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Eskom and the rise of renewables: regime-resistance, crisis and the strategy of incumbency in South Africa's electricity system

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Abstract

The sustainability transitions literature considers regimes as sources of inertia, in which change is difficult to achieve due to resistance and lock-in. However, regime-resistance is an understudied topic, and so it is unclear which parts of the regime create resistance and how. In this paper, we contribute such an analysis by developing the concept of a multi-dimensional selection environment to explore regime-resistance and the maintenance of regime-stability in the face of challenges from a niche. We present a case study tracing the efforts of South Africa's state-owned electricity utility Eskom, conceptualised as a dominant regime-incumbent, to resist the addition of renewable energy-based electricity generation, conceptualised as part of a niche. We examine battles over rule-changes to the regime selection environment, wherein Eskom tried to maintain the status quo and niche actors tried to transform it. We find that Eskom had an evolving strategy of regime-resistance in response to several gains achieved by the renewables niche over time. Our analysis suggests ways to theorise regime-resistance by developing a more specific and dimensioned view of the selection environment and operationalising the strategies that regime and niche actors might implement in their respective attempts to maintain or change that selection environment. By understanding how these strategies work, we argue that those seeking to transform an unsustainable regime could develop more effective strategies for undermining regime-resistance and promoting niches.

Keywords: regime-resistance, incumbency, regime and niche interactions, energy transition, institutional theory, drift and layering

1 Introduction

This paper examines how a regime-incumbent has resisted efforts to achieve socio-technical change that would benefit a more sustainable niche. The paper's focus is of interest to sustainability transitions research as, although regimes are conceptualised in terms of lock-in and resistance to change through inertia [1], there are claims that sustainability transitions theory is unclear which parts of the regime create resistance and how [2]. A clearer understanding of regime-resistance could open up ways to overcome it [3, 4] and could contribute to accelerating sustainability transitions by, for example, identifying ways to destabilise an existing regime [5, 6, 7], while promoting innovative niches [8, 9]. To address this gap, we develop the concept of a multi-dimensional regime

selection environment and examine the struggles between a regime-incumbent and emerging niche over changes to the rules that profoundly shape that selection environment [10, 11, 12].

Moreover, our paper responds to calls to contribute to the nascent literature analysing socio-technical energy transitions in developing-country contexts [13]. The paper provides a case study of a country in the Global South in which a regime has tried to resist socio-technical change. As such, in addition to an empirical contribution, the paper provides insights for enriching how we can theorise regime-resistance, with associated insights for how policy can be used more strategically to accelerate sustainability transitions in Global South contexts.

To examine regime-resistance, we present a case study of South Africa's electricity socio-technical system in which we trace how the state-owned utility Eskom has, over the period 1998 to 2018, attempted to resist the growth of renewable energy in the electricity supply mix. Eskom is a central actor in South Africa's powerful Minerals-Energy Complex (MEC) [14] that, amongst other interests, has long tied coal mining together with electricity generation and consumption [15], and continues to be a significant force in the country's economy [16, 17, 18]. However, despite the power of these coal-based interests and Eskom's efforts to resist change, renewable energy-based electricity generation has seen impressive growth in South Africa in recent years, reaching 3.6 GW of generation capacity as of 2018 [19]. The case provides a useful example of how socio-technical change can be achieved despite the presence of a powerful incumbent. To drive our analysis, we ask the research question: How has Eskom resisted the introduction of renewable energy-based electricity generation in South Africa?

We frame our theoretical approach in terms of the multi-level perspective on sustainability transitions [20, 21], within which we conceive of Eskom as the dominant incumbent within a regime constituted by the MEC, and renewable energy electricity generation technologies and associated actors as constituting the niche. To sharpen our focus, we concentrate on contestation over rule-changes to the regime's selection environment, a crucial space where strategic actors compete to influence and shape outcomes [22]. Drawing on the notion of a socio-political regime [23], and drift and layering concepts from institutional change theory [24, 25, 26], we develop a multi-dimensional selection-environment concept and postulate strategies for regime-resistance and niche-challenge. Applying these ideas enables us to analyse the actions employed by both regime and niche actors in their battles over rule-changes in the selection-environment. We find that Eskom has used an evolving resistance strategy in response to various gains achieved by the renewables niche, and this finding further reveals the specifics of regime-resistance and niche-challenges in their interdependent dynamics as played out in South Africa's case.

The paper proceeds as follows. Section 2 provides the paper's conceptual basis, discussing socio-technical regimes, institutional change and the two strategies regime-resistance and niche-challenge. Section 3 explains the methodology and includes a

discussion of how the resistance and challenge strategies are operationalised in terms of the regime selection environment. Section 4 discusses the socio-technical context of the case study, followed by the case study itself in Section 5. In Section 6, we reflect on the case and discuss what the implications for theorising regime-resistance are, along with consequences for accelerating sustainability transitions. Section 7 concludes briefly, summarising the main points of the paper.

2 Conceptual discussion

2.1 Socio-technical transitions

In the socio-technical transitions literature, the dominant way of realising any societal function – such as electricity production and consumption – is called a socio-technical regime, sitting at the meso level in a multi-level perspective (MLP) [27, 28, 29]. At the micro-level are socio-technical niches, where novel (more sustainable) technologies and practices are the focus of experimentation [30]. The context of both regimes and niches is called the landscape (the macro-level), where heterogeneous factors that are difficult to affect directly play out (e.g. environmental change, natural events, demographic trends, etc.) [27]. Although this literature mainly focusses on how landscape pressures (e.g. climate change) create conditions that niches (e.g. based on renewable energy technologies) can exploit as they strengthen and stabilise, eventually replacing old regimes, there is increasing attention to how old regimes weaken or destabilise – the so-called ‘flipside’ of transitions [5]. Associated with regime-destabilisation is resistance to change, an understudied issue in transitions literature where there is uncertainty over which parts of the regime enable resistance [2]. Examining regime-resistance can inform specific ways to weaken or destabilise regimes and so accelerate sustainability transitions. To examine regime-resistance, we build on the concept of the selection environment – a foundational regime concept – that tends to favour regime reproduction [8, 12, 31, 32] and so changes to it could help achieve such acceleration.

By focussing the analysis of regime-resistance on changes to the selection environment we can see how the selection environment is actively shaped by strategic actors, both within and beyond the regime [22, p. 1513]. We anticipate that attempts to change the selection environment will likely stimulate regime-resistance, so our analyses must attend to the dynamics of power, politics and agency in struggles over regime-change [1, 33, 34]. Using this logic, and to help us understand more systematically how regime-resistance and niche-challenges co-evolve, our aim in this section is to develop a multi-dimensional concept of the selection environment. To do this, we need to take several steps (see Figure 1 for a summary of these steps and associated concepts). After reflecting in Section 2.2 on the importance of rules (another foundational regime concept) and how these relate to institutional theory, in our first step, we draw on the institutional change modes of drift and layering (explained in Section 2.3) to characterise how regimes might defend – and niches might challenge – the status quo. Second, in 2.4, we develop our multi-dimensional selection environment concept. And, third, we translate the drift and

layering change modes into resistance and challenge strategies (respectively), relating these to the multi-dimensional selection environment (see Sections 2.4.12.4.2).

Figure 1: Summary of the conceptual discussion steps and the main ideas

2.2 Socio-technical regime and rules

Rules are at the heart of the socio-technical regime concept, forming the overall guiding normative, regulative and cognitive framework that provides the functional relationship between material resources, actors and the socio-technical regime's organisational networks [8, 35]. Rules (such as normative values, technical regulations or planning heuristics) can change, affecting social legitimacy (impacting political and public

support), the flow of economic resources (increasing or reducing market power), and the commitment of actors (thus shaping the organisational networks of regime-incumbents or niche-challengers). Taken together, changes unfavourable to a regime could lead to its destabilisation [5] and so create opportunities for niche-expansion. Public policies, and associated regulations and standards, etc., are formal rules and have a profound effect on the selection environment. Attempts to change rules, therefore, will likely stimulate battles between regime and niche actors as they seek to either maintain the selection environment (regime actors) or open it up to transformation (niche actors). Thus, we argue that examining battles over rule-changes that could change the selection environment will help us reveal the dynamics of both regime-resistance and niche-challenges.

With this brief rationale for focussing on rule-changes, we note that the socio-technical regime concept draws heavily from neo-institutional theory, whereby rules are embedded in structures that are both context and outcome of actions [27, 32]. Moreover, Fuenfschilling and Truffer [26] use insights from institutional theory to develop a systematic characterisation of regime structuration that enables an analysis of, amongst other things, the degree of regime stability. While these contributions are useful for understanding regime stabilisation and reproduction, we are interested in this paper in how regimes respond to niche challenges and so draw on the theory of incremental and endogenous institutional change [e.g. 24, 25] to examine regime-niche dynamics during attempts to change a selection environment's rules.

2.3 Rule-changes and institutional theory

Turning to the institutional theory literature, we first note that, according to Streeck and Thelen [24], institutional theory usually emphasises institutional reproduction and the maintenance of stability, where change results from exogenous shocks that stimulate radical institutional reconfigurations and a new stability in a process of punctuated equilibrium. However, they argue this emphasis overlooks the incremental institutional changes occurring endogenously. As Mahoney and Thelen [25] reason, there could be internal institutional reconfigurations during times of apparent stasis or stability. Thus, we draw on concepts of endogenous institutional change for analysing internal regime processes rather than exogenously-derived punctuated equilibrium.

We develop our conceptual framework starting with the two institutional change modes drift and layering, drawing on the work of Streeck and Thelen [24] and their characterisation of how institutional change occurs. Drift is a mode in which formal rules are held constant in the face of contextual change, and layering is a mode in which new rules are added alongside old ones. We now discuss these two modes of institutional change more fully and justify why they are appropriate for helping us understand the dynamics of regime-resistance and niche-challenges in the recent evolution of South Africa's electricity system.

2.3.1 Drift: holding on to rules

Drift is defined as a mode of change in which a powerful incumbent tries to maintain the stability of existing institutions that serve its interests despite essential changes to its context, described as contextual discontinuity [36]. Contextual discontinuity could mean new institutions are needed, but the incumbent resists them when it believes they will be detrimental to its interests. Hacker et al. [36] argue that drift enables institutional change to be resisted away from public scrutiny. Contestation in the public domain can spark initiatives that may lead to the mobilisation of competing interests. In contrast, a hidden resistance strategy can allow the more politically-versed and better-resourced incumbent actors time to mobilise their shared interests, shape and influence outcomes, and disable the voices of those with divergent interests [37, 38].

In South Africa, electricity-production has been dependent on coal for more than ninety years, and coal-fired electricity constitutes 90% of the generation fleet [39]. Consequently, Eskom is responsible for about 43% of South Africa's carbon emissions [40] and so is under pressure to adapt to a lower-carbon trajectory. Climate change, therefore, constitutes a contextual discontinuity and the need to act on it requires new institutions that promote, for example, renewable energies.

2.3.2 Layering: adding new rules alongside the old

Layering is defined as the addition of new rules alongside existing ones where the new rules do not 'attack' existing institutions but rather solve problems caused by them [24, 36]. We might see problems arise, for example, when an incumbent is employing a resistance strategy whereby the incumbent's failure to respond to a contextual discontinuity causes the regime to fall into crisis. This can open a window of opportunity for a niche to exploit. Layering, in this sense, can be described as an incremental adjustment, or what Geels et al. [41] call 'fit-and-conform', where a niche-innovation develops within the existing selection environment. Layering allows new and old institutions to co-exist over time, but the new layered institutions could outlive the old leading eventually to more substantial change.

2.4 Strategies in a multi-dimensional selection environment

The selection environment helps explain socio-technical change through the quasi-evolutionary approach of variation, selection and retention [10]. As various technologies are introduced into society (variation), their adoption and diffusion (selection) are filtered through a selection environment that contains material, political, cultural and sociological dimensions. In other words, socio-technical change is 'selected' not only by markets but also by social fitness such as values, beliefs, expectations and visions amongst actors [11]. Moreover, once technologies are adopted in society, there is a process of 'retention' and 'reproduction' – or 'lock-in' – that occurs through establishing regulations (e.g. government subsidies), legally binding contracts, market parameters such as scale and sunk investments, as well as sociological structures that include cognitive routines, and

power and politics, making changes away from the retained technologies difficult [1, 11, 12, 34].

We can now make our second step, elaborating the dimensions of our selection environment concept before proposing, in a final step, how regime-resistance and niche-challenges could play out on those dimensions. For the selection environment dimensions, we consider calls that attention is needed in transitions research to power, politics and agency [1, 23, 42, 43]. Attempted regime changes are likely to encounter resistance and are therefore deeply political because of vested interests and power relations, which tend to favour the status quo [1, 42]. Thus, we draw on concepts related to socio-political regimes [23] and hegemonic social structures [44]. Specifically, Levy and Egan [44] argue that dominant socio-economic structures, which constitute alliances amongst particular groups, can assert supremacy through the persuasive and bureaucratic authority of the state, the dominance and favoured market position within an economic configuration, ideologies that perpetuate mutual interests, and the consensual legitimacy of civil society. In Swilling et al. [23], the ways in which power relations are created, disseminated and maintained, influence prevailing beliefs, particularly in framing and shaping the terms of debate and adoption of policies. Using these ideas, we derive the dimensions of organisational networks and capacity (organisation capital reflects how power relations are exercised), discursive structures (power of ideologies), and the market (dominance of specific economic configurations). Further dimensions relate to material elements of the socio-technical regime: e.g., formal rules such as policies, legislation and standards enable the continued dominance of incumbents and associated technological preferences, and large technical systems tend to create sunk investments [11]. From these, we derive the two further dimensions of public policies, and technology and infrastructure.

Bringing these ideas together, we can now describe the dimensions of our reconceived selection environment: (1) markets, (2) organisational networks and capacity, (3) discursive structures, (4) public policies, and (5) technology and infrastructure. We elaborate on these below (and see Figure 2).

Markets: A regime-incumbent tends to have established market relationships with industries and government, and enjoy widespread social legitimacy. Embedded institutions – those institutions that are deep-seated and in widespread operation – tend to reflect these relationships, providing the incumbent with a dominant market position [42]. The market selection environment is stabilised through price instruments, and customer preferences and practices, each of which has co-evolved with the regime, thereby favouring its reproduction [12].

Organisational networks and capacity: A regime will likely include at least one industrial association, as well as broader networks involving strong relationships between users and firms. There is also the prevailing knowledge base, with dedicated research programmes, groups, and actors' similar search routines. The current knowledge base, practices, search routines, and so on, favour reproduction of the regime and the incumbent's organisational

networks as well as the maintenance of existing power relations. The ways in which organisational networks are constituted, maintained and operated reflect existing power relations [23, 44].

Figure 2: Quasi-evolutionary approach on socio-technical change and a multi-dimensional selection environment

Source: Authors

Discursive structures: Incumbents hold a privileged position over prevailing ideologies and beliefs amongst powerful elites, maintaining those ideas as accepted norms that structure relevant discourses. For example, regime actors might have preconceived ideas about the compatibility of new technologies with an existing technical system [3] and use their position to persuade others of their preconceived ideas. This discursive dimension of the selection environment favours the reproduction of the regime by constraining debate over technology and policy choices to those that maintain regime and incumbent interests.

Public policies: These translate societal normative views into formal rules such as legislation and regulation that profoundly condition the institutional selection environment [8]. Existing institutions, or formal rules, have co-evolved with the regime and so favour its reproduction.

Technology and infrastructure: Technical standards and infrastructure requirements constitute a technical dimension of the selection environment, and existing standards and requirements are usually favourable to a regime-incumbent [12].

2.4.1 Regime resistance strategy

With this brief description of selection environment dimensions, we can consider what drift might look like as a strategy for maintaining a regime-favourable selection environment. Drawing on Hacker et al. [36], we note that delayed action or non-responsiveness enables regime actors to resist rule-changes by conducting debate on technology and policy choices away from public scrutiny. In our selection environment terms, by confining the debate to hidden spaces amongst its organisational networks, a regime-incumbent would be better able to control the terms of the debate, thus maintaining the prevailing regime-favourable discursive structure. Moreover, those outside the regime and its organisational networks – uninformed about the hidden debate – would be less able to develop an alternative discursive structure, and so would be less likely to influence the debate. In turn, rule-changes – to policies, market institutions, technology standards, etc. – will rest on addressing a narrow regime-favourable agenda and so will tend to maintain the existing selection environment.

2.4.2 Niche challenges strategy

If a regime-resistance strategy is about the maintenance of the status quo, niche-challenges are about achieving change to the selection environment. Where regime-resistance would be employed by a regime-incumbent, layering would be sought by niche actors. They would look for opportunities to get a foothold in the regime on any dimension of the selection environment. For example, contextual discontinuity might demand a policy-response, and so niche actors could try to influence public debate in favour of their preferred choices in a bid to secure niche-promoting rule-changes. However, if the debate is being conducted in hidden spaces, niche actors will face challenges to achieve influence. Faced with such challenges, niche actors would have to frame their preferred solutions in terms that do not appear to ‘attack’ the core rules of the

regime – the fit-and-conform strategy described by Geels et al. [41] – so as not to explicitly threaten disruption of the selection environment. This challenge will be exacerbated if niche actors are unable to provide facts and other ideas that may dislodge or destabilise those already structuring the prevailing discourse. To achieve influence, niche actors must be able to seize an opportunity when it arises but do so when in possession of persuasive facts and other discursive elements or, as Geels and Schot [45] argue, when a niche is sufficiently well-developed to be able to exploit the opportunity effectively.

3 Methodology

South Africa's electricity system is an example of a socio-technical system that is path-dependent, with strong vested interests in maintaining the status quo. Given the nature of the vertical integration of Eskom and its position within South Africa's MEC, renewable energy developers must contend not only with the challenges of relatively new technologies but also with the powerful governing interests that seek to maintain the regime.

In our case study, we conceptualise the electricity socio-technical system as embedded within a regime constituted by the MEC (see Section 4 for a fuller explanation of the MEC), within which Eskom is the dominant incumbent, and we conceptualise renewable energy and associated actors as a niche. From 1998 to 2018, South Africa's electricity system experienced a series of changes and a crisis of supply, as well as a growing renewable energy programme. During this period, we argue, Eskom has responded to change by employing a resistance strategy that contributed to the electricity-supply crisis. This, in turn, created a window of opportunity for renewables through which the layering of new institutions for their promotion was possible. As such, the South African case offers a useful example with which to examine the interdependent dynamics of regime-resistance and niche-challenges. To reveal these interdependent dynamics, we ask the research question: How has Eskom resisted the introduction of renewable energy-based electricity generation in South Africa?

We confine our set of core rules for the incumbent to (1) Eskom provides and maintains cheap electricity and (2) Eskom is a supplier of last resort. Eskom's mandate as a supplier of last resort means that the government has tasked the utility by all means necessary to maintain reliable electricity supply. We derive these rules from the fact that Eskom has been South Africa's central electricity supplier for more than ninety years, and that electricity-supply has developmental objectives tied to affordability, accessibility, and reliability. However, we caution that these rules form a subset of those that make up the socio-technical system and do not include, for example, coal and its associated industries.

We consider displays by the incumbent such as resistance, delay, inertia, inaction and indecision to be instances of drift. To elaborate, drift is evident when the incumbent delays market reforms, which can be an effort to maintain market dominance and avoids compliance with new rules, disrupting the functioning of the socio-technical system and

placing organisational networks in limbo. Information asymmetry can be used by the incumbent to skew discussions in their favour and confine deliberations within their organisational networks such that contestation is shifted out of public sight, limiting the capacity of oppositional groups to mobilise social movements against the incumbent. Moreover, the incumbent can stall infrastructure reforms, preventing new entrants from competing effectively. Table 1 overlaps these instances of drift with the selection-environment dimensions discussed in Section 2.

Table 1 also summarises layering operationalised under each of the selection-environment dimensions. We consider layering to mean, for example, including the participation of formerly excluded actors, such as the inclusion of the private sector into the otherwise monopolised electricity market, resulting in new user-producer relations. For organisational capacity and discursive structures, we consider conditions for layering to include trust, learning and transparency to develop nascent networks. Similarly, control policies require legislative certainty, which means introducing new rules formalised by the government and enabling the selection environment for new entrants. In terms of infrastructure, layering means attaching new kinds of infrastructure to an existing setup. In general, we consider layering to be a fluid process of blending different kinds of actors, networks and material resources over time.

Table 1: Operationalised concepts of regime-resistance and niche-challenge strategies in the selection environment

Regime selection environment dimensions	Regime-resistance strategy	Niche-challenge strategy
Markets	Delay market reforms	Forge new user-producer relations
Organisation capacity and networks	Enlist powerful existing network	Engender trust and learning
Discursive structures	Exploit information asymmetry	Seek information transparency
Public policies	Employ indecision and inaction	Lobby for certainty over new rules
Infrastructure	Stall reforms to infrastructural rules	Add new infrastructure to old

Our evidence is derived from both primary and secondary data, and grey and academic literature. For secondary sources, we used policy documents as well as published work (grey and academic literature) by prominent analysts of South Africa's electricity system [e.g. 46, 47, 48, 49, 50, 51]. We also examined transcripts from parliamentary hearings

of the Energy, Public Enterprises and Environmental Affairs Portfolio Committee. These were important for determining what was, and was not, articulated by high-ranking government officials and Eskom employees. These parliamentary hearings include representation by Ministers, Eskom board members, expert actors (prominent academics, policymakers, think tanks) and private sector companies.

Most of the primary research was conducted during fieldwork that took place from June to August 2015, and March to July 2016. In this paper, we draw and cite from 12 interviewees who provide a broad representation of views and knowledge about the South African case. The interviews took place in Pretoria, Johannesburg and Cape Town, and included actors from government, NGOs, the private sector, academia and think tanks. We analysed transcriptions of the interviews according to the operationalised strategies of regime-resistance and niche-challenges, as indicated in Table 1. Each respondent was provided with questions that pertain to these strategies, dependent on their expertise (see Table 2). For analysis, we grouped the outputs from the interviews according to the selection-environment dimensions and triangulated these as far as possible with information from document analyses. Because of the sensitive nature of the topic, interviewees were informed at the beginning of interviews that they would remain anonymous, which also raised the potential to elicit more honest responses.

Table 2: Anonymised summary of interviewees and relevant concepts

Respondent	Description	Focus
A	Former Eskom Group Executive	Regime-resistance
B	Senior Government official served at the DOE	Regime-resistance and niche-challenge
C	Programme manager for a South African Think and Tank and former senior Government official	Regime-resistance
D	Senior Economist for a South African Think Tank	Regime-resistance and niche-challenge
E	The chief economist at a South African State-Owned Enterprise (SOE)	Regime-resistance
F	Director of a South African Think Tank	Regime-resistance and niche-challenge
G	EIUG member, and Manager in a Petrochemical company	Regime-resistance
H	Pricing Manager at an SOE	Regime-resistance
I	Senior Manager for a mining company and member of the EIUG	Regime-resistance

J	Independent contractor for RE I4P ¹ and member of South African Photovoltaic Industry Association (SAPVIA)	Regime-resistance and niche-challenge
K	Senior Academic on energy and infrastructure at a South African university	Regime-resistance and niche-challenge
L	Independent consultant on the industry, trade, energy, and infrastructure policy	Regime-resistance

4 Description of the socio-technical regime

Before presenting our case study, we briefly explain the socio-technical context of the incumbent. As mentioned, we conceptualise South Africa's electricity socio-technical system as embedded within a regime constituted by the MEC and the state-owned electricity utility Eskom as its dominant incumbent. Here, we elaborate on the various elements of the MEC and then describe the position of Eskom within this and within the South African context, focussing mainly on the selection-environment dimensions discussed in Section 2. The MEC describes the reciprocal relationship of several industries that include mining, the energy sector, supportive infrastructure and other related industries [15]. Several scholars have noted shifts in the MEC in post-apartheid South Africa, particularly as existing coal mines are ageing and coal deposits are rapidly depleting [52, 53]. This has consequences on mining new geological sources, logistics, and market structure, all of which have an impact on the MEC [52, 54]. Nevertheless, there are still mining and associated industries that rely on Eskom for their electricity, as the utility remains largely a monopoly. Thus, as long as Eskom remains a dominant incumbent, the utility has a crucial role in enacting the established rules and resources that have enabled the stability of a socio-technical regime related to mining and energy. Moreover, the country continues to rely on mining and the mineral sector, with mining contributing to around 7% of GDP, 25% of exports and accounting for more than 1 million jobs [16]. The biggest mining companies belong to an Energy Intensive Users Group² (EIUG), which together account for more than 40% of electricity demand [15].

Central to the MEC was the establishment of Eskom in 1923, and it continues to form a vital component for support of the mining industry [48]. Eskom has remained a vertical monopoly responsible for electricity generation (>90%), transmission (95%) and distribution (>50%) [39, 40], deriving most of its revenue from three primary customers: redistributors through municipalities, industry, and large mining companies. Together, these three consumer-categories account for approximately 80% of electricity

¹ The RE I4P is the Renewable Energy Independent Power Producers Procurement Programme – see Section 5.3.

² Energy Intensive Users Group (EIUG), www.eiug.org.za

consumption and revenues (see Figure 3), making them powerful sources of pressure to maintain the incumbent core rule for affordable electricity.

Figure 3: Eskom's main consumers by consumption and revenues in 2013

Source: NERSA [55, 56]

At present, Eskom is a state-owned utility, mandated to deliver affordable and accessible electricity, a critical developmental objective mainly due to an industrial policy of enabling mining activities and to provide for low-income households [57]. To ensure affordable electricity, the state has been providing significant financial subsidies to Eskom. Up to 2008, South Africa's electricity prices had been amongst the lowest in the world, but customers were paying below the cost of electricity production.

Due to the state's strong support for developmental objectives, Eskom is managed as a 'quasi-government department' subject to politicians' influence over what objectives are prioritised and how resources are allocated [47, p. 33]. Moreover, according to interviewees³, Eskom's precise accountability is unclear, rendering it subject to makeshift governance. It has been such a vital instrument in the state's policy directives that it has been described as the "vanguard of economic development" and a highly "successful technocratic enterprise" [48, p. 161]. These ideas form the current discursive structure that underpins the pressure to maintain Eskom's core rule as a reliable supplier of affordable electricity. However, it is also clear that the vagaries of political leadership and ideology significantly influence the operation of the electricity system, shaping many aspects of the regime-incumbent's selection environment.

The institutional environment within which Eskom operates is also subject to intense lobbying, with significant political pressure coming from interest groups. The current

³ Respondent A, Respondent B

regulatory framework is weak with insufficient capacity to hold Eskom accountable, and the formal institutional structure around Eskom is, according to one interviewee⁴, “a constant source of inefficiency due to its multiple parents arrangement”. Specifically, the institutional governance structure includes the Department of Public Enterprise (DPE) as the shareholder ministry, the Department of Energy (DOE) where energy policies are formulated, the National Treasury (NT) whose role is to provide sovereign guarantees and to ensure compliance to the Public Finance Management Act (PFMA), and the National Energy Regulator of South Africa (NERSA). Figure 4 depicts this institutional structure, showing Eskom’s “multiple parents”. In this sense, Eskom has a dual role in adhering to developmental objectives in keeping the electricity prices as affordable as possible (NERSA’s mandate), while also conforming to the commercial discipline required by DPE and NT [58].

As can also be seen in Figure 4, there are major interest groups and these include organised local government (South African Local Government Association, SALGA, and the Association of Municipal Electricity Undertakings, AMEU), and the Congress of South African Trade Unions (Cosatu) who are concerned with continued affordable electricity. There are also the vested interests of large industrial consumers, particularly the EIUG. The EIUG is a tight configuration of actors from Eskom, mining and associated industries. Electricity supply for mining consumers must be reliable and predictable, which necessitates close cooperation and coordination between the state and the energy intensive users. This close relationship between mining and the state has concentrated power in a small elite group.

Lastly, the country’s electricity regulatory framework is weak. An independent electricity regulator has not yet been adequately established in South Africa because government officials do not entirely separate power and roles accordingly. Briefly, the National Energy Regulator (NER) regulated the electricity industry from 1995 to 2006. During this time, NER was meant to be independent of Eskom but was initially staffed with ex-Eskom personnel [58, p. 25, 59]. In 2006, NERSA replaced NER but was mostly reliant on cost calculations presented by Eskom and, according to interviewees, has lacked the necessary capabilities or capacity to challenge Eskom’s dominance⁵ or interrogate its data⁶. This creates a huge information asymmetry between Eskom and NERSA. As another interviewee⁷ commented, “Eskom can bury their information in reams and reams of data, and it is very difficult for the regulator to pull things out”. Moreover, yet other interviewees observed that “NERSA is politically weak”⁸ and “there was this sense that Eskom had regulatory capture for some time”⁹.

⁴ Respondent A

⁵ Respondent C

⁶ Respondent D

⁷ Respondent E

⁸ Respondent D

⁹ Respondent G

Figure 4: Institutional governance structure of South Africa's electricity system

Source: Eskom [39, 60]

Note: Eskom's shareholder Ministry (to which it is formally accountable) is the Department of Public Enterprise. This formal relationship is represented by a solid line. The dotted lines represent influences on Eskom. The darker dotted lines depict formal government structures (DOE, National Treasury, and NERSA), and the fainter dotted lines depict the influence of interests groups.

Moreover, the DOE determines the generation capacity that is to be procured, and this is often subject to political decisions, and Cabinet approval, without due scrutiny from the regulator. According to one interviewee¹⁰, "there are cases that Eskom investment plans, planning methodology, and assumptions are developed confidentially without evaluation by NERSA but are approved by Cabinet". Moreover, there are decisions [by NERSA] that are made on an 'ad hoc' basis which is mindful of tensions between political and economic pressure, as opposed to a transparent and predictable methodology [47].

It should be clear from the preceding that NERSA is a weak and ineffective regulator, and this will tend to favour Eskom because there are insufficient mechanisms in place to control its actions. Overall, as an interviewee¹¹ observed, it is difficult to prioritise between the numerous directives Eskom receives, especially under conditions with many competing variables. In general, the primary interest groups provide strong motivation for keeping the status quo, and for Eskom to maintain its status as a monopoly utility and the core set rules of cheap electricity.

¹⁰ Respondent F

¹¹ Respondent A.

5 Case study analysis

Having described the MEC and Eskom's place within it, we now present the case study. Each sub-section begins with a paragraph summarising the main events or features of the period covered, followed by a more detailed historical account of these events and features. At times, we reflect the various developments back to the elements presented in our conceptual framework.

5.1 1998-2006: Energy sector reforms

We begin our case study by discussing the period 1998 to 2006, during which the country's electricity sector was the focus of significant reform efforts. A key turning point was the proposed introduction of private sector participation in 1998, creating a fundamental threat to Eskom's monopoly status. In 2006, two new coal plants were commissioned, and a change in pricing methodology resulted in significant electricity tariff increases. These changes are essential to review because they provide contextual discontinuity for Eskom, making it increasingly difficult to maintain its core rules. Eskom's responses to these changes – delay of market reforms and initiating debates away from public scrutiny – demonstrate its initial resistance strategy.

The 1998 Energy White Paper proposed unbundling Eskom, indicating new electricity generation would be produced by the private sector, thereby threatening a fundamental shift in its monopoly status. There were indications that South Africa's electricity system would adopt a competitive wholesale market as part of its market reforms [58, p. 29], and the policy transferred the power of securing investment for new generation capacity from Eskom to the Department of Minerals and Energy (DME) [54]. Concurrently, the Energy White Paper and subsequent Integrated Energy Plans indicated that the country was heading towards an electricity deficit by 2008 [61].¹²

From 1998 to 2004, the tight supply was due to major policy uncertainty at the time, as well as Eskom's inability to fully comprehend the impending electricity deficit. The policy debate centred on uncertainty regarding the electricity market reform, due to undefined market rules, an immature regulator and an ideologically-based belief in parts of the government that private sector involvement would raise electricity prices beyond the affordability of most South Africans [58]. Eskom contributed to the policy uncertainties and confounded decision making as it downplayed fears of the impending generation deficit by returning-to-service previously mothballed plants [58].

As a consequence, Eskom's proposed solutions were highly inaccurate planning assumptions such as inadequate maintenance plans, and low estimation of the costs of unserved energy [62, p. 61]. Eskom's responses are instances of 'cognitive lock-in' (as in cognitive rules guiding actor's behaviour, as mentioned in the opening of Section 2.2), where this influences the discursive structure such that an incumbent typically persuades

¹² The Department of Minerals and Energy (DME) was split in 2009 to form two Ministries: the Department of Energy (DOE) and the Department of Minerals and Resources (DMR).

decision makers to maintain the status quo. Cognitive lock-in includes taken-for-granted beliefs, where an incumbent tends to search for incremental solutions, insensitive to new development outside their own focus [45].

As Eskom contributed to the lack of clarity that was required for the system to adapt to the changes, the government reversed its decision to implement private sector generation. By 2005, with the electricity deficit in sight, Eskom's resistance strategy – inaction and lack of compliance – had seen it successfully maintain its market dominance. Moreover, by this time, attempts to implement a competitive wholesale market were abandoned, ensuring Eskom remained a monopoly in the form of a compromised Single Buyer Model (SBM), tasking Eskom as the buyer of subsequent future generation capacity [58]. The SBM forms a crucial component for ensuring the continuance of Eskom's core rules. Subsequently, from 2005, Eskom was tasked to build two new coal plants – Medupi and Kusile – with a combined capacity of 9.5 GW [54].

To finance the new coal plants, from 2006, the DOE changed Eskom's pricing methodology in an effort to head towards cost reflectivity, changing Eskom's core rule of providing cheap electricity. Eskom required NERSA's approval of electricity price increases through the Multi-Year Price Determination (MYPD), a strategic phased-in approach that would lessen the impact of short-term electricity price increases against the country's long-term economic and social goals. The MYPD covered 3-5-year cycles from 2006 up to 2018 [57] (see Figure 5 for details).¹³

Figure 5: Eskom's Multi-Year Price Determination (MYPD)

Source: DOE [63] and NERSA [56]

Note: MYPD 1= 2006-2009, MYPD 2= 2009-2012, MYPD 3=2013-2018

¹³ Respondent E, H

5.2 2007-2009: Major electricity crisis

From 2007, there was continued delay in responding to the impending electricity deficit, resulting in a major electricity crisis in 2008. This opened a window of opportunity for renewables and, by 2009, NERSA introduced a renewable energy feed-in tariff (Refit). However, because of institutional conflicts, implementation of the Refit failed soon after and attempts to redress the electricity shortfall through private sector participation also failed. Once again, Eskom's resistance strategy enabled its continued market dominance, and we see the difficulties of implementing coherent generation policy because of the complicated but weak institutional structure.

Due to long lead times, commissioning the new coal plants in time was not achieved, nor were the return-to-service mothballed plants sufficient to ward off the electricity shortfall. By 2008, a major electricity crisis occurred, causing regular blackouts. Eskom, in this period, had contributed to a complex set of inaccurate planning assumptions that included inadequate maintenance plans and underestimation of the costs of unserved energy¹⁴ [64, p. 61]. Hence, the crisis was an internal accumulating pressure over time, worsened by Eskom's persistent defiance and indifference.

As the electricity crisis deepened, Eskom's core rule of 'supplier of last resort' was under threat and indicators of its operational performance were worsening.¹⁵ Two indicators, in particular, are indicative of plant performance: Energy Availability Factor (EAF) and Unplanned Capability Loss Factor¹⁶ (UCLF). The EAF was already in decline, falling from 92% in 2001 to 85% in 2008 and, as Figure 6 shows, continued to decline to 70% in 2015. Meanwhile, the energy lost due to unplanned interruptions, as measured by the UCLF, was also worsening. In 2001, the UCLF was 2%, but this had risen above 5% by 2008 and continued to increase after that, reaching 15% in 2015. Therefore, Eskom had an internal accumulating operational challenge over time. The weakness in performance parameters and the steep tariff increases were together an indication that Eskom was losing its ability to provide both reliable and cheap electricity. Along with the electricity crisis, this prompted a search for alternative solutions, opening a window of opportunity for niches such as renewables to provide solutions to the electricity deficit.

¹⁴ Cost of unserved energy (COUE) is an important measure of the detrimental impact to the economy of energy that is not reliably supplied. By estimation, the COUE in 2013 was calculated around 6 USD per kWh. For more see NERSA [55].

¹⁵ Respondent L

¹⁶ EAF measures plant availability, plus energy losses not under the control of plant management (external). UCLF measures the lost energy due to unplanned production interruptions. For comparison, an acceptable EAF would be above 80%, and an acceptable UCLF would be below 5%.

Figure 6: Eskom plant performance indicators Energy Availability Factors (EAF) and Unplanned Capability Loss Factor (UCLF), 2001 to 2015

Source: Eskom [65, 66]

From 2008, as the electricity crisis intensified, the DOE continued to initiate calls for independent power producer (IPP) bids. However, Eskom – responsible for concluding the bids – repeatedly delayed decisions that would conclude preferred IPP bidders for co-generation, baseload projects and the medium-term power purchase programme [67]. Examples include failed opportunities to contract additional IPPs for an 800 MW Kudu gas-to-power plant in Namibia and, in 2009, a Mmamabula 1200 MW coal contract from Botswana [67]. Within South Africa, 125 qualifying bids totalling 4900 MW failed to obtain contracts from Eskom [67]. This demonstrates that Eskom was determined to persist with its resistance strategy, holding on as much as possible to its core rules by delaying market reforms and playing-down the need to close the generation deficit. Eskom used its dominant position in the electricity sector to effectively hold-off the participation of IPPs, successfully stifling private sector participation and retaining its market dominance.

In 2009, in light of the electricity crisis, the DOE amended the Electricity Regulation Act (ERA) in order to prepare for a large-scale renewable energy project with private sector developers (more in Section 5.3). Around the same time, NERSA initiated the Renewable Energy Feed-in Tariff (Refit), which it had been developing since 2007. However, NERSA overstepped its mandate as it initiated upfront legally-binding tariffs ahead of the DOE, and there was also uncertainty in the process of procurement and licensing, and financial assumptions [68, 69]. Consequently, from 2009-2011, the DOE and National Treasury took the lead with a series of informal consultations from the private sector, and lawyers and financial institutions dealing with renewable energy. Through these consultations, a crucial feedback and learning process transpired, with the design, legal and regulatory framework and technological details being discussed [68]. Subsequently, a competitive bidding process called the Renewable Energy Independent Power

Producers Procurement Programme (RE I4P) was launched by DOE from August 2011, while NERSA ceased the Refit [68]. Despite the withdrawal of Refit, its development process had the effect of widening participation, interests and learning in the electricity sector. A similar process unfolded in the development of the RE I4P, and the two processes combined formed an essential platform on which the RE I4P could later build, as we discuss in the next section.

5.3 2009-2015: Layering of the RE I4P

From 2009 onwards, the new pricing methodology (discussed in Section 5.1) resulted in significant tariff increases. This had the effect of challenging Eskom's ability to maintain its core rule of providing affordable electricity. This period marked a significant window of opportunity, with the successful layering of a new institution – the RE I4P – that promoted renewables. We describe this layering process here, examining the conditions that could explain why it was successful. The success was due, we argue, to a combination of a sufficiently developed niche and a transparent RE I4P bidding process that entailed greater involvement of actors external to the regime-incumbent (e.g. private sector, and greater public participation). This led to the rapid implementation of the RE I4P, followed by significant deployment of renewables and in turn steep reductions in their bid prices. During this period, it seemed, Eskom's resistance strategy was failing and that the renewables niche was becoming a threat to its dominance.

Figure 7: Eskom's average approved tariff increases relative to the consumer price index (CPI)

Source: Eskom [66, p. 2, 70]

As the pricing methodology changed, the average tariff-increase from 2009 to 2012 was consistently above the inflation rate. From 2009 to 2015, cumulative tariff increases were over 100% causing major price shocks, and extensive criticism from residential and industrial customers not accustomed to such changes (Figure 7). Indications were that

Eskom could no longer provide cheap electricity and, therefore, its core rules became increasingly challenging to maintain.

As the MYPD was implemented, NERSA subjected Eskom to public hearings, exposing it to open and visible scrutiny of its operations. Thousands of responses were received from the public after NERSA invited comments on Eskom's proposed MYPD3¹⁷ and these were crucial in securing gradual tariff increases [58, p. 153]. However, whilst open discussions were taking place between the public and NERSA, another debate was taking place out of sight between the EIUG and Eskom, as an EIUG member¹⁸ explained:

“The EIUG made sure to decline [NERSA] public hearings, as we do not want to be seen as a lobby group. Instead, we make it clear that we are a technical, fact-based group. As a group that has skin in the game, we do not want to strain Eskom relationship unnecessarily. We recognise that Eskom is our main electricity supplier, and maintaining relationships is important. This strategy of providing technical reports to Eskom and sharing it without public scrutiny has worked for us.”

Here, we observe that the close relations between Eskom and EIUG enabled information asymmetry between them and the public. Eskom was able to make use of the regime's organisational networks and capacity to engage in the regime-internal debate using privileged information and resources, further allowing it to realise its resistance strategy.

As the electricity crisis continued to grow, the window of opportunity for renewables widened. In 2009, in a layering process, the DOE ratified an amendment to the Electricity Regulation Act to introduce the New Generation Capacity [54]. Then, in 2011, this layering process continued with the introduction of the RE I4P, which allocated 17.8 GW of new renewable energy generating capacity by 2025 [71]. We can describe the RE I4P as layered because it co-exists alongside Eskom's single buyer model, but does not attack Eskom's position directly nor replace it: Eskom retained its dominant position because it maintained control over what electricity it was buying.

The RE I4P was able to build on the failed previous efforts such as the Refit, as those who had been part of Refit were still present. Geels and Schot [45] argue that a niche must be sufficiently developed before it can exploit a window of opportunity opening in a regime. In this sense, the renewables niche might have been sufficiently developed to take advantage of the RE I4P in contrast to what it was able to achieve under Refit.

¹⁷ See “Invitation for stakeholders to submit written comments on Eskom's third Multi-Year Price Determination (MYPD 3) application”, available at [accessed 1 August 2018] <http://www.nersa.org.za/Admin/Document/Editor/file/Notices/Invitations/Invitation%20to%20comment%20on%20Eskom%27s%20Third%20Multi-Year%20Price%20Determination%20%28MYPD3%29%20application.pdf>

¹⁸ Respondent I

However, beyond the readiness of the renewables niche, other conditions might have helped the RE I4P to succeed in comparison with the Refit. RE I4P's layering entailed transparent bidding windows, with the public being informed about the successful bidders and what the criteria were [72, 73]. Moreover, the IPP office within the DOE was decisive in gaining supportive partnership and cooperation between the DOE and National Treasury, mitigating Eskom's dominance by exploiting the IPP office's ambiguous institutional status [72]. The IPP office is an ad hoc entity within the DOE, staffed by more than one hundred private consultants with less than a handful of permanent staff from the government [73]. However, the staff in the IPP office have, according to an interviewee¹⁹, respected experience in public-private partnerships. This enabled mutual trust and relative ease of information-flow between the IPP office and private sector to test the bidding process before its implementation.²⁰

Moreover, the somewhat successful introduction of the RE I4P did not require, nor did it result in, a complete destabilisation of the regime incumbent. Instead, the RE I4P and the burgeoning renewables sector co-existed alongside the dominance of Eskom. Explaining the success of renewables in this period compared with prior efforts includes recognition of the readiness of the niche, developed in part under Refit, and the fact that the RE I4P was implemented in a highly transparent manner. This had the effect of undermining Eskom's resistance strategy by shifting some of the debate into the public domain, resonating with the Hacker et al. [36] notion that shifting contestation into the public arena enables the development of dissenting or alternative narratives. In other words, the electricity crisis and the RE I4P layering did precisely what drift actors were trying to avoid: contestation was now out in the open, resulting in the scrutiny of the incumbent's actions, along with increased availability of information through the transparent bidding process.

It can be argued that, in the context of a persistent electricity-supply crisis, the combination of institutional capacity in the IPP office and the rapid deployment of renewables led to steep reductions in their bid prices [71, 74, 75]. Up to 2015, South Africa had procured approximately 5 GW in four bidding windows across 77 renewable energy generation projects [76, 77]. Further, as Figure 8 shows, the bid prices reduced significantly in this period, especially for solar PV, becoming competitive with the new coal plants Medupi and Kusile.

¹⁹ Respondent K

²⁰ Respondent K

Figure 8: Average tariffs of PV and wind over time, compared with Medupi and Kusile

Source: DOE [77] and Steyn et al. [75]

5.4 2015-2018: Evolution of Eskom's resistance strategy

By 2015, the RE I4P had gained enough traction that Eskom began to accept the renewables niche as an inevitable reality. However, as we discuss in this sub-section, Eskom continued to pursue its resistance strategy and even to evolve it. It delayed the progress of the RE I4P by blocking power purchase agreements (PPAs), changing its grid-connection rules, and stimulating the support of influential trade unions to provoke sentiments around job losses from decommissioning coal plants. Moreover, there are claims that Eskom has become a tool for graft, in which procurement allocations are being redirected to benefit powerful elites [78, 79, 80]. This demonstrates the significance of Eskom amongst its organisational networks and prevailing discursive structures, which may have reasons to maintain the state-owned utility's dominant position.

Eskom regime-resistance strategy went further when, in 2015, it used its monopoly status to block the signing of PPAs with RE I4P developers [66]. It did so by preventing the developers from getting budget quotes, which had the effect of stalling the finalisation of PPAs. Without these further PPAs, the RE I4P was incomplete and, as an interviewee²¹ explained, this had created uncertainty around the programme. Here, we see Eskom's resistance strategy effected through delaying tactics and through information asymmetry, whereby others within the electricity system are prevented from scrutinising its data [81]. In addition, from July 2016 onwards, Eskom discontinued detailed weekly operational

²¹ Respondent H.

efficiency reports that included demand and capacity forecasts. Publishing these updates annually seems to have an effect of decreasing public transparency.²²

Later, Eskom's resistance strategy continued to advance, creating another barrier to the RE I4P by imposing additional grid-connection costs on RE developers. Essentially, the RE I4P developers are supposed to pay for 'shallow' costs of getting power to the substations, while Eskom is responsible for 'deep connections' that relate to the reinforcements needed to integrate new capacity into the existing grid [82]. As an interviewee²³ explained, an unfortunate design of the RE I4P is that the bidding system prioritises the allocation of RE I4P by price and not by substation capacity or location. The transmission grid originated from the coalfields in the Mpumalanga in South Africa's North East and expanded according to where the cities grew. However, the Northern Cape has the best solar radiation, located on the North-Western side, where the population is sparse, and thus grid transmission is lacking. As the RE I4P was implemented, the project developers had to bid within an available substation capacity. The policy objective was to obtain the cheapest megawatt possible, without long-term consideration for grid strengthening. After several years of the RE I4P, the substation availability for connection was quickly depleted. It can be argued that the DOE and NERSA had probably failed to anticipate the rapid implementation of the RE I4P, and therefore neglected the costs needed for Eskom to strengthen its grid. Eskom then exploited this flaw by imposing additional costs on RE I4P developers, which had the effect of further complicating the progress of the renewables programme.²⁴

Consequently, Eskom created unfavourable (to the niche) selection-environment conditions along the technology and infrastructure dimension, impeding the RE I4P from further development.²⁵ Altogether, as Eberhard [73] observes, "Eskom frustrates the entry of IPPs and private investment through the disingenuous use of facts, the political brinkmanship and what lawyers term malicious compliance, through the quiet subversion of government policy by actions such as delayed access or inflated grid-connection costs for IPPs."

Eskom continued to impede the progress of the RE I4P with a further evolution of its resistance strategy, this time by provoking opposition to renewables from the country's major trade unions – the National Union of Metalworkers of SA (NUMSA) and the National Union of Mineworkers (NUM). Eskom stated that to continue with the RE I4P, it needs to hasten the decommissioning of five older coal stations.²⁶ Consequently, the NUM countered with rolling mass action (such as nationwide strikes) to reverse the RE

²² Respondent E

²³ Respondent J

²⁴ Respondent D, J.

²⁵ Respondent K

²⁶ van Rensburg, D., 'New twist in IPP battle as Eskom may close stations early', fin24, 9 April 2017, <http://www.fin24.com/Economy/Eskom/new-twist-in-ipp-battle-as-eskom-may-close-stations-early-20170407> Accessed 15 February 2019

I4P because of the threat to coal jobs. As of January 2018, the RE I4P remained at an impasse, with Eskom repeatedly stating that the programme was unaffordable. In response, RE I4P developers initiated lawsuits forcing Eskom to conclude PPAs.²⁷

Eventually, after almost three years where the RE I4P remained stuck, in April 2018, the remaining bids were signed by a new DOE Minister, partly due to a broader change in national political leadership. This is evidence of the ‘makeshift’ governance we noted in Section 4, which is highly sensitive to the political weather and contributes to uncertain conditions in the electricity system. Consequently, with these erratic conditions, Eskom can respond to decisions that do not suit its interests either passively or more offensively using powerful allies. Moreover, with this ad hoc governance, it is unclear how the RE I4P proceeds, as progress is subject to ongoing decisions by government on Eskom’s future. For now, it is too early to ascertain if Eskom’s resistance strategy will continue to undermine the RE I4P or if there could be long-lasting changes through which Eskom’s dominance is eventually eroded.

6 Discussion

By examining struggles over rule-changes to a multi-dimensional selection environment, we were able to reveal the dynamic nature of regime-resistance and regime-niche interactions. Furthermore, in agreement with Streeck and Thelen [24], examining endogenous institutional change was useful for exposing the regime tensions that, in the case of South African electricity-supply, ultimately contributed to the crisis. In this way, we were able to discern the internal regime-resistance strategy, which would otherwise be overlooked from a traditional punctuated (exogenous) equilibrium point of view.

In our case study, Eskom sought to maintain its long-standing dominance primarily by using a strategy of resistance to rule-changes, attempting to achieve what endogenous institutional change theory calls drift. In this theory, drift – as ‘holding on to rules’ – is enabled when powerful actors can confine debate over rule-changes to hidden spaces, disabling public scrutiny and, in effect, disarticulating contesting narratives. Our adaptation of the drift concept involved translating it to the notion of a socio-political regime, which theorises debate to be conditioned by discursive structures comprised of prevailing ideologies and beliefs. In our rendering of the drift concept, we posited that a regime-incumbent is more likely to maintain existing discursive structures and so can set the terms of the debate.

The period up to 2009 in our case study supports the proposition that a resistance strategy is enabled when a powerful actor can confine debate over rule-changes to hidden spaces and has a dominating influence over the terms of debate. During this period, Eskom kept the deliberation about electricity-market reforms out of the public gaze, aided by those

²⁷ Coen, M. and Bruckhardt, P., ‘Eskom threatens fastest renewable expansion’, Mail & Guardian, 6 December 2016, <https://mg.co.za/article/2016-12-06-eskom-threatens-fastest-renewable-expansion> Accessed 1 February 2018

users closely connected to it within its organisational networks, especially those aligned with the MEC, such as the EIUG. As for setting the terms of debate, Eskom employed several tactics to maintain dominance over discursive structures including downplaying fears about the anticipated electricity-supply deficit and exploiting both information asymmetry and the ‘multiple parents’ arrangement of the governance institutions. We also see the resistance strategy having material consequences in Eskom's inaction over PPAs and the eventual suspension of market reforms. However, our theoretical propositions were not so clearly supported in the case from 2009. Here, we see Eskom was still able to effect a resistance strategy even though the debate shifted into public contestation, as the renewables niche made significant material gains.

Reconciling the apparent anomaly between our theoretical propositions for drift and the observed outcomes requires considering what is revealed by the attempts to layer-on renewables-supportive institutions. We conceived layering to mean the addition of an institution that does not challenge, at first, the core rules of the regime. The first attempt at market reforms could be seen as a challenge to the regime incumbent's core rules, and therefore not a layering process, as the intention was to unbundle Eskom and stipulate the private sector produce 30% of electricity generation. What followed was a single buyer model, where Eskom retained its monopoly status, ensuring its continued dominance in the electricity market. Thus, the attempted introduction of Refit conforms more closely to a layering process in that it was not a direct and significant challenge to Eskom's core rules.

Nevertheless, it was unclear whether Eskom would fully support Refit or continue with its resistance strategy of delaying any PPAs needed for Refit's implementation. In the end, Refit's failure had less to do with Eskom than with battles between the electricity governance institutions – DOE, National Treasury and NERSA – and Refit's uncertain legality. However, the Refit episode did stimulate some important development of the renewables niche. It linked new actors – renewable energy project developers, lawyers and financial institutions – with the electricity regime's governance institutions. The consultations amongst these new actors and the governance institutions began the process of building trust and creating learning around what policy and regulatory frameworks would be needed to support renewables deployment. By engaging new actors who could now exert some influence over the regime's discursive structure, Refit began a process of changing the selection environment, even if only partially and incrementally, opening a space that the RE I4P was able to expand and exploit.

The eventual layering of the RE I4P was preceded by a process that included further consultations between the electricity governance institutions and actors in the renewables niche, which enabled the building of mutual trust and learning about the design, legal and technology issues relevant to the proposed bidding process, along with testing of the bidding process prior to its implementation. All this occurred in the context of a widening window of opportunity created by the electricity-supply crisis and steeply increasing electricity tariffs. Both these aspects of the window of opportunity were in effect attacks

on Eskom's core rules – in some ways, self-inflicted attacks, considering Eskom's resistance strategy and its intention to finance new coal plants through raised electricity tariffs. We see, then, new actors strengthening their relations with the regime's governance institutions and growing influence over its discursive structures resulting in the successful addition of a new rule that would enable significant gains for the renewables niche (for more see [83, 84, 85]). However, because of the prior gains under the failed Refit effort, the renewables niche was sufficiently developed to exploit the window of opportunity more effectively.

Although the RE I4P managed to stimulate the addition of significant renewables capacity to the electricity supply, Eskom returned to its resistance strategy of delaying the finalisation of PPAs, this time by exploiting its monopoly position when it withheld budget quotes. However, Eskom also evolved its resistance strategy by attempting to influence beliefs within the dominant discursive structure when it threatened the loss of jobs for coal workers because decreasing the contribution of coal-fired electricity generation would mean the closure of coal mines. Here, we see Eskom itself had moved contestation into the public arena, making use of its powerful position on four dimensions of the regime selection environment: organisational networks (mobilising key trades unions), discursive structures (information asymmetry, the job-losses narrative), markets, and public policies (delayed finalisation of PPAs). Moreover, the other element of its resistance strategy involved making use of the uncertainty over infrastructural rules, such as who is responsible for the costs of new substation capacity, to impose extra costs on RE I4P developers.

Taken together, we have revealed the dynamics of regime-resistance to niche-challenges as played out between the incumbent Eskom and renewables actors in the battle over rule-changes to South Africa's electricity supply system (see Table 3 for a summary). Not only does this help us understand how Eskom has sought to maintain its dominance and how renewables have been able to make some inroads to the regime, it also provides potential implications for policies aimed at sustainability transitions.

Table 3: A summary of the case study and the types of regime resistance and niche challenges over time

Case study period	Regime-resistance	Niche-challenges
1998-2006 Energy sector reforms	Eskom used its power over the regime's discursive structure to persuade decision makers to maintain the status quo.	Early stages of renewables development and therefore, had no appreciable niche at the time.
2007-2009 Major electricity crisis	Eskom blocked market reforms through delayed decisions in contracting IPP bidders.	Refit was initiated, catalysing learning processes associated with the design, technical, legal and regulatory framework needed for promoting renewable energy in South Africa.
2009-2015 Layering of the RE I4P	Eskom tried to keep electricity-sector debates hidden from public scrutiny by making use of its organisational networks and capacity.	The RE I4P was implemented in a transparent manner, shifting debate into the public domain. This influenced the regime's discursive structure, changing the terms of debate by introducing new facts and gaining public support.
2015-2018 Evolution of Eskom's resistance strategy	Eskom moved debate into the public domain, provoking key trades unions in its organisational networks to engage in industrial action by promoting a job-losses narrative. It also delayed finalisation of PPAs and changed the grid rules to impose extra costs on niche actors.	Niche actors engaged in policy debates and through that started to strengthened their relations with the regime's governance institutions and growing influence over its discursive structures.

Policymakers could, for example, use the approach to characterise the power of specific incumbents to resist transitions and then use this characterisation to construct strategies for eroding this power in favour of more sustainable regimes. With reference to the selection environment dimensions, an effective destabilisation process could entail the following: (1) in the market, reducing the support for the incumbent technology (for example a final clarity on Eskom's unbundling as it may remove monopolist interest that is hostile to IPPs); (2) disrupting organisational networks and capacity by promoting more inclusive participation of niche actors in policy debates, and establishing organisations that favour new entrants with systemic linkages into formal governance structures; (3) developing alternative discursive structures by creating conditions that interrogate dominant narratives, working in spaces that are transparent (e.g. opening up debates to more public scrutiny and divergent interests); (4) ensuring public policies create regulatory pressure to, for example, reduce greenhouse gases; and (5) adapting technology and infrastructure rules to favour modular generation with flexible demand and distributed energy networks. Working across all these dimensions together would then be a systematic and targeted process towards regime destabilisation along with the promotion of more sustainable niches.

7 Conclusion

In this paper, we have analysed how the dominant incumbent in South Africa's electricity system, Eskom, tried to resist changes to the system's institutional arrangements that would promote renewable energy-based generation and therefore be detrimental to its coal-based interests. Drawing on the modes drift and layering from institutional change theory, we operationalised the concept of the socio-technical regime selection environment in specific ways that could be analysed as a battleground over rule-changes.

We found that, over the period 1998 to 2018, Eskom evolved its resistance strategy in response to variously successful challenges employed by actors in the renewables niche. Eskom's resistance strategy began simply with a refusal to implement electricity market reforms that would have eroded its market dominance. However, as renewables began to achieve incremental gains from layering-on rule-additions to the existing institutions, Eskom evolved its resistance strategy by acting across more of the selection environment's dimensions. Eventually, Eskom's strategy involved attempts to publicly-contest the rise of renewables, which included exploiting information asymmetries to influence public discourse and provoking mining unions to engage in industrial action. However, the move to publicly-contest renewables opened Eskom to closer scrutiny, with opportunities for the renewables niche to influence the discursive structure of the selection environment and the eventual addition of the Renewable Energy Independent Power Producer's Procurement Programme, which has enabled an increase in renewables generating capacity of 3.6 GW [19].

The case study shows that regime-resistance can be characterised as the incumbent actively maintaining the selection environment in response to attempts on the part of the niche-challenger to transform it. These findings have potential policy implications where

specific dimensions of the selection environment that enable or enhance regime-resistance can be identified. In doing so, counter-strategies can be developed that achieve some degree of regime destabilisation and thereby open a window of opportunity for a more sustainable niche to exploit. We note, in particular, the significance of influencing the selection environment's discursive structure where, in the case study, we saw how the niche was able to change the terms of debate, exacerbate regime tensions and gain public support. These insights emerge from only a single case study and so further research, making use of the multi-dimensional selection environment concept and analysing regime-resistance and niche-challenges, would be helpful for seeing the extent to which similar dynamics play out elsewhere and in other kinds of regimes. Such research could take a systematic approach to examine battles over rule-changes, building case studies that compare different types of institutional change that hollow out the regime, with potential to lead to a genuine sustainability transition.

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