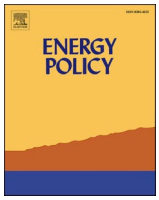
Energy Policy 184 (2024) 113889

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol



Governance of renewable energy procurement via private suppliers: The Ethiopian experience

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ARTICLE INFO

Keywords:
Renewable energy governance
Transition
Green industrial policy
Independent power producers
Financial market failure
Ethiopia

ABSTRACT

This paper addresses the challenges of governing energy procurement from a mix of non-hydropower renewable energy sources supplied by independent producers. Building on political economy analysis and five case studies of independent producer projects from Ethiopia, it seeks to understand the root causes of the protracted delays and limited extent of procurement by independent producers. Unlike previous research, this paper found little resistance by the incumbent (in this case a heavily hydropower dependent state-owned enterprise) to transition to non-hydropower sources, nor to private sector supply. However, competing interests and tensions among key stakeholders over procurement processes prevailed. The key contestations lie in managing long term contracts, risk, uncertainty and in developing the institutional and human capacity to transition. Procurement via private suppliers will inevitably require a competent governance arrangement cognizant of the suitability of energy sector structure to transition. In the Ethiopian case, the bundling of power generation, transmission, and off-taker roles hampers competition. In the face of risk-averse multinational independent producers, the paper argues for a green industrial policy aimed at developing a vibrant domestic private renewables sector contributing to universal access to sustainable and affordable electricity.

1. Introduction

Like millions in the global south, Ethiopians are energy poor with per capita electricity consumption of 100 kWh per year, far below the sub-Saharan Africa average of 487 kWh. Around 50 percent of Ethiopians, or 60 million people, have no access to electricity (Ayele and Shen, 2022).[1] Despite over a century of electricity generation and a wealth of renewable resources such as solar,[2] Ethiopia's capacity reached only 5250 MW[3] in 2023, over 90 per cent of which comes from hydropower generated by state-owned enterprises (MoPD, 2021).

Following electricity sector reform trends elsewhere (Gratwick and Eberhard, 2008; Baker et al., 2021a), over the past three decades Ethiopia has partially reformed its electricity sector with a view to increasing generation capacity and access (Ayele et al., 2021). The most important and relevant reform for this paper occurred in 2013, when Ethiopia embarked on twin energy transitions to: (i) reduce dependence on hydropower by developing the country's abundant renewable resources such as wind, solar and geothermal energy, and (ii) reduce state monopoly generation by incentivising and facilitating procurement through independent power producers (IPPs) (*ibid*). Ethiopia aims to increase non-hydro renewable sources to at least 25 per cent, a large segment of which will be procured privately (MoPD, 2021). While earlier practice was based on direct negotiations, in 2018 the country implemented a transparent and competitive auction-based procurement process for IPPs in the hope that (as industry and government sources widely claimed) it would attract significant private investment to generate electricity at lower prices (Hunton Andrews Kurth LLP (HAK), 2018; IRENA, 2018; IRENA, 2019; MoFEC, 2017).

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[1] See World Bank Statistics: here.

[2] Ethiopia has abundant and diverse exploitable renewable reserves, including 45000 MW (hydro), 7000 MW (geothermal) and 1350 GW (wind) power (MoWE, 2019).

[3] This includes 750 MW new electricity generation from Grand Ethiopian Renaissance Dam (GERD) (Two turbines of the GERD started to supply electricity on 11 August 2022, see details here).

https://doi.org/10.1016/j.enpol.2023.113889
Received 12 April 2023; Received in revised form 22 August 2023; Accepted 31 October 2023
Available online 10 November 2023

Following these reform measures, many IPPs were attracted to the Ethiopian renewable energy sector, with at least five signing power purchase agreements. Gad and Dicheto projects, won by Saudi Company ACWA Power, resulted in US$2.526 cents/kWh tariff agreements, and were celebrated as the cheapest in sub-Saharan Africa (SSA) (Ayele and Shen, 2022). However, at the time of writing and after a decade, none of the projects reached financial close and the volume of procurement dropped by more than 70 percent from the plan (from 1390 MW to 400 MW). The ACWA projects that promised to supply a total of 250 MW were terminated in May 2022 (Fentaw, 2022a). This puts into jeopardy the plan to increase power generation capacity from the current 5250 MW to 19,900 MW, required to achieve universal access to sustainable and affordable electricity by 2030 (MoPD, 2021).

Why does Ethiopia, which has seemingly undergone extensive reform measures to attract private investment in its non-hydro renewable sector, find itself in a protracted process with limited success thus far in procuring renewable energy from IPPs? More specifically, what are the governance challenges of procuring renewable energy from independent power producers? Previous research (see, for example, Baker et al., 2021b) emphasised the governance of renewable energy procurement and how it may impact on institutional arrangements, and the structure of power and interest among key public and private entities. But there has been very little study[4] of the coordination and management of the twin energy transitions in Ethiopia. Drawing on five IPP case studies, this paper explores the challenges that Ethiopia has faced, at the national, sector and project levels, in translating its reforms into concrete investment opportunities. The aim is to understand the root problems and how they might be mitigated in practice and in theory, to deliver on the promise of universal access to electricity in Ethiopia.

Before proceeding, we clarify core concepts used in the paper. As in many relevant studies (for example, IRENA, 2018; Ayele et al., 2021), we use the terms "auctions" and "competitive tenders" or "bids" interchangeably, to denote a procurement process of selecting a competing bid by price with a view to establishing a long-term contract between an IPP – a private entity that owns facilities to generate electricity for sale - and an off-taker or buyer. In the Ethiopian case the off-taker is a publicly owned company – Ethiopian Electric Power (EEP). "Governance" is one of those widely used but slippery concepts in development discourse. Some critical studies (for example, Sovacool and Florini, 2012) offer typologies and meanings of "governance" ranging from global governance to good governance. This paper adopts a topic specific definition by Gregory and Sovacool (2019, p. 345) that encompasses "interactions and decision-making among all the various relevant stakeholders, reflecting the gradients of power and influence, involved in the development and operation of electricity infrastructure". These interactions, in turn, lead to the creation or reinforcement of rules and social norms, along with accompanying institutions (*ibid*).

Against this background, the paper is organised as follows. The next section reviews the literature and identifies the theoretical and policy debates and the challenges of energy transition via IPPs, to gain an understanding of the existing debate on Ethiopia's twin energy transitions. Section three offers the methods of the study, and section four presents the context of the Ethiopian electricity sector, its policies and governance structure. Section five presents the results and the discussion, while section six concludes with a discussion on practical and theoretical implications of the paper.

2. Theoretical and policy challenges of energy sector reform and transition

The entry of IPPs into the Ethiopian electricity market can be better understood within the context of two global developments in the sector: the 1970s and 1980s neoliberal reform programmes in the ownership, organisation, and regulatory regimes of the industry (Gratwick and Eberhard, 2008); and developments in low-carbon technologies (Baker et al., 2021a).

Electricity is a private service, but historically the ownership of the sector swung between private and public sectors (Gratwick and Eberhard, 2008; HAK, 2018). Public provision dominated between WWII and the 1970s, based on the rationale that the industry was considered a natural monopoly that required heavy government investment (Gratwick and Eberhard, 2008; Fabrizio, 2012). To increase efficiency, segments of its value chain - generation, transmission, and distribution - were operated and managed by vertically integrated state-owned enterprises (Baker et al., 2021a). However, neoliberal reforms of the 1970s and 1980s put forward privatisation as an alternative to what was often regarded as overly subsidised and bureaucratic state-owned enterprises (Gratwick and Eberhard, 2008; Jomo et al., 2016). While some countries retained electricity under public ownership, reforms in many others such as the United Kingdom led to changes in ownership and structure of the industry, including separating generation, transmission, and distribution, and the establishment of independent regulatory bodies. Spearheaded by multilateral actors like the World Bank, the reforms that took root in the reforming countries were pushed onto the global south (Gratwick and Eberhard, 2008). However, the risk-averse and profit-driven nature of private investment meant that neither privatisation nor organisational restructuring were fully implemented in many parts of the global south (ibid). Consequently, a hybrid power market emerged, accommodating elements of both centrally organised state ownership and private ownership (Baker et al., 2021a; Gratwick and Eberhard, 2008). Parallel to these is the emergence of decentralised energy systems that accommodate on the grid, micro and off grid solutions. As underlined by Baker et al. (2021a), the latter developments were facilitated by technological breakthroughs such as low-carbon wind and solar technologies which further disrupted the organisation and governance of the sector.

IPPs are part of these evolving ownership and organisational reforms, which come under the umbrella term "public-private partnerships". Contractual arrangements between private and public partners come in a variety of forms. IPPs in energy generation include designing, building, owning, and operating facilities for 2-3 decades of contract period (IREA, 2019). Agreements are arrived at either through direct negotiations between the seller and buyer or through a competitive bidding process (HAK, 2018). PPPs/IPPs are often presented as instruments to address large infrastructure problems, such as energy supply deficits, in developing countries. They seek to bring efficiency, innovation, and private investment into infrastructure development (Delmon, 2015; HAK, 2018; Bayliss and van Waeyenberge, 2018). Auction based IPPs are believed to bring about operational efficiency as the cheapest generator available passes through, and allocative efficiency by limiting subsidies but allowing generators and suppliers to sell electricity at market prices and make profits (Keay and Robinson, 2019; IREA, 2019).

Since the 1990s, IPPs have developed in many emerging markets (HAK, 2018). In SSA, starting in Côte d'Ivoire in 1994, IPPs have become a growing source of power generation particularly from renewable resources (*ibid*). In South Africa they account for up to 25% of generation capacity (Eberhard et al., 2017; HAK, 2018). Despite the growth, however, critics note that the capacities built are inadequate to meet growing demand. Several reasons (internal to host countries and/or external such as international investors) account for these disappointing trends. HAK (2018) noted that procurement through administered processes (or direct negotiations) between the offtaker and developers lacks clear and transparent procurement processes and that this is one of the "single most important limiting factors" for the growth of IPPs in SSA (although, admittedly, competitive tenders can also be complex and time-consuming, with uncertain outcomes (ibid, p. 3–4)). Eberhard et al.

[4] Among the few exceptions is a study by Kruger et al. (2019) who explored how low tariffs can be achieved from procurement processes, and why Ethiopia grapples with securing financial close.

(2017) who conducted a comprehensive review of IPPs in SSA identified a host of factors that impede IPP developments, including lack of rigorous planning, procurement, and contracting capacity (both human and institutional) to hold competitive bidding. They extensively discussed the challenges of managing risks emerging from overly indebted off-takers (often state-owned enterprises). In the same vein, Gregory and Sovacool (2019) found as many as 15 factors, highlighted financial market failures as major causes of slow progress. They argued that the finance market failed due to excessive uncertainty or risks attached to private investment in the renewable energy sector. Hence, they concluded, the global private sector has been less "enthusiastic" to respond to government calls and incentives schemes (ibid). Many of these challenges resonate with the situation in Ethiopia. In their paper, Kruger et al. (2019) highlighted the risk to private investment, particularly emerging from forex availability, as a major challenge to the country's emerging IPP development.

Many studies inspired by socio-technical transition studies (Geels, 2002, 2012, 2014) show that renewable energy transition in general and procurement via IPPs in the global south in particular face incumbents (often state-owned enterprises) which are resistant to change. "Resistance" to liberalisation and/or privatisation is often rooted in the incumbent's dominant industry position creating a locked-in system with little or no space for change. For example, Lawrence (2020) showed that investment in South African large-scale coal generation created lock-in effects that deterred policy initiatives aimed at unbundling the sector and increasing competition.

Some studies on this topic have led to a variety of strategies relevant to core stakeholders in procurement processes (such as governments, investors, and development finance institutions). These include risk mitigation, institutional capacity building to produce "bankable" project documents or switching from negotiation-based procurement to a competitive bidding process (see, for example, HAK, 2018). However, as we will show, moving to competitive bidding did not seem to address the fundamental problems (including financial market failure) of transitioning to a mix of renewable energy supplied by the private sector. Large segments of previous studies give little attention to the challenges built into IPP governance systems, such as the tension between and within core constituents of governance actors in planning and implementation of IPP projects. Studies also shy away from articulating alternatives to the rather reluctant IPP investors in low-income countries. This paper aims to address these knowledge gaps.

3. Research methods

To address its research question, the study looked at the IPP governance structure in Ethiopia (see Fig. 2, section 4.3), its evolution, and the roles of decision-makers in influencing IPP procurement outcomes. Core stakeholders from the renewable energy sector - both state and non-state actors – were involved, and diverse data collection methods and tools were used, as follows: (i) deskwork to identify and review academic articles and grey literature, covering the policies, legal frameworks, and documents on IPPs. (ii) 40 in-depth stakeholder and key informant interviews were conducted with individuals from key stakeholder institutions and those knowledgeable about renewable energy politics, finance, policy, and practice. (iii) qualitative and quantitative data from five IPP projects that signed PPAs with EEP. Interviews were also conducted with selected chief executive officers and/or managers of IPP project companies. (iv) stakeholders' consultation workshop: 27 key stakeholders from government and non-governmental organisations participated in a workshop held in Addis Ababa in 2019. And (v) human and institutional capacity needs assessment for renewable energy development: to assess the extent to which renewable energy development is impacted by skilled personnel and institutional arrangements.

Data were collected in two phases. In Phase 1 the stakeholders' consultation workshop was held and some interviews conducted in person in autumn 2019. From early 2020, fieldwork was interrupted by the Covid-19 pandemic, thus phase 2 interviews were conducted online in 2021. Despite the challenges of the digital divide, the research team included representatives from core stakeholders in the governance of IPPs in Ethiopia. The human and institutional capacity survey was conducted in person in 2022. Data were triangulated and tested against other relevant studies on Ethiopia and elsewhere; and are systematically and thematically organised, presented and discussed in the subsequent sections.

4. The Ethiopian electricity political economy

4.1. Political economy context

With c120 million people as of 2023, Ethiopia is the second most populous country in Africa after Nigeria. For nearly two decades, its economy grew in double-digits, along the way increasing per capita income from US$110 in 2003 to US$880 in 2020, reducing poverty (World Bank, 2022). Public investment has driven reforms in key sectors including energy, where the focus has been on hydropower (MoPD, 2021). Although Ethiopia has abundant and diverse renewable energy resources in hydropower, solar, geothermal and wind energy, it has not sufficiently exploited these resources to its advantage. Hydropower is the most exploited but remains below 10 per cent of potential (MoWE, 2019). Consequently, Ethiopia's energy supply is highly dependent on biomass resources, namely firewood and agricultural waste (ibid). Therefore, use of electricity for social and economic developments is very low – for example, only 24 per cent of primary schools and 30 per cent of health centres have access to electricity (World Bank, 2019a).

4.2. Reforms in the Ethiopian electricity sector

The first electric lights were said to have been switched on at Emperor Menelik II's palace in the late 1890s. However, public, and industrial access to electricity was slow and limited. Lack of trained engineers, investment and institutions for the generation and distribution of electricity were key problems. But, after a long hiatus, electricity sector development made a return from the mid-1950s (Ayele et al., 2021; Baker et al., 2021b).

In 1956, Ethiopia established a vertically integrated Ethiopian Electric Light and Power Authority (EELPA) (Teferra, 2002). EELPA was tasked with the generation (G), transmission (T), and distribution (D) of electricity. EELPA also had an in-built regulatory arm (R). Following the liberalisation trend globally, in 1997 Ethiopia unbundled its state monopoly EELPA into two entities: the Ethiopian Electric Power Corporation (EEPCo), with a remit to generate, transmit, distribute, and sell electricity; and the Ethiopian Energy Authority (EEA) (now the Petroleum and Energy Authority (PEA)), to regulate the sector (World Bank, 2019a). This arrangement continued until 2013 when EEPCo was further split into Ethiopian Electric Power (EEP) to generate and transmit electricity across the country, and the Ethiopian Electric Utility (EEU) to distribute, sell and manage national electricity operations. The Government also started encouraging independent power producers to enter the Ethiopian market and EEP was given an additional remit of buying electricity from IPPs (Fig. 1).

Recent organisational and ownership reforms were necessitated by a host of factors: the EEP and its predecessor had been dependent on public finances, unable to balance its books, hence causing large budget deficits for the treasury. Its investment, and human and institutional capacity was too low to switch to non-hydropower renewable sources. There was insufficient investment to meet the ambitious target set by the government, including the aim to achieve 17,208 MW by 2020 (up from 4300 MW in 2016/17) (NPC, 2016). Droughts and climate change have been threatening sustainable power generation from hydropower sources – the main source of electricity. There is also a pressing need to transition towards cleaner energy, as more than 80 per cent of the

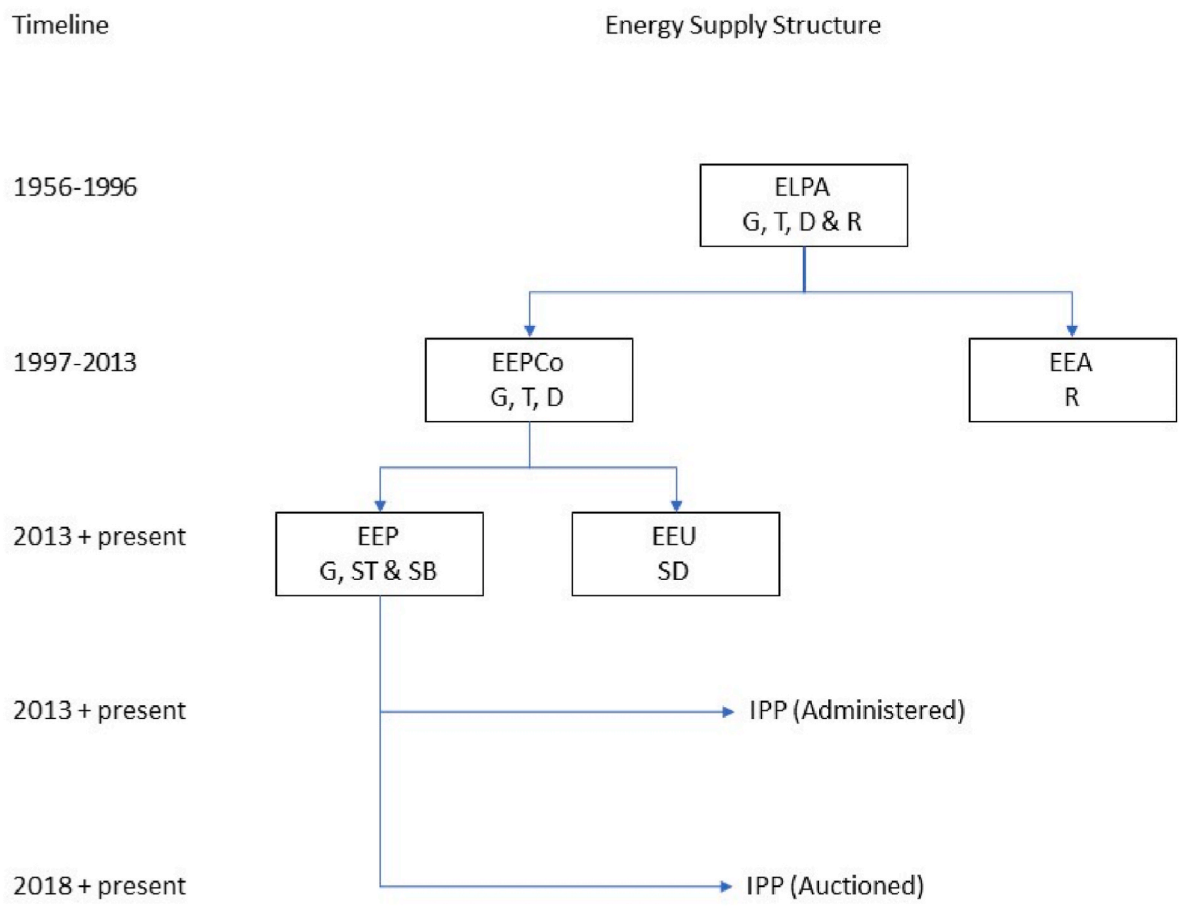

Fig. 1. The evolution of the Ethiopian Energy Supply Industry. *Source:* Authors'. Definitions: G = generator; T = transmitter and ST = single transmitter, SB = single buyer, D = distributor and SD = single distributor; R = regulator.

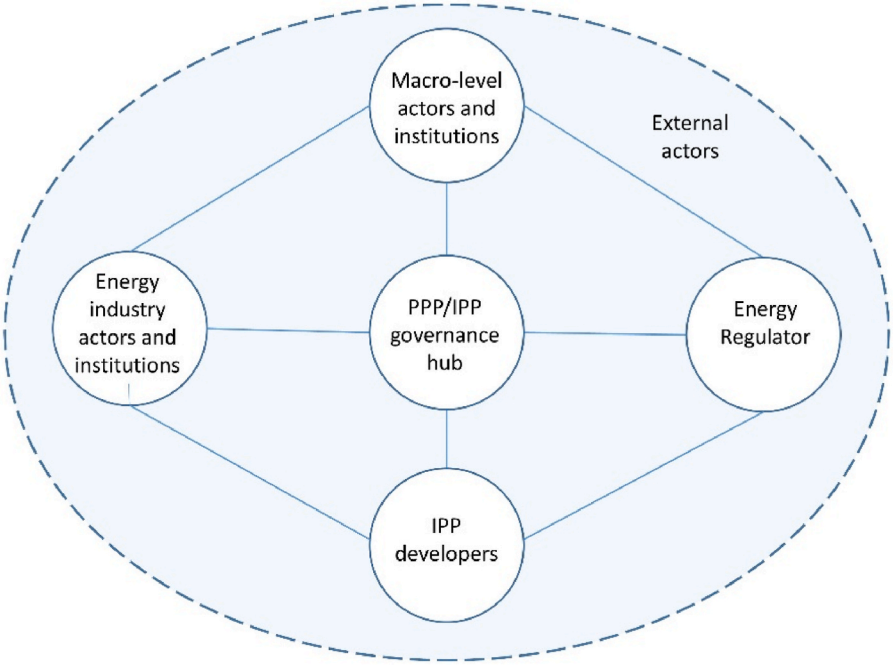

Fig. 2. Heuristic elements of the IPP governance framework. *Source:* Authors'

population depend on unsustainable traditional biomass energy sources (World Bank, 2019a).

4.3. The governance of the electricity sector

As it stands, the Ministry of Water and Energy (MoWE) provides high-level direction and policy for the electricity sector. It coordinates a complex and diverse range of actors within the government – such as the EEP, EEU and PEA – and non-state actors, cooperatives, the private sector, and donors (MoWE, 2019). MoWE supervises the EEP (that operates and maintains 18 power plants - 14 hydropower, 3 wind power and 1 geothermal) and the EEU. Since 2017, Ethiopia has been exporting electricity, albeit at low levels, with 100 MW each to Sudan and Djibouti, earning around US$100 million per year (MoPD, 2021). Kenya also started importing 200 MW from Ethiopia in 2022 (Tekle, 2022). MoWE also supervises PEA - the regulatory agency for the electricity sector, mandated to issue licences for generation, transmission, distribution, and sales, as well as the import and export of electricity.

A major departure from the electricity governance led by MoWE is the governance of renewables procurement through IPPs. Fig. 2 captures the main features of the IPP governance framework - factors such as project plans and finance; and actors and institutions that affect the design, procurement, and implementation of IPP projects.

The framework is composed of the following elements:

PPP/IPP governance hub: involving the Public Private Partnership (PPP) administration, along with the policy and legal frameworks. The PPP hub – the Board and a PPP Directorate General - sits within the Ministry of Finance (MoF)[5] where procurement takes place, buyers and suppliers agree on matters such as tariffs. The Board is the apex body to approve PPP projects and is composed of seven senior ministers and government officials, including from MoF, MoWE and National Bank of Ethiopia; and two private sector representatives appointed by the government. The PPP Director General serves as the secretary of the Board. The Director General Unit is responsible for selecting and procuring projects (FDRE, 2018; Ayele et al., 2021). The hub is affected by three sub-systems (and external actors that support all the sub-systems):

Macro-level actors and institutions: the federal level ministries and departments relevant to renewable energy, including ministries of Water and Energy, Finance, Planning and Development and the National Bank of Ethiopia. These actors provide policy narratives and direction, make plans, and set targets, engage with donors, etc. The macro-level institutions and actors provide the political will and legal and regulatory environment for the IPPs to enter and operate in the Ethiopian market. Policy and institutional developments in support of IPPs in Ethiopia include Energy Proclamation No. 810/2013 (FDRE, 2014) issued to encourage independent power procurement and the 2017 Public–Private Partnership (PPP) policy (MoFEC, 2017) and subsequent Proclamation No. 1076/2018 both aimed to facilitate private investment in major infrastructure projects, including activities in the electricity sector (FDRE, 2018).

Industry-level actors and institutions: these include (i) the EEP and EEU, which between them generate, buy, and distribute electricity. EEP proposes projects for public-private partnerships and enters into contractual agreements with winning parties. (ii) PEA, the regulator, ensures the power purchase agreement (PPA) and implementation agreement are consistent with the country's laws and regulations and enhance enforceability and delivery.

IPP project developers: those who enter the Ethiopian energy market to develop and supply electricity. Successful bidders, by law, will form a project company to execute and implement the PPA and project agreement. Behind a project developer, there are lenders, insurers, contractors, and operators that bring a proposed project to fruition.

External actors: an array of external actors – multilateral and bilateral donors, Development Finance Institutions (DFIs), industry associations also play vital roles at all levels in the governance framework. This includes the International Finance Corporation's Scaling Solar programme, which assigns transaction advisors to support bid preparation and tender processing.

Based on the IPP governance framework (Fig. 2), and the data being collected, the subsequent sections present the results, analysis and discussion, and conclusions and policy implications.

5. Results and discussion of IPP project auctions and negotiations and implementations

5.1. Auction and administered IPP projects

From 2013, EEP started undertaking IPP projects, on a negotiation basis, and at least three progressed to the signing of PPAs, including the Corbetti and Tulu Moye geothermal projects. Moreover, since the competitive bidding procedure came into effect in 2018, PPP Board approved at least 19 projects: eight solar photovoltaic, five wind energy and six hydropower projects. Two rounds of competitive tenders have also been launched to procure 1000 MW of electricity from eight projects. The first tender process (supported by Scaling Solar programme) was launched in 2018 for two solar PV projects, each for 125 MW, in the Afar and Somali regions.[6] Around 100 private companies expressed interest, 28 of whom submitted bids. Of those, 12 pre-qualified as investors, five submitted bids. The bidding process led to the signing of a PPA with ACWA Power in 2019, resulting in one of the cheapest tariff rates in SSA, at US$2.526 cents/kWh over 25 years (Ayele and Shen, 2022). However, as noted, both projects were terminated in May 2022 (Fentaw, 2022a).

Thus, over the past decade, IPP development in Ethiopia shows an increasing number of project developers drawn to the Ethiopian market. Details of the five projects that reached the signing of PPAs are (see also; Table 1 and Fig. 3; and Ayele et al., 2021):

- **Metehara** – a US$120m solar PV project being implemented by Italian energy company Enel's renewable energy subsidiary Enel Green Power.
- **Tulu Moye** – a US$270m joint venture between Meridiam and Reykjavik Geothermal to generate 150 MW. Tulu Moye Geothermal plans to commission the first phase generation (50 MW) in 2023 and the remaining 100 MW in 2025.
- **Corbetti** – led by a consortium involving Reykjavik Geothermal, was one of the pioneer projects in Ethiopia. Like Tulu Moye Geothermal, it will be implemented in two phases (50 MW and 100 MW) with 50 MW generation expected to become operational in 2024.
- **Gad and Dicheto** solar PV projects: ACWA Power-led projects, each for 125 MW, in the Afar and Somali regions, with combined investment of US$300 million (both projects were terminated in May 2022).

While the above development of IPPs were recorded, it is important to note that planned volume of procurement fell from 1390 MW to just 400 MW. In fact, at the time of writing, no on-going projects reached financial close. Various barriers have hindered the development of renewable energy via IPPs in Ethiopia, including protracted processes to undertake economic and social impact assessments. But below we analyse and discuss what emerged as substantial challenges affecting the pace and volume of procurement (see also Ayele et al., 2021).

[5] Prior to the introduction of the auction system in 2018, procurement from IPPs was facilitated by, and within, the off-taker EEP.

[6] In 2019, EEP also announced its Scaling Solar Round 2 for 750 MW from six solar projects; as there was little progress during our fieldwork, these are not discussed in this paper.

Table 1
Non-hydropower renewable energy IPP projects the signed PPA in Ethiopia (2023)

Project (energy source & region)	Capacity (MW)	Project developers	Cost (US $m)	Tariff (US $/kWh)	Project tenure (years)
Metehara (solar, Oromia)	100	Enel Green Power & Orchid Business Group	120	0.0585	20
Tulu Moye (geothermal, Oromia)	150 (50 + 100)	Consortium led by Meridiam & Reykjavik Geothermal	270	0.0695	25
Corbetti (geothermal, Oromia)	150 (50 + 100)	Consortium led by Berkeley Energy & Reykjavik Geothermal	n/a	0.0753	25
Gad (solar, Somali)	125	ACWA Power	150	0.02526	25
Dicheto (solar, Afar)	125	ACWA Power	150	0.02526	25

Source: Authors' (based on Ayele et al., 2021).

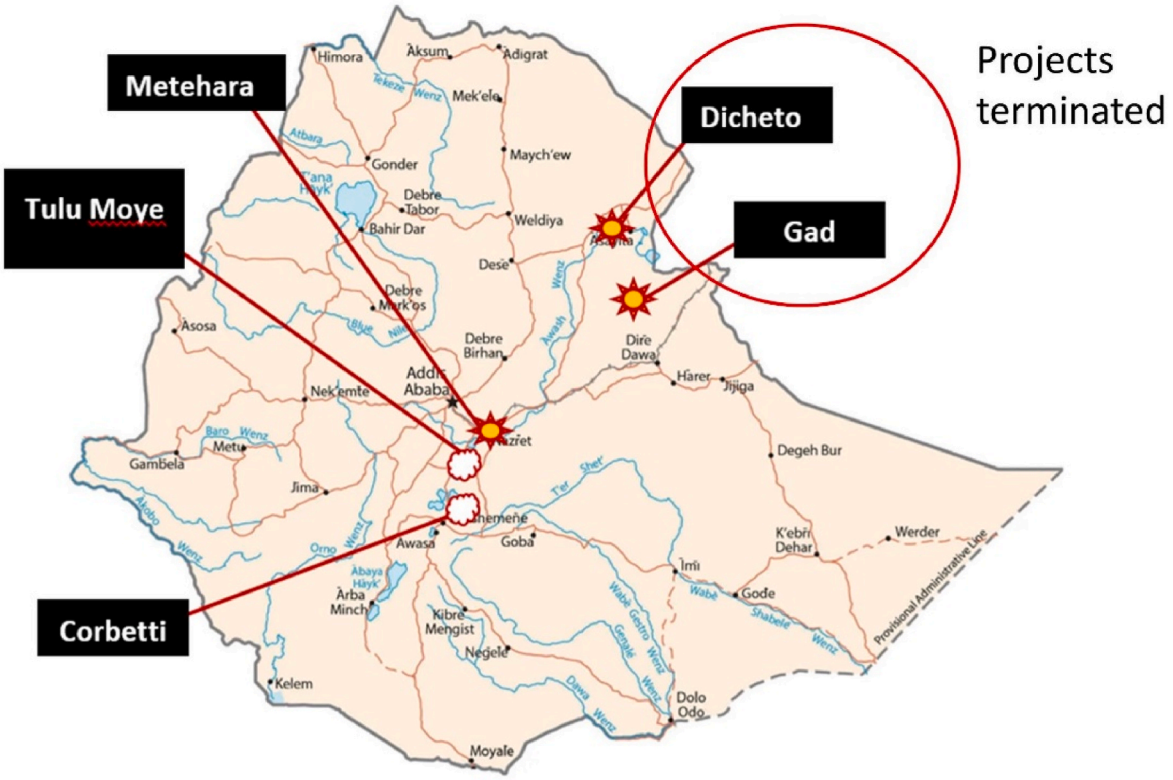

Fig. 3. IPP projects sites. *Source:* Authors' (adapted from Ayele et al., 2021).

5.2. Analysis and discussion of major impediments to procurement via IPPs

Guided by the IPPs governance framework (Fig. 2) and our data collection methods, the main challenges that emerged from the study are analysed and discussed below.

Ambitious number and size of IPP projects: for a country with no experience of designing and implementing IPP projects, respondents overwhelmingly noted that the number and size (as well as the sequencing) of IPP projects prepared and floated for tender was "too ambitious". "Ambitious" targets manifest at two levels. At project level, Ethiopian IPPs tend to be larger than in neighbouring countries (Kruger et al., 2019; Gordon, 2018). All the projects featured in this study are over 100 MW: Metehara (100 MW), Gad and Dicheto (each 125WM) and Tulu Moye and Corbeti (each 150 MW). Likewise, many of the projects in the pipeline are 100 MW or larger (MoF, 2021; Kruger et al., 2019). In terms of pace and sequencing, two tenders were announced in quick succession for eight projects, but without significant preparation and learning from projects already under implementation. And yet, government officials proudly describe their projects as "the largest" in the region, without realising the built-in risk factor in raising project finance. Senior government officials appear to see IPP projects as "magic bullet" solutions, which often create false optimism. The two geothermal projects, for example, started with a target of 520 MW each, but after years of sustained negotiations between officials and project developers both were eventually downscaled to 150 MW.

At the national level, ambitious energy planning is inherent in the system and driven by policy narratives that emphasise Ethiopia's rich renewable resources and unmet demand, but with less attention to institutional and technical capacity for project finance and implementation. For example, the first Growth and Transformation Plan (2010/11–2014/15) aimed to increase Ethiopia's power generation capacity from 2000 MW in 2009/10 to 8000 MW by 2014/15; but only 52 per cent of the target (4180 MW) was reached by 2014/15 (NPC, 2016). As Lavers et al. (2021: 20) note, officials appear to 'informally' encourage high target-setting but are prepared to accept below-target achievements: ' … plan for 100% [achievement of the targets] but 60% is good'. As correctly observed by Kruger et al. (2019) national plans and targets also tend to frequently change and fail to provide a clear signal for the private sector. Albeit driven by the desire to meet growing demand, poor and frequently changing targets fail to encourage private investors. In addition to project size, technical complexities,

location, and institutional factors affect implementation. On the ground, for example, each solar PVs park is said to require at least 236 ha of land (MoF, 2021), access to which is an arduous and complex process. These are classic pointers of a project failing to complete on time, on budget and delivering anticipated benefits (Flyvbjerg and Gardner, 2023).

Tensions within the governance structure: the study found that the PPP/IPP governance is rife with organisational tensions due to overlapping roles and responsibilities, particularly between the PPP-DG hub at the MoF and EEP. With some difference in emphasis, both are tasked with identifying and evaluating the suitability of IPP projects; and involved in designing and implementing IPP tender documents (FDRE, 2018). The EEP perceives that the PPP-DG has "appropriated" its roles and responsibilities, although the latter has limited capacity to prepare and review tenders. As a senior EEP respondent noted: "EEP's roles and responsibilities were carved out and given to PPP-DG. I see this as interfering with EEP's business – our roles and responsibilities. PPP-DG's dominance in the procurement process disempowers EEP".

Bundling electricity generation, single buyer, and transmission roles in EEP: IPPs sell electricity to only EEP, and do not own nor have alternative electricity transmission and distribution channels. Even at generation stage, research respondents critically noted the potential conflict of interest between EEP's role as a generator and buyer of electricity. EEP officials themselves noted that if they deem it necessary, they will not hesitate to reject even the lowest bidder and implement a project by themselves.

Weak and fragmented IPP governance: electricity sector governance is fragmented and lacks coherence. Although by law IPP project developers start with the PPP-DG or EEP as their entry point, they find themselves caught between several agencies. Some start with the EEP or MoWE or even regional governments, as the policies and rules of these agencies control access to resources; for example, regional governments control access to project sites. Institutional disconnects are also rampant. For example, the Ministries of Finance and Trade should have harmonised procedures for project company registration, but did not, as the Ministry of Trade required the signing of a PPA to register a project company, while the IPP guidelines require a legally registered company to sign a PPA. Private sector interviewees complained about high turnover of officials. Many interviewees referred to the whole procurement process as "bureaucratic" - in a strongly disapproving tone – taking months or years to reach a particular milestone. Some government staff were said to prefer state-owned businesses as opposed to private provision of electricity and "mistrusted" the (foreign) private sector, thinking that the latter would take advantage of the weak and fragile system.

However, our repeated engagement with the bureaucracy showed that it behaves like a Weberian bureaucracy - with a hierarchical structure and divisional units with clear rules for undertaking tasks of governing energy procurement. Many staff demonstrate palpable qualities of integrity, will and effort to implement the government's political commitment to private procurement. IPP project developers' complaints seem to have emerged from officeholders' lack of experience in negotiation and fear of making mistakes. They are driven to achieve the best deals, as any negotiating party would do, but fail to grasp the implications of "cheap" deals for the project companies. For example, a CEO of a geothermal project noted that a senior government official expected them to agree to a lower investment cost per MW compared to Grand Ethiopian Renaissance Dam (GERD), and a low tariff. But they did not realise that the cost structure of a geothermal power plant and the reliability thereof are different to a hydro or wind or solar project. The lowest tariff does not necessarily generate a viable project company. Clearly, some officials miss the fact that businesses aiming to enter the Ethiopian market are showing willingness to stay in the country for 2-3 decades, and hence, besides their IPP projects, will be heavily engaged in developing community projects to build positive relationships on the ground. It was evident that closer relationships and trust-based negotiations were more likely to lead to agreements being signed.

Inadequate institutional and human capacity: key institutions, particularly the PPP/IPP hub and EEP's IPP unit, experience dire shortages of expertise and skills in finance, law, and preparation of bid documents. The PPP hub started operation with 4–5 staff – to procure large capital-intensive procurement projects worth millions of dollars. Our data showed that in 2022, it employed 18 professionals (first degree level and above) but lacked 45 per cent of the required staff. Existing expertise and skills in the system tend to skew towards hydropower development. According to EEP officials, shortage of expertise within the PPP/IPP hub was exacerbated by the system's inability to capitalise and build on expertise at EEP. Interviewees noted that the main reason for the capacity gap is lack of preparedness to handle matters at the early procurement stage. The study found that to mitigate such capacity gaps donors, notably the Scaling Solar programme of the International Finance Corporation, assigned Transaction Advisors to support areas like bid preparation and tender processes, and finalise financial and final project approval, loan agreements and insurance. However, senior EEP staff bitterly resent that the procurement process has fallen under the "influence and/or control" of external advisors, who they think are "proxies of the investors". Finally, it was also noted that EEA (now PEA) lacks independence as it depends on government funding, and its major decisions (such as tariffs) are influenced by the government's political agenda and priorities. To meet these capacity-building needs, institutions have taken the short-term route of implementing capacity-building programmes and hiring transaction advisors and consultants, but capacity gaps prevail.

Project risk and financial close:

Availability of forex - the biggest challenge here relates to shortage of foreign currency and convertibility of birr to international currency. The sticking point is the government's reluctance to provide guarantees for foreign currency availability to IPP developers and debt financiers, who are concerned about delays in accessing foreign currency. In relation to the first Scaling Power competitive bidding of 2018, the National Bank of Ethiopia, cognizant of the country's status of foreign exchange reserves, was said to have refused to offer a forex guarantee (Kruger et al., 2019), which consequently led to the collapse of overall risk mitigation strategy drawn up with the support of the World Bank and IFC.

The creditworthiness of the off-taker (EEP): while investment in the sector increased, tariffs remained as low as US$0.02 per kWh for a long time (World Bank, 2019a). In addition, poor revenue collection coupled with high electricity transmission loss saw the gap between electric supply cost and revenue widen. Tesfamichael et al. (2021) reported that in 2017, while EEP's revenue amounted to 7 billion Ethiopian birr (US $253 million), the costs associated with generation and distribution of electricity were 28 billion Ethiopian birr (US $1.01 billion). In recent years, two measures were taken to shore up EEP's creditworthiness: tariffs were reformed to reach to US$0.7 per kWh from 2022 (Tesfamichael et al., 2021), and the Government of Ethiopia cancelled 50% of EEP's debt.[7] While moving in the right direction, as shown below, neither measure appears to have convinced investors to invest in the Ethiopian energy market.

Macroeconomic risk: emerging economic challenges such as reduction in foreign reserves and inflationary pressures dampen prospects for growth and hence increase risk to investors. Ethiopia's debt service is a concern, particularly as it recovers from the Covid-19 pandemic. The debt increase has been partly due to inability to attract private finance, as the Government's efforts to attract the private sector garnered little interest and it resorted to debt finance to maintain investment (Ayele and Mutyaba, 2021). Private creditors use ratings by Standard and Poor, and Moody and Fitch in their assessment of risk. On 9 February 2020, both rated Ethiopia CCC, down from the previous B (Minney, 2020). On

[7] See 2Merkato.com here: Ethiopian Electric Power Relieved of 191.8 Bn Birr in Debt, Capital Upgrading, accede 6 April 2023.

20 December 2022, Fitch rated Ethiopia CCC[8] which indicates substantial risk to investors. Then there have been uncertainties over the future structure and ownership of the electricity sector (MoWE, 2020). In fact, EEA (now PEA) drafted a policy document for decentralising the sector (EEA, 2021). It floated the idea that up to 200 MW facilities can be owned and operated end to end, meaning that buyers and/or suppliers can use their own transmission and distribution systems. Exporting electricity, including by private suppliers, was also widely discussed. While policymakers are still digesting the implications of their policy options, investors have to wait and see.

Political and security risk: another important risk highlighted by respondents is the deteriorating security situation in Ethiopia, particularly in northern Ethiopia, where civil conflict and ethnic-based political tensions have led to armed conflicts that have been ravaging the country. The narratives over the causes and consequences of the conflict vary, but the fallout between the Tigray People's Liberation Front (TPLF) and Prosperity Party-led Federal Government of Ethiopia has caused significant civilian death, displacement and suffering, and damage to the trust between communities and regional authorities and the federal government. Reports show that, in Tigray alone, as many as 600,000 people may have died in the conflict, including 31,300 to 89,300 civilians, with many more dead from starvation and lack of healthcare (FT, 2023; House Lords House of Lords Library, 2022).[9] Ethiopia has been subjected to various sanctions, including losing its US Government African Growth Opportunity Act (AGOA) beneficiary status (USTR, 2022) which, at the time of writing, has not been reinstated. The conflict damaged the economy – its infrastructure and productivity loss – amounting to a staggering US$28 billion (or 26% the country's gross national product) and contributing to 3 million people falling under the absolute poverty line (Endale, 2023). Interviews and media reports also showed that delays in implementations or total collapse of major projects in the conflict or neighbourhood areas, such as the ACWA projects, were directly associated with the conflict (Fentaw, 2022a). In short, private sector investors are spooked, and Ethiopia has been squandering precious resources on these conflicts at the expense of its social and economic development.

The government of Ethiopia, and its donors and DFIs came up with several risk mitigation measures. In the event of government default due to *force majeure*, the World Bank Group put in place the Ethiopian Renewable Energy Guarantee Programme (REGREP) and put aside US$ 200 million (World Bank, 2019b; Kruger et al., 2019). Similar arrangements were made by the Bank's Multilateral Investment Guarantee (MIGA) to cover significant portions of project equity and debt (Kruger et al., 2019). Major fallout occurred when the National Bank of Ethiopia refused to offer a partial guarantee of forex (Kruger et al., 2019). In the case of Scaling Power I, this led the whole risk mitigation strategy to collapse (ibid). Consequently, all bidders except ACWA withdrew from the process, and ACWA, who did not ask for such guarantees, became the winner. Industry expert research participants, however, were concerned about the deal – that the tariff was so low it would not become a viable business. Albeit at a slow pace with reduced sizes, the other three IPPs in this study went to implementation based on equity investment.

Weak policy support for the nascent domestic private sector: the Ethiopian IPP business model is based on encouraging foreign multinationals to enter the Ethiopian market. It encourages imports of technology, know-how and project management. 70 per cent of bid ranking goes to commercial criteria – mainly price. The remainder goes to bidder's technical capabilities and experiences, but 'local content' and 'local ownership' each receive 5 per cent (Kruger et al., 2019). Except for one junior partner in the Metehara solar PV project, we found no Ethiopian company participating in the IPP tenders. It can be argued that this was mainly a reflection of the weak domestic private sector that some observers noted "cannot even supply galvanised steel" (Kruger et al., 2019), but as we argue below and as our interviewees strongly contend, if the domestic sector was properly supported, it can supply essential inputs (including panels) and lay the foundation for an independent energy sector.

6. Conclusions and policy implications

Independent power producers (IPPs) are posited as sources of investment to generate electricity at lower prices. They are regarded as sources of innovation and efficiency to create/expand capacity to generate, and increase access to, electricity, reducing dependence on often subsidised stated-owned utilities. Over the past decade, Ethiopia opened its market to IPPs to procure electricity from a mix of renewable sources and address its chronic energy poverty. It set up the legal and institutional framework to facilitate IPPs and succeeded in attracting several to procure thousands of megawatts of electricity at reasonably low tariffs, but managed procurement of only 400 MW by the implementation stage. At the time of writing, none of the projects reached financial close.

This study set out to understand the challenges of governing energy procurement from renewable energy sources supplied by independent producers. Based on evidence from five IPP projects, and several stakeholders engaged in the IPP governance framework, it explored the root causes of protracted and limited extent of procurement. Five major challenges stand out:

First, *faultlines in procurement coordination and energy planning*: the size and sequencing of projects were unrealistically high; and inter-agency rifts and disconnects were hampering procurement. Second, *weak human and institutional capacity* contributed to poor planning and implementation. Third, *incomplete electricity sector reforms* generated uncertainties over the future structure and ownership of the sector and put investors in a wait and see position. Fourth, *significant projects risk*, including security, contributed to private suppliers and lenders to attach high risk to operating in Ethiopia. Finally, *weak domestic private sector*: while facing insurmountable challenges such as facilitation of investment, the diminutive private sector has not been supported by policy.

Unless relevant policy actions are taken, Ethiopia will not meet rising demand for electricity (RDEE, 2022)[10]. Nor will it achieve universal access by 2030 (MoPD, 2021). Below we discuss the policy implications (see also Ayele et al., 2021).

(i) **setting realistic targets for IPP projects**: excessive plans and targets were based on Ethiopia's comparative advantages in renewable resources and its unmet needs, but underestimate the capacity needed for implementation, including the risks that investors face as they raise finance. This study and experiences (see Flyvbjerg and Gardner, 2023) show that, (mega)projects with poor planning and preparation often fail to deliver. The government should consider more realistic targets, firmly based on understanding of complex factors such as risk. Project size should emerge out of considerations of choices between optimal technical, financial, economic, security, and political options.

(ii) **prioritising implementation of projects in the pipeline**: many projects stuck in the pipeline will only overstretch limited institutional and technical capacity when dealing with multiple and simultaneous negotiations and inter-agency coordination. The immediate focus should be on implementing at least an exemplar project and generating lessons to address many of the (seemingly

[8] See Fitch's Ethiopia rating: here.

[9] Many thousands also died, displaced, and lost livelihoods in the Amhara and Afar regions (House Lords House of Lords Library, 2022).

[10] Recent studies on Ethiopia (see, for example, Meles et al. 2021) show households and businesses are willing to pay high level tariffs for reliable electricity.

intractable) challenges. As Flyvbjerg and Gardner (2023) would say, "think slow, act fast" – or prepare well but execute at speed.

(iii) **mitigating inter-agency rifts** and disconnects through productive engagement and (re)allocating agency tasks based on competencies. As it stands, IPP projects procurement is under the influence of the Ministry of Finance (MoF). Playing the "sovereign grantor" role of projects may be justifiable, but MoF is not in the best position to make technical assessments of projects, nor bids. The government may consider reorganising and/or relocating the PPP/IPP hub. For example, given its centrality to planning and its sectoral neutrality, and its ability to conduct technical and financial reviews of projects, it may consider moving it to the Ministry of Planning and Development.

(iv) **addressing IPP project auction design and implementation capacity deficits** in a systematic way, for example by capitalising on existing capacity within the system (rather than depending externally financed transaction advisors).

(v) **mitigating real and perceived project risks**: while the availability of forex was the dealbreaker, the broader risk was compounded by security risk, macroeconomic risk, off-taker risk, and uncertainties over the future of electricity sector reform policy (see below). Even were the forex condition met,[11] substantial evidence (for example, Gregory and Sovacool, 2019) indicates that IPPs investment will not automatically follow. At a minimum, the government should take swift and sustained political action to end the country's security crises. Besides the conventional social and environmental impact assessments of projects, successful startup, operation and growth depends on trust with affected communities on the ground. Thus, government and project companies alike need to engage with communities and support initiatives that benefit communities who can be sources of strength at times of instability (Vanclay and Hanna, 2019; Alik-Lagrange et al., 2021).

Even with the above potential policy changes, the global IPP industry remains reluctant to invest in countries like Ethiopia (Gregory and Sovacool, 2019). More fundamental policy shifts are needed. These, we argue, come in two interrelated areas: reforming the electricity sector and nurturing the domestic private sector. Along the way, we argue that Ethiopia needs to explore not only procurement from mixed sources, but also a mix of public, private, public-private, domestic, and foreign suppliers. Any diversification of the power mix comes with the recognition that hydropower will continue to be the dominant power generation source (RDEE, 2022), because Ethiopia is rich in the resource and has decades of experience of hydropower generation. We are cognisant of the fact that hydropower remains vulnerable to climate change (RDEE, 2022). That said, choice of technology should be based primarily on cost of delivery and reliability of supply. Scalability and lower investment costs for wind and solar power could result in significant expansion of these technologies by 2030.[12] But geothermal, and to some extent hydropower, are most reliable – as one interviewee said, "it does what it says on the tin". Below, we elaborate on these policy implications:

First, electricity sector reforms: the continued debate over state vs private supply of electricity in Ethiopia and elsewhere is unproductive, as history abundantly shows that either ownership or co-existence of state and private or joint ownership are perfectly possible. The more important question is what kind of organisational structure companies, including state companies, will have. Due to technological breakthroughs, decentralised and networked systems have been growing (Baker et al., 2021b). Thus, we argue that the government should consider: (i) decentralising the industry, allowing prosumers, off- and mini-grid solutions. (ii) further unbundling the existing system, more specifically (a) separating EEP's power generation and off-taker roles, to overcome conflicts of interest in procurement and the risk of poor creditworthiness. It follows that creditworthy off-taker(s) need to be established, with new ones honouring all previous commitments with IPPs and lenders. (b) separating EEP's power generator and transmitter roles, to overcome delay problems associated with expected reforms to unbundle generation and transmission and introduce competition into the industry. EEP's generation and transmission capacity undermines private sector bargaining power as it denies alternative transmission infrastructure. Again, new transmission companies should be set up, but some suppliers need not necessarily depend on state-owned transmission companies.

Second, the case for bold green industrial policy: while the domestic private sector faces huge challenges in coordination and facilitation of investment (IPE Global Limited, 2019), the Ethiopian IPP business model solely focuses on encouraging foreign multinationals to enter the Ethiopian market. But global industry is risk averse and reluctant to invest. This could allow for green industrial policy (GIP) aimed at the domestic private sector (see also Shen et al., 2023; Aghion et al., 2011). Building on Ethiopia's broad climate-resilient green economy strategy (FDRE, 2011), the case for GIP (or twin energy transitions) is strong. Here, we propose four specific rationales towards supporting the domestic private renewable energy sector in Ethiopia and low-income countries more generally:

Nurturing domestic industry will have cascading effects – supporting and enabling domestic industry will boost local technology development and manufacturing capacity. It will make the industry a strong partner for IPPs and facilitate technology transfer and the acquisition of knowledge. A strong private sector will mitigate the demand for foreign currency and convertibility issues described above.

Green energy is key to combatting climate change: renewable energy reduces carbon emissions and is economical but requires heavy investment and state support. Many developed countries, including the USA and UK, are heavily intervening in their green energy sectors (Allan et al., 2021). Moreover, with growing use border taxes on carbon (for example, the EU (Gerbeti, 2021)), supporting and greening economies will reduce taxes and bring market advantage, while achieving climate targets.

Green Industrial Policy promotes competition and economic performance – EEP has been loss making and reliant on government subsidy for decades. A viable domestic private sector reduces the need for subsidy, improves allocation efficiency and competition (Keay and Robinson, 2019).

Energy is a matter of national sovereignty: electricity is key to growth and development, and affordable and sustainable electricity is a matter of national security too. Many countries have addressed energy security as part of their national sovereignty to build resilience and some degree of autonomy in their systems.

Thus, as Rodrik (2008) would say, the question here is not why but how the government should nurture the domestic private sector through tax incentives, training, and promoting joint ventures. As Mazzucato (2016) argued, we propose GIP should go beyond the usual tax reductions and subsidies, with the state playing the "green entrepreneurship" role to enable economic agents to take on risk and uncertainty (ibid: 3). It should create an enabling environment – strong finance to raise capital, energy export and forex retention to expand business; and education and research systems to train qualified researchers and businesses to jointly develop research programmes, etc. Feed-in tariff mechanism extended to IPPs should be offered to the domestic private sector suppliers, but, again, with due consideration for requisite institutional and technical capacity (Ndiritu and Engola, 2020). Given the ample opportunities, for example, in small-scale PV solutions (Kebede,

[11] The Government of Ethiopia agreed to pay IPP investors, on demand, in US dollars (see Fentaw, 2022).

[12] As underlined by Flyvbjerg and Gardner (2023: p. 155) simplicity and scalability make solar and wind power projects (if well planned) among the few mega projects which complete ahead of or on schedule, and on or under-budget.

2015), the domestic private sector can be the driver of the development of the renewable energy sector.

Developing policies requires strong political leadership with capacity to navigate competing political, sectoral, and national and sub-national interests, and guide project design and implementation (Wang, 2022). Above all, fractious Ethiopia requires peace and stability whereby critical voices of communities are heard and included in the design and implementation of large projects (Vanclay and Hanna, 2019). Many of the seemingly interactable problems that Ethiopian IPP governance faces are part of the learning process during the transition from state to a mix of state and market-led development pathways in the energy sector (Ayele et al., 2021). Procurement via private suppliers will inevitably require a competent governance arrangement that is cognizant of the suitability of entire energy sector structure to transition.

Funding

This research was produced with UK Aid funding from the UK government (Foreign, Commonwealth & Development Office) under the Applied Research Programme on Energy and Economic Growth, managed by Oxford Policy Management (OPM). The findings and conclusions contained herein are those of the authors and do not necessarily reflect positions or policies of the UK government or OPM. The authors are responsible for any errors and omissions.

CRediT authorship contribution statement

Seife Ayele: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Wei Shen:** Conceptualization, Investigation, Writing – review & editing, Project administration, Funding acquisition. **Yacob Mulugetta:** Validation, Writing – review & editing. **Tadesse Kuma Worako:** Investigation, Data curation, Project administration.

Declaration of competing interest

We declare no potential conflict of interest, financial and/or personal relationship with people and organisations to inappropriately influence (or create bias) in the study.

Data availability

The data that has been used is confidential.

Acknowledgement

This research was produced with UK Aid funding from the UK government (Foreign, Commonwealth & Development Office) under the Applied Research Programme on Energy and Economic Growth, managed by Oxford Policy Management (OPM). The authors would like to thank the funder and all those who provided interviews and data. We also thank Mr. Mesfin Daba at the Ministry of Water and Energy for facilitating data collection. Finally, we thank the two reviewers for their insightful and valuable comments. The findings and conclusions contained herein are those of the authors and do not necessarily reflect positions or policies of the funder. Authors remain responsible for any errors and omissions.

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