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Powering the State: The political geographies of electrification in Mozambique

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Powering the State:
The political geographies of electrification in Mozambique

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Introduction: energy, geopolitics and development

> "[on]e of the fundamental tasks of the State is to striate the space over which it reigns" (Deleuze and Guattari, 2002 [1980]: 385)

The expansion of (sustainable) electricity access in Africa is increasingly hailed as fundamental to poverty eradication but in rolling out thousands of kilometres of electricity transmission lines, African states are also able to extend their reach and authority, to more effectively 'striate the space' over which they reign. Electricity infrastructures (and the capture and control of flows associated with them) help constitute the state as a visible actor in the everyday lives of rural people whilst the arrival of electricity affects state-citizen relationships in various ways (Winther, 2008). As Mitchell (2011: 7) has shown, examining the socio-technical and political worlds built with energy resources and the social and material properties of electricity reveals a great deal about the different ways of engineering political relations and making political connections out of flows of energy but also about the impacts on existing hierarchies and inequalities in institutions and practices. Energy infrastructures, including electricity generation, transmission and distribution facilities, are sites of contestation and have played a significant role in processes of nation-building, modernization and development (Calvert, 2016) and in imaginations of national sovereignty (Huber, 2015).

In Mozambique, the discovery of coal reserves estimated at more than 23 billion tonnes and gas deposits of more than 100 trillion cubic feet (IEA, 2014) has raised the prospect of massive resource wealth that could be used to address longstanding challenges of energy poverty as the extractives boom has begun to spur investments in domestic power

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generation (Hanlon and Nuvunga, 2015). The costs and benefits of energy extraction and generation have however been experienced unevenly both socially and spatially and despite plentiful energy resources, Mozambique faces the paradoxical situation of widespread and persistent domestic energy poverty (Kirshner and Power,~~Authors~~, 2015). Although estimates vary, the country has some of the lowest electrification rates in Africa along with acutely uneven geographies of electricity access, as the national grid reaches only about one fifth of its 23 million inhabitants[1] (World Bank, 2015).

Electricity infrastructures represent an important physical medium through which to express state authority, to extend the reach of the state and its capacity to administer. Electricity has become a potent symbol of what the state can do for citizens, and in return it serves as an important instrument in generating state legitimacy. In this paper we argue that examining electricity infrastructures can uncover important features of the political ordering of space and provide valuable insights into emergent political geographies. Examining the nexus of energy, geopolitics and development in Africa, we suggest, is highly instructive and can reveal a great deal about how states come into effect or increase their visibility, how they seek to 'read' and translate their territories and citizens and how they enlist and enrol them in state-led projects of modernisation and development. For the state to take on meaning and importance in the lives of un-served rural residents and to forge connections with them, this process "not only has to be enacted through festivals or parades but must also command the attention of citizens through large-scale [infrastructural] efforts as part of what characterizes the state as something that stands apart from society" (Harris, 2012:39). From the wires, poles, and generators themselves to the entrepreneurs, engineers,

[1] Firewood and charcoal make up to 81% of the total energy consumed in Mozambique (Cuvilas et al, 2010).

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politicians, and donors who drive and determine the process of electrification, electrical grids can create power and politics just as they transmit it and can perform and enable (or disable) social formations in important ways (Shamir, 2013).

In their study of clean energy development in Kenya, Newell et al (2014) highlight the ways different forms of power relations combine to determine the scope for enhanced energy access. This includes *institutional power* (where does power lie within and across government and how far is it reinforced or undermined by actors beyond the state, especially donors?); *material power* (who controls the finance, technology and means of producing electricity and 'clean energy') and *discursive power* (who defines what is regarded as clean, green and affordable energy, how are the energy needs of the poor represented and for whose benefit?) (Newell et al, 2014). Our analysis builds on this conceptual approach in tracing how these forms of power combine in the Mozambican context, while supplementing this with a focus on the spatiality of energy infrastructures. As the state is composed of multiple relations within and beyond national boundaries, we examine the spatial dynamics of state power in Mozambique, its territoriality and how it is brought to bear on energy systems.

The paper adopts a political economy approach that examines the discourses, institutions and interests that influence electricity policy and provision and the implications for enhancing energy access. It examines the role of electricity infrastructures in extending the power and reach of the state, in narrating the state's presence and in enabling particular forms of elite accumulation and subject formation. We argue that electricity provision in Mozambique plays an important role in statecraft and provides accumulation opportunities

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for governing elites. Further, we suggest electrification is a transnational governmental project embroiled in colonial histories and geographies, in strategies of neoliberalisation and in efforts to attract foreign exchange and investment.

The paper begins by introducing the key features of Mozambique's energy system. The second section sets out our conceptualisation of the state in Mozambique and provides a brief overview of the recent literature on the intersections between electricity and the state in Africa, while also drawing on examples from industrialized states. A third section introduces our methodology and sets out the context for our research before we then examine the particular configuration of institutional and material power guiding electrification efforts in Mozambique, the accumulation opportunities it creates, and the interests it serves for those connected to the party-state. A final section examines how, under the cover of rural electrification, the state has sought to extend its reach and authority and enhance the power of its institutions along with the role that electrification plays in extending the market, in wider neoliberalisation and in creating regular bill-paying, neoliberal consumer-subjects. The conclusion reflects on the prospects for transforming the colonial spatialities of Mozambique's energy system and for extending energy access.

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Mozambique's energy system

Mozambique's electricity system (see figure one) has developed as a patchwork of three separate systems that lack interconnection, particularly between the southern and central systems, along with an ageing transmission system and a distribution network that connects all administrative centres but leaves large swathes of the country without a power grid

(World Bank, 2015). The central and northern provinces depend largely on a single transmission line, such that one failure is enough to cut electricity to vast regions of the country. Most facilities are owned and operated by *Electricidade de Mocambique* (EDM), the state-owned electricity utility founded in 1977, two years after national independence. At the time electricity access was confined to the capital city, Lourenço Marques (today Maputo) and provincial centres, with generation from a series of small municipal diesel generators, a coal fired power station and small hydro-power plants along with the Cahora Bassa hydroelectric dam project constructed in the dying days of Portuguese colonialism (Cuamba et al, 2013). EDM integrated these previously dispersed production units inherited from the colonial period and began expanding the grid, but after decades of underinvestment many of the facilities are now obsolete or requiring rehabilitation (Cipriano et al, 2015).

Hydropower has been the main source of electricity supply in Mozambique to date, accounting for 95% of total generation (Cipriano et al, 2015). EDM´s available generation capacity comes from Cahora Bassa and several smaller hydropower facilities (Corumana, Mavuzi and Chicamba), yielding roughly 565 MW in total (Cipriano et al, 2015). Since 2011, with increased demand from the domestic population, load has exceeded this capacity, creating the need for Independent Power Producers (IPPs) or costly imports from within the Southern African Power Pool (SAPP)(ibid). ~~According to the government's load forecasts, average growth in demand of 12.5% is expected over the coming years, necessitating an extra 100 MW in electricity generation capacity (and additional infrastructure for its distribution) every year (Cipriano et al, 2015).~~ In order to meet the ~~this rising~~ projected growth in demand, the state has increasingly begun to outsource for energy provision

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through the licensing and divestment of generation operations to ~~Independent Power Producers (~~IPPs~~)~~, several of which seek to use newly-exploited hydrocarbon resources to construct new coal- and gas-fired power plants linked to the grid network, increasing supply but also prices ~~too~~ (Nhamire and Mosca, 2014).

After the adoption of Marxism-Leninism, Frelimo (*Frente de Libertação de Moçambique* or the Mozambique Liberation Front) moved quickly to centralise economic and political control so that the state could be harnessed for the task of modernizing the nation (cf. Pitcher, 2002). Throughout the post-liberation period Frelimo has prioritised national unity and the expansion of territorial control (Bertelsen, 2016) with the extension and control of electricity infrastructures regarded as one means to achieve this. During Mozambique's devastating Civil War (1977-1992) the promise of electrification accompanied Frelimo's campaign to persuade peasants to join the communal villages that were the centrepiece of its socialist ideology (Geffray, 1991) while the South African-backed counter-revolutionary militia Renamo (*Resistência Nacional Moçambicana*) specifically targeted key infrastructures (including electricity) for attack as a means to confront and "dehierarchize" the emerging state order (Bertelsen, 2016: 39).

As early as 1981, Renamo forces dynamited pylons near Espungabera in Manica province on the border with Zimbabwe, reducing electricity exports by 50% (AIM, 1981) and during the war itself, Renamo repeatedly sabotaged the dam's power lines, as the state lacked the capacity to protect the 4,000 pylons which cut across 900km of remote countryside, 1400 of which were destroyed by Renamo in 1988 alone (Anderson, 2016). The cost of repairing the

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power lines was estimated at US$500 million—almost three times the total value of Mozambican exports (Isaacman and Sneddon, 2003).

Mozambique's electricity infrastructure remains heavily oriented towards resource extraction and regional markets—given the government's need for foreign exchange derived from these exports—and its development has been shaped by colonial experiences and the extractive mercantilist capitalism that structured the colonial economy (Castel-Branco, 2010). At the centre of Mozambique's electricity system is the Cahora Bassa dam, completed in 1974 on the Zambezi in the northern province of Tete (see Figure 1). Hailed as a testimony to Portugal's 'civilizing mission' and framed in high modernist ideology, the dam was billed as a means of extending Portugal's colonial territorial reach and authority. Construction began in 1969 with the project financed by the sale of cheap electrical power to South Africa in exchange for support in the colonial war (Isaacman and Isaacman, 2013; 2015).

During the 1960s, Frelimo waged a guerrilla campaign to block construction of the dam, but it was completed just six months prior to Mozambican independence and the newly-installed Frelimo government had little alternative but to discard its long-term opposition and 'domesticate the white elephant' as President Samora Machel put it, seeking to turn an exploitative colonial project into a national asset, a symbol of liberation which would be instrumental in the 'socialisation of the countryside'. *Hidroeléctrica Cahora Bassa* (HCB), the state-owned company which manages the dam and sells power to EDM, began operations in 1977, supplying power to the Mozambican, Zimbabwean and South African grids through power purchase agreements. HCB ownership, agreed in 1975, gave the Portuguese state an 82% stake and it was not until 2007 that HCB passed from Portuguese to Mozambican state

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ownership when Portugal, needing funds to reduce its budget deficit to meet EU regulations, agreed to sell most of its equity. With the return of Cahora Bassa, hailed at the time by President Armando Guebuza as a 'second independence' (IOL, 2006), expectations rose that Mozambique would prioritize its own energy needs and reverse the dam's 'enclave' nature (Isaacman and Isaacman, 2013). The Mozambican state now owns 92.5% of HCB but plans to sell 7.5% of shares on the stock market with the remaining 7.5% being held by the recently privatised Portuguese energy company REN (AllAfrica, November 28th 2017).

HCB ~~currently sells power to South Africa and Zimbabwe but~~ also plans to expand its regional markets to include Malawi, Zambia and Tanzania (Ibid). Around 65% of HCB's production, or 1500 MW of electricity, is currently exported at well below market price via the Apollo substation outside Pretoria, with a portion re-imported into southern Mozambique on lines owned by South African utility Eskom (Sebitosi and Da Graca, 2009). Electricity in Mozambique is thus a transboundary issue with several neighbouring states importing electricity from Cahora Bassa. According to some observers, Cahora Bassa is the world's largest dam ~~in the world~~ constructed for the specific purpose of exporting energy (Isaacman and Isaacman, 2015). This internationalisation of electricity - the transfer across national borders of electric power and the fuel, capital and ownership required to generate it – makes it vulnerable to many of the same strategic concerns linked to oil, including disruption of supply, volatile prices, and struggles over control of resources and infrastructures (Bridge and LeBillon, 2013). In the next section we review the literature that guides our theorisation of the state in Mozambique and informs our analysis of how electricity infrastructures and electrification initiatives not only enable particular forms of state power and (neoliberal)

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subjectivity but also serve elite interests and accumulation strategies both nationally and transnationally.

Electricity and the State

Despite calls to rethink the state 'as a social relation', reified understandings that view the state as a differentiated institutional realm separate from civil society have persisted in academic and political debate (Painter, 2006). Feminist, anthropological, and poststructuralist approaches have however begun to reorient attention away from formal state institutions toward socially embedded processes through which ideas of the state are reproduced. States do not simply exist; rather, they are accomplishments reified and reformulated through everyday activities (Painter, 2006). Understanding the mundane and prosaic practices through which 'the state' becomes present in everyday life reveals their "heterogeneous, constructed, porous, uneven, processual and relational character" (Ibid: 754). In the case of Mozambique, Bertelsen (2016) identifies ~~a number of~~ novel entry points into understanding the state, locating state formation in disparate domains (e.g. sorcery, informal markets, gendered corporalities, spirit possession, and lynchings). We contend that electricity flows and consumption are also important in the everyday spaces of state power and represent a key means through which Mozambican state formation is enacted and contested in daily life. Sharing Bertelsen's (2016: 270) reading of the Mozambican state as "an incomplete and beleaguered mode of organization", as "perpetually unfolding" (Ibid:9) and as always emerging and becoming, we argue that electricity infrastructures constitute an important way in which the state is enacted, unfolds, emerges and comes into being.

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State power is in part the capacity of infrastructures to order, arrange and make legible (Scott, 1998). High-modernist infrastructure schemes established to enhance electrification and promote energy for 'development', given their associations with scientific and technological 'progress', expanding production, mastery of nature and the rational design of social order, represent an important part of the ways in which the state *performs* and *narrates* its presence and comes into being as a 'socio-natural effect' (Harris, 2012). Scott (1998: 2) writes of the 'blindness' of the state and about legibility as "a central problem of statecraft", the gradual resolution of which enables the state to get a better handle on its subjects and their environment through a more permanent visibility that assures the automatic functioning of power. Building on this work, we contend that the extension of electricity infrastructures helps with the process of seeing (and being seen to act) like a state. Electrification may not always improve a state's ability to measure, record and monitor its territory and citizenry but it can be understood as one of many attempts made by the state to achieve ~~a more permanent~~ greater visibility and to 'read' or 'translate' its territory and citizenry. Extension into previously un-electrified space is regarded as a way of enhancing the state's capacity to administer and allows the state to project and amplify its authority and reach more people.

Technologies and infrastructures are not merely symbols or tools *for* political expression; rather, they are a *political terrain* for the negotiation of moral-political questions, and it is in the politics of electricity infrastructures that such questions are negotiated and contested (von Schnitzler, 2013). In this sense, it is important to examine how infrastructure matters politically (Meehan, 2014) and how it comes to mediate a diversity of political projects and conflicts concerning questions around, for example, basic needs, political recognition or the

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rights and obligations of citizenship. The idea that objects—including all types of tools, beings, and things—are pivots for socio-political inquiry is prominent in science and technology studies and gaining traction in political ecology, anthropology and geography (Meehan, 2014). Infrastructure "helps create, destroy, expand or limit the contours of what we call the state" (Meehan, 2014: 216). Electricity infrastructures can (in their partiality) limit the jurisdiction of the state but they can also sustain modern societies and generate political and economic difference among groups and individuals (Shamir, 2013). Their topologies of connection and isolation create new publics and political identities but also spaces for resistance (Luque-Ayala and Silver, 2016).

Extending electricity services to households means extending 'progress' through the range of appliances and household items that claim to improve quality of life and allow people to participate in "what is considered a modern lifestyle" (Labban, 2012: 389). Electrification is therefore a process that guarantees "dual access": peoples' access to electricity and thus to modernity, but also the access of the market to more people "expanding quite literally with the extension of the electric grid" (Labban, 2012: 389). Novel forms of prepayment are seen to widen access to utilities (including electricity) in low-income areas and empower citizens, especially the poor but they also help to advance neoliberal-style reforms while using an empowerment narrative, seeking to discipline consumers, and often benefiting only privatized service providers (see McDonald, 2009; Baptista, 2015~~3~~). This is particularly relevant in Mozambique where, from 2005, EDM introduced Credelec, a system of prepaid electricity to consumers extending to all the district town seats, whilst 88% of EDM clients connect to the grid through a prepaid meter (Baptista, 2015~~,~~; 2017). In this way electrification enables the state to enrol its citizens as bill-paying consumers, as neoliberal

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subjects. Beyond this, the materiality of its infrastructure gives electricity a centralising effect. Power plants that generate electricity and distribute it through a broad network centralise command over the network, the flow of electricity through it, and "the accumulation of money flowing in the opposite direction" (Labban, 2012: 390).

Although there is now a growing literature on electricity in the global South that considers its "dialectical relationship to social infrastructures and political institutions" (Gupta, 2015: 563), relatively few contributions have explicitly considered the relationships between electricity and the state in Africa. Winther (2008) argues that the arrival of electricity affects the state-citizen relationship in crucial ways and that grid extension in rural Zanzibar in the 1980s and 1990s provided the state with an efficient new mechanism for strengthening its political control over the population (Winther and Wilhite, 2015). Anthropologists in particular have argued that the coming of electricity in Africa shapes everyday lives, spaces and temporalities, ~~and have~~ illustrating~~ed~~ how it can conceptually and materially bridge the gap between centre and periphery, as people and places redefine their position within discourses of modernity and development (Ibid). Degani (2016) analyses the ad hoc nature of the electricity sector in postsocialist Tanzania as symptomatic of tenuous political and neoliberal reforms, which rather than empowering citizens require them to develop their own 'provisional pathways' of electrical power as best they can.

In many studies of electrification in Africa, the process is viewed apolitically, as a largely technical and logistical process of widening connections and 'plugging' consumers into a grid infrastructure. Electrification is understood here as part of the 'will to improve' underpinning development interventions and exemplifies the practice of 'rendering technical' (Li, 2007)

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where energy access is depicted as a series of technical 'problems' responsive only to a 'development' intervention while rendered non-political as experts concerned with improvement exclude political-economic relations from their diagnoses and prescriptions through a subliminal and routine 'anti-politics' (Ferguson, 1990). Moreover, many current policy interventions in African energy systems rarely consider the colonial and postcolonial histories that have shaped the energy systems they are seeking to expand or upgrade (Baptista, 2017). Although power sector reform has figured prominently in the literature, there is often a failure to consider how electricity infrastructures and programmes~~electrification initiatives~~ serve elite interests and enable strategies of accumulation. The capitalist state is extensively involved in the electricity business through ownership, funding, development, regulation and protection of markets, and even though electricity distribution presents a collective action challenge and is regarded as a public service and a responsibility of government, private actors have become increasingly involved in shaping infrastructure that is ostensibly 'public' with electricity continually regarded as a 'private good'.

Two of the most useful concepts to have emerged in critical scholarship that has considered the state's entanglements with electricity in Africa are that of a minerals-energy complex (MEC) (Fine and Rustomjee, 1996) and 'electric capitalism' (McDonald, 2009). The MEC refers to a regime of accumulation developed in apartheid South Africa based on low cost state-owned electricity production via the public utility Eskom, cheap labour and large-scale national and international corporate capital tightly bound to the energy and mining sector. This work emphasizes the historical relationship between the state and capital in ways that are highly relevant to Mozambique, as is the idea of providing industry with heavily

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subsidised electricity "at the expense of social and environmental sustainability." ~~which~~ This relationship underpins what McDonald (2009: 438) calls 'electric capitalism' in Southern Africa. The circulations of capital and accumulation strategies that electrification enables are multiple however whilst the political economies of electrification in Mozambique are shaped not just by a regional MEC but also by supply arrangements with South Africa and Eskom's needs as well as through the Southern Africa Power Pool (SAPP) which co-ordinates electricity trade in the region.

Several studies of the connections between electricity and political power undertaken in highly industrialized contexts are also relevant here. Geographers, sociologists and historians of technology have examined the ways that networks of electricity infrastructure are deeply implicated in the reproduction of political and economic power (Hughes, 1993). For example, Granovetter and McGuire (1998: 149) examine the formation of the electricity industry in the US in the early 20th Century. They show how its specific form and structure emerged, not because it was the most technically and economically efficient, but because a set of powerful actors accessed certain techniques and applied them "in a highly visible and profitable way". This process triggered pressures for uniformity across all regions of the US, even when it excluded viable alternative technologies and organizational forms, such as decentralized provision, or co-generation systems, in homes and factories. Harrison (2013) examines the uneven development of electricity networks in North Carolina in the US South, and the centralization of capital into a single provider along with implications for energy poverty and injustice. Going further, Harrison (2016) traces the use of racial categories in rural electrification planning in North Carolina during the New Deal 1930s, analysing the ways in which race was used to readjust projections of electricity consumption and the

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planning of distribution lines, strategically keeping some areas un-electrified. ~~Taken together, these analyses provide a better understanding of the relationship between energy and social power~~.

Collectively, these different literatures inform our approach by enabling us to conceptualise the state relationally, as incomplete, emergent and becoming and as processual, socially embedded and uneven. They allow us to trace how electricity infrastructures and electrification initiatives constitute an important way in which the state is enacted in and through everyday spaces but also how they become part of the state's attempts to order, arrange and translate its territory and citizens, to make them more legible. Finally, the focus on the national and regional political economies of electricity infrastructures (and how they are shaped by material, discursive and institutional forms of power) (Newell et al, 2014) informs our analysis of how electrification serves elite interests and enables strategies of accumulation but also how it allows the state to enrol its citizens as bill-paying subjects of neoliberal capitalist development.

Setting the context: methods and approach

Our research formed part of a larger project on the 'Rising powers' and low carbon energy transitions in Southern Africa (Power et al, 2016). ~~[REDACTED FOR PEER REVIEW]~~. The initial aim of our research was to examine the ways in which (re) emerging economies, specifically Brazil, India and China, have influenced energy pathways in southern Africa through various roles, investments and interventions. This research was concerned with the political economy of energy transition and involved examining the discourses, institutions and

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interests that influence electricity policy and provision in Mozambique. It quickly became clear that the Mozambican state views energy as an important physical medium to achieve its political objectives and that energy access discourses were geopolitically framed and imagined. We thus set out to examine the extent to which state-led electrification initiatives are embroiled in long-term state building projects and come to symbolise the reach of state power, enabling certain forms of subject formation and elite enrichment.

Methodologically, the paper draws on two phases of multi-sited fieldwork conducted in Mozambique in September to November 2013 and July to August 2014. In the first phase, data were gathered through 75 in-depth interviews with officials from the state-owned electricity provider, EDM, FUNAE (a smaller state agency charged with off-grid rural electrification), several government ministries (including those for Natural Resources and Energy, Environmental Management, Foreign Affairs, and Planning and Development) and other state agencies (such as the Centre for Investment Promotion). We conducted further interviews with donor organizations, diplomatic staff, small businesses and NGOs engaged with the energy sector to get a sense of the wider non-state discourses and narratives around electrification and energy access and to triangulate them with those articulated by public officials. In these interviews, we sought information on institutional histories, energy development priorities, investment strategies, donor engagements and locational characteristics. In addition to mapping the particular institutional and material configuration of power around electricity our primary objective was to explore the (highly political) process of narrating expanding energy access and so discourse analysis was used to critically interpret the interview materials.

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In the second phase, and working in partnership with the NGO Practical Action (through its Harare, Zimbabwe office), we carried out extended site visits to six off-grid energy service projects in Maputo, Manica and Zambézia Provinces, and a solar equipment assembly plant outside the capital city, Maputo. Return visits in 2015 and 2017 enabled several follow-up interviews. During these visits, we observed the ways in which energy resources, technologies, infrastructures and demand are configured in different parts of the country beyond the capital city. As Bertelsen, (2016: 4) has noted of Mozambique, it is:

> "worthwhile to pursue how postcolonial state formation is imagined and experienced from its margins—that is, from provinces beyond Maputo and from circumstances of impoverishment external to the powerful centers of political and economic elites".

We thus wanted to explore not just how the state regards electricity infrastructures as a means to advance state formation but also of better 'connecting' citizens at its margins to these centres of political and economic power. In doing so, we sought to get a sense of how the state understood electrification infrastructures as a means to increase its visibility and enhance its power to govern, administer and order rural areas ~~and to 'read' and 'translate' its territory and citizens along with the ways in which~~ and how electrification affected state-citizen relations.

We also draw on archival research conducted at the Mozambican News Agency (*Agência de Informação de Moçambique*, AIM), extensive desk-based studies and our earlier involvement in a variety of research projects based in Mozambique to understand the broader energy and political histories at play in the country. The authors are proficient in Portuguese and

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the analysis that follows is based on extensive experience in researching the political economy of Mozambique over many years. Our partners in Practical Action speak fluent Sena, Shona and Chichewa, indigenous languages spoken in the regions where the site visits took place. In what follows, we draw on these methods to explore how electrification has become a means through which the state seeks to establish political authority and counter its 'blindness' in peripheral spaces whilst enabling elite accumulation.

Electricity, capitalism and state power

Mozambique's configuration of *institutional power* is focused on the ruling party Frelimo, which following liberal transition after the end of civil war in 1992 has consolidated its hold whilst the party's effective monopolization of access to donors and international networks, together with the privatization process (cf. Castel-Branco, 2014; Hanlon, 2004) have enabled it to blur the lines between party and state and to "centralize wealth and power in ways that were impossible under socialism" (Sumich, 2010: 681). Privatization has helped to create a small national business class linked to the party and after winning all five post-war elections Frelimo, as an elected one-party state, has been able to monopolise power, rents and rent-seeking (Macuane, Buur and Monjane, 2017). ~~Consequently, the postcolonial state has been variously represented "as a machinery to thwart and tap cycles of exchange and extract life substances" albeit one "lacking redistributive elements" (Bertelsen, 2016: 224) to notions of Mozambique as a "gangster democracy characterized by sharp inequalities" (Cramer, 2007: 269).~~ It is important however to avoid the tendency to reduce the state to a "one-dimensional mechanism of exploitation usurped and employed by self-serving elites" (Bertelsen, 2016: 14).

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In the party's and ruling elites' own understanding, Frelimo is the shaper of Mozambique's contemporary history (Bertelsen, 2016), even the *dono do país* (owner of the country), ~~of Mozambique's contemporary history (Bertelsen, 2016)~~ and therefore acts as the major 'arena of negotiation', channelling demands and interests internally and imposing constraints on the ability of actors to operate independently of its structures (Sumich, 2010:681). In this sense the postcolonial state acts "as a machinery to thwart and tap cycles of exchange and extract life substances" (Bertelsen, 2016: 224). This centralised rent management enables Frelimo to control economic development and investment opportunities and cut off independent accumulation outside the ruling coalition, with the aim of strangling the political opposition. This has been further accentuated by a shift from an inclusive and decentralized political settlement after the General Peace Agreement in 1992, under President Chissano, to a more exclusive and centralized one under President Guebuza, but also by the resource boom over the past two decades, which has intensified this distribution of power (Macuane, Buur and Monjane, 2017; Castel-Branco, 2014). Local companies, often linked to key Frelimo figures mixing political, commercial and regional interests, have scrambled to tie up deals in infrastructure, and in supply and service contracts related to the extractive industries and emerging mega-projects (cf. Chivangue and Cortez, 2015; Macuane, Buur and Monjane, 2017). For example, Intelec and Insitec, firms which are directly or indirectly associated with the Guebuza family ~~of former President Guebuza~~, have interests spanning infrastructure, construction, energy, banking and real estate (Castel-Branco, 2014).

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At the centre of energy policy formulation around oil, gas and coal in Mozambique, is the Ministry of Mineral Resources and Energy (MIREME). Enjoying "privileged access to information on the country's natural resources" (Interview, European Commission Delegation to Mozambique, September 17th, 2013), sSome ~~of its~~ senior MIREME officials (appointed by Frelimo) ~~and bureaucrats, appointed by FRELIMO,~~ have established companies that can service the extractive industries and related infrastructure developments ~~because they enjoy "privileged access to information on the country's natural resources" (Interview, European Commission Delegation to Mozambique, September 17th, 2013).~~ The institutional power of MIREME is also reinforced by alliances with transnational actors such as mining and energy conglomerates, but also by foreign donors who have endorsed plans for mega projects and infrastructure developments, in the gas, coal, aluminium, heavy sands, and related sectors (Chivangue and Cortez, 2015). The result is a particular hegemonic vision of how the country's energy needs can best be addressed and the promotion of a particular mode of accumulation centred on extractive industries and infrastructural activity that advances elite interests (Büscher, 2009; ~~–~~Kirshner and Power, ~~authors~~, 2015).

Key to ~~At the centre of~~ this vision are high-modernist plans, developed through MIREME, for the construction of several large-scale hydropower facilities. The state has actively sought foreign investment to catalyse these projects (which also require increases in transmission capacity) so as to lure energy-intensive industries and boost regional electricity exports (Interview, African Development Bank, November 1st, 2013). This is also part of Frelimo's wider promotion of national unity, securing its consent to stay in power, while countering recent calls from opposition party Renamo for autonomous governance at the provincial

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level, particularly in the four provinces it won in the 2014 national elections (see Cahen, 2015). These large hydro facilities (see figure one for locations) are also intended to showcase Mozambique's recent economic growth and its impending modernity for both citizens and foreign investors whilst enabling the state to make its presence felt in rural regions.

The largest hydroelectric scheme is the 1500 MW capacity Mphanda Nkuwa dam, sited 60 km downstream from Cahora Bassa which is estimated to cost US$4.2 billion, and with the transmission system needed to export power costed at a further US$1 billion (World Bank, 2015). Although information in the public domain about the projects has been very minimal, investment is mostly coming from China's Exim Bank in collaboration with private-sector Brazilian construction conglomerate Camargo Corrêa, the Mozambican investment company Energia Capital (a subsidiary of Insitec, linked to former President Guebuza) and EDM (TBY, 2016). Once completed, about 75% of the generated power will be sold to Eskom with 15% to Zimbabwe and the remaining 10% used for domestic consumption with the justification given that Mozambique has only a limited transmission infrastructure available to distribute electricity across rural areas (Ibid). The project, in the works since 2013, was originally tendered, without public competition, to a consortium composed of EDM (20%); Insitec (40%) and Camargo Corrêa (40%) (Nhamire and Mosca, 2014). Projected to displace 1400 households and indirectly affect the livelihoods of a further 200,000 Mozambicans, Mphanda Nkuwa represents a startling example of 'post-colonial amnesia,' as the memory of displacement and ecological damage from Cahora Bassa is erased (Isaacman and Sneddon, 2003: 38-9).

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Another key institutional actor in the electrification process is the state-owned utility EDM. According to Carlos Yum, chair of EDM's board of governors, the agency is a "development pillar" of Mozambique, working "for all Mozambicans" as part of the fight against poverty (Yum, 2017). EDM's control over electricity provision gives it considerable *material* power to shape Mozambique's evolving energy pathway. Combining donor support and foreign investment, EDM has expanded the grid network significantly starting in the mid-1990s (Interview, EDM, November 8th, 2014). Like MIREME, EDM cooperates with foreign investors in support of new opportunities developing in the extractive industries and fossil-fuel based power generation. State control of EDM is most visible in areas like the setting of electricity tariffs where the promise of free or subsidized electricity is used by the state to win political support (e.g. in election campaigns) whilst the state has also protected public institutions (including the Armed Forces) that have run up debts for the electricity they consume by intervening locally or centrally to prevent EDM from cutting off supply to enforce payment (Nhamire and Mosca, 2014). Overstretched by rising demand and with high levels of debt and considerable operating losses, EDM is also understaffed, lacking the technical staff to cope with regular grid operations and maintenance while working on an ambitious new connection[2] programme (Cipriano et al, 2015).

[2] Between 2011 and 2014 EDM connected around 120,000 households per year but would need to connect an additional 57,000 households above its current rate each year to meet the government's 50% access target by 2023 (World Bank, 2015). Mozambique needs to add between 300,000 and 400,000 customers, in addition to those being connected by EDM, to achieve universal access by 2030 and meet its Sustainable Development Goals (World Bank, 2015; interview with Joaquim Ouchim, EDM, November 8th, 2014).

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Critics accuse EDM of eliding its corporate mission and social responsibility of supporting the public interest by outsourcing its duties to companies linked to Frelimo elites via public tenders. This fits a broader pattern of neopatrimonialism involving personalized networks and relations, in which senior government officials have established private companies that can service the electricity sector (Chivangue and Cortez, 2015). EDM officials have also often set up independent companies to provide the goods and services required for its electrification process, and at the local level there is evidence that EDM has become a source of petty corruption involving company technicians (Nhamire and Mosca, 2014).

Despite these accusations and critiques, EDM's operations as a state-owned company are guided by its "social mandate" to extend connections domestically (Interview, EDM, February 2nd, 2017). This extends from the historical role of EDM and HCB as public companies during the period of socialist planned economy (Baptista, personal communication, May 16, 2017). In rural and peri-urban areas lacking coverage, most households are "not profitable, at least in the first five years" (Ibid). Also, most domestic consumers in Mozambique are not energy intensive, adding further challenges for EDM to extend service in a way that covers costs. Meanwhile, pursuing this social mandate exists in tension with the state's goal of positioning Mozambique as an energy exporter.

Given the recent shift towards IPPs, EDM has begun to outsource for energy provision, frequently without open competition or public tendering (Nhamire and Mosca, 2014). Through EDM and MIREME, the state has joined a range of multinational firms such as the Brazilian mining multinational Vale and the Scottish power generation company Aggreko, to build industrially-oriented generation facilities (Cipriano et al, 2015). One example of this, a

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new 120MW gas-fired power station at Ressano Garcia, located on the South African border, is owned by Gigawatt Mozambique, in which Intelec (minority owned by former President Guebuza) has a 26% stake (MacauHub, 2016). Through these IPP projects, Frelimo's political and business elites engage in profit-making opportunities around new energy generation projects, largely for their own benefit.

These wider national and regional political economies around electricity infrastructures reveal a great deal about how electrification projects come to serve elite interests and enable strategies of accumulation that further entrench the Frelimo party-state and its hold on power. Yet, such projects do little to address the enormous inequalities in electricity access or to increase affordability, with industry receiving abundant cheap power while the poor majority remains off-grid, a situation common in much of Southern Africa (McDonald, 2009). The export-orientation required by neoliberal models of capitalist development arguably further pushes many African states towards producing energy for export and away from serving the needs of the poor with some two-thirds of all energy investment on the continent ~~is~~ devoted to producing energy for export and approximately half of current electricity consumption ~~is consequently~~ used for industrial activities – mostly mining and refining (IEA, 2014).

~~Indeed, it could be argued that the export-orientation required by neoliberal models of capitalist development pushes many African states towards producing energy for export and away from serving the needs of the poor~~.

Statecraft and rural electrification

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The national government's *Energy Strategy* aims to reach 50% grid connectivity for the population by 2023 (Ministério da Energia, 2014) but this requires significant infrastructural investment (World Bank, 2015). Consequently, in recent years, the state has turned to decentralised generation in rural areas, partly motivated by recognition of the limits (and costs) of grid extension but also by donor priorities for addressing energy poverty and climate agendas (Interview, DFID Mozambique, October 13th, 2016).

In part, these efforts reflect ongoing neoliberalisation in the electricity sector in African contexts (McDonald, 2009). Across the Global South, governments have unbundled and privatized large public utilities, facing pressure from lenders to reduce corruption and the clientelist distribution of services. Yet it is often unclear that political influence in the sector has been reduced; in some cases, the constellation of actors has expanded following privatization (Maclean and Brass, 2015). In contrast to ~~the jubilant era of~~ the 1960s, when developmental states in Africa were the primary actors responsible for increasing energy access by expanding a centralized, national electric grid, the contemporary juncture of neoliberal globalisation has seen a growing range of private, non-state actors becoming involved with electrification and "NGO-business hybridisation" in the sector increasing (ibid: 59). Further, with decentralized and privatized solutions to energy poverty, it increasingly becomes the household's responsibility to install renewables such as solar panels in homes, with the state withdrawing from energy provision (McDonald, 2009). In Mozambique, the World Bank has mediated this process, urging reform of the electricity sector and the mobilizing of private capital for the building of power plants, advocating tariff increases and

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the use of IPPs, while also encouraging off-grid approaches to accelerate energy access (World Bank, 2015).

The key institutional actor shaping the roll out of small-scale renewable energy in Mozambique is the National Energy Fund (FUNAE). Established in 1997 with Danish assistance, FUNAE operates under MIREME as the agency supporting rural energy, including electricity and fuel. Initially supplying diesel generators and kerosene, by the 2000s FUNAE's focus had shifted to financing and supplying renewables, principally through solar PV systems and a small number of mini-hydro and pilot wind projects. The agency is funded through the state budget, with revenues from taxes and levies from petroleum and electricity concessions, along with donor support from the World Bank, the EU, several European bilateral donors, and more recently, India (Interview, FUNAE, November 3rd, 2013). By agreement with EDM, FUNAE works in areas projected to be over 10 km from the grid network within five years (Interview, EDM, November 8th, 2014). Since the 2000s, FUNAE has partnered with several donor agencies in deploying RETs in projects for the provision of electricity for social uses in off-grid environments, such as school lighting, water pumping, and vaccine refrigeration. These projects use localised mini-grids or stand-alone systems that supply electricity for public services, including clinics, schools and teachers' and nurses' residences.

FUNAE is a public agency, yet in some ways it has incorporated neoliberal thinking in its approach, joining donors and development agencies in discursively articulating rural electrification as an 'enabler' of rural development, propelling activities in agriculture, trade, industry, health and education, attracting new investments and improving livelihoods.

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Donors frequently articulate the notion that rural dwellers must quickly be brought into neoliberal modernity through a discourse of 'connectivity,' and that improved access to modern energy services will lead to the extension of market exchange in rural areas (cf. Labban, 2012; Kale, 2014). FUNAE's vision interpolates with these discourses in which off-grid energy access is seen to champion the advance of the market in previously disconnected rural spaces, ~~along with the idea that doing so will~~ enabling ~~e~~ a wider and unfettered dissemination of development (Kale, 2014).

Despite its focus on decentralized energy, FUNAE operates mostly in a centralised, 'top-down' fashion, with its headquarters and decision-making located in Maputo, whilst local communities ~~remain recipients of~~ receive energy and other infrastructure that is planned and decided by the state and investors. FUNAE's procurement and supply-based model has succeeded in rolling out energy service projects to expand coverage, but often with limited local consultation or commitment to capacity building. The approach focuses on connecting rural institutions, such as government offices, clinics and primary schools, rather than providing direct access for households. The agency considers households connected if they live within a 20-km radius of these connected institutions (Interview, FUNAE Manica Office, November 3rd, 2013). Local participation in shaping electrification, whether on-grid or off-grid, typically consists of a space in which non-state actors are invited to be 'consulted' or to give consent to an initiative, rather than proactively shape such a space (Castan Broto et al, 2014).

During fieldwork, we observed that much of what FUNAE does is focused on the centralized delivery of electricity and seeks to strengthen the power of rural state institutions while

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making the state's presence felt among residents. Rural electrification in this sense is a means through which the state is enacted and comes into being in and through everyday spaces and infrastructures whilst enhancing the state's institutional capacity to order, arrange and translate its territory and citizens and increase their legibility. Many ~~of its~~ projects however rarely have connections that extend to a distance greater than 20 km and are seldom sited in the most remote areas of a district such that~~. Nhamire and Mosca (2014: 61) suggest that in this sense~~ it is somewhat "fallacious to speak of rural electrification" (Nhamire and Mosca, 2014: 61). Others, however, view the electrification of rural schools and clinics as a substantial "step in improving rural wellbeing" in isolated contexts with limited capital investment and caution the need to be realistic about the available options (interview, Belgian Technical Cooperation, September 17th, 2013). In Chinhambuzi, Manica province, a solar PV mini-grid, supported with Belgian finance and technical assistance, supplies electricity in the evenings for the local chief's house, schoolteachers' residences and four local shops, but ordinary residents remained disconnected. Several residents told us they considered connecting 'spontaneously', without FUNAE's permission yet the system's capacity would not support it, according to the FUNAE provincial director.

In Mavonde, Manica province, local residents told us that most of the households who live far from the town centre—to be closer to their *machambas* (cultivated fields)—are unable to repay loans offered by FUNAE for installation of solar home systems (SHS) and have not benefitted from the project. Others felt the SHS created certain impositions, such as taking up space in their homes. Local entrepreneurs are encouraged to seek loans for new uses of energy such as freezing meat and fish, saving time and creating new commercial opportunities. In these projects, FUNAE has material power in centralising and controlling

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the supply of solar units from its Maputo headquarters, drawing criticism for impeding local enterprises insofar as it receives state subsidies and donor funds, crowding out competition (Interview with Boris Atanossov, September 17th, 2013). In establishing certain expectations of project recipients (chiefly that they formally become bill paying consumers) the agency also plays a key role in the state's fashioning of neoliberal subjectivities.

In Majaua-Maia, Zambézia province, an EU-financed mini-hydro project has rehabilitated a hydraulic system used on a late colonial maize plantation in the 1960s and 1970s. Similarly, there was little participation in decision-making among residents in the delivery of electricity. In particular, the system bypassed a local mill, used by local women to grind corn for *xima*, a staple food. This was a priority among residents who spoke with us, as women must travel long distances to a diesel-powered milling facility, located across the Ruo River in Malawi. Local residents are expected to pay for the electricity service, without much consideration of their ability to do so, or how they will use the new electricity to meet their own needs. Nor was there consideration of the new expectations created, many of which require support, such as maintenance, service or training.

The sociotechnical electricity infrastructures installed by FUNAE typically serve the more affluent in rural regions, such as shopkeepers, local officials and ~~other~~ government workers, although the extent to which the rural poor have benefited remains unclear and requires further research. In FUNAE's case, the installation process can be costly for customers and often overlooks local energy needs as the goal is mainly to bring electricity to the district town seats and administrative centres, to appear in government statistics that claim electrification to be a socially and spatially more inclusive effort than it is in practice.

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Narrating the methods and geographies of expanding energy access is a highly political process, with widely varying estimates of electrification rates highlighting its contested nature. FUNAE uses the discursive power of the state, albeit shaped by donor priorities, in narrating expanding energy access and in deciding how the energy needs of the poor are represented and for whose benefit, along with what kinds of energy solutions are regarded as accessible and sustainable. What is rarely discussed explicitly, however, either by FUNAE or EDM, is who and how many benefit from rural electrification in the districts and towns as they are connected. Given the dispersed settlement patterns across much of rural Mozambique, many citizens are effectively bypassed. According to FUNAE officials and energy planners, the selection of host communities is based on technical feasibility and population size, although there appears to be little transparency in this process (Interview, FUNAE, October 31st, 2013).

Conclusions: Electrification, state power and neoliberal subjectivities

The tentacles of electrification can be regarded as a central element of "modernity at large" (Appadurai, 1996, Winther and Wilhite, 2016). Similarly, for Ferguson (1999~~6~~) the deterioration of the electricity system in Zambia was an icon of how people's expectations of modernity came to falter. During the civil war in Mozambique Renamo regularly attacked electricity infrastructures as a way of contesting state claims to modernity and popular expectations of what the state could deliver. We have argued here that electricity infrastructures in Mozambique have helped to bring an incomplete and beleaguered state, one that is emergent and becoming, further into being whilst enabling it to extend the tentacles of state-led projects of modernity. Through these infrastructures and their

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extension into previously unelectrified space, the state has sought to perform and narrate its presence, to project and consolidate its territorial authority and to increase its visibility, especially in contested and peripheral areas where discontent and opposition party challenges may be gathering momentum. They therefore constitute a highly contested political terrain that mediate a diversity of political projects and conflicts, helping to create and expand the contours of the state (or limit its jurisdiction). A variety of different electrification projects, from large-scale grid connected infrastructures to small-scale off-grid decentralised energy systems, constitute important forms of statecraft, doing the symbolic work of garnering support and legitimacy and demonstrating what the state can do for its citizens. We suggest that it is highly productive to examine the nexus between geopolitics, energy and development in Africa and to locate the study of everyday spaces of state power in and around electricity infrastructures as they represent a key means through which state formation is enacted and contested in daily life.

One of Mahatma Gandhi's critiques of electrical power was the worry that it would bring centralised control over the lives of people in remote villages and prevent communities from becoming self-sufficient for their energy needs (Kale, 2014:28). It is not the case however that the extension of electrical power has immediately brought more centralised control over people and places in Mozambique, but it is regarded by the state as a key means by which to perform and narrate development and improve its capacity to administer and govern its territory and citizens. Whilst the state has claimed that grid extension to rural spaces is a key priority, much infrastructural investment has focused on connecting urban and semi-urban district capitals and provincial centres whilst rural electrification has been

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focused not on improving household access but on enhancing the power and capacity of rural state institutions.

Electricity infrastructure represents an important means through which the state seeks to counter its 'blindness' in peripheral spaces and although in Mozambique it hasn't yet improved the state's ability to measure, record and monitor, an expanding grid network and off-grid energy systems help the state to achieve a more permanent visibility, to extend the state's presence and begin to enhance its power and capacity to order and arrange and to 'read' and 'translate' its territory and citizenry. The intersections between electrification and statehood in Africa warrant ~~much~~ further attention as does the ~~way in which~~ contestation of electrical flows and infrastructures ~~are subverted~~ in ways that transform wider geometries of power. Mozambicans perhaps know better than most that infrastructures do not always work as expected, as demonstrated by the creative exploitation and micro-politics around prepayment ~~metering~~ technology or the theft of EDM-supplied electricity or of FUNAE-installed solar panels.

The extension of electricity infrastructures also facilitate accumulation involving national political and economic elites in alliance with transnational actors. In Mozambique the monopolistic nature of grid-based electricity service provision has provided ample opportunities for rent-seeking and abuse, as the provision of electricity services is subject to political capture or the focus of patronage networks and petty corruption. Many of the prominent firms ~~at the front of the queue~~ in infrastructure projects are linked to ~~key~~ Frelimo ~~figures~~ official mixing political, commercial and regional interests and capturing public resources and institutions to do so. Electrification in Mozambique represents a peculiar

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public-private project. Such hybrid constellations of state and non-state actors are becoming increasingly common in Africa in the wake of neoliberalisation, but the particular assemblages of actors they bring together and their impacts require further research, as does the way in which they are inflected by each country's particular political-economic history and through wider regional and global economies.

Electricity infrastructures, we have argued, also help to enlist and enrol citizens as subjects of state-led modernity and development. We drew attention to the discursive power of state agencies like FUNAE in framing energy access problems and solutions and advancing the idea that rural energy users must quickly be brought into neoliberal modernity through a discourse of 'connectivity'. The normative assumption is that all individuals should be connected to the grid, but the necessity and desirability of life on the grid are seldom questioned (Gupta, 2015) and little consideration is given to how poor people can afford to pay for it. ~~this relatively expensive product.~~ Energy access is framed as key to the extension and intensification of market exchange into rural areas, enabling and facilitating 'development' but the process also in part creates neoliberal subjectivities. Electrification allows the state ~~to advance its vision of neoliberal development and~~ to enrol its citizens within ~~that~~ its vision of development as modern, bill-paying consumers and subjects (Baptista, 2015; Labban, 2012). Ironically, however, in many ways the Mozambican state's centralised and top-down approach to the supply and installation of decentralised energy ~~technologies and infrastructures~~ in rural spaces has stifled and constrained private markets and actors.

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Particular ways of organising energy institutionally and geographically create new winners and losers (Mitchell, 2011). Access to electricity, both socially and spatially, remains acutely uneven and McDonald (2009: 445) even raises the prospect that Mozambique will remain 'trapped' by a 'colonial electrical geography' in which poor majorities are excluded as the energy needs of corporations are placed above those of households and communities, especially in rural areas. Investment in power generation in Mozambique appears disconnected from the basic energy needs of the poor and there is an assumption that the energy services most important to poor people will be delivered automatically as a by-product of ambitious expansions in electricity generation capacity and electrification. Given the current configuration of institutional, material and discursive power within Mozambique's energy sector the scope for rapid, large-scale and socially inclusive increases in energy access appears limited. ~~despite~~ The state's ambitious plans and targets are~~nd~~ therefore ~~to~~ unlikely to radically transform the colonial spatialities of the Mozambican~~its~~ energy system in the immediate future.

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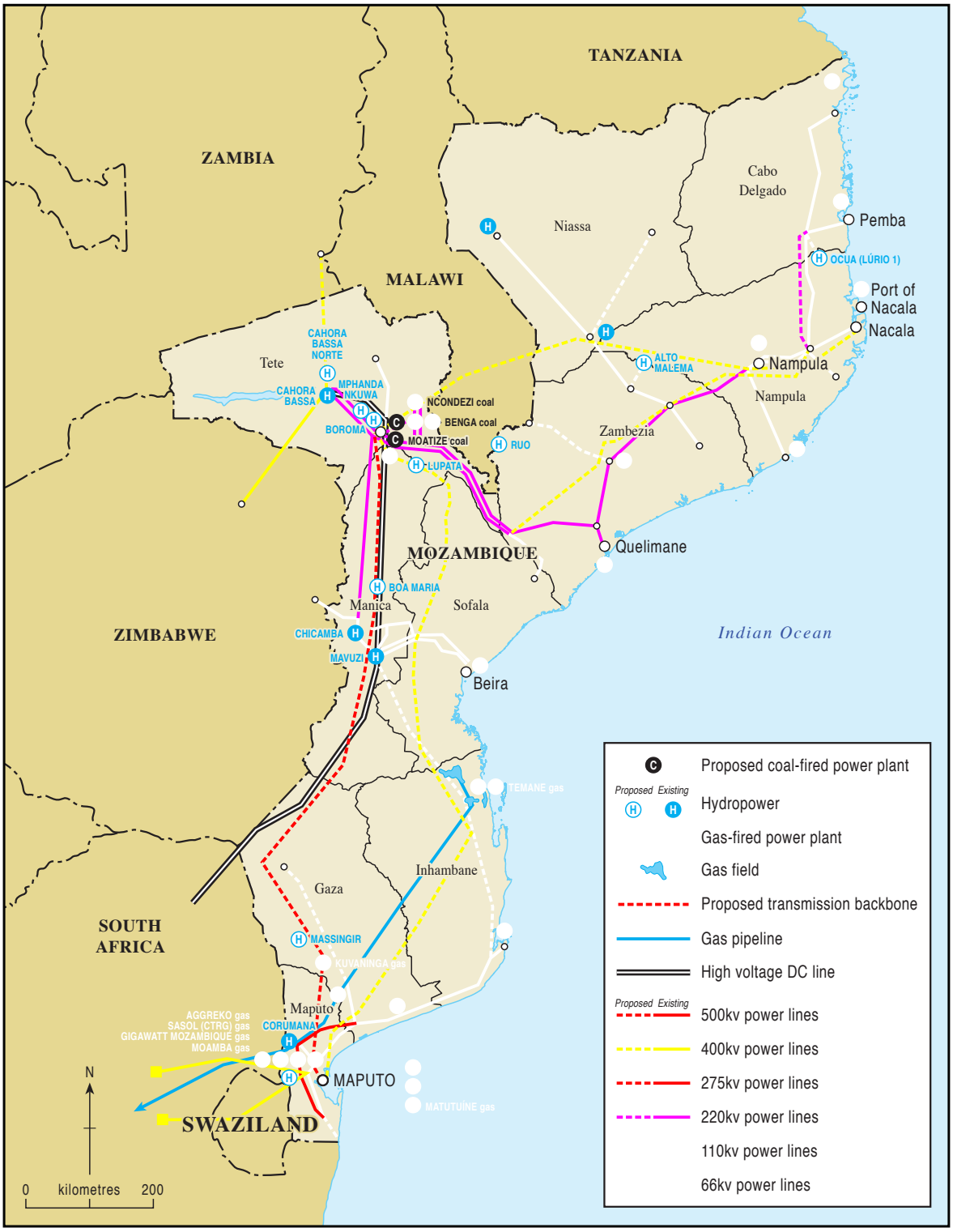

The figure was adapted from (1) the 2015 *Annual Statistical Report* produced by Electricidade de Moçambique (2015) and (2) A map of Mozambique's electricity grid produced by the Global Energy Network Institute (GENI). It was prepared by Chris Orton in the Cartographic Unit with the Department of Geography at Durham University. The map illustrates that despite the continuing heavy reliance on hydro power there is growing use of high carbon sources (coal, gas and diesel) in Mozambique's electricity generation. The map also illustrates the limited spatial coverage of Mozambique's existing electricity grid infrastructure.