considering a partial privatisation of EEP or at least a separation of its electricity generation and transmission function, both proposals have met pushbacks expectedly. Our field data shows that some government officials still want to maintain tight control of the electricity generation department for various reasons. For one, Ethiopia has a highly subsidised tariff system, which is deeply rooted in its ideological and institutional stickiness which considers electricity as a public good. This means the privatisation of EEP will continue to face resistance, particularly from the political establishment.

These recent institutional changes in Ethiopia have created an avenue through which the private sector can play a leading role in the development of non-hydro renewables. Currently, five renewable energy IPPs are under negotiations with a total capacity of 650MW, including two geothermal and three solar PV projects (Ayele et al., 2021). Multiple donor agencies such as the World Bank, United States Agency for International Development, Japan International Cooperation Agency and Danish International Development Agency are providing intellectual support for these institutional reforms

and IPP programmes. International Finance Corporation is also involved in the mobilization of financing resources for these projects and will act as the guarantor for the Scaling Solar program (Kruger et al., 2019; Njoroge, 2019).

The ongoing sectoral reforms and introduction of renewable energy procurement programmes in both countries have consequential impacts on institutional practices at a specific project or transactional level. First, both REI4P and IPP/PPP programmes have encountered overt or implicit resistance from the incumbent utilities due to obvious conflicts of interest. In South Africa, after the huge success in the first four bid windows between 2011 and 2014, the fifth bid window was interrupted and postponed until October 2021[1]. The interruption was mainly due to Eskom's rejection to sign the power purchase agreement with awarded IPPs, on the ground of rising concerns over the safety of the grid operation and high tariffs of IPPs which would further worsen its financial performance. As a result, among 112 awarded IPPs in the first four rounds, only 76 projects are now in operation. Some of these projects only reached financial closure after several years of transactional struggles.

In Ethiopia, even before the introduction of the IPP/PPP scheme, several wind energy projects were developed and operated by the EEP, including Adama I and II (204MW) and Aysha (120MW) wind farms. Since 2019, all the awarded IPPs have not yet reached the operational stage mainly due to the hesitation and friction among key implementation agencies, such as between EEP and the newly established PPP unit under MoFED (Ayele et al., 2021). Furthermore, unlike South Africa, most of Ethiopia's renewable energy IPPs rely heavily on foreign expertise, technology and finance, which further exacerbates the difficulties and uncertainties around project development. This has been further worsened by frictions over land use change and distributive benefits at the local level, and the conflict in Tigray.

[Insert Table 2 here]

Chinese engagement with the Ethiopian and South African institutional systems

In general, China's involvement in South Africa and Ethiopia varies and is mainly shaped by energy resources endowment, market potential, and bilateral political relations. As shown in Table 1, Chinese enterprises have been involved in South Africa's renewable energy projects through several modes of engagement including EPC contracts, technology supply and equity investment. Currently, the Chinese have participated in six wind projects (446.5MW installed generation capacity) and four solar PV projects (208MW installed generation capacity). Chinese participation in the Ethiopian renewable energy market includes both utility-scale projects via the EPC + financing contracts and distributive solar systems in rural areas. Chinese companies have been involved in Adama I & II and Aysha wind farms (410MW installed generation capacity) and Reppie- waste to energy plant (25MW installed generation capacity) (see Table 1).

The institutional interactions between the Chinese and the two host countries are mainly at the level of project implementation (third layer). As explained, the engagement activities are undertaken by the Chinese companies, who have established their operations and extensive networks across African countries in the past two decades among host government agencies and local business partners. The involvement of Chinese companies such as Sinohydro, SANY Group and Dongfang Electric in the

[1] South Africa's Department of Mineral Resources and Energy has now resumed Bid Window 5 and 102 bids were submitted and around 25 bids were chosen, see https://www.ipp-projects.co.za/ProjectDatabase. Bid window 6 was also announced and submission of bids closed on 11 August 2022.

development of the three wind farms in Ethiopia is the manifestation of how these engagements can help to secure renewable energy contracts. However, there are also "newcomers", including Goldwind, Sinovel, and Guodian Longyuan in the wind energy sector, and Jinko and Chint in the solar energy sector, who appear to be more enthusiastic to participate in the procurement programmes and IPP projects, compared to SOEs focusing on government-sponsored projects as EPC contractors.

Different project implementation models affect Chinese companies' interaction with host countries' local communities and stakeholders. Although wind and solar energy are low-carbon energy sources, social and environmental impacts on the surrounding communities may still occur. A significant challenge is access to land, which often requires relocation and compensation to local farmers. When Chinese companies are involved as EPC contractors, usually they have limited institutional engagement with the local stakeholders. However, when they are involved as IPPs, Chinese companies tend to be more active in engaging with various local community stakeholders. For example, Longyuan South Africa financed and developed the De Aar wind farm in South Africa, under the IPP model. The Chinese company fulfilled the procurement criteria on community and social development by developing local schools, and early education centres, and building a multi-sports complex proposed by the Emthanjeni Local Football Association. Longyuan South Africa also purchased a "medical" bus that provides medical assistance for the disadvantaged groups in the local communities, which was then donated to the local health department during the Covid-19 outbreak.

On the contrary, local stakeholders' and communities' engagement in the Adama wind projects in Ethiopia was slightly different. Ethiopia has a land compensation policy which is generally handled by government officials. Land use for any infrastructure project must therefore be approved and allocated by the regional government as the custodians of the land (Chiyemura, 2020). Consequently, the decision-making process on land is a top-down process with land allocation for the project decided at the federal level, and then passed on to the regional governments. In this process, local communities are consequently excluded in the decision-making process around their land and the compensation schemes. HydroChina as the EPC contractor of the Adama wind farm was included in the public participation processes even though they were not the project developer. The EEP as the project developer and monopolistic state power generation company is responsible for recruiting consultants for the environmental and social impact assessment (ESIA) report. HydroChina helped with the dissemination of project information among locals by holding information sessions, as well as talking to the farmers who would directly be affected. These steps were taken to meet the requirement under the ESIA. Despite these extra efforts, acquiring the land was not a smooth process. Farmers blocked access roads to the construction sites, with other farmers refusing to leave their farmlands because of compensation-related grievances. Consequently, HydroChina had to pay out of its own pocket so that the project could move forward (Chiyemura, 2020).

During these transactional level struggles, Chinese government agencies are often not involved. Interviews with DFI officers also indicate that there is little incentive for the DFIs to engage with transactional-level struggles with local stakeholders. Chinese companies are therefore viewed as the sole player in handling any transactional-level issues on the ground. Our investigations in Ethiopia and South Africa show that Chinese development agencies and financiers are not involved in assisting or advising around energy sectoral reforms and renewable procurement programmes. Chinese state actors are therefore relatively detached from the institutional contexts of the host countries. However, NEA, the major government agency that supervises the Chinese energy sector, does host capacity building programmes under China's South-South Cooperation Fund. Yet most of these programmes

are hosted in China whereas Chinese experts and advisors seldom visit specific African countries. China's newly established development agency, CIDCA, is yet to establish any sectoral specific advisory capacities. There is not yet any formal engagement at the second-level institutions, and consequently, Chinese participation in Africa's renewable energy markets is reactive rather than proactive.

In theory, China possesses important experience in reforming a highly centralised state-controlled energy system (Zhang et al., 2017). It also has rich experience in piloting renewable energy procurement since 2006 (Baker et al., 2021). These valuable experiences can be crucial for African countries facing similar institutional challenges. Chinese experiences in achieving universal energy access (Zhang et al., 2019) and a just transition out of coal (Heffron, 2021) could also benefit Ethiopia and South Africa. For example, China managed to reduce the number of coalmine employees by 50 per cent since its peak in 2013, from 5.3 to 2.7 million in 2021, with a projected decline to 1.44 million by 2030 (Clark & Zhang, 2022). Mutual exchanges and learnings on these common challenges can be beneficial to both parties.

Conclusion: institutional stickiness, change, and engagement

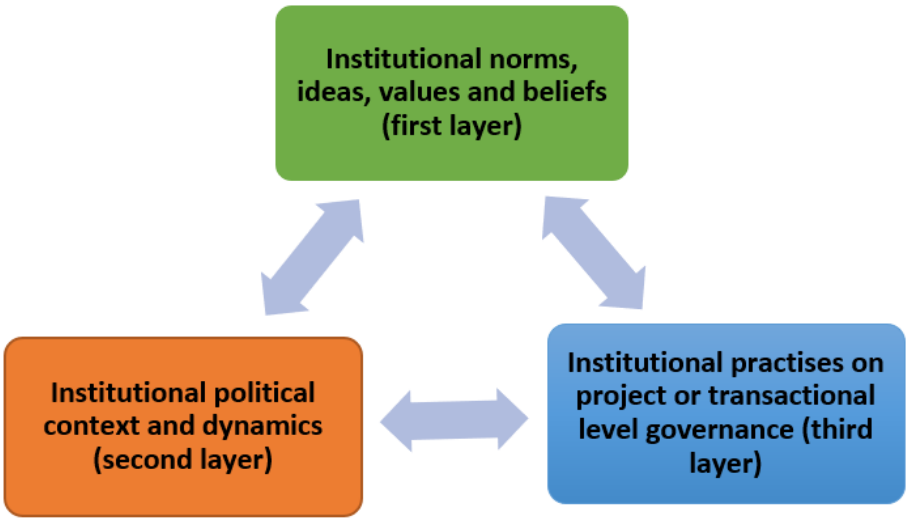
Chinese overseas energy activities are supported through an institutional system that is deep-rooted in mercantilist and non-interference values, ideas and beliefs, which contributed to China's success in supporting traditional energy activities in Africa. However, it exhibits notable challenges in supporting non-conventional renewable energy activities, particularly among difficult markets in Africa. In addition, the fragmented and complex institutional arrangement among Chinese regulators, DFIs and SOEs has led to the absence of a clear engagement strategy with host African countries in the energy sector. Therefore, scaling up Chinese renewable energy activities in Africa requires a more dedicated and coordinated effort among key state agencies to facilitate necessary institutional changes that goes beyond the project-level engagement.

On the other hand, by comparing the institutional arrangement of South Africa and Ethiopia, we argue that in Africa the deployment of renewable energy capacities is often amid the ongoing institutional changes around energy sector governance. Yet such changing dynamics are often not captured by the key Chinese decision-makers due to the lack of engagement strategy and channels mentioned above. The implication is that the lack of mutual institutional engagement inevitably leads to insufficient technological or knowledge transfer. Currently, most of the existing technology or knowledge transfer happens at the project level (Chen & Landry, 2018). Lacking active Chinese engagement in African countries' energy sectors planning and institutional reforms also lead to a lack of understanding of the opportunities and risks of African renewable energy markets among Chinese officials and financiers, leading to slow response and consequently a low level of participation in the market. However, enhancing mutual institutional engagement requires a leading Chinese government agency capable of coordinating with a wide range of research institutions, international organisations, and other Chinese government agencies. In addition, Chinese DFIs and ECAs are decision-makers on the ground, but their conservative risk appetite for more innovative project financing mechanisms and a lack of a green agenda also impede their support for renewable energy transactions (Ma & Zadec, 2019).

Chinese engagement with African renewable energy markets is at a crossroads due to both institutional stickiness from the Chinese side and fast institutional changes from the African side. It is noted that the Chinese central government has exhibited its willingness to promote more sustainable energy activities in Africa (Harlan, 2020; Roberts et al., 2021). Yet, to what extent these political

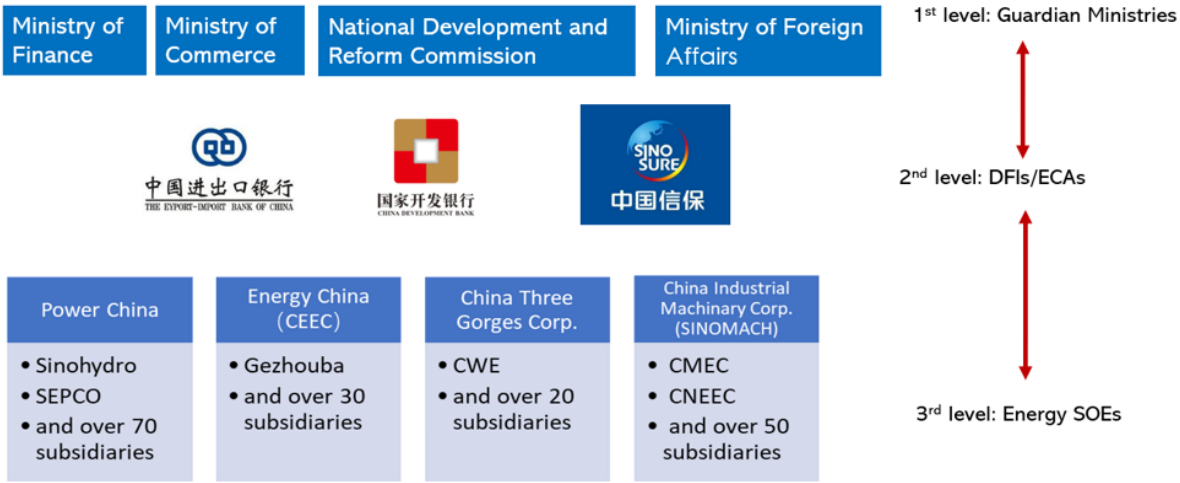
announcements can actually facilitate the much-needed institutional changes on the ground requires further studies.

Figure 1: A dynamic institutional analysis framework



Source: Authors' own analysis

Figure 2: China's State-DFI-SOE complex



Source: Authors' own analysis

Table 1: Wind and solar energy projects with Chinese involvement in South Africa and Ethiopia

Country	Plant	Capacity (MW)	Status	Type of involvement	Chinese companies involved
Ethiopia	Adama I	51	Completed	EPC+ financing	Sinohydro (HydroChina), Goldwind
	Adama II	153	Completed	EPC+ financing	Sinohydro, SANY Group
	Aysha II	120	Under construction	EPC+ financing	Dongfang Electric
South Africa	De Aar phase 1 and 2 wind farms	244	Completed	Project developer/sponsor	Guodian Group
	The Golden Valley wind plant	120	Under construction	Technology supplier	Goldwind
	Excelsior wind plant	109	Under construction	Technology supplier	Goldwind
	Klipheuwel-Dassiesklip wind plant	27	Completed	Technology supplier	Sinovel
	Van Stadens wind plant	27	Completed	Technology supplier	Sinovel
	Soutpan Solar plant	31	Completed	Equity investor	Chint
	Witkop solar plant	30	Completed	Equity investor	Chint
	Lesedi solar plant	75	Completed	Technology supplier	GCL-Poly equity investor with Hwanhwa
	Letsatsi solar plant	75	Completed	Technology supplier	GCL-Poly equity investor with Hwanhwa

Source: Authors compilation from various sources.

Table 2: Comparative analysis of Institutional Systems in South Africa and Ethiopia

	South Africa	Ethiopia
Institutional beliefs (player one)		
Belief in decentralisation	Strong	Strong
Beliefs in diversification	Strong	Strong
Eliminating energy poverty	Not a concern	Strong
Concern on climate change	Strong on climate mitigation and global commitment	Strong on climate adaptation and resilience
Just transition	Strong	Medium
Institutional contexts (player two)		
Energy sectoral reforms	In debate	In debate
Developing procurement programmes	REI4P	IPP/PPP
Institutional practices (player three)		
Transactions awarded and in operation	76/112	0/5
Incumbent struggles	Strong	Strong
Transparency and inclusivity	Strong	Medium/Strong
Reliance on external assistance	Medium	Strong

(Source: Authors' own analysis)

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