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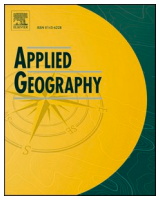

Uneven development and the geographies of energy transition in Mozambique

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ABSTRACT

In Mozambique, sustainable energy access is an increasing priority for a diverse range of actors seeking to improve livelihoods and stimulate economic development—particularly in rural areas where energy infrastructure remains limited. Drawing on field research conducted as part of a comparative three-year project examining the potential of community energy systems to foster inclusive, just, and clean energy transitions in Southern and East Africa, this paper develops a critical, policy-relevant and geographically grounded analysis of Mozambique's energy transitions, which are unfolding across multiple fronts. Our analysis addresses both the move away from conventional or 'traditional' energy sources to 'modern' energy services, and the shift toward renewable energy technologies. We argue that while Mozambique has taken important steps toward a cleaner energy future there remain significant constraints to progress and that it is crucial to consider the advancement of renewable energy in relation to the country's embedded resource and extractive geographies that shape the directions, possibilities, and spatial dynamics of transition. We examine the broader policy environment, focusing on the state's energy transition strategy and its implications for energy justice, spatial inequality, and economic opportunity. Particular attention is given to the role and potential of decentralized, off-grid energy systems, emphasizing the need for greater community participation in both policy design and implementation. Finally, we develop a political economy framework to analyse the influence of state institutions, international donors, and private capital in shaping Mozambique's energy transitions, and assess their impacts on energy poverty and the goal of equitable, sustainable energy access.

1. Introduction: A political economy of Mozambique's energy transitions

In Mozambique, expanding sustainable energy access has become a strategic priority for state and non-state actors, international partners, and donors, particularly in underserved rural areas. In recent decades, a range of initiatives have emerged to advance rural electrification, integrate renewable energy sources, and promote private sector participation in response to development and climate imperatives. This paper critically examines these initiatives alongside the evolving policy and legislative frameworks shaping Mozambique's energy transition, with a focus on the prospects for a more inclusive and equitable energy future.

In formulating effective energy policy, it is essential to "work back from the [desired] energy future we want" (Van der Horst, 2014, p. 70), identifying the necessary transitions, strategies, and institutional changes required to achieve that vision. Energy transitions are cumulative and so understanding what might constitute the "right" policies for accelerating transition in Mozambique requires an understanding of the past and the 'colonial debris' (Stoler, 2016) that remains within its highly uneven energy geographies and landscapes. The electricity network established during the colonial period mirrored the wider colonial state administration – it was highly fragmented and spatially uneven, organized into three distinct 'systems': a southern network centred around the capital (located in the far South), a central network

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concentrated in the Beira region, and a third, more metaphorical 'system' comprising a series of disconnected and geographically dispersed smaller urban centres (Baptista, 2017). At its heart was the Cahora Bassa hydro-electric dam, on the Zambezi River in Tete province, initiated in 1969 by the Portuguese in the dying days of empire and completed just months before independence in 1975. The spatiality of the already existing energy infrastructure in Mozambique is illustrated in Fig. 1.

This article critically engages with Mozambique's unfolding energy transition and possible future pathways through the lens of the political economy of energy (Newell, 2021). In doing so we emphasise the importance of power relations and dynamics in shaping how energy transitions unfold, along with the interplay between various actors and forms of governance at different spatial scales (e.g. global, regional, local). Tracing the 'winners and losers' of energy transitions and policies, and the uneven distribution of the benefits and costs stemming from energy systems and infrastructures is crucial in the Mozambican context. Accordingly, we map the range of actors involved in the formulation, implementation and enforcement of energy and resource policies (and their interactions) and examine the political and economic drivers that motivate their actions. To do this, we consider the economic, institutional, discursive and environmental contexts shaping Mozambique's energy geographies and trace how this has led to specific policy outcomes. We focus on the financing of sustainable energy systems and interrogate the ways in which energy transitions are governed and mobilised, why and for whom. Like Newell (2021) we place questions of energy justice and community energy at the centre of our analysis.

Along with Mozambique's shift toward clean energy, we argue that equal consideration must be given to the resource and extractive geographies shaping the pathways, prospects and spatialities of transition. We emphasise the need for a *relational* approach to transition that does not exclusively focus on renewables but instead considers the shift toward sustainable energy in relation to the wider resource and extractive geographies that act upon and shape the energy system. The discovery and extraction of hydrocarbon resources has created rent-seeking opportunities for the governing party Frelimo[1] (Salimo et al., 2020) and there are significant questions around the distribution of the wealth generated by the resource and extraction boom. Several companies with influential political connections have been established around hydrocarbon infrastructures, logistics and services, reselling licenses and concessions for natural resources for large sums to international operators (CIP, 2022).

Mozambique has also been rocked by the 'hidden debt' scandal where in 2016 high-level state officials took out secret loans amounting to over US$2 billion to fund a series of fictitious business ventures (Hanlon, 2016). The loans (which at the time constituted around 13 % of GDP) created a public debt crisis that has since curtailed the state's capacity to fund various development and infrastructure initiatives, including energy access. This was worsened by the subsequent withdrawal of donor support, along with rising inflation and austerity, and has also increased the pressure on the state to adhere more closely to donors' prescriptions in the future.

Mozambique is now embroiled in a state of 'permanent crisis' (Sumich, 2021). The multi-party elections held on October 9th, 2024, were marred by irregularities and large-scale electoral fraud leading to protest and political unrest following the widely disputed re-election of Frelimo. As the protest morphed into wider 'anti-Frelimo' struggle and sentiment, 314 people were killed and 633 were shot by heavily armed security personnel[2] along with thousands of protestors being subjected to unlawful detention. Consequently, the legitimacy and authority of the Frelimo party-state to oversee and direct energy transition has been profoundly weakened and undermined.

In this context, we critically examine the political economies and development imaginaries shaped by state elites, which have coalesced around an 'extraction-development' nexus (Wiegkink, 2018) and a growing reliance on hydrocarbons for export and domestic power. This shift toward carbon-intensive energy has given rise to "mega-project developmentalism" (Cezne & Wethal, 2022), characterized by a preference for large-scale, landscape-altering energy infrastructures, especially hydropower projects. In practice, many such projects have progressed slowly and risk undermining more sustainable alternatives by reinforcing dependence on high-carbon energy. Moreover, the continued prioritisation of grid expansion, fossil fuels, and large-scale hydropower reflects a centralized approach that sidelines more context-appropriate solutions—such as solar micro-grids, stand-alone systems, and ground-mounted PV—which offer significant potential as community energy systems, particularly for meeting the needs of energy-poor, dispersed, and underserved populations.

An enduring feature of the political economy of Mozambique's energy system is its export-orientation. Currently 27 % of electricity is exported (ALER/AMER, 2024), with state agencies seeking to increase revenue streams (and address trade deficits) by selling power to energy hungry markets in neighbouring countries, especially South Africa. Another is the blurring of party and state. The state-owned electricity utility EDM (*Electricidade de Moçambique*) has strong ties to Frelimo but plays a central role in extending the national grid and associated infrastructure, connecting households or installing power plants, substations, transmission lines and transformers. Decision-making regarding the siting of these infrastructures is managed by EDM in coordination with the state, with a tendency to prioritise high demand within major urban spaces[3] (Baptista, 2017) and the wider political and economic agendas of state actors and agencies.

Energy access exhibits considerable spatial variation across and between urban, peri-urban and rural spaces, as well as provincially and regionally. There is also notable *social* differentiation where in terms of cooking, for example, dependence on fuelwood (and on charcoal[4] in urban areas) is high amongst many of the poorest citizens. The continued reliance on biomass as a primary energy source has had significant environmental consequences, notably accelerating deforestation in the peri-urban hinterlands of major cities. Again, the fragmented and uneven character of Mozambique's energy geographies is apparent, revealing enduring disconnections between biomass fuel supply chains, formal electricity infrastructure, and the extractive industries of coal and natural gas (Mavhunga, 2013; Castán Broto et al., 2018).

Mozambique has significant potential for decentralized, off-grid energy systems, but national energy policy remains centred on an assumed urban-rural differentiation and a notion that these constitute distinct models and constituencies of energy provision (Castán Broto, 2017). The first approach, centred on EDM, focuses on urban grid expansion, while the second, led by FUNAE (National Energy Fund), within the Ministry of Mineral Resources and Energy (MIREME), concentrates on using off-grid technologies to supply sparsely populated, low-income rural populations. In part this differentiation reflects donor priorities, but it also results from the constraints on centralized supply. In practice however both modes of provision (centralized/decentralized) can coexist within rural and urban spaces, and occasionally both are absent (Ibid). This binary rural-urban distinction in energy access policy also

[1] *Frente de Libertação de Moçambique* or Front for the Liberation of Mozambique.

[2] According to civil society electoral monitoring group Plataforma Eleitoral DECIDE.

[3] Urban peripheries have expanded rapidly but the pace of grid extension has lagged, leading many residents to rely on Solar Home Systems (SHS) and other alternative solutions as temporary measures to meet their electricity needs (Howe et al., 2024).

[4] Charcoal production, processing, and transportation largely occur within informal networks, outside established legal and regulatory frameworks, posing significant challenges to efforts aimed at improving the sector's sustainability and governance (Salva Terra, 2022, p. 11).

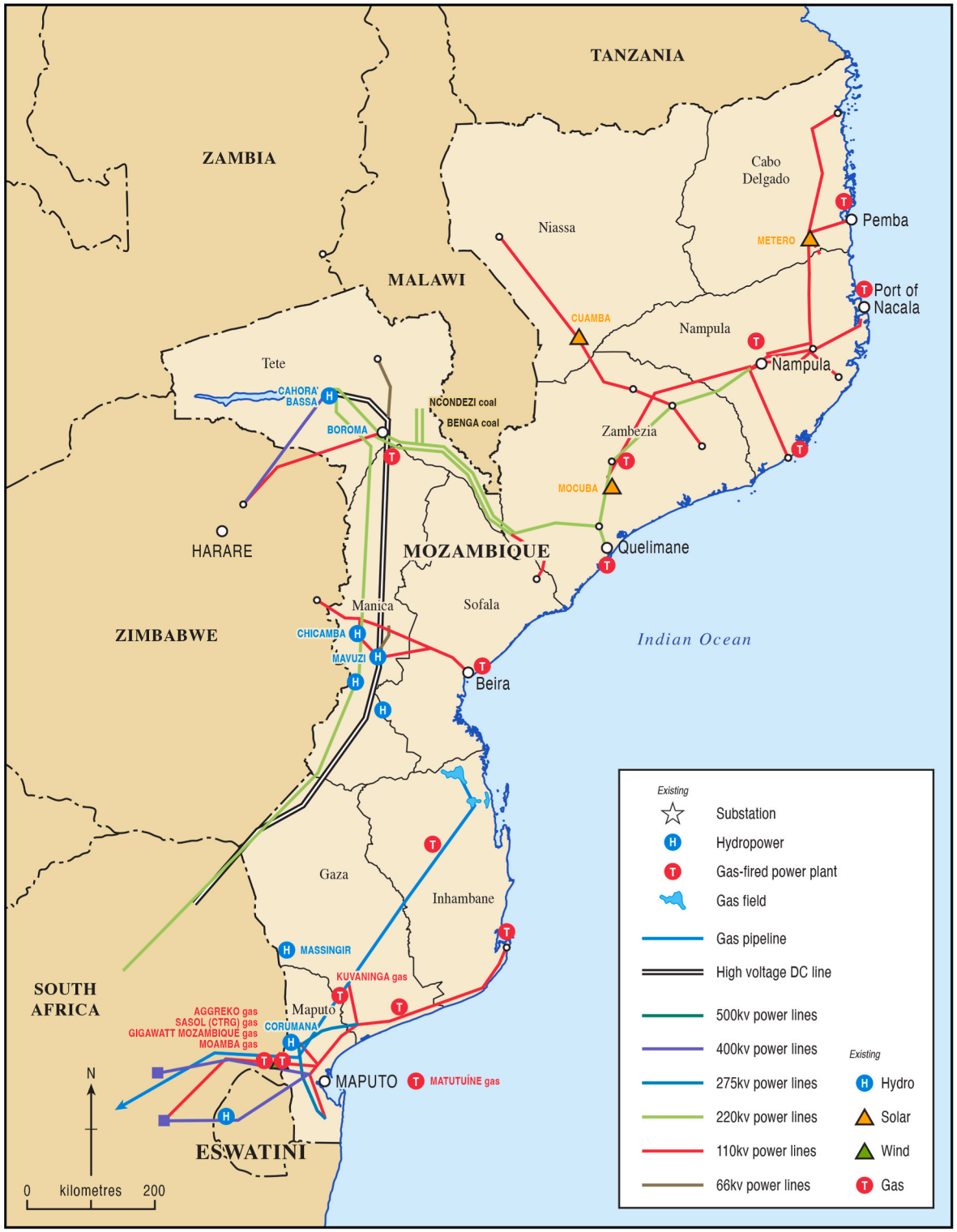

Fig. 1. Already existing energy infrastructure in Mozambique.

lacks engagement with the heterogeneity of 'rural' and 'urban' as categories, while also overlooking the effects of rapid and widespread urbanization.

This article examines Mozambique's dual energy transition, which includes both a move away from conventional to 'modern' energy sources and services, and a shift toward renewable energy technologies. Both are marked by uneven geographies, but the latter, we will argue, appears to be regressing. The central research questions we seek to address here are (1) to what extent do these two transitions exacerbate or mitigate social and spatial disparities in energy access and economic opportunity and (2) what roles do state institutions, donors, and private capital play in this process and how important is the *debris* of colonial energy systems, infrastructures and pathways?

We draw here on field research conducted as part of a three-year comparative study of the potential of community energy systems in Southern and East Africa. This involved a multi-sited and multi-scale

methodology, including semi-structured interviews with an extensive range of actors and stakeholders in Mozambique's energy sector, ethnographic observations and site visits, and community-based focus groups. We also draw on earlier phases of qualitative social science research conducted by each of the authors since 2012, and on the review of secondary literature, archival records, official reports, working papers and other materials available online, including news reports and websites of the energy projects and initiatives analysed in the study.

In the next section, we map out the key institutional actors in Mozambique's energy sector before tracing the evolution of its post-independence energy policy. We then examine the political economies of the resource boom around gas and the growth of extractive industries before analysing the changing roles of foreign donors, private sector actors and international financial institutions (IFIs) in shaping the energy landscape in Mozambique and the state's pursuit of energy policy. Finally, in the concluding section we return to our central research questions and evaluate the prospects for sustainable energy transition.

2. Mozambique's energy policy in transition

After independence from Portugal in 1975, energy was quickly positioned as a central instrument through which Frelimo could advance its 'high modernist' development agenda. In 1977, the government established EDM, consolidating 26 previously fragmented colonial-era production and distribution units into a unified national entity (Baptista, 2017) that aimed to support broader national development goals and enhance citizens' well-being. EDM's capacity to deliver on this was however radically curtailed by the war with Renamo,[5] leading to a shift away from Marxist-Leninist ideology in the 1980s followed by the onset of neoliberalisation.

After the first multi-party elections in 1994—won by Frelimo—EDM began expanding the national electricity grid, capitalizing on growing inflows of donor assistance, foreign direct investment (FDI), and support from regional partners (Baptista, 2017). This expansion gained momentum in subsequent years, ultimately achieving the electrification of all provincial capitals and the integration of all 128 administrative districts into the national grid. However, while urban areas and commercial hubs are predominantly connected to the grid, significant portions of the rural population remain unconnected. The extension of electricity infrastructure into these areas is constrained by a combination of high costs and logistical challenges, compounded by the low population density and limited purchasing power in many rural communities. Further, many of the aging grid transmission lines need replacement and are vulnerable to damage from climate shocks.

Within the state apparatus, MIREME acts as the lead institution for energy sector planning, tasked with overseeing the exploitation of energy resources and the growth of energy infrastructure (MIREME, 2021). While EDM is tasked with the execution of on-grid electrification projects, FUNAE is the institution charged with developing off-grid energy systems, including Solar Home Systems (SHS) and mini-grids. Established in 1997 to promote renewable energy, FUNAE underwent an institutional restructuring to enhance its capacity in financing and implementing off-grid energy solutions. However, the institutional delineation of electrification responsibilities, where EDM focuses primarily on urban areas and FUNAE on rural ones, has resulted in a limited exploration of off-grid electrification potential in higher-density peri--urban and urban-fringe areas where such initiatives might advance energy access objectives.

Since the late 1990s, the state has enacted regulatory reforms to facilitate private sector engagement in supplementing the energy that EDM provides, seen as key to the future development of renewables. This began with Power Purchase Agreements (PPAs) which featured in the 1997 Electricity Law, introduced to attract private sector participation in electricity generation. Reforms subsequently enacted in 2012 and 2013 established regulatory frameworks aimed at facilitating Independent Power Producers' (IPPs) involvement in both large- and small-scale energy projects, enabling them to produce and supply electricity to the national grid. To create a more competitive and transparent investment environment, the Renewable Energy Auctions Programme (*Promoção de Leilões de Energias Renováveis* or PROLER) was launched in 2020 in collaboration with the EU. This initiative aims to streamline procurement processes for renewable energy infrastructure to enhance investor confidence and facilitate the participation of IPPs (Howe et al., 2024). Further reform in 2021 focused on regulating energy access in off-grid areas, allowing both public and private entities to develop mini-grids up to 10 MW and provide energy services to underserved populations.

Several stakeholders argue that IPPs could play a central role in shaping the country's off-grid energy landscape (ALER/AMER, 2022), viewing the development of a framework for regulating off-grid energy as a critical step toward addressing a lack of clear definitions and procedures regarding the designation of off-grid areas and the process for obtaining off-grid concessions. Enacting such regulation is also often seen as a mechanism to unlock financial incentives, including tax exemptions, subsidies, and tariff support, thereby enhancing the financial viability and attractiveness of investments for prospective off-grid energy providers. IPPs now play an increasing role in enhancing national energy supply, but the electricity procured from these producers is often priced above what EDM can recover through existing tariff structures, placing financial strain on the utility (World Bank, 2015).

In 2022 President Nyusi's administration introduced the Economic Acceleration Package (*Pacote de Aceleração Económica*, PAE) as a strategic response to pressing national growth and development challenges. Among the measures included was a reduction in the VAT rate from 17 % to 16 %, alongside a proposed VAT exemption on the import of electrical equipment, which aimed to incentivize investment in renewables and expand energy access in rural and underserved regions. However, it took over a year for the government to approve the details of the tax exemptions, and the resulting package included technical specifications for renewable energy equipment that were far too detailed to be implementable in practice. According to senior staff within MIREME, the origin of the design specifications remains unclear (Interview, February 2025), yet critics perceive that high-level corruption may have influenced these decisions.

Many analysts view local community engagement as instrumental in enabling decentralized energy systems, promoting the take up of diverse renewable energy technologies (Wirth, 2014) and building a more just transition. However, critical dimensions such as social inclusion, gender equity, technology justice and resource sovereignty are often overlooked within predominantly technical approaches to community energy. Further, structural politico-economic barriers—including insufficient legal recognition, limited access to appropriate technologies, and resource constraints—continue to hinder communities' capacity to initiate, manage, and own energy infrastructure (Gebreslassie et al., 2022). Policies aimed at diversifying the energy sector's institutional landscape have generally prioritized infrastructure expansion and investment mobilization over promoting socially inclusive development. This is despite increasing recognition that a just and sustainable energy transition necessitates not only technological innovation but also profound cultural and social transformation (Howe et al., 2024).

Emerging state discourses on energy transition in Mozambique appear to reflect a gradual departure from the participatory frameworks that were more prominent in earlier policy formulations. The *New and Renewable Energy Development Policy* of 2009 explicitly committed to enhance community participation in the process of developing new and renewable energies (along with engaging companies and civil society). The Master Plan (2018–2043) however makes no mention of community systems nor does it refer to local or stakeholder participation (MIREME, 2018). Although the off-grid regulation requires the engagement of communities as a prerequisite for mini-grid projects, it stops short of

[5] *Resistência Nacional Moçambicana* or Mozambique National Resistance.

recognising community energy as a viable or strategic development pathway. Within the wider political economies shaping Mozambique's energy transitions, the dominant focus remains on private and public sector actors, while the space for communities and civil society organizations is increasingly marginalised. Consequently, the potential for communities to lead (and thus further democratise) energy initiatives or to pursue forms of energy sovereignty is constrained.

Even among the principal state and state-sponsored organizations tasked with overseeing Mozambique's energy sector—EDM, MIREME, and FUNAE—their respective roles in planning, decision-making, and policy implementation are at times characterized by a lack of clarity and transparency. This institutional opacity extends to the coordination between on-grid and off-grid energy initiatives, particularly in instances where grid expansion overlaps with areas initially designated for off-grid electrification, creating ambiguity concerning project continuity and governance. Further, key principles for effective energy governance—namely independence, accountability, transparency in decision-making, and stakeholder participation—remain significant areas of weakness within Mozambique.

With the blurring of party and state, calls have grown for greater *independent* regulatory oversight of competition between public and private actors. In response, the Energy Regulatory Authority (ARENE) was established in 2017 to replace the National Electricity Council that had previously functioned under direct government authority. Current laws however do not prohibit individuals who previously held positions in organizations regulated by the Energy Regulatory Authority (ARENE) from being appointed to leadership roles within the authority itself, including board positions or the CEO role (Transparency International, 2024). MIREME, the ministry responsible for overseeing ARENE, is also simultaneously a contracting party in energy agreements and the authority charged with regulating and supervising their implementation—a dual role with a conflict of interest (CIP, 2022).

Beyond these wider political-economic and governance challenges, energy suppliers operate under challenging economic conditions, exacerbated by the absence of domestic manufacturing capacity for off-grid energy technologies. As a result, nearly all equipment must be imported, and a significant portion of the operational costs—especially for SHS—is attributable to customs duties and import taxes. These additional costs are frequently transferred to consumers, further inflating end-user prices. However, the primary target market for SHS in rural, off-grid areas consists of households with limited or no stable income, constraining their ability to afford such technologies. Reducing or exempting import duties could substantially lower system costs, improving affordability and potentially accelerating adoption among low-income populations.

State-led investment in energy infrastructure has remained intermittent and fragmented whilst renewable technologies like wind and solar continue to occupy a marginal position within the broader framework of national electrification policy. Further, Mozambique's longstanding dependence on foreign aid—with donor funding constituting a substantial portion of the national budget—has meant that decisions regarding energy infrastructure development have often been shaped more by donor priorities than by coherent, domestically driven planning.

Power generation capacity and transmission and distribution infrastructure have consequently increased incrementally and in a fragmented manner; currently the generation capacity stands at a total of 2841 MW, with the state aiming to more than double this to a capacity of 6462 MW by 2030 (Sultane, 2023). The spatiality of the proposed energy infrastructure is evident in Fig. 2. Plans to enhance power generation maintain a heavy emphasis (and continuing path dependency[6]) on extending installed hydro-electric capacity, with the state seeking to add 3.5 GW of extra capacity between now and 2030[7] (from new hydropower schemes and revitalising existing hydro infrastructures). Some 77 % of Mozambique's electricity generation capacity derives from hydropower, totalling 2192 MW (ALER/AMER, 2023).

Despite the growing focus on enhancing (sustainable) energy access in Mozambique, there is little consensus on the status of electricity access through the grid or mini/off-grid systems, with estimates varying from 40 % of the population (IEA, 2024) to 51.3 %[8] (ALER/AMER, 2024). Such divergences are unsurprising given the lack of reliable and comprehensive data although the state officially remains focused on reaching 100 % access by 2030. What is clear is that there is notable spatial variation and disparity in access levels across the country, illustrated in Fig. 3.

Despite advances in rural electrification, the World Bank projects that Mozambique's electrification trajectory will not achieve universal access until 2065, anticipating connections for 6.2 million users through grid connections by 2030 (World Bank, 2024). To close this gap, the World Bank advocates a more diversified approach, combining on-grid and off-grid solutions given the growing risk of droughts across much of the country, which threaten to undermine the electricity system's reliance on hydropower.

During the COP28 gathering in Dubai in December 2023, Mozambique's then President Filipe Nyusi[9] launched a national Energy Transition Strategy (ETS)[10] for 2024–2050 (Government of Mozambique, 2023). Nyusi outlined Mozambique's energy transition priorities, which include the continued exploitation of substantial natural gas reserves in the Rovuma Basin—estimated at 286 $\times$ 10^9 m^3—alongside efforts to attract international investment. Aiming to align the state's priorities with the expectations of the international community, Nyusi also announced a commitment to mobilizing US$80 billion for implementing the ETS, with a strong focus on scaling up renewable energy and diversifying the national energy mix. Nyusi's administration also introduced a set of energy sector policy reforms, which included enacting a new regulatory framework aimed at fostering off-grid energy developments. As noted previously, the pursuit of climate-friendly sustainable development in Mozambique is increasingly linked by the state to its pursuit of extractive industries and fossil fuel resources, to which we now turn.

3. Resources, extraction and conflict

Once considered "on the periphery of the periphery" (Sidaway & Power, 1995), in recent years, Mozambique has emerged as a prominent 'energy frontier' on the global stage following the discovery and large-scale exploration of substantial natural gas and coal reserves. Despite international donors and the government's enthusiasm for renewable energy and its potential role in reducing energy poverty, hydrocarbons have attracted the lion's share of foreign investment in the country's energy sector (Foster et al., 2024; Wiegink, 2018). This has

[6] 'Path dependency' refers to how past decisions and events (e.g. the building of large-scale infrastructures such as the Cahora Bassa dam) constrain future choices and outcomes (e.g., which energy infrastructures to prioritise in expanding energy access).

[7] Along with the expanded hydro capacity (15MW of which is from new sources) the state plans to add a further 2GW of solar, 200–500MW of onshore wind energy and a further 2.5 million on-grid electricity connections by 2030, according to EDM.

[8] The rate of electrification since 2001 has risen from 1.3 % in 2001 to around 55 % in late 2022 (EDM, 2022). Significant challenges remain in reaching the goal of universal energy access, particularly in rural areas, which account for approximately 67 % of Mozambique's population (INE, 2019, p. 38). As of 2022, fewer than 6 % of rural residents had access to electricity, in stark contrast to 57 % of their urban counterparts (INE, 2022).

[9] Nyusi's administration ran from 2015 to 2024.

[10] The strategy is structured around four key pillars: the development of modern energy systems grounded in renewable energy sources, the promotion of green industrialisation, the adoption of clean energy technologies in the transport sector, and the pursuit of universal access to modern energy services.

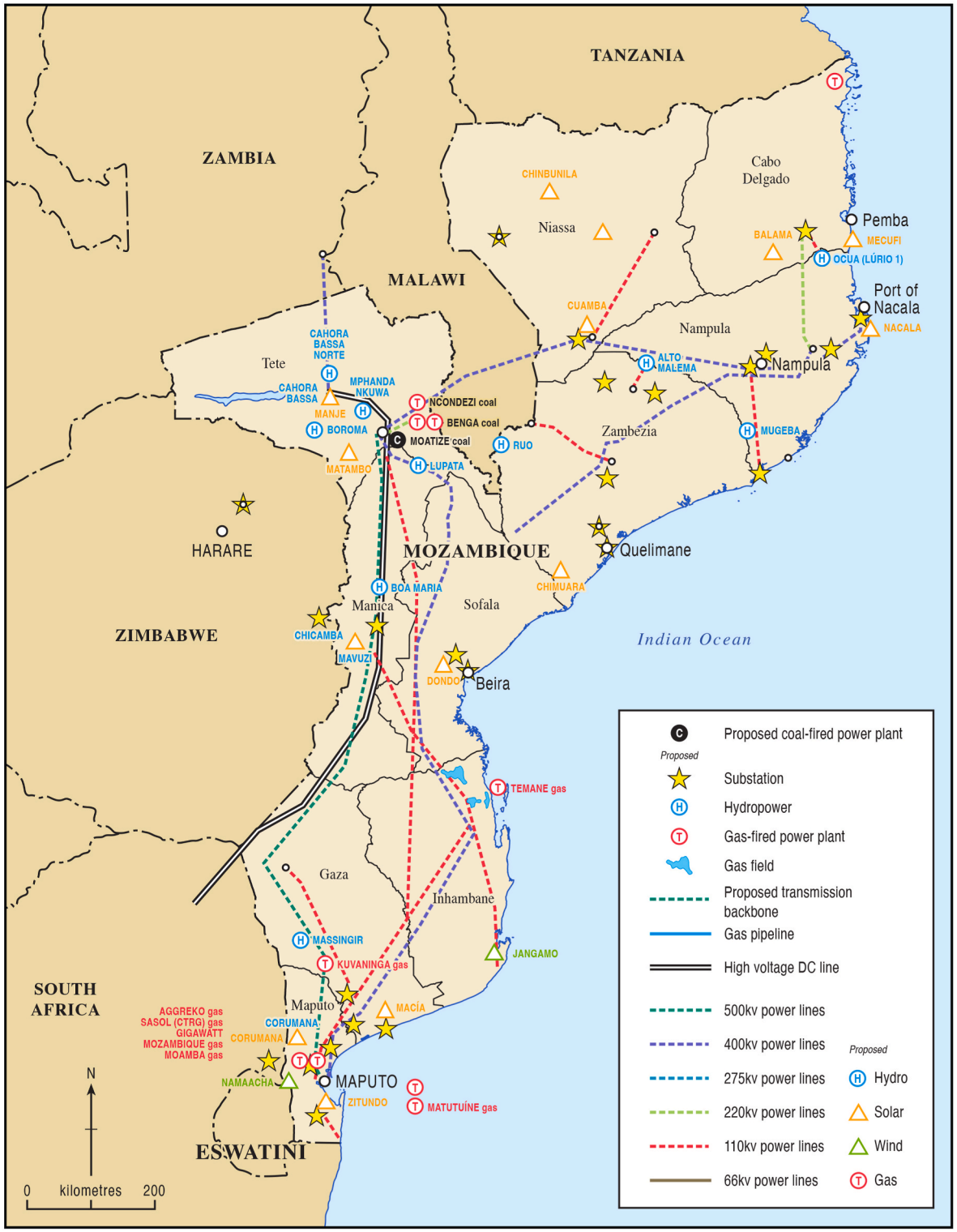

Fig. 2. Proposed energy infrastructure in Mozambique.

raised critical questions about Mozambique's relationship to the wider global dynamics of resource extraction and the broader implications for environmental sustainability, conflict, and insecurity (Blanes et al., 2023; Wiegink, 2018). Natural gas resources have contributed a notable economic uplift too, with exports in 2024 climbing to US$1.967 billion, almost reaching parity with coal exports (US$ 2.006 billion) (Lusa, 2025).

Mozambique's energy transition is thus unfolding across multiple fronts, with its complex political economy evolving across different spatial scales. Whilst its hydrocarbon resources are gaining importance in global energy markets and supply chains, within the Southern Africa region the country is also occupying a more central role in relation to meeting the growing demand for energy in neighbouring countries. Internally there are also growing calls to deploy hydrocarbon resources (especially gas and coal) domestically in the effort to rapidly boost energy production and access, rather than consigning them for export

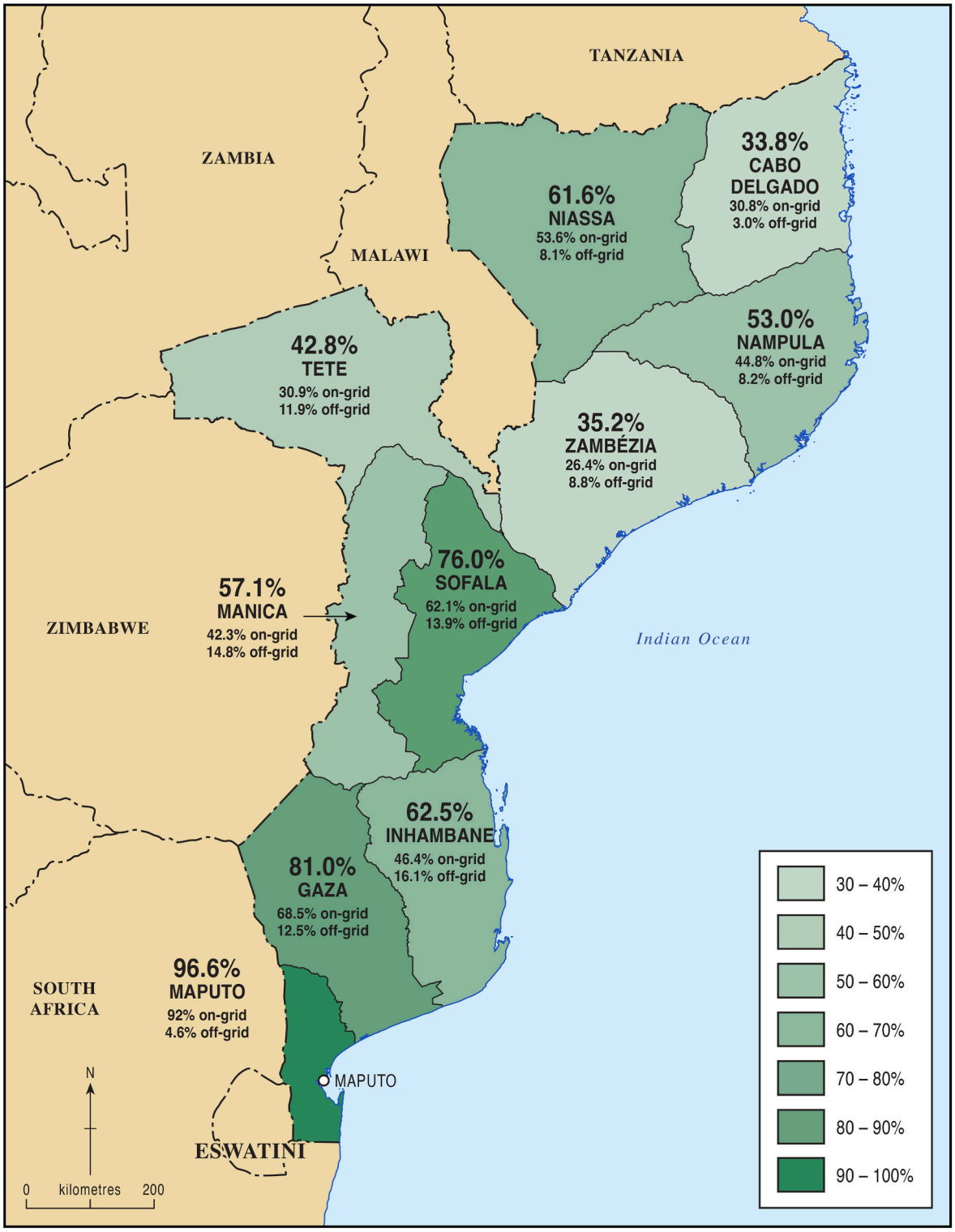

Fig. 3. Energy Access levels by province in Mozambique. Adapted from (ALER/AMER, 2024).

(Blanes et al., 2023).

Following the resource discoveries, the Mozambican government anticipated substantial economic gains and job creation; however, this resource exploitation has been seen by some commentators as connected to rising corruption, economic distortions and domestic conflict. Foster et al. (2024: 245) note that Mozambique's GDP per capita has declined by over 20 % since the gas reserves were discovered in 2010, citing World Bank data. Further, the resource discoveries have been subsequently associated with the emergence of an Islamic insurgency in the northern province of Cabo Delgado since 2017. This conflict has led to the large-scale displacement of local populations and prompted the deployment of both national and international military forces to restore stability. Despite these interventions, the insurgency remains ongoing, with over 6000 reported fatalities to date (including 2500 civilians) and over 578,000 displaced (Africa Center for Strategic Studies, 2025).

3.1. Mining-led urbanisation and development in Tete province

While coal is being phased out and replaced by renewable energy sources in many parts of the world, the speed of this transition is impeded by political inertia and the continued commitment to coal, driven by prevailing narratives of extractivist, growth-oriented development and state-building, particularly in the global periphery (Blanes et al., 2023; Brown & Spiegel, 2019). Extractivism has in many ways become a "style of development" (Gudynas, 2018) in Mozambique, one around which diverse socio-natures and spatial relations are shaped, extending from the initial point of extraction to the final destination of natural resources. In this sense, we follow the conception of extractivism advanced by Chagnon et al. (2022: 760) who identify "a complex ensemble of self-reinforcing practices, mentalities, and power differentials underwriting and rationalising socio-ecologically destructive modes of organising life through subjugation, violence, depletion, and non-reciprocity."

Along and across the journey(s) that extracted resources undertake, multiple territories, infrastructures and a complex web of relationships and dynamics are mobilised and produced (Bridge, 2023). In the case of coal, Tete province is the primary locale of extraction and the anticipated revenue gains there have spurred a significant shift in Mozambique's wider political-economic trajectory, characterized by policies aimed at attracting foreign investment through tax incentives and other fiscal concessions (Kirshner & Power, 2015). There are winners and losers in such processes, as certain groups profit from and become integrated into global production networks, while others face dispossession and displacement (Ibid: 69). From 2014 onwards, the coal projects in Tete experienced severe setbacks when global coal prices plummeted, leading to the withdrawal of major investors and delays in state investment due to infrastructure and service challenges (Cezne & Wethal, 2022).

Amid these shifting dynamics, scholars have emphasized the importance of recognising the complex entanglements of coal within broader political-economic structures, as well as the symbolic and material effects it generates in specific local contexts (Brown & Spiegel, 2019). In Mozambique, the coal projects in Tete have been central to the region's urban expansion and economic dynamism over nearly two decades, beginning in 2004 when the Brazilian multinational corporation Vale secured the concession for the coal-rich Moatize mining complex, located adjacent to the city of Tete. Vale divested from its coal projects in Tete in early 2022 amid stagnant profits, handing its concession to the Indian mining company Vulcan, a subsidiary of Jindal. Financial and infrastructural investments have since slowed, leading to disillusionment and urban 'postponement' among residents, along with the dismissal of large numbers of unskilled employees in mining operations, many on short-term contracts (Marshall, 2023). Several resettlement projects, delayed compensation for displaced residents, and environmental degradation lay in its wake (Tsuji & Otsuki, 2023), highlighting the socio-ecologically destructive forms of depletion and non-reciprocal relations widely observed in resource extraction frontiers (Chagnon et al., 2022).

3.2. Gas extractive zones

With the government setting up legal and extra-legal mechanisms to facilitate access to conventional energy resources, Mozambique is, in a sense, undergoing a transition in reverse: fossil energy exports and consumption have increased since 2015 (EDM, 2018), reducing the share of renewables in the overall production of energy. Despite its showcasing as a hub for renewables by the state and donors, any theoretical price advantage of renewable energy is nullified by the profit advantages fossil fuels have in the country's national development policy.

New energy technologies, resources and infrastructures are frequently shaped by "networks operating within and beyond the state, while maintaining the political-economic power imbalances guiding energy system development" (Calvert, 2016, p. 116). From the outset, the LNG projects in Cabo Delgado province in northern Mozambique have been embedded within such transnational networks. These networks, which span state and non-state actors, are intricately linked to global markets—both as sources of FDI to finance extractive activities and as potential consumers of the exported gas. Cabo Delgado hosts three major LNG projects: Mozambique LNG (TotalEnergies), Coral South FLNG (Eni and ExxonMobil), and Rovuma LNG (ExxonMobil, Eni, and CNPC). The UK Export Finance Agency alone has committed over US$1 billion in financing toward Total's US$24 billion Mozambique LNG project (Friends of the Earth, 2021).[11]

In March 2021, militants locally referred to as *mashababo*—a term derived from *Al-Shabab* but with no confirmed affiliation to the Somali militant group—launched a coordinated assault on the coastal town of Palma in Cabo Delgado, situated adjacent to major LNG facilities under construction. TotalEnergies subsequently suspended plans to resume construction at its megaproject on the Afungi peninsula, declaring a state of *force majeure*, effectively suspending its contractual obligations. At the heart of the crisis lies the contested distribution of benefits derived from these energy resources—including employment opportunities, vocational training, and provisions for local content—in a region where multi-billion-dollar LNG investments in the Rovuma Basin have attracted a range of international oil and gas companies (Habibe et al., 2019). In September 2025, TotalEnergies announced it is ready to resume operations and is already "remobilizing on the ground" with LNG production commencing in 2029 (AIM, 2025), but only if it can convert the Afungi peninsula into a fortress with access only by air or sea.

Former President Nyusi projected that the Mozambican state stands to gain approximately US$100 billion in revenue from its natural gas projects. Demonstrating a notable capacity to attract FDI, the state has secured over US$20 billion in financing for LNG development. This investment has been mobilised from a diverse array of actors, including major international energy corporations such as TotalEnergies, ENI, and ExxonMobil, as well as national oil companies, development finance institutions, commercial banks, and other financial intermediaries (Brückner, 2020). The exploitation of these gas reserves is positioned as a central pillar in the government's Energy Transition Strategy, in part because current debt servicing strategies are predicated on the generation of future hydrocarbon revenues. This approach persists despite growing global uncertainty regarding long-term fossil fuel demand in the context of net-zero commitments and decarbonisation pathways, along with the challenges posed by high capital costs (Foster et al., 2024).

The Nyusi administration argued that revenues from gas exports would increase tax income, generate an estimated 70,000 jobs over two decades, and reduce reliance on foreign aid. However, tangible progress toward these goals remains limited, particularly in terms of ensuring that low-income, marginalised, and vulnerable populations are meaningfully included in planning processes or benefit-sharing mechanisms related to these large-scale investments.

In the material frame, international financial institutions (IFIs) present the rationale of their efforts using a discourse of national potential, while seeking to stabilize localized extractive enclaves and assemblages through linkages with private companies and a small number of Mozambican officials (Buur & Sumich, 2019). Together they create and take advantage of the resulting development 'bubble'—cast as

[11] The UK Export Finance Agency alone has committed over US$1 billion in financing toward Total's US$24 billion Mozambique LNG project (Friends of the Earth, 2021).

countrywide progress—for as long as possible.[12] We now turn to the role of the IFIs, private investors and foreign donors in shaping Mozambique's energy sector.

4. Donor financing and Mozambique's energy landscape

Donor financing in Mozambique's energy sector has gained momentum in the last 10–15 years, following the escalating UN focus on universal sustainable energy access by 2030 and other international cooperation framework agreements focused on financing energy infrastructures. However, the financial requirements for achieving these targets far exceed the capacity of most countries to independently fund the necessary energy infrastructure and projects. Mozambique is no exception, consistently ranking among the top recipients of overseas development assistance (ODA) in the region and has remained heavily dependent on international cooperation and financial aid throughout the post-conflict period.

Mozambique thus faces many economic constraints to realising its energy sector ambitions. Beyond aid, the economic base is centred on natural resource exports (coal, gas and aluminium) and importation of secondary goods. Public spending is mostly committed to paying wages, pensions, and debt services, with the country being assessed at 'high risk' of debt distress (World Bank, 2023). To compound these the country has also faced multiple economic, social and environmental shocks. In addition to the US$2 billion hidden debt scandal and the suspension of direct budget support from donors that followed, there was also the Covid-19 pandemic, impacts from annual tropical storm, cyclone and drought events, and insurgency conflict in the gas-rich northern region, which many observers view as a response to extreme regional inequalities in which scant benefits from the multibillion dollar investments in gas operations are felt in the host communities in coastal Cabo Delgado (Feijó, 2023).

Regional inequalities between the south, central region and north of the country have also affected efforts to progress the energy transition. These disparities have been interlinked with some instances of post-war armed conflict between Renamo and the government in the central region (along with the state occasionally withholding funds to opposition strongholds like Beira). They are also a key feature of the wider insurgency in Cabo Delgado as noted above. Most recently, post-election contestation from opposition groups has added a new layer of instability against the backdrop of rising poverty rates from 48.4 % in 2014/2015 (Government of Mozambique, 2024) to 62 % in 2023 and a projection of 60.6 % for 2025 (World Bank, 2025). This situation has subsequently impacted donor and investor confidence in the country (World Bank, 2022) and has also motivated a series of government reforms aimed at improving the business environment to attract investments to help meet long-term development goals which include the development of the ambitious energy transition strategy (ETS).

The donor financing landscape around energy has changed significantly with the efforts to liberalise the energy sector to include public-private partnerships (PPPs), IPPs and private financing (Baptista et al., 2025). Substantial investment inputs followed from multilateral actors like the African Development Bank (ADB) and the World Bank, European donors including the European Commission and bilateral development funds (Belgium, France, Germany, Sweden, UK) as well as bilateral funding from Japan (JICA) and the US (Power Africa[13]), amongst others. The MDBs, alongside Japan and the US, have typically concentrated their financing through grants and loans to strengthen the grid transmission and power generation infrastructure network. This was intended not only to support universal energy access and boost domestic consumption but to help situate the country as a regional energy supplier through the Southern African Power Pool. There has been an effort therefore to consolidate and even intensify the long-standing export orientation of Mozambique's energy system to secure more of the lucrative revenues this can generate for the state.

By contrast, investment from European donors has tended to dominate the renewable energy sector through support for policy, regulation and legislative reforms, such as the legislative decree approved in 2021 regulating off-grid energy to pave the way for private sector investment. Recent estimates put current donor grant financing in the region of €212.5 million[14] (ALER/AMER, 2023). Looking at the pipeline of large IPP renewable energy projects that are planned for development between 2025 and 2030, contributing up to 690 MW through majority solar-powered plants, these are dominated by European financiers and implementers (Interviews with key informants, February 2025) and are notably more focused on central and northern regions which have historically been underserved regions of the country (see Fig. 2).

Most of these projects will be implemented under the umbrella of the Renewable Energy Auctions programme PROLER, or through GET.invest, which has financial support from the EU and GIZ (German International Cooperation) to assist domestic energy operators in attracting private financing and investment through the development of model business cases or toolkits to guide developers. However, as Baptista et al. (2025) caution, the 'financialization' of energy infrastructures, and push for private finance to fund off-grid energy developments, risks exacerbating existing social and spatial inequalities. The current taxation regime and high cost of securing finance, due to risks associated with the prevailing political economy conditions, means off-grid energy developers are likely to prioritise their investments in areas that are more easily accessible and where the population has a greater ability to pay.

Stakeholders working in Mozambique's energy sector have observed how European funding, like that of the MDBs, can be viewed as paternalistic in how it is operationalised, with regulatory and procedural conditionality attached, creating unequal relationships between donor and recipient (Interviews with key informants, February and March 2025). This not only increases costs but also the time required for funding to become available. Secondly, funding is heavily concentrated in legal and regulatory frameworks that conform to prevailing (European) industry standards, which eases the path for European financiers and energy developers to enter the Mozambican market, at an unfair advantage vis-à-vis non-western donors.

The donor investments embraced by the government have however afforded Mozambique some of the highest levels of private investment in its energy sector relative to other countries in the region (Shenga et al., 2024). In addition to the facilitation of market entry noted above, private investment is also linked with the prospect of Mozambique becoming the third-largest LNG exporter in Africa by the mid-2030s. For some commentators, private sector involvement is quickly becoming the primary or inevitable investment source in Africa's energy development future, with donors having compelled the adoption of this agenda via their programming for governance and legislative reforms (Eberhard et al., 2017). However, the prevailing governance and institutional realities in many countries, including Mozambique, mean that the risk profiles and enabling environments required to secure, absorb and manage private finance are complex and challenging. As a result, many countries arguably need a more 'blended approach' to finance combining technical assistance, grants, loans and guarantees (Gebreslassie et al., 2022; Baptista et al., 2025).

One illustrative example is the 40 MW Mocuba solar photovoltaic power plant—a utility-scale renewable project (the first in Mozambique)

[12] See Macuane et al.'s (2018) account of the political and technocratic elite and international businesses networks underpinning the oil and gas sector and benefiting from foreign aid.

[13] Power Africa has since been gutted by the Trump administration, following the dissolution of USAID in early 2025.

[14] This figure is cumulative and refers to the current grant funding available under various donor support programmes for off-grid renewables (excluding grants for grid-connected renewables).

developed in the mid-2010s during a period when macroeconomic conditions were widely regarded as excessively risky for private sector investors (IEA, 2024). For the project to become a reality, financing from EDM was needed, together with a development finance institution (Norfund), and a renewables developer (Scatec Solar) through a blend of modalities (grants, loans, loan to equity, performance guarantees) to reduce risk perceptions and lower financing costs.

The project also procured a syndicated loan from the International Finance Corporation (IFC) and from the Climate Investment Funds (CIF), which (along with other debt financiers) played a critical role in enhancing the project's bankability and mitigating investment risk. These financial guarantees were particularly important in the context of Mozambique's debt crisis, which had caused significant delays prior to the project reaching financial close in 2018. Given the risk profile and unfolding politico-economic dynamics in Mozambique, we expect to see more examples of these blended finance approaches to energy systems in the future.

5. Conclusions: uneven development and energy justice

Mozambique's energy transition has proceeded across multiple fronts. For some, this is primarily a move away from conventional or 'traditional' to 'modern' energy sources and services. For others the transition concerns the shift toward renewable energy technologies. Accordingly, 'transition' must be understood not as singular or linear, as it means many different things to different actors in Mozambique's shifting and contested energy landscape. Rather than examining transition solely through the lens of renewables, we wish to emphasise the need for a *relational* approach, one that considers the shift toward sustainable energy always in relation to the wider resource and extractive geographies that act upon and shape the energy system. Vital to this, as we have argued here, is the need for a political economy approach that identifies the 'winners and losers' resulting from the uneven development of energy systems and infrastructures and the disparities that this creates.

The expansion of energy infrastructures, technologies and resources in Mozambique is shaped by different actors and forms of governance at various spatial scales. Increasingly this includes transnational networks that operate both within and beyond the state. These actors, networks and trade, resource and investment flows play a key role in determining how transitions are governed and mobilised in Mozambique and whose interests are prioritized, raising critical questions of energy justice, particularly in relation to equity, accountability, and access for local communities. Mozambique's energy system continues to be shaped by colonial geographies and path dependencies and remains heavily oriented toward export markets and the needs of industrial consumers rather than to the reduction of energy poverty and enhancing energy access for the poor. Similarly, resource and extractive geographies in Mozambique are marked by subjugation, violence, depletion, and non-reciprocity, reinforcing uneven development and perpetuating economic dependencies.

Whilst efforts to expand access to 'modern' energy sources and services are progressing, this remains socially and spatially uneven, and dependence on biomass fuels like charcoal and fuelwood remains very high at around 92 % of households according to one recent study by the IFC (Lusa, 2024) with many using a combination of both traditional and modern in a practice known as 'fuel stacking'. In relation to the shift towards renewables, we have argued that Mozambique is undergoing a form of *retrogressive* energy transition, wherein the expansion of fossil fuel extraction and consumption is outpacing the growth of renewable technologies, diminishing their relative contribution to the national energy mix. The discursive framing and promotion of Mozambique as a hub for renewable energy and a destination for clean energy investments remains in stark contrast to the central role that hydrocarbons occupy within national development narratives and policies. This 'conflicted' emphasis on fossil fuels within the ETS and the state's plans for expanding power generation introduces a complex and uncertain dynamic in its relationship with international donors. Such tensions may ultimately hinder Mozambique's ability to secure the climate finance required to meet the US$80 billion target outlined in the ETS, further complicating the nation's transition to a low-carbon energy future.

When the ETS was launched at COP28 in December 2023, much of the fanfare around it was generated by European donors and investors who, in the preceding years, were reluctant to show public support for financing gas development, which was at odds with their climate commitments. However, with Russia's invasion of Ukraine in February 2022 and the need for European countries to diversify their reliance away Russian energy exports, there was a notable shift in donor narratives, as they began actively backing the development of the ETS, adopting the framing of LNG as a 'transition fuel', alongside efforts to expand the country's renewable energy capacity. The discursive framing and promotion of Mozambique as a clean energy hub by both the state and foreign donors is thus fluid, dynamic, inconsistent and at times incoherent.

This article has provided new analysis of the key roles that state institutions, donors, and private capital are playing in mobilizing and governing energy transition. We return to the Frelimo party-state, the credibility of which, after the disputed elections, has been profoundly compromised. It remains to be seen how this will impact on the framing and prioritizing of energy policy, but there is no doubt that change is needed in the governance of energy. The sheer volume and quick succession of government energy policy and strategy documents is in part a reflection of the government's willingness to play along with donor narratives and to act as a 'donor darling', willing to adopt whatever policies or plans investors demand to absorb whatever funding is on the table, rather than push back in support of its own strategic plans.

Much of the policy and legislation governing the extractives sector has been enacted or amended at such a swift pace that notable inaccuracies and omissions have abounded, expanding the potential for corruption (CIP, 2022). The complexity of the legislation further exacerbates this issue, creating rent-seeking opportunities among officials responsible for the issue of licences, permits and the formal approval of commercial activities (Transparency International, 2024). Indeed, corruption and rent-seeking continue to be a feature of the energy landscape and there remain real questions around the independence of key actors and the accountability and transparency of their decisions, along with a continuing need for improved clarification and differentiation of institutional roles.

Importantly, the (top-down) manner in which the state has framed and pursued energy transition(s) to date has constrained progress towards decarbonising Mozambique's energy system. Beyond the rent-seeking and corruption or wider governance issues, this includes the failure to properly or promptly deal with the *material* constraints around supply chains for renewable technologies to help lower operating costs, including customs and import duties levied by the state itself. It also includes an excessive focus on the private sector and insufficient attention to bottom-up, community-led initiatives.

While state officials repeatedly hail the potential of revenues from extractive industries to generate employment, tackle dependence on foreign aid, and drive economic growth and development, there has been limited tangible progress in ensuring that low-income, vulnerable, and marginalised populations are meaningfully included in the planning processes or equitably benefit from these investments. Mozambique now has a Sovereign Wealth Fund, for example, which has received US$158.8 million in revenue since 2022 from taxes on the extractive sector (largely oil and gas exploration). Projections suggest the SWP could be worth as much as US$6 billion per year by the 2040s (MZ News, 2025) and a much greater share of this wealth could be diverted toward enabling sustainable community energy systems. The unequal and contested distribution of the wealth and other benefits derived from resource extraction has created widening social and spatial disparities, but these are symptomatic of the underlying power asymmetries that

continue to shape the (uneven) development of the wider energy system while limiting the potential for a more equitable and transformative transition.

The development and direction of Mozambique's energy transitions and energy infrastructure has been influenced by donor agendas and aid flows. In terms of power relations and dynamics, assistance to Mozambique's energy sector (both multilateral and bilateral) retains a strong paternalistic flavour and there are questions about whether key elements of the transition to off-grid, renewable energy technologies are being led and driven predominantly by donors or by the state and about the wider dependency on aid. Donors often seek to create opportunities for their own energy sector actors (companies, financiers) to enter the Mozambican market as one of southern Africa's important and growing energy hubs, in ways which provide an unfair advantage over other actors in the energy or donor landscape. Further, coordination between multiple donor actors engaging in Mozambique's energy sector remains a significant issue, even though an Energy Sector Working Group (ESWG) was created over a decade ago for precisely that end. Many development donors have long spoken about 'capacity building' and 'technology transfer' as a priority in Mozambique but enhancing skills and capacity around renewables remains a pressing need.

The expansion of off-grid renewable energy technologies is reconfiguring energy geographies, particularly in rural spaces and at the urban–rural interface, where access and expectations around energy use are shifting. Even while state support remains limited, informal community energy practices are beginning to take shape on the ground. It is imperative however that energy planning foregrounds environmental sustainability and the everyday needs of citizens, especially those historically marginalised in national development agendas. Embedding these priorities is essential to realising energy justice and fostering more equitable transition pathways. There is significant scope to enhance participatory governance in the shaping of energy futures, particularly through community-level engagement. Active involvement in the co-production of energy policy and implementation processes is critical to enabling socially and spatially just outcomes. This may include targeted subsidies for community-led, off-grid renewable projects, as well as regulatory mechanisms that require oil and gas corporations to invest in local clean energy as part of licensing agreements. Achieving just and sustainable energy transitions demands urgent efforts to institutionalise community participation and properly recognise the value of decentralized, place-based energy systems.

CRediT authorship contribution statement

Marcus Power: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Lorraine Howe:** Writing – review & editing, Writing – original draft, Visualization, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Joshua Kirshner:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Carlos Shenga:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

We have nothing to declare.

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