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The *Infrastructural Time* of Resilience: Accounting for New (and Old) Forms of Government in the South African Grid

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Abstract

Temporality has long, if implicitly, structured geographic research on resilience---whether by underwriting geographic endeavors to show how resilience aligns with late 20th century neoliberal modes of intervention or framing suggestions that resilience demarcates a recent shift beyond neoliberalism. It is evident, however, that a range of "old" and "new" governmental rationalities can be observed in resilience measures. To account for that simultaneity, I suggest that researchers turn to infrastructure. Doing so attunes us to the ensemble of historically-situated ethical and political projects that, as they are attached to and enacted through materials, create the complex political and physical terrains in and on which present-day resilience measures act. It also allows us to trace how the time horizons of infrastructure give shape to specific (de)centralized, collectivizing, and individualizing forms of resilience, which can be associated with a range of "old" and "new" governmental rationalities. I make this argument through a case study of the South African electricity system and measures taken to address its ongoing breakdowns. I show how temporal logics of finance, politics, development, and electricity have shaped the contemporary problem space in which resilience measures intervene, as well as the limited and interdependent forms that resilience is taking. In doing so, the paper advances new accounts of, and ways to account for, resilience today. Specifically, it reads contemporary resilience measures as temporal projects. Insofar as they act on places, they also act on and through time, and are mediated by prior infrastructure investments that have taken place over time.

Key words: infrastructure, resilience, temporality, energy transitions, finance

1. Introduction

By late August 2023, South Africa was in the midst of what many in the country called a wholesale "energy crisis" (Swilling 2023, n.d.). Over the past few decades, the nation's ageing electricity infrastructures had fallen into significant disrepair and could not keep up with growing electricity demand. Mismatches between electricity supply and demand had led Eskom, the nation's government-backed electricity enterprise, to introduce planned blackouts—known as load shedding—to reduce demand and the likelihood of total grid collapse. While regular load shedding was intended to prevent the catastrophic disruption of the South African electricity system, it also portended what some commentators called "political-economic Armageddon" (Swilling 2023). Load shedding, which took place for a total of 280 days in 2023 and could last for up to 12 hours at a time, disrupted the livelihoods of millions of South Africans (Eskom 2023). It also took a significant economic toll, amounting to approximately $51 million in economic losses per day that year (South African Reserve Bank 2023). Moreover, load shedding and its impacts threatened the political future of the African National Congress (ANC), the political party which had governed the nation for decades. Where the ANC had made electricity infrastructures central in the political project of redistribution—a core pillar of its claim to

legitimacy—residents and opposition parties increasingly saw the ANC as uncommitted to, or incapable of, keeping the lights on.

In this context of increasingly intermittent electricity service, individuals and government officials began to undertake measures that they hoped would bolster resilience, which in this case referred to the capacity to cope with energy disruption. While united under a common banner of resilience, these measures acted at specific scales and toward specific, occasionally conflicting ends. Affluent households, for example, increasingly turned to renewable and independent power sources such as solar panels, generators, and batteries that promised to minimize disruption amid energy shortages and thus support their users' energy resilience (GoSolr, n.d.). Regional governments like the Western Cape devised and began implementing decentralized renewable energy generation and supply plans, such as the Western Cape Energy Resilience Programme. For its part, the ANC undertook a range of centralized measures to avert further economic losses and "turn the crisis into an opportunity for future growth and resilience" (South African Government News Agency 2022). These measures included a historic bailout of Eskom, which over apartheid and majority rule had accrued massive amounts of debt, and in recent years had become a significant source of macroeconomic risk. Measures also included pro-renewables incentives and regulatory reforms[1] to reduce pressure on the grid; the unbundling of the utility's vertically integrated generation, distribution, and transmission outfits into a series of individual, market-oriented parts, and the restoration of power plants previously marked for shuttering, among others.

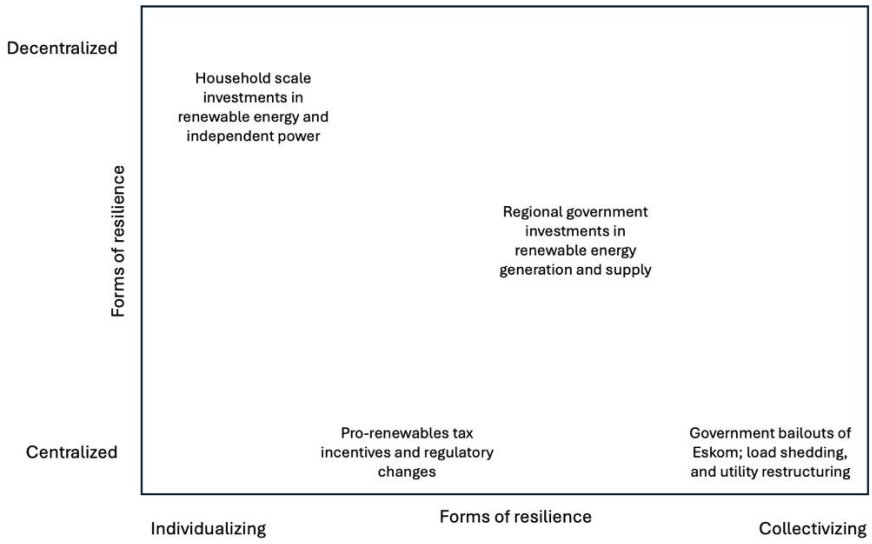


Figure 1 Forms of resilience

Notably, the resilience measures presently underway in South Africa have taken a limited set of (de)centralized, collectivizing, and individualizing forms (see Figure 1). The benefits of centralized, collective interventions, like government bailouts of Eskom, are intended to circulate across the country, whereas the immediate benefits of centralized, pro-renewables tax incentives

[1] For example, the ANC permitted individuals to claim 25% of the cost of solar panel installation in their income tax returns and lifted the cap on independent power production.

are meant to flow to individual households. Equally, decentralized resilience efforts are devised to have individualizing and collectivizing effects: household investments in renewables build up property-level resilience, just as regional energy resilience programs are intended to bolster the economic resilience of the populations living within the program area. These forms are also interdependent: decentralized household- and regional-level investments in renewables, for example, took place in response to centralized efforts to manage collective electricity demand through load shedding.

Moreover, and perhaps most strikingly, officials and individuals devised the measures in order to act on a variety of temporal problems and pressures. Affluent households increasingly turned to renewables and independent power at least partially because they provided a fast fix to electricity disruption in general and in relation to the extended time horizons of much-needed national electricity system repairs (personal interview 29 January 2024). Regional-level energy resilience plans were intended to reduce catastrophic, daily economic losses and shore up the region's independent energy supply over the near- to medium-term (Brijraj 2023). The ANC, cognizant that load shedding and sustained household and regional investments in renewables could prove disastrous for its political future and send the country on a trajectory of collective economic decline, took up its suite of centralized strategies to demonstrate to South African voters and investors that it was "doing something" about the crisis and thus avert further, near-term economic and political losses (personal interview 3 March 2024). Resilience, in other words, is a temporal project: insofar as resilience measures act on and through place, they also act on and through time.

The centrality of time and temporality in the creation of these limited and interdependent forms of resilience invite us to revisit an important question posed in geography and adjacent disciplines: how, exactly, does resilience become certain "kinds of things" in practice (Anderson 2015: 60)? Here, I suggest that the analytic of infrastructural time, or the varying temporal logics at work within a given infrastructure, is highly useful for answering that question (Appel 2018; see also Addie et al 2024). It is, after all, not the Eskom grid per se that has prompted the specific resilience interventions that are under way in the country. Instead, and as is true for many governments struggling to manage floundering electricity infrastructures, it is the frequency and duration of load shedding, the extended time horizons of electricity system repair, expansion, and transition and so on in relation to the shorter time horizons of debt repayment, electricity consumer needs and expectations, and electoral cycles, among others, that have rendered the present a "crisis" and spurred the development of the (de)centralized, individualizing, and collectivizing resilience measures that we presently observe. Equally, it is the promise of quick returns—whether an electoral victory, minimized disruption, or reduced economic losses—in relation to longer-term power sector repair that has catalyzed the centralized and decentralized resilience interventions we see now.

If infrastructural time helps account for the limited, interdependent forms that resilience measures take, it also helps us trace how and why resilience has emerged as a particular problem in the present. As Appel (2018) and others show, the analytic helps us analyze how, exactly, the temporal logics and relations that are bound up within infrastructure interact over time. For that reason, and by extension, the analytic of infrastructural time helps us trace how these interactions create particular kinds of "crises" and catalyze specific modes of, and capacities for, intervention--inclusive of those linked with resilience. Infrastructural time therefore attunes us to the contemporaneity of resilience: that resilience measures and the crises to which they respond are made of and through a combination of new and old elements, trajectories, and "stories-so-far"[2]

[2] The phrase 'stories-so-far' emphasizes Massey's (2005) view that space, as a product of relations and a site where new relations are forged, is never finished or closed. I will be referencing this term throughout to introduce and highlight the emergence of key 'moments' when new relations are forged within South Africa's electricity systems.

(Massey 2005: 9; Rabinow 2009; Folkers 2021; Serres and Latour 1995). Understanding resilience in this light also helps resolve, and push beyond, a longstanding concern of human geographers: determining whether, how, and why resilience is aligned with late 20th century neoliberal rationalities of government. When treated as contemporary, the question instead becomes how those and other rationalities, along with their material expressions, have helped shape the complex physical and political terrains on and in which resilience measures now act.

In making these arguments, I draw on 22 interviews with South African government and Eskom officials; resident association officials;[3] energy, financial, and legal experts, as well as analysis of relevant media (e.g., newspaper articles, Eskom reports, government planning documents, and social media); non-participant observation of relevant events (e.g., public, recorded debates on Eskom and energy transitions), and histories of South African electricity systems. Section 2 draws out the underlying temporal structures of critical resilience literatures: namely, their tendency to show how, or evaluate whether, resilience aligns with (neo)liberal logics, modes of intervention, and norms of the late 20th century or demarcates a recent shift beyond them. As I will show, such concerns sit uneasily with the South African case, where one can observe the simultaneity of "old" and "new" modes of governmental reasoning and intervention at work (Rabinow 2009). By way of engaging with the South African electricity landscape, as well as interdisciplinary scholarship on infrastructure, the section introduces and further develops infrastructural time (Appel 2018; Addie et al 2024) as a key analytic in explaining that simultaneity and the specific forms that resilience has taken (Anderson 2015; Grove 2018). In Section 3, I investigate the infrastructural time of South African electricity, and trace how the interacting temporalities of politics, finance, development, and electricity have rendered Eskom and its grid a source of significant risk and disruption, to which present-day resilience efforts respond. Section 4 unpacks these efforts and diagnoses their politics: as expressions of the destabilization of longstanding *and* recently acquired expectations of, and relations with, electricity. The concluding section discusses the relevance of infrastructural time for further research on resilience. For one, infrastructural time enables researchers to tease out the geographically and historically situated political dynamics, trajectories, and relations that the term resilience, when invoked and put to work in particular places, can flatten or erase. But it also opens up new modes of inquiry on the future. Specifically, it helps researchers anticipate the possible futures, crises, and controversies that present-day resilience interventions may generate or help build.

2. Accounting for "resilience multiple"

Over the past couple decades, geographers and scholars in adjacent disciplines have been preoccupied with the proliferation of resilience as a norm and object of government. Across a range of settings, researchers have probed the "neoliberal prospectus" of resilience (Amin 2013): that resilience is aligned with neoliberal rationalities of government that transfer responsibility to address contemporary problems from the state to enterprising communities, individuals, and markets and depoliticize contemporary problems (Evans and Reid 2014; Walker and Cooper 2011; MacKinnon and Derickson 2010; Joseph 2013). When governments intervene to address issues like financial crises, they do so mainly to shore up existing modes of accumulation and

[3] Resident associations (RA) are voluntary associations that cover specific spatial areas, such as a neighborhood. I sampled Johannesburg RAs because they have been key sites of renewable and independent power uptake. Within Johannesburg I selected a range of upper- to middle-class neighborhoods to account for socioeconomic differences. However, this account can and should be supplemented by research on RAs in cities and neighborhoods beyond Johannesburg.

political organization rather than protect impacted populations (Cooper 2011). Others have read resilience differently, suggesting that resilience is (also) rooted in or aligned with fields such as psychology, design, and security, and entails interventions that extend beyond familiar neoliberalizing forms, such as robust government intervention on collective problems and the synthesis of diverse knowledges, among others (Grove 2018; Collier 2025; Tierney 2015).

Importantly, these claims are often animated by an implicit, underlying temporal structure: namely, demonstrating how, or probing whether, the techniques, practices, knowledge forms, and discourses that we can observe in present-day resilience measures arose within, align with, or reflect the norms and rationalities of, a specific era. These concerns are particularly evident in prominent first-cut critiques of resilience, which originate resilience in 1970s and 1980s reforms in ecosystem management and economic systems that advanced broader goals of decentralizing, and in some instances liberalizing, control of those systems (Walker and Cooper 2011). Temporal concerns are also present in other first-cut accounts which insist that, or interrogate whether, the rise of resilience demarcates a new era or a "shift" within liberalism that "abandons the very concept of security" and compels the formation of "responsible" individual subjects who provide for themselves amid "unavoidable endangerment" (Evans and Reid 2014: 3, 12). One can observe similar temporal structures in more recent resilience scholarship, which probes the extent to which resilience denotes a possible transition toward renewed state responsibilities to intervene on matters of common concern (Zebrowski, 2025; O'Grady, 2025; Collier et al, 2025).

What is notable about the South African case and others (see Collier 2025) is that many of these norms and practices, as well as their underlying temporalities, are at play at the same historical moment. One can certainly "see" late 20th century turns toward, and norms of, liberalization in the resilience-minded unbundling of Eskom today. But recent resilience measures like Eskom bailouts, and even load shedding, give credence to scholarly diagnoses of the significance of resilience in the present: that resilience now denotes massive, highly centralized state interventions to address collectively held and felt macroeconomic risks. One might thus be tempted to read the South African case as supportive of important geographic claims that resilience can be many "kinds of things" and represents a "fractured, multiple" field (Anderson 2015: 60; Grove 2018). But this paper seeks to push beyond multiplicity, and to account for the limited field of empirical variation that can be observed in ongoing South African resilience efforts and elsewhere. Specifically, it seeks to trace how and why it is that decentralized, centralized, individualizing, and collectivizing forms of resilience are taking shape in the present. The central claim is that infrastructures are useful sites for doing so. After all, infrastructures, or the "built networks that facilitate the flow of goods, people or ideas…over space," are made and remade by many "kinds of things" (Larkin 2013: 328; Anderson 2015: 60). Such "things" include obvious materialities, like concrete and wires. They also include a "rich texture" of political forces, legal regimes, knowledge practices, and people, as well as the "dreams and aspirations, breakdowns and suspensions" of everyday life (see Star 1999: 379; Mitchell 2002; Edwards 2003; Anand et al 2018; Simone 2004)---all of which have unique rhythms, lifespans, and time horizons (Knuth et al 2024; Folkers 2021; Addie et al 2024).

Thus when we investigate the South African electricity system, we must direct our attention to technical "things" such as the (largely coal) power stations, grids, and cable lines that produce, transmit, and distribute electricity to approximately 90 percent of the nation's municipalities, homes, and businesses, as well as to neighboring countries (Eskom 2023; see DeBoom, this issue). But we must also pay attention to the actors that own, use, and govern the system's individual parts. These actors include: (1) Eskom, the government-sponsored electricity

enterprise that owns the 46 giga-watt power stations,[4] the transmission grid, and 405,000 kilometers of lines and underground cables that distribute electricity around and beyond the country, (2) municipalities, which act as intermediaries and purchase electricity[5] from Eskom at wholesale prices and resell it to households and businesses at marked up prices, (3) the national government, which is legally responsible for a majority of Eskom's debt and has the capacity to regulate the parastatal, and other domains of electricity provision, as well as (4) individual households and firms, which use and pay for electricity directly through Eskom (approximately one-third of electricity sales), or indirectly through municipalities (about two-thirds of sales).

As relates to resilience, the point in foregrounding these heterogeneous relations and elements is to emphasize that infrastructures---and in particular electricity infrastructures—are host to resilience projects that unfold at the same time; have distinct relations with time; and are mediated by prior infrastructure investments that have taken place over time (DeVerteuil 2015; Zarecor 2018). For example, the resilience of the electricity system hinges on keeping electricity supply and demand in constant balance. That capacity is shaped at least partially by prior investments in, and ongoing maintenance of, power stations as well as the consumption patterns of electricity users, inclusive of those intended to bolster household-scale resilience amid electricity disruption. Consumption patterns, too, are shaped by earlier investments in electricity, as well as the expectations of immediate, reliable electricity that those investments both enabled and sustained.

The key claim here is that infrastructural time, or the temporal logics at work within infrastructure, is a useful tool for holding these temporalities and temporal dynamics in a common analytical frame, and thus helpful in interpreting how and why specific formations of resilience emerge today (Appel 2018; Addie et al 2024). For one, it enables us to trace how key temporalities of infrastructure, whether related to user expectations of infrastructure, the extended time horizons of maintenance and repair, and so on, shape infrastructures and the work they do throughout time. Moreover, infrastructural time also alerts us to the ways in which the same logics lay the groundwork for "crisis" over time and structure subsequent resilience responses in relation to time, whose specific forms can be associated with different periods of time (e.g., late 20th century projects of utility liberalization).

[4] Among high-GDP African countries, South Africa has one of the higher national grid capacities (e.g., Egypt has 59.5 GW and Nigeria has 12.5 GW).

[5] The South African Constitution makes electricity distribution a responsibility of local government, and is a source of significant revenue for cities (Jaglin 2014). As of 2022, electricity sales made up on average about 28% of municipal revenues (Statistics South Africa 2022), but are significantly higher in some smaller, less affluent municipalities, where sales can account for about 50% of revenues.

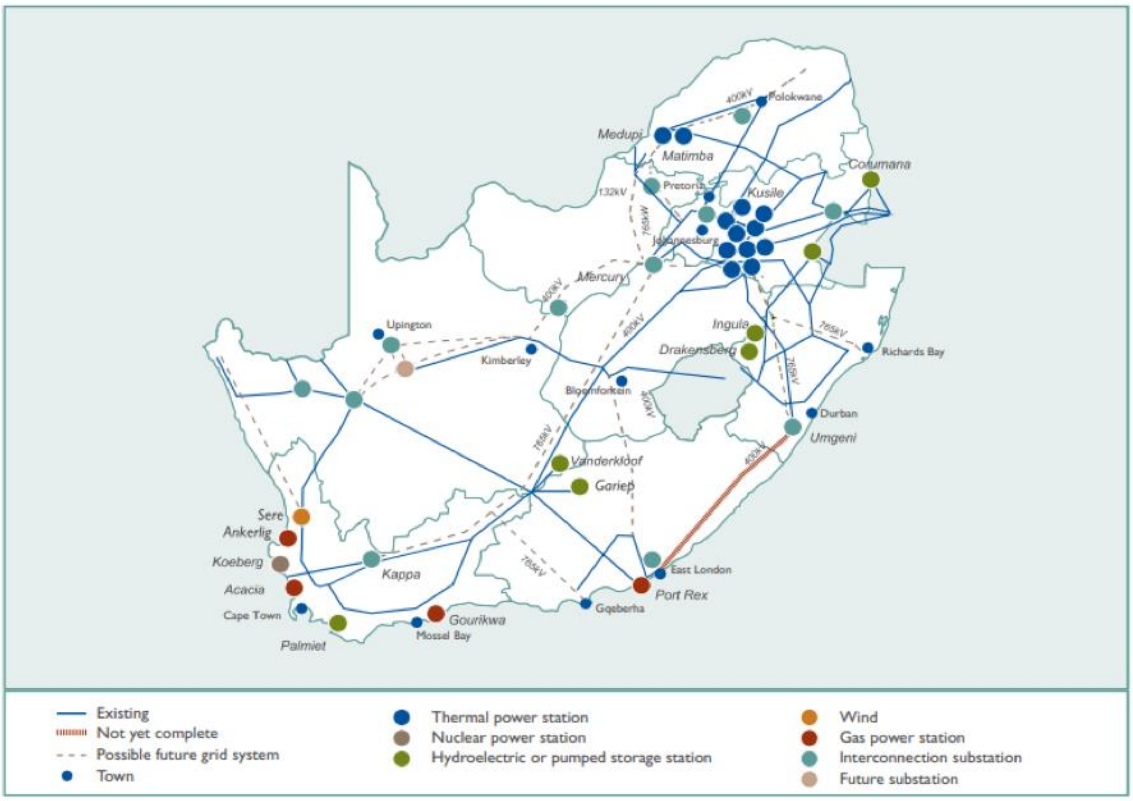


Figure 2 Eskom electricity network

Within the South Africa case, four logics are important to highlight: electricity, development, politics, and finance (see Table 1).[6] The temporality of electricity refers to the synchronicity of electricity (e.g., the need for electricity supply and demand to operate at the same frequency for grids to function and avoid collapse); the long lifespans of power plants and grids as well as the extended time horizons of their construction, and expectations of the immediate and regular availability of electricity. In South Africa and many White supremacist contexts, such expectations are highly racialized.[7] Under colonial[8] and apartheid regimes, for example, electricity extended almost exclusively to White populations, therefore rendering expectations of the immediate and regular availability of electricity White temporalities. The same process shaped

[6] The temporalities discussed are derived from key themes and dilemmas that emerged in interviews and documentary analysis, but are not the only ones that matter. Future research on this case and others could, for example, explore the temporality of labor (the long-term expectations of job security and availability that are bound up in infrastructures) or law (the strategic usage of the legal system to speed up, or delay, infrastructural change), or further specify the temporality of electricity by focusing on operations (e.g., the need for an electricity system to respond rapidly to a problem to reduce downtime or, alternatively, be prepared for future possible disturbances through vulnerability reduction measures).

[7] Here I am drawing on geographic scholarship which unpacks the racially uneven distribution of futurity. In many White supremacist and settler colonial contexts, expectations of "progress" have historically been extended to White subjects and emerged "on the backs of" racialized others who are systematically denied "positive" expectations of and relations with the future (Sexton 2010; Anderson et al 2020: 626). Thus when we analyze the temporal logics of infrastructure as outlined by Appel (2018), we must also attend to their racialized doubles: progress and suspension, mobility and immobility, instantaneous access and routine denial, and so on (see also Grove et al 2022).

[8] Note that here and hereafter I am referring to the Union Period of 1910-1948, when electricity generation and provision first became an object of government intervention.

Black temporalities of electricity, which have historically entailed waiting[9] and expectations of the absence or irregularity of electricity, whether due to meager, poorly assembled, late-apartheid grid extensions to Black townships or majority-rule era disconnections due to non-payment. These expectations would only begin to be formally reconfigured under majority rule and, as we will see in Section 4, continue to animate contemporary South African politics.

TABLE 1

Temporal logic	**Temporalities**	**Key expressions in Union Period (1910-1948)**	**Key expressions under Apartheid (1948-1994)**	**Key expressions under majority rule (1994-2022)**	
Development	Long-term (30-40 years) trajectories toward a desired normative end, such as "progress"	Investments in electricity infrastructure; creation of Eskom; lack of electricity for Black majority	Rationalization of electricity planning and provision; mass grid expansion and consolidation via industrial policy; lack of electricity access for Black majority	Grid expansion to support redistribution projects; increased access for Black majority	
Politics	Short-term election cycles (every five years) or desires to challenge, stay in, or personally benefit from, formal political power; long-term horizons under apartheid due to systematic exclusion of	Creation of Eskom	Mass grid consolidation and expansion via industrial policy; gradual extension of grid to Black townships	Industrial policy to support redistribution projects; state capture; (dis)investment in	

[9] Here I am drawing on Bourdieu's (2000) and Bissell's (2007: 277) understanding of waiting. Where waiting was essential in the exercise of apartheid and colonial power, waiting in the early days of majority rule was "alive with potential" – in this case potential for broad support of the ANC's ambitious projects of political and economic redistribution.

	the Black majority form the political system			electricity maintenance	
Finance	Long term expectations of returns on investment; short-term periods in which debt, rate payments must be made and over which market actors evaluate an entity's economic health and value	Investments in electricity infrastructure; creation of Eskom	Debt issuance for electricity investments; '80s shuttering of planned expansion projects and proposed utility restructuring	Debt issuance for electricity investments; credit rating downgrades	
Electricity	Need for supply-demand synchronicity; sudden changes in demand relative to supply; long-term horizons of power plant and grid construction; short term horizons of renewable installations on individual properties; expectations of immediate, regular availability of electricity	Investments in electricity infrastructure; growth and consolidation of White economic and political power; lack of electricity access for Black majority	Mass grid consolidation and expansion via industrial policy	Growing Black expectations of immediate, regular access to electricity; blackouts	

The temporality of development denotes linear, long-term trajectories toward progress that electricity promises (Appel 2018; Harvey 2018). While such trajectories were long afforded to the White minority and denied to the Black majority under colonial and apartheid rule, we can also see temporalities of development in the interventions of majority rule administrations, specifically in industrial policies such as mass electrification that advanced redistributive projects to build "improved" non-racial futures (see Figure 5). The temporality of *politics* refers to the duration of a given political administration. In democratic settings, such as post-1994 South Africa, political time horizons are often truncated to short-term electoral cycles. In minority rule settings, such as apartheid and colonial rule, where political powers are not accountable to a majority population, political time horizons may more closely align with longer-term developmental horizons. In South Africa, one can observe political time in ambitious "durable materialities," such as the expansion and centralization of the Eskom grid under colonial and apartheid rule (Appel 2018: 57). One can also see political time horizons in short-term resilience "fixes" like ANC pro-renewables regulations to secure its political future, and late-apartheid piecemeal electricity extensions to Black townships to defer transitions to post-apartheid futures. While the temporalities of development and politics have much in common, what makes politics distinctive is that themes of progress and improvement are means, not ends. Put differently, such themes take on affective, performative qualities that are instrumental in addressing political aspirations and fears, such as winning elections or being ousted by an opponent, and thus (in democratic settings) shoring up temporalities of development.

Finally, the temporal logic of finance incorporates "the promise" or "expectation of future income…[baked into] the scale and longevity of" infrastructures, which is produced in the form of revenue, traded in the form of shares, or sold in the form of debt (Mitchell 2020: n.d.; Coutard 2024: 80). It also includes the relatively short time horizons over which debt and rate payments need to be made, and market actors evaluate the economic future of a given place or the value of its assets, and so on (see Schindler and Kanai, 2024). We can observe financial time horizons in utility-scale resilience interventions, such as the ANC's decision to bail out Eskom, and in colonial decisions to make massive investments in electricity infrastructures in the first place, among other examples.

In what follows, I explore the infrastructural time of electricity in South Africa across three key periods in South African history: the Union period (1910-1948), when colonial authorities forged

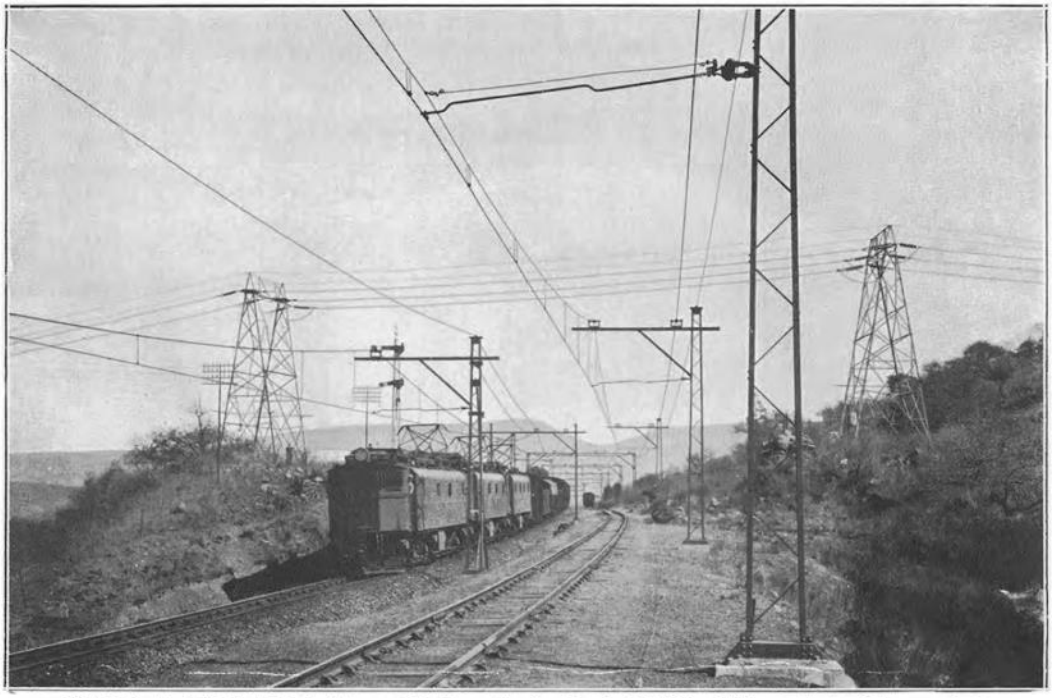
a common government and electricity provision became an object of government; apartheid, and majority rule—and how infrastructural time has helped shape specific resilience projects, their forms, as well as controversies over them, today. As a full account of the infrastructural time of electricity and present-day resilience interventions are beyond the scope of the paper, I capture critical junctures across these periods, and how the transecting temporalities of electricity, development, politics, and finance have helped set the stage for the contemporary resilience conjuncture in South Africa, as well as the specific forms of resilience that are taking shape within it (see Table 2 for an overview).

3. The infrastructural time of electricity

Union period

Key features of the contemporary resilience landscape---chiefly racialized expectations of electricity access and the entanglement of electricity in broader political and development projects—emerged between 1910 and 1948, the period over which previously self-governing British colonies came together to form a "united" nation pre-apartheid. Where a handful of private mining companies and municipalities once generated, supplied, and consumed a fragmented, erratic stock of electricity toward the beginning of the century, a few decades later mines, municipalities, railways, and White households had access to abundant, reliable, and cheap electricity whose supply was regulated (and effectively generated) by the state-owned enterprise Escom.[10] The creation and expansion of Escom, as well as the broader minerals and fossil-fueled mode of accumulation that Escom supported, should be read as a material enactment of transecting political, financial, and developmental time horizons: part effort to produce and "future-proof" White South African prosperity; part effort to generate immediate and future revenue to make those desires a reality, and part check on the political movements and populations that officials feared may throw those profitable futures into disarray (Fine and Rustomjee 1996).

[10] The parastatal's name was only changed to Eskom, its Afrikaans spelling, in the 1980s under apartheid.



Natal Central Undertaking: View of Railway Track, showing 88,000-volt Transmission Line crossing.

Figure 3 Eskom power lines, 1933

For many South African officials, the establishment of a state-owned enterprise that provided "at cost" and at-scale energy to entities including mines and municipalities would enable the government to pursue, and pay for, industrial policy that would reduce its economic dependence on gold (Ballim 2023; Christie 1987). Equally, by wresting control of electricity from municipalities and circumventing its extension to majority Black areas, officials believed that the parastatal could (1) prevent future labor strikes in cities, where leftist movements had seized control of electricity infrastructures to make political demands and (2) keep rural Black peasants from competing with White capitalist agricultural markets (ibid 1987; Figure 2). The coercive power of the state and its new "heavenly"[11] electricity enterprise enabled mining companies and White industrialists to speed and scale up their operations, thereby prompting the need for more investments in electricity infrastructure to match growing electricity demand.

State intervention also enabled the same entities to generate diverse financial returns, and formalized White expectations of instant, cheap electricity access and growth through grid connectivity.[12] Unlike the White minority, the Black and coloured[13] majority would have to endure extended presents of being kept in the dark (Anderson et al 2020). It is in the Union period, then, that we see the racialization of electricity and development temporalities. Where White minorities were made to expect instant access and rapid, endless growth through electricity, the Black majority faced indefinite exclusion from electricity and the expectations of growth it promised. These racialized temporal forms, one significant outcome of how Union officials would develop, respond to, and capitalize on electricity infrastructures, would largely endure until the turn of the 21st century. As we will see, the same racialized temporal forms

[11] In a 1955 speech, an Escom executive called legislation that created Escom and its at-cost mandate an "inspiration from heaven."

[12] At the time electricity rates were cheaper than many US cities, but still too expensive for Black workers to afford.

[13] This term was introduced under apartheid to denote individuals of multiracial and multiethnic descent. While considered a slur in the US and UK, the term is still officially recognized and used by many in South Africa to describe their identity and is not considered to be a slur.

would animate the centralized and decentralized forms that resilience is taking, as well as the political controversies over them.

Apartheid

If developments within the Union period help us understand the entanglement and racialization of electricity in South African development and political projects today, developments under apartheid enable us to appreciate the material structures that mediate present-day electricity crises, and drive both centralized and decentralized resilience responses we see now. Indeed, when the National Party took power in 1948, it inherited an industrial state whose electricity infrastructures were comparable to those in the United States and Western Europe in terms of electricity costs and generation capacity. But, and as with other nations at this period, the Party sought to develop those infrastructures even further. A mix of post-war economic booms, electricity demand shocks, and recently-mainstreamed techniques in forecasting future electricity requirements encouraged apartheid officials to (1) *expand* Eskom's reach beyond South African borders and (2) *centralize* its operations through the creation of a single, national grid and control center, where a handful of men could turn off entire power stations across the country at a moment's notice (see Figure 4; Deboom 2025).

Key aspects of development temporalities can be seen in the rationalization of electricity planning: the expansion and centralization of the physical grid were, after all, about securing the multigenerational longevity of the apartheid regime and creating conditions for multi-generational economic growth (Ballim 2023). But such efforts were also punctuated by near- and medium-term political aims: specifically, desires to pre-empt or defer near- to medium-term futures wherein liberation movements—rising from within townships or crossing South African borders—threatened the survival of apartheid government or ended it themselves. One can observe the materialization of political time horizons transecting with longer-term developmental aims in at least two ways. First, through modest, placating 1980s extensions of electricity to middle class Black townships like Soweto. Eskom officials hoped that these extensions would "regulate" the actions of a growing Black political elite whose militant arms increasingly targeted electricity infrastructures in efforts to protest, attack, and draw global condemnation of the apartheid state (Von Schnitzler 2017, 2018; Wenzel 2016).[14] Second, through the electrification of national borders and the creation of White "buffer zones" in the 1980s. Officials reasoned that by extending electricity to the border, where White commercial farmers resided but were increasingly abandoning due to challenging economic conditions, they could keep farmers in place and enlist them in efforts to discourage guerilla attacks on the apartheid regime (Veck 2000; Ballim 2023).

[14] The 1988 Eskom Annual Report (p. 3) describes the gradual extension of electricity to Black households as an effort to "create a basis for cooperation."

Figure 4 Eskom employee in centralized control center.

The developmental and political ambitions of the apartheid regime, which can be observed in the vast, crisis-ridden power stations and transmission lines in the present, were wildly expensive. Their costs, among other resource-oriented changes in Eskom, led the parastatal to turn to capital markets[15] to finance its projects. But sudden changes in market valuation, as well as short term debt payment timelines, on occasion cratered the apartheid regime's borrowing capacities and the realization of its developmental and political ambitions.[16] As investor opinion soured on the apartheid regime, the debt that Eskom acquired in its expansion efforts—nearly 25 percent of South African GDP by 1989—became the "millstone around the neck of the apartheid regime," and forced the internal reorganization of Eskom, privatization talks, the shuttering of planned expansion projects and, as we will see, the modification of majority rule development plans (McDonald 2009: 64; Eskom 1989). But excess electricity supply, one manifestation of the developmental time horizons underwriting Eskom and South African economic growth under apartheid, also laid the groundwork for long-term, mass electrification programs and economic empowerment projects post-1994—and, for a time, buoyed the political future of the African National Congress (ANC) and the infrastructural promises ANC officials made (Veck 2000; Bowman 2020).

Majority rule

The highly centralized and expansive machinery of the apartheid project, and the racialized expectations of electricity that preceded it, would simultaneously power and trouble another key dynamic of the contemporary resilience landscape: the use of electricity infrastructures, and debt,

[15] Under early apartheid the National Party received external financial support for electricity in the form of loans from what would become the World Bank (Eskom 1951). The parastatal floated its first foreign bond issuance in 1975 (Veck 2000) and would eventually turn to capital markets to help repay its loans (Eskom 1983).

[16] For example, Botha's 1985 declaration that he would not support majority rule or efforts to advance Black participation in national government made South Africa (and by extension Eskom) a toxic investment. The parastatal then had to raise money through local capital and money markets and eventually shutter some planned electricity expansion activities (Veck 2000; Mondi 2020).

in projects of redistribution and private enrichment under majority rule. On the one hand, excess electricity production capacity that the ANC inherited from its apartheid predecessors could in principle make relatively quick work of electrifying the country and advancing ANC visions of a non-racial South African future. On the other hand, the debt that apartheid officials had acquired through Eskom and other parastatals left the ANC with few easy ways to pay for that future. Coupled with recent "debt trap" experiences of developing countries in Africa and elsewhere, the ANC's own apartheid debt trap made macroeconomic populism and debt issuance as a means of development unappetizing if not impossible to some ANC leadership (Padayachee and Van Nierkerk 2019; Ballim 2023). That disposition extended to Eskom. Following in the footsteps of its late apartheid predecessors, ANC leaders initially attempted to break the parastatal up into a series of privatized, decentralized parts.[17] Although the proposed "unbundling" responded to existing macroeconomic conditions and the policy positions that incumbent business coalitions preferred, some ANC officials also thought that "unbundling" could address the racialized legacies of apartheid. Because the systematic marginalization of the nation's Black majority was achieved through a highly centralized public sector and state-owned enterprises like Eskom, some officials believed that infrastructure privatization and decentralization offered opportunities to "reverse the longstanding patterns of racial discrimination…by increasing Black opportunities for ownership," and, as Figure 4 demonstrates, render the future something to which the Black majority could formally, and finally, lay claim (Pitcher 2012: 244-245; McDonald 2012).

[17] Interpretations of early ANC proposals to 'unbundle' Eskom vary. While some see it as the emergence of the Washington Consensus, whose arrival in South Africa had been deferred due to its global isolation under late apartheid, others view it as responsive to "the reality of inheriting a bankrupt state and a bloated bureaucracy" (Mondi 2020: 89) and ANC "fear of being caught in a debt trap later on based on fiscal ill-discipline early" (Padayachee and Van Nierkerk 2019: 149).

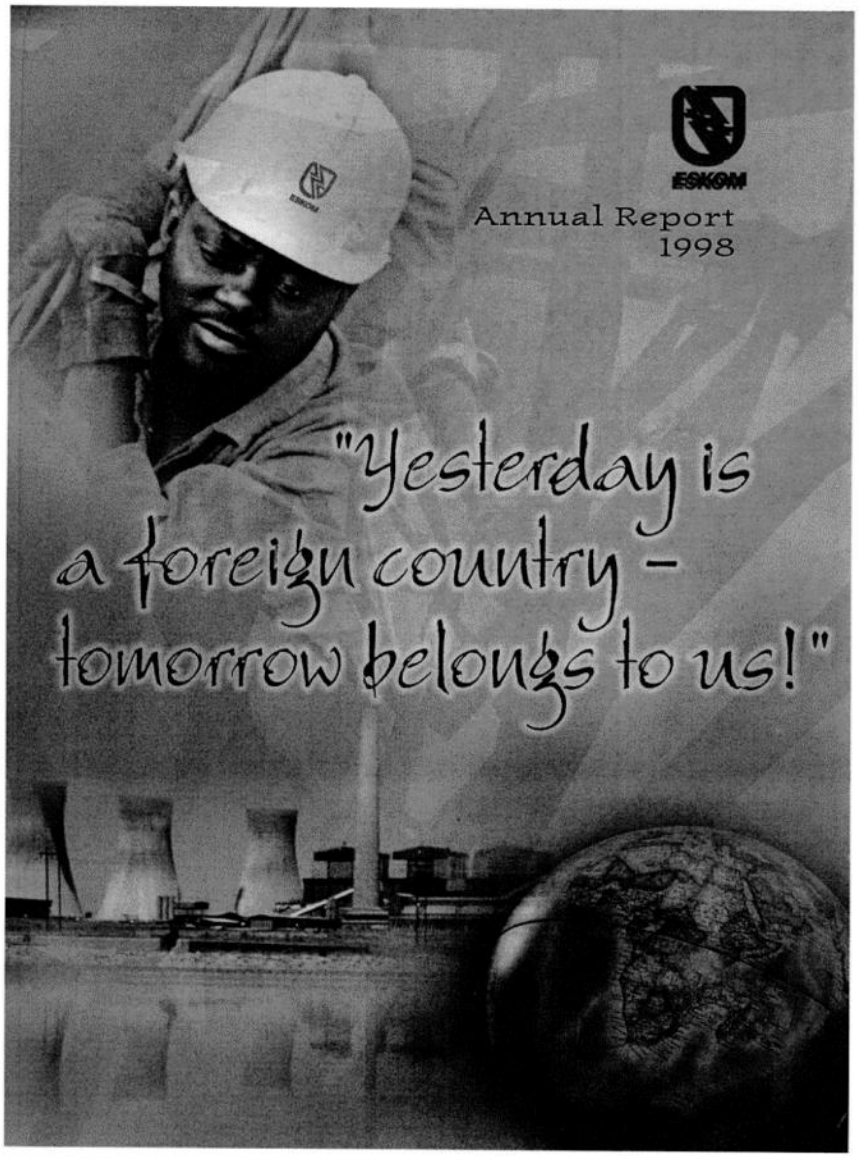


Figure 5 Cover of Eskom annual shareholder report, 1998.

But the linear progress and brighter tomorrows that ANC leaders sought through strategic, "neoliberal" use of parastatals did not align with the caliber or time horizons of political change demanded by many of the party's political constituencies (Padayachee and Van Nierkerk 2019). Indeed, trade unions---a significant component of the ANC's tripartite alliance—threatened to withdraw its support of the party if it proceeded with unbundling (ibid 2019). To help preserve its political future, the ANC halted unbundling plans. Instead, and in a move that resembled earlier Union era efforts to yoke electricity to broader developmental agendas, the ANC pursued industrial policy. Where expectations of instantaneous electricity access and growth through electricity infrastructures had previously been tethered to White South Africans, the ANC endeavored to extend those expectations to the Black majority through top-down policies that aimed to create a Black industrial class and accelerate national electrification and economic redistribution in favor of the majority (Mondi 2020; McDonald 2012; Ballim 2023). One material expression of apartheid development temporalities, a surplus of electricity, helped make the realization of these ANC developmental and political visions possible. "This was the era of excess electricity," one former Eskom executive told me. But it was also an era in which powers

that be began to turn to parastatals to enrich themselves and their allies.[18] While personal and political enrichment through parastatals in many ways kept with the practices and aims of colonial and apartheid regimes, what mattered here was that such enrichment took place as the nation's aging electricity infrastructures—now operating in a context where they had to provide for a majority rather than a minority population—were introduced to ANC leadership as a source of disorder. As another former Eskom executive continued, "We had already indicated to them [the ANC] in the early 2000s that the plants would not be sufficient to meet the growth in the country, in terms of energy demand, but for almost a decade there was very little to no movement in terms of a decision." For this executive, it was the then-present abundance of cheap electricity, coupled with the party's own short-term political horizons that explained the absence of large-scale electricity improvements. "For them, everything was still working, you know, all the capacity wasn't taken up. So they were just like, 'why were we at Eskom making noise about running out of capacity?' Plus, I mean, we were looking at the 15-20 year window. And I think the government view was very much on an election period…the time horizons just didn't coincide" (personal interview, 1 February 2024).

4. Blackouts and the emergence of resilience

If the near-term political and financial abundance that emanated from strategic use of centralized, apartheid era electricity infrastructures made it easy for the ANC to ignore the same infrastructures' longer-term challenges, by late 2007 it was impossible. That year, the consequences of the multi-dimensional temporal interaction and misalignment described by the former Eskom executive began to appear in the form of blackouts, which would become increasingly common in South African life.[19] And no small wonder: at that point, about half of operational Eskom power stations were commissioned before 1980, the oldest among them in 1961, and were tasked with generating electricity for nearly three-fourths of the population, up from just one-third in the early 1990s (McDonald 2012). But the same temporal tensions also made infrastructural improvement harder to come by. Short-term acts of state capture[20] led to significant inefficiencies and charges of corruption[21] in initial plans to address blackouts. By the time the electricity landscape had become truly dire, rating agencies had downgraded both Eskom and South Africa multiple times, citing "[weakened] standards of governance" like state capture, making it vastly more expensive to turn to capital markets for grid repair. At the same time, traditional sources of money for repair, such as electricity rate revenues, had begun to dwindle as a new "story" within the South African grid emerged in response to load shedding: individual and regional resilience qua investments in decentralized generation (Massey 2005; Baker et al 2019).

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[18] We can also interpret corruption through the intersections of political and electricity time horizons. As Ballim (2023: 15) highlights, the ANC became a prominent political party while systematically excluded from economic echelons of power. Underpinning many early ANC corruption scandals under majority rule was a significant need for political party funding, which some ANC members secured by offering allies lucrative contracts linked to costly long-term infrastructure projects like the Medupi power station.

[19] By the end of 2022, planned blackouts in the form of load shedding lasted for 3,773 hours, or a little under six months, and lasted 6 to 12 hours a day (Eskom 2022).

[20] This refers to private individuals, such as former President Jacob Zuma, and companies manipulating state institutions to divert public resources for their own benefit.

[21] For example, Medupi and Kusile, two massive power plants planned in the mid 2000s when demand soared and load shedding began in earnest, were significantly delayed, exceeded their budgets, and by 2015 were still not in full operation, just as existing stations were on average 40 years old and without regular maintenance. Some watchdogs have attributed the delays and costs to corruption.

"Suddenly people just moved"

One key example of the decentralized forms of resilience emerging in the South African energy landscape is the Western Cape Energy Resilience Programme (WCERP), which the Western Cape Provincial Government introduced in 2023. Explaining the rationale for the program, and for framing it in terms of resilience, a senior energy advisor to the Western Cape Premier told me that "the one thing we need to do is grow the economy, we need to create jobs and strengthen the fiscal framework of the province…for us to do that, we need a system that we can rely on and that is able to absorb the changes of different technologies, whether the mix is solar, wind, hydrogen, et cetera. We are just going to need a system that is flexible, but also able to cope with the changes that we're going to have" (personal interview, 1 February 2024). While still in early stages of planning, this individual indicated that the WCERP will pursue a decentralized electricity generation model, wherein electricity supply is embedded within a municipal network whose excess supply can be fed back into the Eskom grid. Notably, this official framed the WCERP as a critique of highly centralized practices and materials of electricity provision that were developed under apartheid but are now associated with the ANC. "Here in the Western Cape we don't necessarily support the idea that you should build five, big centralized 600 megawatt plants and that you need long transmission lines to get that energy into your different provinces and towns. Because that's what Eskom does and that model doesn't work. It's actually coming apart, and we do not need to be dependent on that model anymore" (personal interview, 1 February 2024). It is also a form of resilience that the official anticipates seeing elsewhere. "We've presented our plans to the other provinces, particularly Northern Cape, Gauteng, Eastern Cape, and KwaZulu Natal, and it was very much on the basis that they wanted to establish similar teams to ours…because nationally we don't seem to see traction in terms of fixing the problem."

Interestingly, this energy official's words echo the sentiments of many middle- to high-income South Africans who, in the past two years, have also developed decentralized forms of resilience by turning to renewable energy and independent power at unprecedented rates. By June of 2023, for example, Eskom reported that 4.4 gigawatts of rooftop solar had been installed throughout South Africa—four times what had been installed in March of 2022, and about 10 percent of the power currently produced by Eskom power stations (46 GW). As discussed in the introduction, such developments have prompted popular South African media outlets to report the arrival of a "full-blown energy crisis" and "bottom-up transition," where shifts in energy generation and consumption take place without strategic planning or guidance from national government or electricity parastatals (Swilling 2023). Here, too, we can see key elements of infrastructural time—namely the extended duration and high frequency of load shedding and the long time horizons of meaningful repair of collective electricity infrastructures—shaping both *when* and *why* these decentralized forms of resilience took place. As one energy expert told me of changes within his middle class Johannesburg neighborhood[22],

> "Things only seriously started at the beginning of last year (2023). Until then, people were sort of holding back because they were still getting used to the situation and thought, 'Oh, well we haven't needed them [renewables or independent power] in the past. And to set them up you needed batteries and batteries were expensive and so on…so it was only a couple of people who really thought that far ahead and did something about it…but when it became clear that the power cuts were gonna last, and were gonna be worse than anything we've had before, and that even with the best government possible that makes all the right decisions, it's still going to take several years for us to get out of this, suddenly people just moved. So in my suburb, a typical middle class area, I would say three years ago, it was just two percent of houses that had solar

[22] Johannesburg suburbs have seen some of the highest uptake of renewables and independent power.

> installed. In the meantime it's grown to probably 20 percent. And I think it's gonna grow even more" (personal interview, 29 January 2024).

Facilitating resilience?

The regional- and household-scale resilience efforts introduced above initially happened in lieu of large-scale national government intervention. However, the national government would soon facilitate decentralized, individualized resilience efforts to reduce pressure on the grid and undertake significant centralized and utility-scale interventions to enhance the economic and physical resilience of Eskom[23] (O'Grady and Shaw 2022; Eskom 2023). In 2022, for example, the government announced it would lift the 100 megawatt cap on how much power that companies can generate privately—a move which has subsequently led to an explosion of planned or actual investment in distributed generation facilities. One year later, in February 2023, the National Treasury announced that it would offer a one-year 25 percent tax rebate on the costs of solar panel installation (Republic of South Africa 2023). While facilitating resilience measures that were intended to act on individuals, the government also unveiled measures that were intended to act at the scale of the collective. The very same day, the Treasury also announced a historic, $13 billion bailout of Eskom over the next three years (about 3 percent of the country's GDP). By taking on over half of the parastatal's $22 billion debt, the majority of which it had assumed in the early 2000s building of the mega power stations meant to address blackouts, Finance Minister Enoch Godongwana said the government would "ease pressure on Eskom's current balance sheet" and enable Eskom to invest in important maintenance work and transmission improvements, while also reducing its fiscal risks (National Treasury 2023). These developments followed an important prior announcement from the Minister of Public Enterprises that, and echoing post-1994 plans for electricity reform, the government would pursue a plan to "unbundle" Eskom into separate generation, transmission, and distribution entities for the sake of encouraging private investment in South African electricity. Taken together, President Cyril Ramaphosa said that the national government interventions detailed above will "[turn] the crisis into an opportunity for future growth and resilience" (South African Government News Agency 2022).

Notably, key temporal logics of development (such as confidence that energy sector reform will lead the nation toward a better future) and finance (such as the sense of scale and rapidity of action required to improve near term risk assessments of the country among investors and rating agencies) appear in government officials' reasoning about why these centralized, individualizing and collectivizing resilience interventions matter and must take place now. As one chairman of the National Energy Crisis Committee (NECOM), a recently-assembled presidential advisory body intended to guide and implement national energy reform, told me:

> "If we start fixing the electricity crisis now [via facilitating movement off grid, bailing out, and unbundling Eskom], we address our political risk,[24] we keep channels open to global financing, our GDP grows, we get our ratings back into investment grade, and GDP growth creates funding to do all the other stuff we care about, like climate adaptation" (personal interview, 6 August 2023).

Interestingly, a Moody's Vice President who leads analysis of South Africa within the Sovereign Risk Group saw things differently. It was the time horizons of politics, not development or even finance, that drove the government's resilience measures. As he told me:

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[23] In the 2023 Annual Report, the Eskom chair notes that Eskom-specific government electricity reforms enable "a more resilient and responsive Eskom."

[24] The chairman is referring to lingering negative perceptions of South Africa due to state capture.

> "They [national government officials like those of NECOM] talk about credit ratings because we told them that it's [what the South African government does with its energy sector] one of the reasons we could change their rating up or down…but to be honest with you I think the acceleration of these resilience plans[25] is because the elections are coming in 2024. If they [the ANC] did not do anything and things got to stage eight or nine [of load shedding][26] before the election, Eskom cannot pay down its debt, and things [winning the election] would've been very difficult for them [the ANC]. So now they are throwing the kitchen sink at the problem so there is no load shedding during the election…in my view the rating is a secondary concern" (personal interview, 25 January 2024).

Importantly, however, near-term political gains by "throwing the kitchen sink" may also produce destabilizing effects in the medium term. For one, it may lead to a lopsided transition. As the Western Cape Energy Resilience Programme representative told me:

> "Because the energy landscape right now is market driven, and the government is following us rather than leading it [e.g., following regional- and household/firm-scale resilience efforts like the WCERP and private moves toward solar and independent power], not all the things are factored in the equation. For example, we started with IPPs (independent power stations) and solar, which are great from a generation perspective, and the government followed us. But since we didn't have an updated IRP[27] to guide us, we didn't focus on transmission immediately, and so there hasn't been a focus on sorting out the transmission issue [by the national government]. So it [the transition] hasn't been simultaneous or holistic, it's been sequential. And that messes things up quite badly when it comes to energy planning" (personal interview, 1 February 2024).

Moreover, and demonstrating the complex interdependence of the centralized and decentralized forms of resilience detailed here, regional- and household-level turns toward renewables stand to drastically reduce electricity revenues for Eskom and municipalities, many of which depend on electricity rates to provide basic goods and services for low-resource residents (Fatti and Khanyile 2023). A sustained revenue drain due to the proliferation of decentralized forms of resilience may, many officials told me, yield a renewable energy landscape of "haves and have nots," and reproduce long-standing racialized experiences with, and expectations of, electricity—this time in "green" clothing. "The bottom line," one energy official told me, "is that the revenue model of Eskom and municipalities will have to be reviewed and changed because they're not going to have the same demand levels they've had in the past, and therefore not the same revenue levels as well." Equally, a key centralized form of resilience, the Eskom bailout, is essentially a high-stakes bet on the future and its imagined returns: when the Treasury transferred over half of Eskom's debt to the South African fisc, it did so on the belief that Eskom would improve its operations and credit quality over the next few years. And that, the Moody's executive told me, is a risky intervention in and of itself. If wrong, the Treasury's "responsible" resilience gambit could send the nation on a long-term trajectory of economic decline and force subsequent restructuring that threatens not just the ANC's near-term political future but the life chances of millions of low-income South Africans (personal interview, 25 January 2024; Collier, 2025).

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[25] Here he is referring to incentives meant to reduce pressure on the national grid and salvage Eskom's finances.

[26] This refers to the gigawatts of electricity that must be "shed" from the grid to avoid collapse (Stage 8 load shedding thus refers to 8 gigawatts of electricity demand that is cut from the grid).

[27] This refers to an Integrated Resource Plan, which the Republic of South Africa issues to estimate the country's electricity demand a provides a blueprint for electricity planning over a 25-year period.

A broken social compact: blackout politics

As importantly, the same coinciding, transecting temporal logics of electricity infrastructures that have catalyzed the resilience projects unfolding in South Africa have also helped set the stage for high stakes debates about the nation's future and who should steer it. In January 2023, for example, the left-leaning, historically Black Economic Freedom Fighters (EFF) party called for a national shutdown to protest load shedding and demand both "the return of electricity and the resignation of Cyril Ramaphosa" (@EFFSouthAfrica, 2023). The shutdown, which EFF officials said included universities, schools, factories, and individual businesses, was intended to demonstrate the ways in which load shedding "shut down" public and private life over the past two years and contributed to higher levels of unemployment and poverty among the already, and predominantly Black, poor. Just a year later in January 2024, the Shadow Minister of Electricity for the Democratic Alliance (DA), a White-led moderate party, issued a statement arguing why persistent load shedding had to be yoked to the need for change in political leadership. Notably, in making her argument the DA leader pointed to the entanglement of electricity within South African politics---a historical constant in the nation but something that the DA official reduced to the near present. "Decades of ANC corruption and mismanagement are the root causes of the collapse of our electricity system and the associated explosion in unemployment and hardship," the Minister wrote. "The only way to end load shedding is to seize the opportunity presented by the 2024 election to replace the ANC with a new national government anchored by the DA" (Graham-Maré 2024). Across social media and public discourse, meanwhile, government facilitation of renewables and independent power in the name of resilience has led to talk of energy colonialism. "People are screaming about how the Germans are going to colonize South Africa by providing investments in solar power," a physicist and university professor based in Johannesburg told me. "Things are really emotional here right now, and about things you'd think wouldn't lead to so many emotions, like what's the best power solution" (personal interview, 29 January 2024).

The prominence of load shedding in spirited debates over the nation's future is both obvious and surprising. On the one hand, postcolonial scholars have long documented the ways in which high stakes political contestation takes place through and against colonial infrastructures—often the only link between states and subjects (Chatterjee 1991). In South Africa, local treatment of infrastructures as highly political terrains has persisted into the present, inclusive of the resilience measures that are intended to address electricity breakdowns (Von Schnitzler 2017). On the other hand, Eskom is just one South African parastatal whose governance and service delivery have collapsed over the years. Moreover, many other objects of government, such as logistics operations, pose significant threats to the South African macroeconomy (Moody's Investors Services 2023). The prevalence of load shedding in such consequential debates about the future, as well as the emotionally charged ways the energy crisis and resilience-building measures are presently discussed, can be better understood if we view electricity systems as infrastructural to, and reflective of, state-society relations (Popke and Harrison 2018). As one senior energy official told me:

> "Energy and electricity are sort of instrumental to our economy, but they're also instrumental in terms of our social compact with people in the country. And when you start to not have that [electricity] available, or it seems broken and you feel the pain of that every day for over a year, you're going to start looking toward other people to save the day, and politicians on either side are going to take the opportunity to say how they're going to do so, and you're going to get really invested in that" (personal interview, 1 February 2024).

But we must dig a bit deeper than this official's account to understand the emotionally and affectively charged politics surrounding centralized resilience measures like load shedding and

government facilitation of renewables. As discussed in Section 3, in South Africa and other (settler) colonial contexts where social compacts have historically been forged on the systematic dehumanization of racialized others, the experience of infrastructural time is racially uneven. Majority rule reforms detailed previously have transformed (some) Black expectations of, and relations with, electricity. But load shedding summons the spectre—or, pending one's socioeconomic position, doubles down on the durability—of Black waiting, a crucial temporality in the formation and stabilization of colonial and apartheid rule, and that post-1994 reforms sought to abolish (Figure 5). Equally, load shedding disrupts well-established White expectations of instant access to, as well as growth and betterment through, electricity systems, and portends a seemingly "foreign"[28] future wherein affluent White populations, too, are left waiting in the dark. We should therefore read the energy official's account of a broken social compact qua load shedding, as well as its attendant multi-racial politics, through the lens of infrastructural time: that is, as expressions of the destabilization of long-standing, and recently acquired, expectations of and relations with electricity.

5. Toward new "stories-so-far:" future directions for geographic work on resilience

It would be easy to use the resilience projects examined above to argue that resilience is a neoliberal rationality of government or, for that matter, to counter that resilience can be "many kinds of things" in practice (Anderson 2015: 60; Grove 2018; Walker and Cooper 2011). After all, we do see seemingly neoliberal forms of responsibilization at play: early, small-scale movements toward decentralized energy generation took place in the absence of large-scale national government intervention. Moreover, many utility-scale interventions are oriented toward the creation of new electricity markets. We equally see, however, forms of government responsibility (Collier, 2025; O'Grady, 2025; Rosa-Rosa and Rhiney, 2025). These forms include the national government acting to facilitate, rather than drive, energy transitions (O'Grady and Shaw 2022) via pro-renewables regulatory reform and incentives. But they also include utility bailouts whose benefits are meant to flow throughout the South African economy both now and in the future. These "responsible" interventions even include load shedding. Despite the damaging effects of load shedding in the immediate term, this centralized form of intervention is intended to provide for collective welfare by reducing the likelihood of total grid collapse.

The point in highlighting the distinct, yet interdependent and simultaneous forms of resilience in the case is not to reflexively praise either "enterprising," decentralized practices or "responsible," centralized actions on resilience. After all, and as many South African development and sustainability experts have warned, it is those who cannot afford solar panels and who already have tenuous at-best access to Eskom-provided electricity who stand to lose most as energy transitions continue from above and below (Fatti and Khanyile 2023). Instead, the point is to use these forms as empirical starting points for conceptualizing resilience in ways that account for, rather than revert to, claims that resilience is akin to neoliberalism, or that resilience is multiple and fractured (Anderson 2015; Grove 2018; Walker and Cooper 2011).

Here, I have drawn on and further developed the analytic of infrastructural time to help do that (Appel 2018; Addie et al 2024). On the one hand, following the infrastructural time of electricity helps explain how and why South Africa has arrived at a critical juncture wherein the pursuit of resilience at a range of sites and scales, and by actors with sometimes conflicting agendas, rules the day. By excavating the transecting time horizons and temporal logics at play in electricity infrastructures, as well as their respective expressions, I have shown how and why Eskom

[28] Several RA chairs in middle to upper middle class Johannesburg neighborhoods have told me that Eskom's instability threatens to make South Africa "just like every other African country" (personal interview 3 March 2024).

features so prominently in concerns about South Africa's ability to weather coming and current storms, why the utility is so physically massive (and massively in debt and disrepair), and why for many the status of Eskom functions as a way to diagnose the post-apartheid condition (Von Schnitzler 2017). On the other hand, infrastructural time also helps interpret key developments taking place within this multi-scalar resilience-oriented conjuncture. For example, affluent households, firms, and regions turning to solar amid load shedding is, above all, reflective of electricity time: historically White expectations of, and needs for, constant electricity supply met with the grim, extended time horizons of meaningful change-making within Eskom power stations, electricity capacity, and organizational structures, and the relatively short period of time it takes to install solar panels. We can equally see the linearity of developmental time horizons in the NECOM chairman's advocacy of market liberalization as a form of resilience: if one breaks the utility into a series of market-friendly parts, political risk can be substantively addressed, and better, brighter, more resilient futures can be had. And of course, the temporalities of politics and finance are at work in recent, high-stakes decisions to bail out Eskom. These quickly implementable measures can spare South Africa from rating downgrades that loom large in government imaginations of the short-term future and help demonstrate to an increasingly disenchanted, soon-to-vote population that the ANC is "doing something" to fix the problem and thus deserves another stint in power.

The question nevertheless remains: given the distinct political, socio-economic, and ethical projects and trajectories discussed here, why "stay with" the term resilience at all (Anderson 2015: 60)? Might the term risk flattening these projects and trajectories, and thus the overarching analysis? Absolutely. However, given the remarkable "resilience of resilience" as a norm, practice, and aim of present-day governmental intervention, it seems that the term is staying with us whether we like it or not (Zebrowski, 2025: 2). There is thus a need to keep resilience political as it continues to circulate across contexts and reframes—if not depoliticizes—the myriad projects and trajectories discussed here.[29] The problem is that dominant critical accounts of resilience—whether cautious, pragmatic diagnoses of multiplicity or definitive and inevitably partial diagnoses of neoliberalism—provide us with few tools to identify those simultaneous projects and trajectories and hold them within the same analytical frame.[30] Infrastructural time, as I have tried to further develop it here, helps us do so.

But inasmuch as infrastructural time enables us to politicize resilience by holding on to past projects and trajectories, as well as their present-day accretions and discursive reformulations, the analytic of infrastructural time can and should also be used to inquire about the futures that present-day resilience interventions will help build and the past futures that have shaped present-day turns toward resilience in the first place (Luhmann 1976; Collier, this issue). What sorts of time horizons, logics, rhythms, and trajectories are at play in resilience interventions in climate-changing cities, financial markets, or increasingly disaster-prone public utilities, for example (Knuth et al 2024; James and Knuth 2025; Besedovsky et al 2019; Grafe and Hilbrandt 2019)?

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[29] As discussed in Section III, late 20th century proposals to unbundle Eskom were framed in terms of privatization and attracting foreign aid, but now are referred to as ways to build resilience. Equally, ongoing turns away from the national grid and toward renewables among largely White, suburban households could be read as a present-day expression White logics of 'separation' but are instead couched as energy resilience measures.

[30] It is certainly true that critical accounts have turned to genealogy to make their respective cases, thus enabling the past to maintain a grip on scholarly diagnoses of the present and present-day resilience measures. However, as Collier (2025) notes, genealogies of resilience as neoliberalism are affixed to a particular moment in time. Genealogies that bolster accounts that resilience is multiple tend to focus on one project or field of thought, like design (see Grove 2018). An analytics focused on infrastructure and infrastructural time in particular allows us to cast a somewhat wider, more open-ended view and hold multiple projects in common, given the multiple relations that constitute infrastructure, and the multiple, overlapping political, socio-economic, and ethical projects taken up through, and embedded within, infrastructure over time.

What already-existing temporal logics and devices are laying their foundation—and possible grounds for controversy (Wijsman, 2025; Koslov 2019)? On what resilience pathways might these temporal logics, devices, and rhythms push various collectivities and individuals, and with what implications for how vital considerations of fairness, equity, and justice are (and are not) understood and addressed, wherever and whenever such interventions break ground (Wijsman and Berbes-Blazquez 2022; O'Grady 2024)? Put simply, geographers have produced a range of important "stories-so-far" of resilience, but it is time to tell new ones (Massey 2005: 9). Infrastructural time offers one productive way forward.

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